energy

Department:
Energy
REPUBLIC OF SOUTH AFRICA

Roadmap Towards

Improved Energy Efficiency & Deployment of Renewable Energy Technologies in Public Buildings

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1. Introduction

Energy Efficiency is recognised as one of the most cost effective ways of meeting the demands of energy security, and shifting towards a low-carbon development. In order to create a "pro-energy efficient" environment, the NEES enhances energy efficiency through enabling instruments and interventions including economic and legislative means, establishing implementation instruments, setting energy efficiency targets and establishing an energy efficiency monitoring system.

In accordance with the 2005 NEES, national energy efficiency improvement target of 12% reduction in energy intensity was agreed to be achieved by 2015. This overall national target is divided into sub-targets for each sector, including the public and commercial building sector of 15%. In order to track the achievements of the national and sub-sector targets and monitor changes in energy efficiency trends across the four primary sectors (namely industry & mining, residential, public and commercial buildings and transport), the Energy Efficiency Target Monitoring System, being developed, through the financial and technical support from the Swiss Agency for Development and Cooperation (SDC). However, it should also be noted that the energy efficiency in public building programme is a sub-set of the Department of Public Works' 2011 Green Building Framework.

It is therefore fitting that the roadmap for the energy efficiency in public buildings also consolidates ideas that are necessary for the growth of a green economy, emergence of a sophisticated and clean built environment, and the realisation of better life for the people of South Africa.

Given the broad-based nature of socio-economic areas affected by Green Building, it is the view of Government departments involved in the energy efficiency programme that, whilst the Department of Energy and Department of Public Works would lead the process of implementation, other Departments and State Owned Companies should be afforded an opportunity to make representations on both technical and strategic aspects of the programme in order to establish a broader understanding, sustain and continuously improve energy efficiency within the public building sector.

The content and propositions contained herein have been incorporated mindful of the fact that this Roadmap towards improved energy efficiency in the public sector would manifest through various sub-project activities addressing the building envelope in totality.

In dealing with these components this paper thus covers the following areas:

- A policy and regulatory framework for the introduction of energy performance certificates and smart metering technology in public buildings;
- Introduction of energy performance certification in public buildings as a rating tool for energy management;
- Determination of energy consumption baselines through energy audits and measurement of actual electricity consumption using smart meters;
- Adoption of energy efficient and clean energy technologies in order to reduce energy consumption and improve energy efficiency of public buildings; and
- Introduction of energy efficiency monitoring system in the public building sector.

This document provides an indication of the process and activities to be implemented in achieving energy efficiency improvements in public buildings.

2. Proposed Energy Efficiency and Renewable Energy Measures in public buildings

As part of involving government departments in the Energy Efficiency Leadership Network, which was established by the Minister of Energy with Industry Stakeholders in December 2011, standardized energy management plans are to be developed to commit government departments in collaboration with the Department of Public Works to work towards meeting the energy savings target laid down in the National Energy Efficiency Strategy.

The proposed energy efficiency in public building programme is also included as component of the 2011 Green Building Policy Framework, and to give effect to this commitment the Energy Efficiency Policy Framework for the public building sector will be developed, and will requires each government department to implement energy management measures, keep their own inventory of electrical appliances, determine their own energy consumption baseline, and develop their own Energy Management Plans for consolidation by the Department of Public Works, and then submit to the Department of Energy for monitoring and evaluation. In addition, the Department of Public Works would be responsible for reporting on progress towards meeting the public buildings' energy efficiency targets on an annually basis.

The proposed energy management will also involve behavioural change, which is arguably the most cost-effective energy efficiency intervention possible for the public building sector. Some of the measures will be switch-

off energy equipments when not in use (including lights, computers, printers, air-conditioners, and hot water heating systems.

For its part, the Department of Energy would develop guidelines for the introduction of the energy management plans, and provide technical support on the development of monitoring tools for public building's energy managers.

The proposed elements of the energy management interventions will include the following:

2.1. Development of a Policy Framework and System to Introduce Energy Performance Certificates in Public Buildings

The development of *Energy Performance Certification for Buildings* in South Africa will be in line with Green Building Framework, and International Best Practice using applicable South African National Standard (SANS). The sub-activities for the introduction of energy performance Certificates (EPCs) will include the following:

- Development of a policy and regulatory framework for the introduction of energy performance certificating in buildings. The framework will be used as directive to all government owned or occupied buildings to develop and implement energy management plans, and display their own EPC indicating the energy consumption level of their occupied buildings.
- Development of a standard in accordance with international standards, and translated to a South African National Standard (SANS) once approved by the South African Bureau of Standards (SABS). The energy performance in buildings refers to the energy consumption of the whole building, measured and assessed in kWh per square metre (m^2) of nett floor area, and will include all common areas, tenanted space and any

other elements that are contained by the building. The net energy consumption shall include the amount of all energy carriers, and shall be assessed as accurately as reasonably practicable, from recorded data, energy bills, or measurements.

- Accreditation process by the South African National Accreditation System (SANAS) for Independent Bodies to issue EPCs.
- Energy surveys, data collection and analysis, as per the EPC standard for compilation and issuing of Energy Performance Certificates.

2.2. Determination of energy consumption baselines through energy audits, and measurement of actual energy consumption using smart meters

The Department of Energy in collaboration with the Department of Public Works has collected energy data in 40 public buildings as part of the development pilot phase of the Energy Efficiency Monitoring System. However, the findings of this pilot indicated a need to install energy smart meters to measure and collect electricity consumption data, and also to conduct a detail audit that will provide data and information of building occupancy, net square meters of buildings, electrical appliances used, and potential energy efficiency and renewable energy measures that can be introduced to reduce the energy consumptions.

The second phase of the Pilot Project on Energy Audits and Measurement of Electricty Consumption will cover about 200 public buildings of the 1000 buildings targeted for the next three years. The activities that will be executed in this process will include, among others, the following:

- Procurement and installation of 200 smart meters in public buildings in various DPW regions. This process will include the actual measurement of electricity consumption parallel to the currently installed municipal electricity meters. The data collection sheets/questionnaires have been finalized and agreed for the pilot phase of the data collection.
- Mapping of public buildings using the geographic information system software and GPS coordinates.
- Detail energy audits in 200 buildings to collect data and information that will include square meters, electrical appliances used, number of lights, HVAC system, etc.
- Capacity assessment and building of facility managers, government staff members of the Departments of Energy and Public Works on energy management, monitoring and energy performance certification in public buildings.
- Development of an energy efficiency monitoring system to capture and monitor trends in energy efficiency improvement.

2.3. Development and implementation energy efficiency and renewable energy measures in public buildings

The Departments of Energy and Public Works are in a process of identifying corrective pilot projects to better the condition of existing buildings in line with the objectives of the energy efficiency component of the Green Building Framework. In order to enable DoE to establish a clearer picture of the environmental effects of its property portfolio, a parallel energy baseline study will be undertaken around a targeted and prioritised portfolio. In supporting this baseline study, already an energy efficiency target monitoring system is being developed, and this will also consider issues of

Measurement and Verification (M&V) using the South African National Standard (SANS) 50010.

This project will also include elements of Energy Efficiency, and Renewable Energy. The elements of energy efficiency in public buildings will be a combination of various measures and policy instruments, including replacement of inefficient with energy efficient technologies (namely, lighting, HVAC system, hot water heating systems), energy efficiency awareness and education, introduction of Energy Performance Certification of Buildings as a key policy instrument for reducing the energy consumption. Energy Performance Certificates provide a means of rating individual buildings – whether they are residential, commercial or public, and on how efficient (or inefficient) the buildings are with respect to the energy required to provide users with energy needs. However, the development of these energy performance certification schemes involves a diverse institutional framework; validated assessment procedures, qualifications accreditation authority for the assessors, certification accreditation authorities, etc.

The Renewable Energy measures will include ....(Noma to populate)

2.4. Capacity Building and Training on Energy Management, Monitoring and Performance Management

This will include establishing capacity within industry and Government on energy management, monitoring and reporting. The plan is to conduct seminars and formal training on energy management and monitoring for facility Mangers and government officials within the Departments of Energy and Public Works. The industry capacity building and training programme will cover aspect of certification on energy auditing, measurement and verification of energy savings and energy management in collaboration with academic institutions. The certification of competent individuals will support

the accreditation process of Bodies/Institutions within the South African National Accreditation System (SANAS).

3. Proposed Project Plan (see annexure)