INTRODUCTION

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Editor

The construction industry is often referred to – particularly from a green building perspective – as the 40 per cent industry as it generally known to consume 40 per cent of all energy generated globally to operate and maintain buildings; use 40 per cent of all water globally for sanitation and other uses in buildings; and consume 40 per cent of all resources globally.

On the other hand, buildings are essential vehicles for meeting the needs and aspirations of humanity. They create the enabling environments in which we live and from which we operate. Increasingly these enabling environments are located in urban environments, creating new pressures on both humanity and the planet.

Thus a crucial – if not *the* crucial – challenge facing this century is how this contest between the consumption of natural resources and the enlargement of the built environment can be managed in a manner that is restorative and transformative of both.

One of the solutions posited is to construct this 'built' environment using "green" building methodologies: these are generally defined as construction practices and processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from site planning to design, construction, operation, maintenance, refurbishment, and eventual deconstruction.

Thus the common objective is that green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environmental degradation[1]

However, many argue that this is inadequate in terms of the generally agreed definition of sustainable development as articulated in the Brundtland Report (1987), that is development that:

- Meets the needs of people, especially the poor
- Is transformative
- Is restorative
- Recognises the limitations imposed by the state of technology and society
- Is equitable

Fortunately the Geneva-based International Standards Organisation (ISO) has, with ISO 15392:2008, established internationally recognized principles for sustainability in building construction. The new standard applies the concept of 'cradle to grave' sustainable development to buildings and other structures, individually and collectively, encompassing construction materials, products, services and processes.

The building and construction sector is a key sector in national economies and the built environment is a major element in determining quality of life, as well as contributing to cultural identity and heritage. Since construction works absorb considerable resources over their life cycle, ISO emphasizes the significant economic influence and environmental impact they wield. Moreover, building and construction

[1] U.S. Environmental Protection Agency. (October 28, 2009). Green Building Basic Information. Retrieved December 10, 2009, from http://www.epa.gov/greenbuilding/pubs

constitutes a key sector in national economies, and the built environment is a major determinant in quality of life. ISO 15392 thus provides a common basis for communication among builders and architects, product manufacturers and designers, building owners, policy makers and regulators, housing authorities, and consumers to achieve the common goal of sustainable building.

Fundamentals elaborated in ISO 15392:2008, Sustainability in Building Construction - General Principles, form the basis for a suite of standards promoting sustainable construction via multiple avenues. The standard interprets sustainability as comprising three primary aspects — economic, environmental, and social aspects — while addressing technical and functional performance requirements. Accordingly, ISO 15392 reflects the tenet that meeting the challenge of sustainable construction worldwide necessarily entails strategies dictated by local conditions, including priorities and needs in the social environment, e.g., poverty reduction and job creation, particularly in developing countries.

The principles elaborated in ISO 15392 take into account that while the challenge of sustainable development is global, the strategies for addressing sustainability in building construction are essentially local and differ in context and content from region to region.

The standard thus acknowledges that these strategies will reflect the context, the preconditions and the priorities and needs, not only in the built environment, but also in the social environment. This social environment includes social equity, culture, traditions, heritage, health and comfort, social infrastructure and safe and healthy environments.

Using this standard as a point of departure, Smart-ECO, an EU funded programme focusing on the uptake of innovations that enable the building and construction sector to meet the requirements of Sustainable Development, has produced a Smart-ECO Vision to define what sustainable buildings are. The result is a definition of sustainable building that is consensus-based and founded on sound scientific principles.

In terms of this vision, Smart Sustainable Eco Buildings[2] need to address the following key considerations:

1. Apply the general principles of sustainability [ISO 15392:2008]: these are: Continual improvement, Equity, Global thinking and Local action, Holistic approach, Involvement of interested parties, Long-term consideration, Precaution and risk, Responsibility, Transparency.
2. Result form the involvement of all interested parties and be designed to meet its occupants' needs individually and collectively. The occupants' needs must be consistent with collective social ones.
3. Be completely integrated into the relevant local building, town-planning or environmental-planning schemes and infrastructure.
4. Be designed or refurbished from a Life Cycle perspective covering planning, design, construction, operation and maintenance, renovation and end of life. Evaluation of performance at each phase includes taking into consideration all other phases.
5. Have its environmental impact minimised over the estimated or remaining service life. This acknowledges regional and global requirements, resource consumption (energy, material and water) and waste and emissions (to air, water and soil) reduction.

[2] CIB News Article, Smart-ECO, November 2009

6. Deliver economic value over time. To assess economic value over time requires a life cycle cost approach, taking into account future costs of operation, maintenance, refurbishment and disposal.
7. Provide social and cultural value over time and for all. A Smart Sustainable Ecobuilding (SSE) must provide a sense of place for its occupants (permanent or occasional), and be seen as a means of improving their work status. A SSE building should relate to the local environment and wider regional culture. Moreover, a SSE building is one of the key points for social affordability.
8. Be healthy, comfortable, safe and accessible for all. Health criteria include indoor air quality and comfort criteria (acoustic, thermal, visual, and olfactory comfort). Full access allows everyone to use the facilities of the building. A SSE building must allow safe working conditions to the workers during its construction and service life.
9. Be designed to be user-friendly, simple and cost effective in operation, with measurable technical and environmental performance over time.
10. Be designed or refurbished to be adaptable throughout the service life, with an end-of-life strategy. The building must allow adaptation to changing performance and functional requirements, in accordance with new environmental constraints, and taking into account particular regional requirements.

The significance of this vision cannot be overstated: sustainability and green building are terms that are too often misunderstood and abused, often addressing only the 'low-hanging fruit' as a means of gaining 'green' credentials. This authoritative definition of what "sustainable building" actually means should help to reduce ambiguity and uncertainty and assist in the formulation of policies and strategies that will deliver on the promise of sustainable development to the benefit of all.

It is with this in mind that the content of this Volume 2 of the Green Building Handbook has been constructed. Recognising the specific environmental challenges facing South Africa, mindful of the Government's commitment to reducing South Africa's Greenhouse gas emissions, and acknowledging the need to build social cohesion, this Handbook offers practical strategies for policy-makers, designers, contractors, and end-users aiming at delivering SSE buildings.