

Promoting Sustainability by Building Responsibly and Efficiently

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Abstract

One of the remarkable provisions in the building codes is that it shifts responsibility of ensuring that compliance with energy efficiency requirements to the owners. Pursuant to this, the owner has to enlist the services of a competent person who will certify that the building complies in to-to the standard prescribed in the codes. This article examines the importance of the requirements for the standard of energy efficiency aspects of the codes and the policy on energy efficiency. It explains that these interventions are germane because of their tendencies to reduce emissions in the building, control the temperature in the building and make the building more sustainable for the comfort of the users and the environment.

Keywords: Building codes, Compliance, Energy Efficiency, Sustainable building, Emissions reduction.

1. Introduction

South Africa is considered the highest emitter of greenhouse gas on the African continent. This is due to its burning of coal-fossil fuel (Karrappan, 2012.) to power its energy needs. The country although not compelled under the Kyoto Protocol to reduce emissions, is however acting responsibly and voluntarily to ensure that it contain and curtail its emissions (Leiserowitz, 2007). Crongie (2014) of the advocates for energy efficiency in buildings writes "energy efficiency in buildings, up to recently, has been a matter of choice. Having an energy efficient building is now, however, no longer just the preserve of those wanting to do the right thing – what was a voluntary standard was written into law in Sept 2011 and was implemented and has become applicable as of 11 Nov 2011. These are the new SANS 10400-XA: Energy Usage in Buildings, and SANS 204: Energy Efficiency in buildings" (Crongie, 2014).

According to Matlou (2011) "as part of strategy to make energy efficient in South Africa, energy use in buildings has now become one of the priorities for the government, stakeholders and role players. The introduction of the South African Bureau of Standards (SANS) 204 standards for energy efficiency in buildings has brought a remarkable approach to environmental sustainability. Importantly, SANS 204 prescribes enforceable code for energy efficiency in order to limit energy consumption and to ensure the buildings does not run out of base electricity-generating capacity" (Mota D 2011).

One of the strategic interventions put in place is to ensure that the country becomes energy efficient in all its energy usage whether for home or commercial purpose (Haines et al. 2007). Considering that most of the emissions of noxious gases causing harm to the environment and people are from buildings, this paper looks at energy efficiency and other sources of renewable energies as viable and sustainable alternatives to energy from fossil fuels (Omer, 2011). To this end, the aim of the energy efficiency regulations is to intervene for purposes of sustainable development which will have a noticeable impact on the environment. It is against the backdrop of this, that the South African Standard for energy efficiency during construction of buildings and in buildings (Laustsen, 2008) was approved by the National Committee StanSA SC 5120.61K, in accordance with procedures of Standards South Africa, in compliance with annex 3 of the WTO/TBT agreement. In 2010, the Department of Energy in South Africa also introduced a Policy to support the Energy Efficiency and Demand Side Management Program for the Electricity Sector through the Standard Offer Incentive Scheme (EEDSMP, 2010). These regulations and other regulations aim at ensuring that energy is used efficiently and not wasted, greenhouse gas emissions are curtailed, energy is saved and the country becomes less susceptible and vulnerable to the impact of global climate change. The overall objectives of the Building Standard are succinctly put thus "this intention of this Standard is to provide a National Mode of Acceptable Practice for Cost, Energy and Environmentally Effective Building Design, Construction, Operation and Maintenance, Products, Systems and Professional Services be developed according to the targets outlined in the National Energy Efficiency Strategy for South Africa set by South African Department of Minerals and Energy" (SANS 204-1:2007).

2. Motivation for Energy Efficiency in Buildings

Everybody needs to be motivated to act responsibly by using energy efficiently and sustainably (Pitt et al. 2009) base on the reasons aptly articulated by the Building Standards thus "the consumption of finite resources should be reduced in order to ensure a transition to renewable resources, CO₂ and other pollutants need to be reduced substantially, Running costs of buildings must be controlled, The structure of buildings should be protected and preserved, value is added through energy efficiency measures, comfort can be enhanced, productivity and competitiveness can be improved, sustainable jobs are created while the existing infrastructure is retained." Enormous energy is consumed through electricity and electrification of a building (Jacobson and Delucchi, 2009). Undoubtedly, a lot of the electrical appliances in buildings use energy and in order to sustain the level and momentum, supply is increased (Masters, 2013). If the energy is from fossil fuels, it automatically means that there will be increase in emissions. This is inefficient and unsustainable. It is also against the backdrop of this that the Department of Energy South Africa Policy support the Energy Efficiency and Demand Side Management Program for the Electricity Sector through the Standard Offer Incentive Scheme 20 May 2010. The EEDSM, 2010 indicate that "South Africa's electricity demand rises, we have traditionally met this demand by merely increasing the supply. Having recognised that energy efficiency represents an economically attractive option, this policy focuses on the management of the electricity demand through energy efficiency interventions within the residential, commercial and industrial sectors." Amongst the outcomes to be achieved through the EEDSM policies are:

- 1) Quick power system relief;
- 2) Relative cost effectiveness;
- 3) Quick deployment of interventions across the residential, commercial and industrial sectors to create SMME opportunities and quality employment;
- 4) Mitigation of greenhouse gas emissions and the resultant climate change impacts;
- 5) Participants will realise relief from their energy bills" (DEEDSM 2010).

Furthermore, the motivation becomes more pressing in view of the fact that "in 2010, energy services delivered in residential and commercial buildings accounted for about one third of worldwide final energy demand... and carbon dioxide (CO₂) emissions" (Amecke et al. 2013).

Inaction will compound and complicate the problems, to some extent; the world has been experiencing different manifestations of the impacts of the bizarre weather events in all nooks and corners of the world. This is the reason why proactive actions are needed to contain and curtail climate surges (Karassin, 2009). By introducing regulations that compel energy efficiency in buildings, South Africa is acting responsibly and promoting sustainable construction and buildings (Hill et al. 2002).

With regard to an acceptable standard, the code is explicit and categorically mandates the "integrated planning and design of energy usage in buildings, which is a fundamental aspect for sustainable building construction. This standard is intended to enable designers to design buildings, constructors to construct and commission buildings and their sub-systems, owners to operate and manage their buildings in an energy efficient manner."

By regulating energy usage in buildings, energy wastes will be prevented, the environment will be benign and noxious emissions will be curtailed, there will be energy cost efficiency and sustainability and occupants' health and safety will be ensured. (Landman, 1999).

Energy efficiency regulations need to be embraced by all because they encourage the use of less energy to provide the same service (Herring and Roy, 2007). According to Motau (2011), "it is clear that energy efficiency does not mean simply moving the lights around in your office, but includes everything that involves the use of energy, such as electricity." It is therefore necessary that the regulations focus primarily on energy waste and how this waste can be removed entirely or substantially reduced. By reducing waste, energy efficiency will improve and ultimately reduce emissions. This will definitely have a significant impact on sustainable development and result to what Motau (2011), observed that "what you invest in environmentally sound energy practices today will pay itself back tomorrow."

3. Building Regulations and Compliance Enforcement

The overarching importance of the building regulations is that they are legal requirements regulating the energy performance of building designs and their compliance during construction until they are certified for occupation and usage (Meacham et al. 2005).

Therefore, building codes are legal regulations that will ensure that buildings are constructed sustainably to include all efficient devises from the beginning until the building is finalised for occupation and usage (Liu et al. 2010). It is

pertinent to stress that building regulations should continue to regulate a building in perpetuity until the life cycle of a building is completed (Kibert, 2012). This does not mean that regulatory compliance will stop as soon as a building is completed and certified from energy efficiency (Von-Witt, S 2011.). Monitoring and evaluation of a building for efficiency are part of the functions that the regulations are supposed to be in charge of mainly through oversight officials. Changes in technologies might mean changes to the existing energy efficiency devices in a building to meet contemporary time. At this stage, the regulation plays vital roles (Alanne and Saari, 2004).

In South Africa, economic growth, drive to reduce unemployment and poverty, provisions of social economic goods, services, amenities to the people especially energy for electrification to the historically deprived, denied and disadvantaged are some of the factors that are increasing the demand for modern energy services (Dimitrov, 2012). It is pertinent to point out that in a bid to provide these social amenities, huge pressure is mounted on the demand side of energy, making service providers to intensify efforts on more coal being fired to generate electricity to meet the demand. The implication of this is that more and more carbon is released to the atmosphere and causing global climate change. Undoubtedly, one of the ways to mitigate this is through the deployment of energy efficiency plans in buildings and houses. This is important to energy security and sustainable energy supply and demand. It has been identified by the intergovernmental Panel on Climate Change (IPCC) as having the greatest potential for cost-effective reduction of carbon emissions by 2030. To realise this, implementation and compliance enforcement are key, coupled with political wills of the government and adequate oversight, energy efficiency in buildings will be the order of the day as opposed to business as usual which is driven largely by corrupt practices and lack of adequate capacity to monitor and enforce, political intervention. All these vices are the major challenges to the realisation of the full potential of the codes and regulations. Pursuant to this, Liu et al. (2010) points out that "even in industrialised countries, enforcement remains uneven and inconsistent due to political and resource support. In developing countries, compliance enforcement of building energy efficiency codes is either seriously lacking or non-existent."

In the same vein, it has been reported that "the key challenges to improving compliance enforcement in developing countries include the level of government commitment to energy efficiency, the effectiveness of government oversight of the construction sector, the compliance capacity of domestic/local building supply chain, and the finance constraints." It was however indicated that these challenges are "surmountable in countries where economic growth is sustained and energy efficiency is pursued as a key element of national energy strategy" (Liu et al. 2010).

However, South Africa has been taking a responsible lead by ensuring that compliance enforcement is applied to buildings from the initial design stage until the final stage and thereafter (Hönke et al. 2008). The owners of a building is also considered as an active interested party in ensuring compliance and as such, the building code places responsibility on the shoulders of the owner, by categorically asserting that "responsibility for achieving compliance with the requirements of SANS 204 rests with the building owner. The competent person(s) shall provide a report to the building owner that indicates that the design, construction, inspection and commissioning work complies with SANS 204." In the same vein, the code also enlist the expertise of the competent person and mandates that "designers are encouraged to incorporate into their design all latest demand side management (DSM) programs available in order to reduce the building maximum demand and the electrical energy consumption" These interventions, coupled with effective monitoring, evaluation, assessment and certification which are implemented to the standards and letters will achieve environmental sustainability (Wafula, 2013).

What makes compliance enforcement possible is that adequate laws are put in place to regulate energy efficiency, otherwise there will not be any guidance for what is being, and not being regulated (Bell, 2004). It is against this backdrop that there have been various legal interventions regulating energy efficiency in buildings. Therefore, the enforcement of mandatory code in new construction and for altered portions of existing buildings is an effective and necessary government policy intervention to reduce energy waste during the life cycle of new buildings, (Kaputu, 2013). This can be achieved mainly through reduced demand for active energy use in devices that use energy in domestic and commercial buildings (Hinnells, 2008). Considering that in South Africa, "buildings account for 27% of electricity use and 12% of the final energy use. Improving the energy efficiency of buildings is very important to reducing greenhouse gas emissions, lowering energy costs and ensuring energy security" (Wafula, 2013). More importantly, the IPCC has recognised that as part of the climate change mitigation, buildings have the largest global mitigation potential in the period leading to 2030 (Levermore, 2008). And that this is achievable through cost-effective energy efficiency measures, through mature technologies for energy efficiency and climate change mitigation is also co-benefit (Johansson et al. 2012).

4. Conclusion

Regulatory frames works for building are potentially stronger for achieving success in energy efficiency buildings. The regulations do not only compel, but also provide ample guidelines to be followed in order to achieve the objective of energy efficiency in buildings. More importantly, energy is saved as a result of efficient interventions. These interventions will reduce pressure on the demand and supply sides of the conventional energy. Occupants of buildings will benefit more as a result of energy efficiency measures because it is cost effective, reduce waste and do not cause harm to the environment due to emissions. It is also a potential strategy for mitigation of climate change and promotes substantially sustainable livelihood and environment.

5. Recommendations

All building regulations and the standards prescribed need to be continuously updated to meet the changes in technological innovations for energy efficiency. The regulations and codes should be enforceable at all times without fear favour. This will be an effective way to ensure compliance and as such deliver more energy-efficiency buildings. Government interventions also need to be persistent because this will make energy efficiency a pillar of building construction. Political intervention should not be encouraged in regards to compliance enforcement.

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