Energy Efficient Buildings in South Africa

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Although South Africa does not have mandatory targets on green-house gas emissions under the Kyoto Protocol [1] there is concerted effort by the South African government to play its part and meet the country's obligations to the international community in the climate change arena.[2]

The latest manifestation of this is that as of May 2012 all new buildings and extensions have to comply with the energy usage in buildings provisions in the amended the National Building Regulations ("**the Regulations"**).[3] These amendments introduce requirements for energy usage in buildings by setting minimum standards for energy efficiency with which all new buildings and extensions in South Africa are required to comply.

These regulations have been driven by the national Department of Trade and Industry ("**DTI**") with a view to reducing the country's current energy consumption levels by changing energy usage patterns to achieve greater energy efficiency. This is critical given the state of energy generation in South Africa and the heavy reliance on coal to generate energy.

Because buildings are big users of energy one of the best ways to save energy is to build buildings that are more energy-efficient, better insulated, less vulnerable to air leaks through poorly sealed windows, doors and ceilings, and therefore less reliant on electrical energy for heating and cooling. This is the aim of the regulations.

These regulations have transformed the South African built environment landscape in seeking to align South Africa with countries that have longstanding building energy usage legislation. They do however place new and stringent requirements with which building developers need to familiarise themselves and comply with.

The requirements for energy usage in buildings

The Regulations require that in order to reduce greenhouse gas buildings, new buildings and extensions be designed and constructed such that they are capable of using energy efficiently without compromising user needs.[4] They also require that at least 50% of the annual domestic hot water requirement of a building must be provided by sustainable energy efficient means instead of traditional electrical resistance (element) heating.[5]

These requirements reflect a concern and a wish to achieve environmental standards required in schemes such as the Global Reporting Initiative. For the building developer, it

[1] http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php accessed 9 July 2012.
[2] One of the National Climate Change Response Objectives contained in the *National Climate Change Response White Paper*, published in *Government Gazette* 34695 of 19 October 2011, is to make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a time frame that is compatible with sustainable development.
[3] Made in terms of the *National Building Regulations and Building Standards Act 103 of 1977*, published in *Government Gazette* 34586 of 9 September 2011.
[4] Regulation XA1.
[5] Regulation XA2

means that energy efficiency considerations have to inform a building from the design stage right through to its completion.

Using energy efficiently

There are three ways in which new buildings can satisfy and ensure compliance with requirement to use energy efficiently.

Firstly, the requirements of Regulation XA1 are deemed to be satisfied if new buildings and extensions of buildings are designed and constructed in accordance with SANS 10400 Part XA - Energy Usage in Buildings ("**SANS 10400 - XA**"), in terms of Regulation XA3. This standard is similar to ASHRAE 90.1[6], but is informed by and aimed at achieving the energy efficiency targets set in the national Energy Efficiency Strategy.[7]

This provision incorporates SANS 10400- XA into South African building law and establishes it as the benchmark for the environmental sustainability of buildings.

SANS 10400 - XA is extensive and encompasses, among other issues, energy usage and building envelope, R-values, design assumptions, requirements for floors, walls, fenestration and advanced window systems , roofing and mandatory ceiling insulation.

The standard addresses the design elements of a building by looking at the orientation of the building and the use of natural light and insulation. These measures allow for buildings to be kept cool in summer and warm in winter naturally which will reduce the amount of energy that will be consumed for heating and cooling of buildings.

There are a number of references to an earlier standard - SANS 204 – Energy Efficiency in Buildings ("**SANS 204**") – contained in SANS 10400 in establishing many of its requirements. This therefore makes SANS 204 indispensable for proper compliance with the regulations and also now part of South African building legislation.

Secondly, a building can be designed and constructed in accordance with a rational design by a competent person, usually an engineer, which demonstrates that the energy usage of the building is equal to or better than that which would have been achieved by compliance with SANS 10400 - XA.

Thirdly, a building can meet the regulation requirements by being designed and constructed to have a theoretical energy usage performance less than or equal to that of a reference building in accordance with SANS 10400 - XA. This performance must be determined by using certified thermal calculation software.

[6] American Society of Heating, Refrigerating and Air Conditioning Engineers ("**ASHRAE**"). *Standard 90.1* is the energy standard for buildings.

[7] Department of Minerals and Energy. 2005*. Energy Efficiency Strategy for the Republic of South Africa.* SANS 10400 and 204 follow the Australian performance system, and are designed with the aim of achieving the 10 percent target set in the Energy Efficiency Strategy. A shift in the targets will mean adjustments to these standards.

The implications for building developers

Although this move by the DTI has been largely applauded [8] as a significant and positive step, it has serious implications for building developers.

There is a lot of effort that will be required to understanding and getting to grips with the new requirements from developers, engineers, architects and other role players. Compliance will mean additional cost which will result in increased building costs. While non compliance poses the risk of penalties under the National Building Regulations and Building Standards Act. [9]

Further, it is expected that the standards will become more stringent in the future once the initial introductory phase has stabilised. Likely and immediate next-steps might include the extension of these standards to existing buildings which are not yet covered by the Regulations and the increasing of the values as some have been set very low compared to other countries.

Building developers need to take cognisance of all these factors when making decisions about building development.

[8] Examples include the Green Building Council of South Africa (GBCSA) and the Sustainable Energy Society of Southern Africa (SESSA).

[9] A person who erects any building without prior approval shall be guilty of an offence and liable on conviction to a fine not exceeding ZAR100 for each day on which they were so engaged in terms of section 4(4) of the NBRSA. Section 24 provides that if a person fails to comply with the provisions of the NBRSA, where not penalties have been stipulated, that person may be may be convicted of an offence and liable to fine not exceeding ZAR100 000 or to imprisonment not exceeding 12 months. Furthermore, section 21 permits the local authority to apply to the magistrate's court for an order prohibiting a person from commencing or proceeding with erection of any building or an order authorizing the local authority to demolish the building if the magistrate is satisfied that the erection is contrary to or does not comply with the provisions of the NBRSA.