

Energy Poverty Alleviation	<ul style="list-style-type: none"> <li>alternatives in the marketplace;</li> <li>Lower energy costs for households by improving domestic energy efficiency.</li> </ul>
<b>Goal 4</b> Reduce local Pollution	<ul style="list-style-type: none"> <li>Atmospheric pollutant levels reduced by a reduction in fossil fuel combustion at power stations;</li> <li>Local atmospheric pollutant levels reduced by a reduction in fossil fuel combustion within industry and commerce;</li> <li>Transport-related atmospheric pollutant levels reduced by a reduction in combustion of petroleum products in motor vehicles.</li> </ul>
<b>Goal 5</b> Reduce CO <sub>2</sub> Emissions	<ul style="list-style-type: none"> <li>National CO<sub>2</sub> emissions reduced by improving energy efficiency across all economic sectors;</li> </ul>
<b>Goal 6</b> Improve Industrial Competitiveness	<ul style="list-style-type: none"> <li>improved industrial and commercial profitability by controlling and minimising energy overheads;</li> <li>Improved international acceptability of South African products by minimising the environmental impacts of their manufacture.</li> </ul>
<b>Goal 7</b> Increase Energy Security	<ul style="list-style-type: none"> <li>Increased national resilience against oil price fluctuations by reducing the country's dependence upon imported crude oil supplies;</li> <li>Increased resilience against internal supply disruptions by reducing load demands placed upon power distribution systems.</li> </ul>
<b>Goal 8</b> Defer Additional Generation Capacity	<ul style="list-style-type: none"> <li>Construction of additional power generation plant deferred as far as practicable by contributing towards Eskom's peak load reduction target.</li> </ul>

### 3.5 Monitoring and Measurement

The *White Paper on Energy Policy* states that:

*"Government will ensure that the necessary resources are made available to establish structures, systems and legislation to facilitate the specification, collection, storage, maintenance and supply of energy data, and energy-related data, according to the requirements of integrated energy planning and international standards."*

In this regard the recently promulgated Energy Act (2008) will be used to implement regulations on the management, measurement and reporting of energy efficiency.

In line with this legislation Government will be able to measure the effectiveness and efficiency of measures implemented and initiatives put in place for the promotion of energy efficiency, as prescribed by Energy Act, and must sustain this capacity.

There is a need to establish a system for continuous updating and registration of figures related to energy efficiency; in particular, indicators for efficiency measurement. A formalised system for collecting, managing data and calculating indicators is necessary for monitoring the implementation and success of activities initiated as part of the strategies for energy efficiency. It is DME's responsibility to establish such a monitoring and verification system and ensure that it is implemented. This is also a compliance measure that fulfils requirements by the Energy Act on the collection of energy information. The DME will take responsibility to ensure that progress towards targets is reviewed and monitored on a continual basis.

The success of such a system will inevitably depend upon using a multi-stakeholder approach, including consultation with representative bodies within each sector. The relevant players are outlined in Section 4.4. The DME has embarked upon a programme to develop detailed methodologies for the monitoring and tracking of sectoral targets. The monitoring plan will take into account all sectoral variables, which are likely to impinge upon the targets prescribed for each sector. Such variables will include factors such as *actual* economic and sectoral growth per sector, thereby enabling energy usage data to be normalised against representative data, which describe sectoral activity over time.

Independent external parties may be used to verify the Department's methodologies and findings.

## 4. Implementing Instruments

The Strategy makes use of a range of generic implementing instruments, which are applied as appropriate to meet specific needs within each Sector Programme. The relative maturity of the marketplace will determine which instrument is used where, and how. For example, where interventions are seen as novel and may require some development, the appropriate instruments may include trials and incentives. By contrast, where interventions are already somewhat developed awareness may be the driving need.

### 4.1 Support Mechanisms

The following paragraphs illustrate and describe the main supporting mechanisms and instruments used with each sectoral programme. Such mechanisms are intended to be independent of financial and policy instruments.

#### Efficiency Standards

Efficiency standards have been successfully applied overseas and have brought about significant improvements in efficiencies. South Africa has a well-developed system of standards and codes of practice that, in some cases, may be amended to include efficiency aspects without the need to establish completely new standards. The Energy Act (2008) gives the Minister of Minerals and Energy substantial authority to make standards compulsory.

*Mandatory energy efficiency standards will be an important and integral part of the Strategy.*

#### Appliance Labelling

Energy labelling of appliances is an internationally tried and tested tool to build awareness and raising capacity about energy consumption.

A number of studies, the latest completed as recently as 2003, have looked into the feasibility of introducing labelling for some household appliances in South Africa. Potential savings with labelling or higher efficiency standards are estimated at 3 PJ in 2012.

The adoption of European Union standards for labelling is considered, as this has already been tested and is widely approved. Furthermore, the success of the EU standards in conveying the message of efficiency to a diverse target-group, comprising a variety of cultural backgrounds, would be of particular benefit to South Africa.

In addition, energy efficiency labelling of motor vehicles has been introduced.

*Mandatory appliance labelling for household appliances forms an important element of the Strategy and will be promoted and implemented.*

#### Certification and Accreditation

The Strategy makes use of several instruments where inspectors or auditors will be expected to carry out certain technical functions, or studies. These functions will necessarily require a minimum level of technical competence on behalf of the party concerned. Examples include the certification of energy auditors for buildings, industrial

plant, and the accreditation of inspectors for Efficiency Standards. The outline requirements of relevant accreditation procedures will be specified by the DME, professional associations and the certification made by SABS.

*It is the intention of the Strategy to help develop such accreditation procedures and to enable appropriate certification to be awarded to the relevant aspirants.*

### **Education, Information and Awareness**

Information and generic awareness are key elements to achieve success in terms of changing South Africa into a more energy efficient society. Once laws and regulations are established, architects will need guidance (from standards, codes of practice, etc.) on how to design houses according to the new regulations, and plumbers should also have be informed about the need to insulate geysers and how to install solar water heaters.

Awareness-raising starts with pre-schooling education and runs through all learning fields into the adult education system, under the auspices of the National Qualification Framework (NQF) up to level 8. The DME will engage with the institutions responsible for education and support, and facilitate the inclusion of appropriate education on energy efficiency in the curriculum.

*The DME will strive to ensure that:*

- *Energy Efficiency is taught and examined at all levels in all appropriate subjects, in particular engineering and architecture;*
- *Energy Efficiency is a competence requirement under the National Qualifications Framework training programmes for skilled workers in the relevant construction and buildings services trades*

### **Research and Technology**

Technological options represent significant potential for energy efficiency improvements and, in many instances, are well researched and already developed. However, the majority of these technologies are not manufactured locally and require importation. The latter point will represent a challenge for the Government, particularly as the drive to promote energy efficiency gains momentum.

The South African National Energy Research Institute through the Energy Act (2008) will be funded to carry out a dedicated programme of research and development for energy efficiency and the Department of Science and Technology will also provide assistance in this regard.

*The Strategy will support appropriate research and the possible adaptation of internationally available technologies and processes.*

### **Regulation**

The increase in the unit price of energy, coupled with more awareness on energy savings potential, may result in significant success arising from both voluntary and mandatory measures and other non-legislative instruments. For this reason, regulatory means will be applied to achieve further improvements where necessary. Efficiency Standards will have limited impact unless made mandatory, and energy audits should be accompanied by an obligation to implement, for example, all no-cost recommendations identified. NERSA will contribute by implementing regulatory measures for guiding reporting and compliance.

## Energy Audits

Energy audits have internationally been used across all sectors to identify efficiency measures that can be implemented in a cost-effective manner. However, to be effective it has often required both the audits as well as the implementation of measures to be compulsory and to be paid for by the client. The Department of Trade and Industry in cooperation with the Department of Minerals and Energy and UNIDO has commenced with a project to ensure training and energy audits in the industrial sector.

*The Strategy will promote energy audits as a means of improving efficiency. Studies will be undertaken to design ways in which audits will achieve the greatest impact.*

## Energy Management Systems

Energy management enables the formalisation of monitoring, evaluating and targeting energy consumption as well as providing sector-specific benchmarking information. Within industrial and commercial applications, the concept of energy management must also embody other key areas, including Training, Motivation and Awareness, Green Accounts (where companies audit the environmental performance of their operation, as well as its economic performance), Energy Policy and formalised Monitoring and Targeting (M&T). The importance of effective M&T cannot be over-emphasised, as it provides the yardstick against which savings are targeted and improvements are measured. Without the key information that M&T provides, attempts to save energy within an organisation can be frustrating, futile and de-motivating.

The implementation plan for the industrial sector will execute a special project designed to develop a monitoring and targeting system in collaboration with the database function at the DME.

*The Strategy will support the proliferation of energy management and the establishment of necessary information, including the introduction of Monitoring and Targeting and "Green Accounts".*

## 4.2 Policy, Mandate and Governance

The mandate to govern and undertake energy efficiency initiatives is derived from the following documents:

- The Energy Act of 2008
- The South African Constitution;
- The White Paper on Energy Policy, 1998;
- The Municipal Systems Act No. 32 of 2000;
- The Electricity Act No. 41 of 1987 (as amended);
- The Standards Act;
- The Electricity Regulation Act

The DME will prepare appropriate legislation and regulations for the Governance and Implementation of this Energy Efficiency Strategy. The regulations will take into account the capacity of the Government to enforce implementation.

The mandate given by the Energy Act and the *White Paper on Energy Policy* says that the DME should promote Energy Efficiency through various means as well as consider the establishment of an agency to be instrumental for the Coordination, Leadership and sector capacity development for the implementation of Efficiency. Government's present capacity to undertake energy efficiency programmes is limited. Other countries in similar circumstances have found the establishment of an agency to be an effective means of providing the necessary leadership and capacity to implement programmes.

The DME will ensure the National Energy Efficiency Agency, which has been in existence since April 2006, is appropriately funded to undertake its responsibilities.

#### **4.3 Finance Instruments**

The formulation and implementation of this Strategy is geared towards self-finance, positive savings and job creation. The majority of Energy Efficiency improvements will materialise through the implementation of standards, regulation and management tools, which at the end of the day lead to short pay back periods for the individual enterprises, house owners and government.

Costs related to investments in equipment or refurbishing of production flows, houses, etc. are to be born by the direct beneficiaries, which is reasonable to expect, due to the short payback periods. Where payback periods are less favourable, the option to partake in other enabling mechanisms should be encouraged. Such mechanisms include the Clean Development Mechanism (CDM), developed under the 1997 Kyoto Protocol and Verified Emission Reduction (VER) schemes which is a carbon trading mechanism with less red tape.

For Government the real costs to implement this Strategy relate to the massive information and coordination requirements – such costs are to some degree flexible and therefore, kept at the implementation level rather than the Strategy level.

As an example, the successful implementation of energy efficiency in the electricity sector leads to reduction in costs to end users due to deferred generation investments. Therefore subsidising energy efficiency to accelerate implementation will prove beneficial to all users of electricity. The costs of intervention to the end consumer are at this stage best quantified by comparison with the costs of a 'business-as-usual' alternative – increasing electricity tariffs to pay for new generating plant.

#### **Incentives**

At this stage of South Africa's development it is difficult to justify government subsidies for Energy Efficiency when there are so many other pressing needs nationwide.

However the continuous process of fiscal reform does present opportunities to promote energy efficiency as part and parcel of the reform process. For example National Treasury has announced that it is reviewing the vehicle allowances in personal income tax that favour larger (and therefore less efficient) engines. National Treasury also provided for a R5 million subsidy to the Manufacturing Industry through the Department of Trade and Industry for Cleaner Production and energy efficiency is one of the criteria for cleaner production.

### **Fee Bates**

Fee bates will again be investigated for vehicles. The basic principle of fee bates is that levies are imposed upon less efficient vehicles and the funds collected used to cross-subsidise more efficient vehicles. National Treasury is simultaneously implementing the *Framework for Environmental Fiscal Reform on South Africa*. These two developments are being aligned to achieve the desired impact.

The Government's Motor Industry Development Plan has already enjoyed some success in shifting demand towards small more efficient cars. It presents an alternative instrument that could be used.

### **Financing the Public Sector Implementation Plan**

In the past some cost effective capital measures in the Public Building Sector remained unimplemented because there were no specific budgets to cater for them. However, National Treasury have approved an amount of R20 million for the 2008/09 financial year for the implementation of energy efficiency in government buildings and it is anticipated that this funding will continue in the MTEF framework for the next 3 years. The incentive for National Departments will be that they will be able to retain the savings that arise from the energy efficiency measures that they implement, once they have paid off the costs thereof.

The same budgeting and delivery mode will be extended to all Provincial and Local Government authorities and state owned entities that are funded by Parliamentary appropriations

This presents another enabling instrument for cost effective capital measures with short to medium term payback periods.

### **Energy Service Companies**

The business of an Energy Service Company (ESCO) is to sell energy services. Energy management being one of the most common activities with saved energy as the main product. The ESCo meets client needs to reduce costs, improve energy efficiency, manage risk and enhance a competitive edge. The ESCo will typically offer this through a package, which includes a comprehensive energy audit service, financing mechanism, equipment procurement, and installation and commissioning, operation monitoring and performance guarantees. This addresses those situations where companies do not have the expertise and resources to devote to energy management activities themselves.

Saved energy cost is typically used to meet the implementation cost of saving energy. There are several payments options that include lump sum payment or once off payment and performance contracting paid through shared savings where a percentage of the cost savings are split between owner and the ESCo. This approach can be used to implement resource management measures, such as energy management in industrial and commercial and even in the residential sectors. The strength of the approach is in the delivery of results i.e. actual energy cost savings by the ESCo enabling the customer to focus on their core business.

Although the ESCo concept is not new, it is not yet fully developed in South Africa. Players do exist in the marketplace, but they are relatively few and many of them have limited experience. As a result a confidence gap exists in the market where customers are sceptical and reluctant to use this service delivery mode. This is exacerbated by an

absence of a well-established performance standard and service provider certification and accreditation. DME's role in respect of ESCo's will be primarily devoted to addressing this deficit by creating a more formal framework within which they can operate. This will consist of accredited performance standards and approved methodologies for energy efficiency audits as well as skills training accreditation.

Despite this, it is accepted that the ESCo model does have an important role to play in the delivery of energy management services in South Africa. There is, therefore, merit in supporting and strengthening this service delivery mode given the potential to achieve energy savings at minimum cost to the Fiscus. Regulation of ESCo's is probably unnecessary as the risk of non-delivery is carried by the ESCo. However, the type of contract is quite crucial.

### **Clean Development Mechanism**

The Kyoto Protocol was adopted at the third Conference of the Parties in 1997. The Protocol provides that developed nations accept commitments to limit, or reduce, the emission of greenhouse gases according to differentiated targets. For the signatory parties, termed Annex 1 countries, this represents an overall reduction of 5% by the period 2008 to 2012 in relation to their combined emissions of greenhouse gases in 1990. South Africa ratified the UNFCCC in August 1997 and acceded to the Kyoto Protocol in March 2002 as a non-Annex 1 signatory.

Achieving such goals will result in significant costs to the economies of each Annex 1 country, and a number of mechanisms were developed to assist these countries to comply with their respective targets. One of these mechanisms is the Clean Development Mechanism, or CDM. The basic principle of the CDM is simple: developed countries can invest in low-cost abatement opportunities in developing countries and receive credits for the resulting emissions reduction. Such credits would then count towards their own abatement targets.

The CDM can positively contribute towards the sustainability objectives of a developing nation by:

- Transferring technology and financial resources;
- Developing sustainable methods of energy production;
- Increasing awareness of energy efficiency and environmental issues;
- Alleviating poverty through income and employment generation;
- Helping define investment priorities in projects that meet sustainability goals.

The CDM encourages developing countries to participate by promising that their own development priorities will be addressed as part of the package. This recognises that only through long-term development will all countries be able to play a role in protecting the environment.

### **The Voluntary and retail markets**

The voluntary markets refer to entities (companies, governments, NGO's, individuals) that purchase carbon credits for purposes other than meeting regulatory targets. The retail market refers to companies and organisations that invest in offset projects and then sell off portions of the emission reductions in relatively small quantities with a mark-up. Credits from projects that are not seeking CDM registration and therefore will not be used for meeting Kyoto or EU targets are called Verified Emission Reductions. (VER's).

## Demand Side Management

It is a well known fact that additional generation capacity is required in South Africa as a matter of urgency. As the construction of additional generation plant is an extremely costly and lengthy process, the only other alternative to ensure that load shedding does not take place is by using a combination of energy efficiency measures, load management and negotiated interruptible supplies. The different measures are likely to change in response to the effectiveness of interruptible supply agreements.

The Power Conservation Programme (PCP) is therefore a short term option specifically designed for the electricity sector and impact therefore only on a small portion of this National Energy Efficiency Strategy. The PCP is only used in emergency situations where there is not sufficient electricity and where industries and commercial entities are required to close down certain activities in order to stabilise the system. The 10% target of Eskom which is short term and not sustainable should therefore not be confused with the National Energy Efficiency Targets which is long term and sustainable in nature.

## Energy Pricing

Following from the specific policy objectives of the *White Paper on Energy Policy (1998)*, energy pricing will be based on an assessment of the full economic, social and environmental costs and benefits of policies, plans, programmes and activities of energy production and utilisation. That is to say, a process of moving away from cross-subsidies towards cost-reflective prices will generally be adopted.

## 4.4 Stakeholders

The South African energy arena is characterised by a number of diverse role players each with a mandate within the fields of energy supply, conversion, efficiency and regulation. Only through well co-ordinated initiatives and promotion to activate the different role players will South Africa be able to effectively promote energy efficiency.

*The DME will prompt the different stakeholders to take a leading role in their areas of responsibility on a sector by sector basis. The means will be information, regulation, promotion, and facilitation of an enabling capacity development framework, as well as the coordination of knowledge and actions where necessary, as well as publicised public comments.*

Figure 8 shows how the key stakeholders will be involved in the strategic processes described in this document. Stakeholder relationships are shown against each implementing instrument, or focal area, in terms of primary stakeholders and secondary stakeholders. Primary stakeholders may be broadly defined as those whose main functionality deals directly with the associated focus area. Secondary stakeholders may be described as those whose responsibilities partly overlap with a particular focus area, or where their involvement would be of an *ad hoc* nature.

Figure 9 compares the major roles of the primary stakeholders across the sectoral initiatives proposed. These roles are defined in terms of strategic responsibility, implementation, regulation and monitoring. The figure also indicates which stakeholders will be responsible for the Monitoring and Verification (M&V) of sectoral initiatives, as indicated in Section 3.5.



Figure 8. Stakeholder Responsibilities

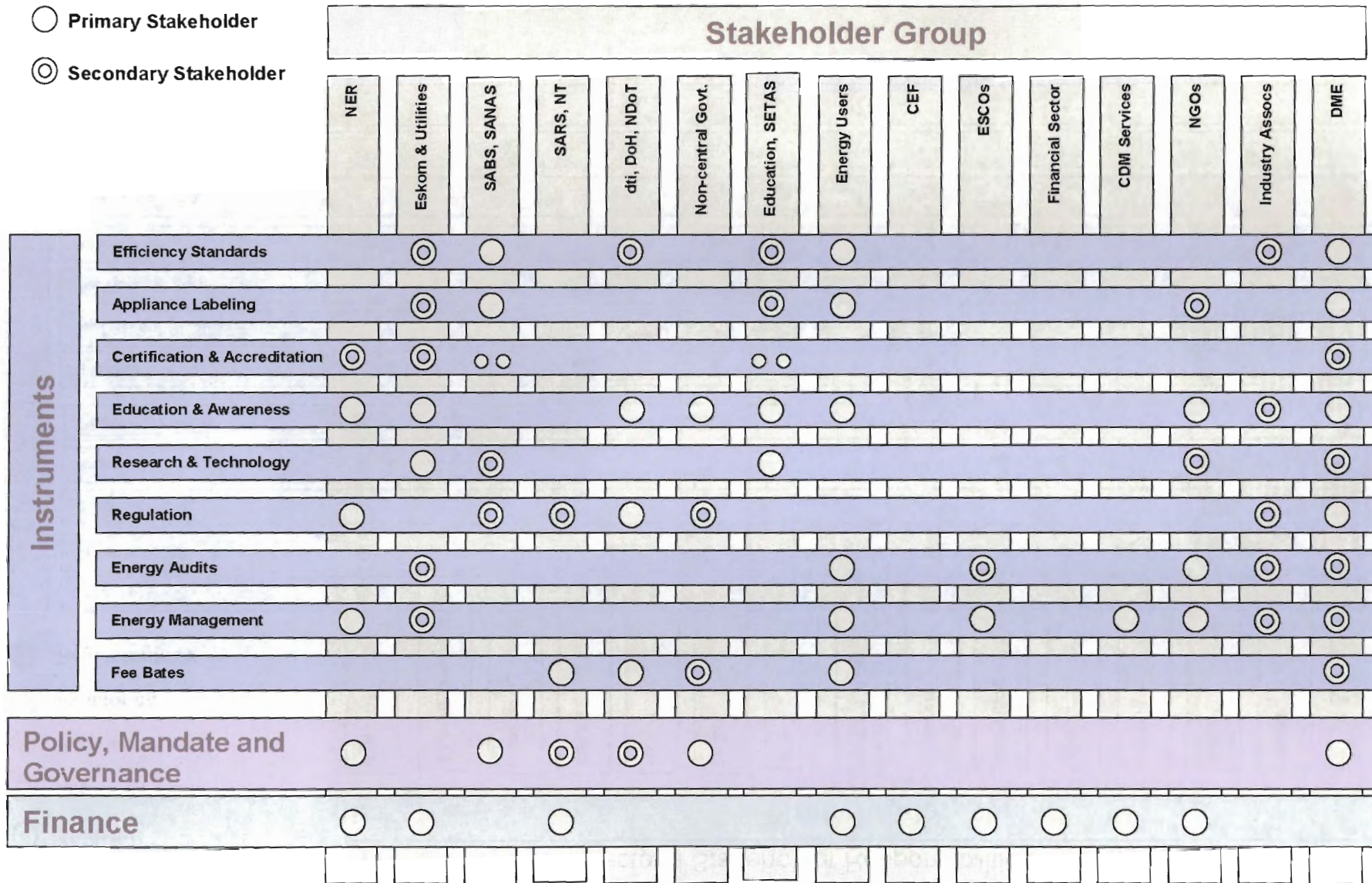
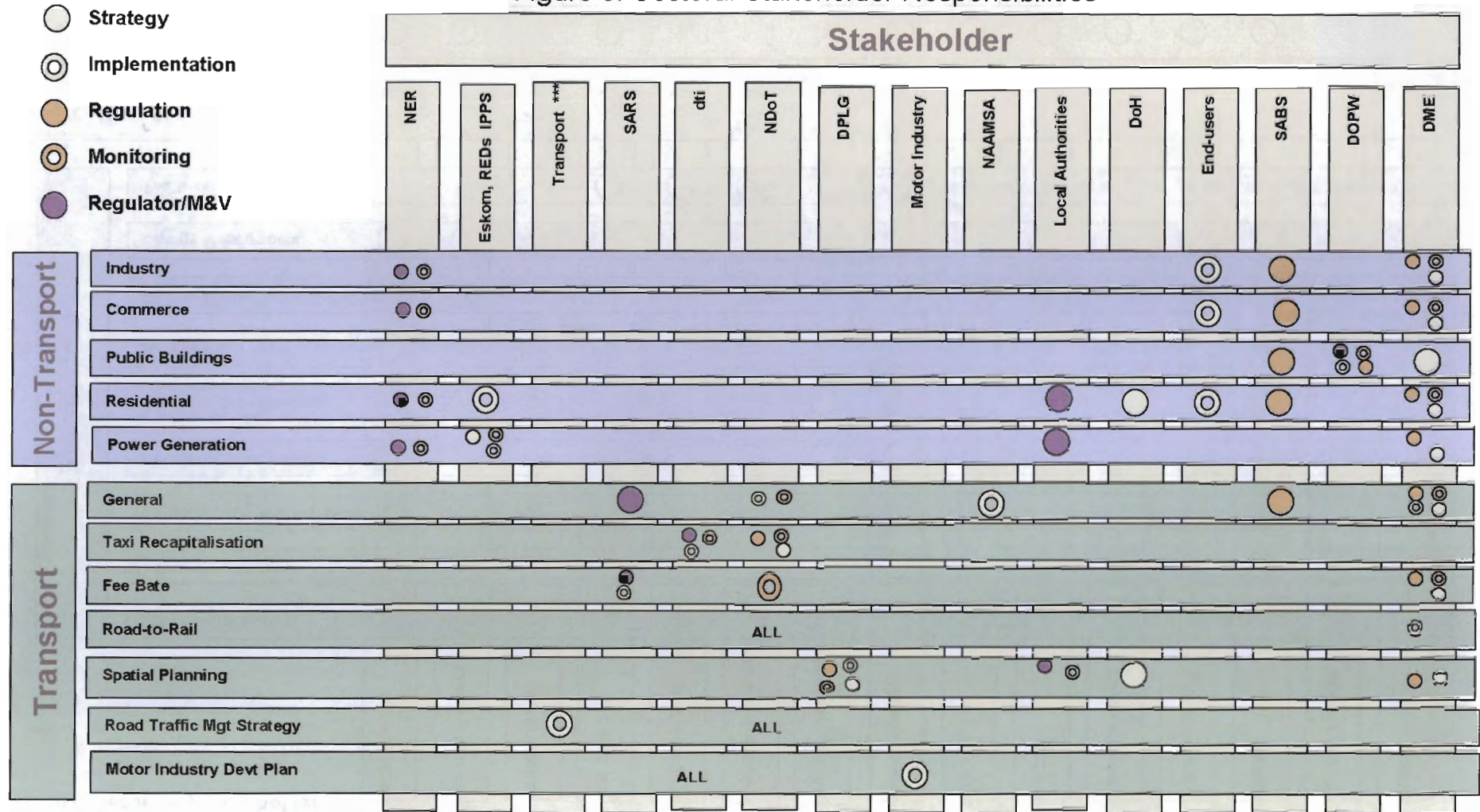


Figure 9. Sectoral Stakeholder Responsibilities



\*\*\*\* Transport includes the Department of Public Enterprises, Transnet, Spoornet, the SAA, the Ports Authority and Port Operations

## 5. Sector Programmes

This section outlines the planned programme of interventions relating to each economic sector.

In order to meet the objectives of this Strategy, it is intended that energy efficiency interventions will be implemented through a phased approach. The timing of the three Phases is as follows:

- Phase 1: March 2005 to February 2008; completed and reviewed October 2008
- Phase 2: March 2008 to February 2011;
- Phase 3: March 2011 to February 2015.

It is the broad intention of the Strategy that these phases will be linked to the economic characteristics of each activity. For example, it is probable that a low-cost intervention with a rapid payback would be implemented during the early stages of Phase 1. Conversely, a high-cost or complex intervention may only be initiated during the latter phases of the Strategy.

Whilst the economic criteria are important in determining the phasing of interventions, issues such as technical standards will be addressed at an early stage so as to maximise the long-term benefits. The Strategy will be reviewed at the end of each Phase. It should be noted that the different Phases are not mutually exclusive and that some interventions may transverse more than one Phase.

The interventions for each sector are described in outline on the following pages. These sections will form the basis for the elaboration of detailed implementation plans that will be developed for each sector. Implementation plans for the Industrial Sector and Commercial and Public Building Sector have been finalised to some extent but more work is required for action following approval of the Strategy. Plans for the Residential and Transport Sectors have also been started but finalisation should take place during 2009.



## 5.1 Industry and Mining Sector Programme

### Key Facts

- Industry and Mining account for 43.2% of total end-user energy demand in South Africa;
- Industrial energy usage is dominated by a small number of energy-intensive industries. These include ferrous and non-ferrous metals processing, mining, pulp and paper, and the petrochemical industry;
- The energy intensities in these industrial sectors are typically higher than those of other first world countries;

### Core Objectives

- To decouple the rate of growth of industrial energy consumption from the rate of growth in industrial output;
- To bring the energy intensities of major industrial sectors into-line with international standards and best practice.

### Approach

- A suite of "leadership by demonstration" programmes will be implemented. The DME will drive this activity, which, it is intended, will be actioned by voluntary initiatives within industry itself. This was mainly achieved up to now with the Energy Efficiency Accord, but it is clear that it must be extended to more entities. There may be opportunity to utilise donor funding for certain specific projects. These programmes are intended to build industrial capacity in the area of energy management and best practice, and to give incentive for replication nationwide;
- A series of mandatory standards will be introduced in phases. The intention is to ensure that life-cycle costs are considered where the purchase of "horizontal technologies" is concerned. The term horizontal technology refers to any specific technology which is commonly used across many industrial sectors;
- An obligation to carry out energy audits within the energy-intensive industries will be introduced in phases with the assistance of the dti and the Cleaner Production Centre which is already providing funding for audits. This will assist in awareness raising and in ongoing improvements in energy efficiency.

**Table 3. Industry and Mining Sector Programme**

Output Activity	Measures	Timeframe	Status and responsibilities
<p><b>Norms and standards for horizontal technologies</b></p> <p>Technical standards to be developed for industrial boiler efficiency, pumps, and thermal insulation. These horizontal technologies are common to many industries and such standards will encourage lifetime cost assessments to be carried out when purchasing new plant.</p>	<ul style="list-style-type: none"> <li>• Research into existing national and international standards</li> <li>• Formulation and adoption of standards</li> <li>• Training of inspectors and operators</li> <li>• Implementation of standards</li> <li>• Monitoring and results dissemination</li> </ul>	<p>Partly completed</p> <p>Phase 1</p> <p>Phase 3</p>	<p>A standard for AC motors has been completed. A UNIDO project driven by the dti will assist in providing audits and training in this regard.</p> <p>DME, dti, SABS, Education Providers, Energy Services Industry engaging with Industry Associations and wider industry</p>
<p><b>Energy Audit Scheme</b></p> <p>This will encourage capacity building within audit providers and will promote energy efficiency best practice within industry itself. The scheme has been tested via a series of trial audits in industry. It is intended that regular energy auditing will be made mandatory for high energy users in due course.</p>	<ul style="list-style-type: none"> <li>• Develop certification process for auditors</li> <li>• Certification of auditors</li> <li>• Trial audit scheme through specific sectors</li> <li>• Ongoing mandatory scheme (non-subsidised) in specific sectors</li> <li>• Monitoring and results dissemination</li> </ul>	<p>Phase 2</p> <p>Phase 2</p> <p>Phase 1 - 2</p> <p>Phase 2 - 3</p> <p>Phase 1 - 3</p>	<p>DME, NERSA, SANAS, ECSA and Education Providers engaging with Industry Associations and Industry generally</p>
<p><b>Energy Management Best Practice</b></p> <p>A solid Energy Management foundation is essential in any firm in order to optimize energy efficiency best practice. The key tenets of good Energy Management are information (Monitoring &amp; Targeting), Training &amp; Awareness (Motivation) and corporate commitment (company policy). The importance of these will be demonstrated and promoted.</p>	<ul style="list-style-type: none"> <li>• Continue to undertake Monitoring and Targeting demonstration projects</li> <li>• Investigate suitable industrial training schemes and develop a programme of industry training support</li> <li>• Establish a Corporate Commitment programme to encourage adoption of energy efficiency policy into existing corporate policies.</li> <li>• Monitoring and results dissemination</li> </ul>	<p>Phase 2</p> <p>Partly completed</p> <p>Phase 1 - 2</p> <p>Phase 2 - 3</p>	<p>ECSA is currently already looking at 17 different unit standards for training in energy efficiency. The Energy Efficiency Hub of SANERI is the University of Pretoria and they are already working on making energy efficiency part of current engineers' curricula.</p> <p>DME, Eskom, Education Providers, Funding Agencies engaging with industry</p>
<p><b>Technology Information and Research</b></p> <p>It is important to have a sound technology information base to industry in general. This will ensure that appropriate efficient technology is adopted and will potentially lead to further research-based projects.</p>	<ul style="list-style-type: none"> <li>• Regulation to ensure energy management, measurement and reporting</li> <li>• International benchmarking study to enable more meaningful benchmarking by industrial sector</li> <li>• Establish a technology and information base, using existing literature</li> <li>• Promote awareness of available information</li> </ul>	<p>Phase 2</p> <p>Phase 2</p> <p>Phase 2 - 3</p>	<p>It became clear that data is the biggest problem in South Africa and therefore a new regulation to legislate measurement and reporting.</p> <p>DME, Education Providers, International EE Agencies, Industrial Associations</p>
<p><b>Promotion of Energy Service Companies (ESCOs)</b></p> <p>ESCOs are already playing a vital role in the Demand Side Management (DSM) programme. There is potential to further develop the energy service provision market to encourage greater energy efficiency within the industrial sector.</p>	<ul style="list-style-type: none"> <li>• Ensure accreditation of ESCo's</li> <li>• Establish means of enhancing the promotion of ESCOs within industry</li> </ul>	<p>Partly completed</p> <p>Phase 1, ongoing</p>	<p>DME, NEEA and Eskom DSM engaging with ESCOs and wider industry</p>
<p><b>Maximise the Value of Energy Efficiency Investments</b></p> <p>This activity will encourage and facilitate the conversion of eligible Carbon Credits into real cash benefits for</p>	<ul style="list-style-type: none"> <li>• Establish DNA function and procedures</li> <li>• Improve CDM awareness and publicise successful CDM projects</li> </ul>	<p>Completed</p> <p>Partly</p>	<p>DME, DEAT and CDM service providers engaging with industry</p>

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industry, via the Clean Development Mechanism (CDM) including the programmatic approach as well as Voluntary Emission Reduction (VER's).		completed	
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## 5.2 Commercial and Public Buildings Sector Programme

### Key Facts

- Commercial and Public Buildings account for 6.7% of final energy demand. The Commercial sector alone contributes 45% towards total national GDP;
- The majority of energy is used in the form of electricity, the main end-uses being HVAC systems, lighting and office equipment;
- The Commercial sector is undergoing significant growth which presents the opportunity to capture energy efficiency at the design stage of new stock.

### Core Objectives

- To demonstrate the Government's commitment to sustainable energy development within its own building stock;
- To progressively upgrade the energy performance of existing public and commercial building stock;
- To achieve best practice energy performance in new public and commercial building stock.

### Approach

- The Government will lead by example through raising energy efficiency awareness and by implementing specific measures within its own estate;
- Energy efficiency standards for buildings has been completed called the SANS 204 standard and must now be made mandatory by making it part of the National Building Regulations of the dti, together with a building Energy Audit programme;
- Emphasis will be placed on incorporating energy efficiency into building design and energy efficient technologies will be introduced in existing buildings;
- Energy management systems for buildings will be tested, demonstrated and promoted as well as the Green Building rating system and modelling tool from the Green Buildings Council of South Africa;
- In conjunction with the implementation of SANS 204, energy labels will be developed to assist with compliance rating.

<b>Table 4. Commercial and Public Buildings Sector Programme</b>			
<b>Output Activity</b>	<b>Measures</b>	<b>Timeframe</b>	<b>Responsibilities</b>
<b>Energy Efficiency Standards for Commercial and Public Buildings</b>	<ul style="list-style-type: none"> <li>• Develop Energy Efficiency Standard for Office Buildings (SANS 204)</li> <li>• Incorporate SANS 204 in National Building Regulations</li> <li>• Energy Labels (Compliance Green Buildings Council)</li> <li>• Implementation of standards</li> <li>• Development of labelling according to use categories</li> <li>• Standard for existing buildings required</li> <li>• Certification with energy efficiency standards</li> <li>• Develop a Green Buildings Manual.</li> </ul>	<p>Completed</p> <p>Phase 2 Commenced</p> <p>Phase 3</p> <p>Phase 3</p>	DME, the dti, SABS, CSIR, Architects, Building Industry
<b>Mandatory Energy Audits for Commercial Buildings</b>	<ul style="list-style-type: none"> <li>• Introduce compulsory building auditing</li> <li>• Prepare Audit Standard and framework</li> <li>• Prepare monitoring and evaluation protocol</li> <li>• Identify/train/certify both trainer and trainee auditors (BEE)</li> <li>• Determine/clarify financing mechanisms</li> <li>• Address problem of import duties on equipment</li> <li>• Monitor quality of audits as well as effect on overall consumption</li> </ul>	<p>Phase 1</p> <p>Phase 2</p> <p>Phase 3</p>	<p>DME, Training Certification Authorities – ECSA, Public Works</p> <p>DME</p> <p>Treasury/DPW/DME DME DME</p>
<b>Energy Management Systems</b>	<ul style="list-style-type: none"> <li>• Test and showcase energy management systems</li> <li>• Promote energy management systems</li> <li>• Ensure triple bottom line reporting</li> </ul>	Phase 1	SABS, Manufacturers, DME, DPW, Building Industry
<b>Technologies</b>	<ul style="list-style-type: none"> <li>• Efficient Lights Programme</li> <li>• Monitor Programme</li> </ul>	Phase 1	DPW, DME
<b>Thermal Measures (HVAC)</b>		Phase 2	DPW, DME



### 5.3 Residential Sector Programme

#### Key Facts

- The Residential Sector accounts for 17,9% (2004) of final energy demand;
- Much of this energy is consumed in the form of biomass in the rural areas, but an increasing amount of electricity is used in middle and high income homes and as the national electrification programme reaches more users
- Savings can be anticipated in thermal energy demand from the incorporation of energy efficiency measures (thermal insulation) in new housing, the subsidisation of solar water heaters, from the implementation of appliance labelling and standards and through massive education and awareness campaigns

#### Core Objectives

- To combat pollution on health grounds;
- To enforce standards for housing and labelling/efficiency standards for household appliances;
- To introduce state-of-the-art technologies.

#### Approach

- Awareness raising to communicate the cost-benefits of energy efficiency in the home;
- Introduction of appliance labelling;
- Demonstration projects to create an incentive to invest in energy efficiency;
- The approach will initially address higher income (i.e. higher usage) homes and state-subsidised housing incorporating energy efficiency measures as a standard feature
- The standard for energy efficient housing (SANS 204) to be made mandatory by its incorporation into the National Building Regulations.

<b>Table 5. Residential Sector Programme</b>			
<b>Output Activity</b>	<b>Measures</b>	<b>Timeframe</b>	<b>Responsibilities</b>
<b>Standard for Housing</b>	<ul style="list-style-type: none"> <li>SANS 204 for energy efficient housing</li> <li>Incorporate SANS 204 in National Building Regulations</li> <li>Monitoring and dissemination of results</li> </ul>	Completed  Phase 2	The dti, EE Experts, CSIR, Building Industry, Thermal Insulation Industry,  DME
<b>Appliance labelling</b>	<ul style="list-style-type: none"> <li>Establish standards for household appliances</li> <li>Label household appliances</li> <li>Make the Label mandatory</li> <li>Market appliances with labels</li> <li>Monitor progress</li> </ul>	Phase 1  ongoing	DME, SABS, Eskom, Appliance Manufacturers, retailers, servicing industry GEF Funding
<b>Awareness Raising Program</b>	<ul style="list-style-type: none"> <li>Development of specific program</li> <li>Implementation</li> </ul>	Phase 1 ongoing	DME, Eskom DSM, GCIS, DPE
<b>Efficient Lighting Program</b>	<ul style="list-style-type: none"> <li>Demonstration in all sectors</li> <li>Implementation</li> <li>Monitoring</li> </ul>	Phase 1 Ongoing ongoing	DME, Eskom DSM, Municipalities, DPW
<b>Non-electric Appliance Standards</b>	<ul style="list-style-type: none"> <li>Study of fossil and biomass-using appliances</li> <li>Draft standards developed</li> <li>Standards (mandatory for some appliances)</li> <li>Implementation</li> </ul>	Phase 1  Phase 2	DME, Manufacturers, Eskom, SABS  DME, Manufacturers, Eskom, SABS
<b>Fuel Standards</b>	<ul style="list-style-type: none"> <li>Studies</li> <li>Development of standards</li> <li>Implementation</li> </ul>	Phase 1  Phase 2	DME, Manufacturers, SABS  DME, Manufacturers, SABS

## 5.4 Transport Sector Programme

### Key Facts

- Transport was responsible for 25.7% of final energy demand in 2004. Petroleum products represented 97% and electricity 3% of energy demand in this sector. Road transport represents 84% of energy use;
- Petrol and diesel are mainly used for road transport of passengers and freight. In terms of primary energy supply, nearly 80% is from imported oil - representing the largest item on South Africa's import account;
- Transport fuels represent a significant portion of the country's imports into the economy. Government is concerned that the impact of crude oil imports on the economy should be contained.

### Core Objectives

- Build the user base for public transport through provision of quality public transport and non-motorised transport services and infrastructure;
- Incorporate international best practice into new developments for housing, government services, sports and entertainment that support the public transport objective;
- Put in place a regime of monitoring mechanisms, penalties and rewards. Conduct research to articulate the value of energy efficiency to local transport managers and customers and use results to develop target-based performance objectives for local authorities to meet in terms of public transport provision;
- Increase public knowledge and awareness of efficiency issues, including specific efficiency indicators, as well as the engendering of a "civil responsibility" regarding environmental and sustainability issues;
- Finalise an appropriate mode freight logistics policy that incorporates the energy efficiency objective

### Approach

- Include transport fuel efficiency promotion in ongoing fiscal reform
- Fuel efficiency labelling of vehicles has been completed but it does not address the large second hand market for vehicles;
- Conduct and support fleet audits stressing regular vehicle maintenance;
- Regulations, standards and codes of practice which will stimulate the supply of energy efficient vehicle technologies
- Public information programmes that would sensitise the motoring public to the benefits of efficiency measures.
- Complimentary programmes to change the country's transport infrastructure (moving from road to rail), and the demand placed upon it by users (spatial planning) can be viewed as longer term interventions

**Table 6. Transport Sector Programme**

<b>Table 6. Transport Sector Programme</b>				
Optimise Passenger and goods transport	Passenger Transport Management policy and regulatory/incentive dispensation	<ul style="list-style-type: none"> <li>Draft appropriate goods and passenger transport policy, accompanying regulations and necessary fiscal and budgetary reform</li> </ul>	Phase 1	NDoT, NT, DME, SARS, Local Government
	Establish local Transport Authorities (LTAs)	<ul style="list-style-type: none"> <li>Finance establishment of local Transport Authorities</li> <li>Audit local Integrated Transport Plans for energy efficiency</li> <li>Quantify EE baseline with TAs and establish targets</li> </ul>	Phase 2 Phase 3 Phase 3	NDoT, DME, Local Government
Introduce Energy Management Measures in Passenger Transport	Fee Bate	<ul style="list-style-type: none"> <li>Vehicle licensing</li> <li>Differential licensing fee</li> <li>Implementation, monitoring and dissemination of results</li> </ul>	Phase 1  Phase 2	NT, SARS, NDoT, DME, Local Government
	Efficiency labels for motor vehicles	<ul style="list-style-type: none"> <li>Development of energy efficiency label for new vehicles</li> <li>Introduction and marketing of label</li> </ul>	Completed Phase 2	DME, NDoT, STANSA, NAAMSA, SAPIA
	Emission standards for vehicles	<ul style="list-style-type: none"> <li>Development of mandatory standard</li> <li>Implement standard</li> </ul>	Phase 1 Phase 2	STANSA, DME, DEAT, NAAMSA, SAPIA
	Audits on vehicle fleet operators	<ul style="list-style-type: none"> <li>Large fleet owners to measure and report to DME</li> <li>Develop audit standards for fleet operators</li> <li>Implementation and monitoring</li> </ul>	Phase 2	NDoT, DME
	Awareness Raising Program	<ul style="list-style-type: none"> <li>Awareness and education on driving efficiently</li> <li>Influence learner driver curriculum (K53 test to include)</li> </ul>	Phase 1/ongoing	DME, NDoT, AA, Local Government
	Roadworthy test including emission test	<ul style="list-style-type: none"> <li>Include emission standards in Roadworthy Certificate</li> <li>Develop training curriculum for vehicle inspectors</li> </ul>	Phase 2	NDoT, STANSA, DME, DEAT, Local Government
Facilitate Energy Efficiency in Freight Logistics	Advance Appropriate Mode Freight Logistics Policy	<ul style="list-style-type: none"> <li>Finalise research on impacts of shifts between road and rail</li> <li>Audit EE of goods moved via range of freight modes</li> <li>Explore implementation of an energy efficiency levy on freight movements consistent with energy impacts</li> </ul>	Phase 2 Phase 3 Phase 3	NDoT, DME, Spoornet
	Exploration of renewable energy in the freight logistics sector	<ul style="list-style-type: none"> <li>Study regenerative braking systems on electric locomotives</li> <li>Run pilot project to detail costs and benefits of bio-fuel mixes to road freight sector</li> <li>Ensure that energy efficiency criteria are included in the capital investment plan.</li> </ul>	Phase 3  Phase 3	NDoT, DPE, Spoornet, SAPIA
	Intelligent transportation	<ul style="list-style-type: none"> <li>Establish ITS forum with key stakeholders in freight sector</li> </ul>	Phase 3	NDoT, STANSA, SAPS, freight logistics

	System data management		companies, IT sector
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## 6. Cross-cutting Issues

### 6.1 *Integrated Energy Planning*

Expenditure on energy constitutes some 15% of South Africa's GDP. Therefore energy efficiency is an important facet of the Integrated Energy Planning process carried out by the DME. By virtue of its size and economic importance, the energy sector periodically requires considerable investments in new supply capacity, which impacts on the economy. Integrated resource planning decisions around the world now consider not only maintaining security of supply but give full consideration to the economic, environmental and social impacts of all alternatives, such as demand-side management and energy efficiency programmes. This Energy Efficiency Strategy will be used to inform the National Integrated Resource Plan of the National Electricity Regulator as well as the National Integrated Energy Plan of the DME.

### 6.2 *Renewable Energy*

There are several areas of overlap between Renewable Energy and Energy Efficiency that warrant a brief discussion.

A widespread installation of solar water heating in industrial and commercial buildings and houses has the potential to defer the need for building new power plants, as the combined heating requirements of these sectors consume the energy produced by three average power stations. The main constraint on implementing a national solar water heating programme in the Residential Sector related to cost, but since 2005 CEF managed to install 500 subsidised solar water heaters in a very short time and Eskom with the subsidy provided installed 500. However, the current small market and lack of economies of scale is still perceived to be a barrier for implementation. The lack of demand, even with a subsidy provided, in itself is due to low public awareness of the technology or its economic benefits. Currently the cost of a domestic solar water heater would take in excess of 5 years to pay back.

However, it is a different story when it comes to large commercial installations. Because of the size, and electricity tariff at peak times, these solar water heaters are competitive with electric geysers and hotels are installing them. The main barrier again remains lack of information about the technology.

Thermally efficient housing – houses designed to save energy, can reduce household space heating requirements. The Department of Housing in collaboration with the Department of Minerals and Energy has developed appropriate guidelines and the SANS 204 standard for the construction of thermally designed housing incorporating passive solar design.

The household sector requires the following measures:

- Regulation of low-cost energy efficiency measures in housing;
- Incorporating passive solar design;
- Heat insulation in homes;
- Replacement of electric geysers by solar water heaters.

Currently the Department of Housing is re-appraising its subsidised housing strategy in preference of quality rather than quantity and will revise the Housing Code to

incorporate heat insulation. A similar approach has been followed with the SANS 204 energy efficiency standards developed by SABS for both buildings which are naturally ventilated (such as houses) and for office buildings that are artificially ventilated.

The implementation of the measures mentioned above will clearly reduce the need for power, mostly during periods of peak demand e.g. solar water heating, heat insulation, passive solar design; and can therefore be viewed as energy efficiency interventions which reduce demand. As such DME would view such projects as eligible for funding from appropriate sources, such as the Eskom DSM Fund.

In terms of bio-fuels the Transport Sector presents an important opportunity for exploring energy efficiency measures in the fuel mix in road freight. Renewable power in rail freight using regenerative braking systems in locomotives will be investigated (which also provide a means of generating power for the National Grid). Government has announced a massive investment programme for Spoornet to improve its efficiencies and thus to win back customers lost to road transport. Efforts will be made to introduce energy efficiency criteria when these investment decisions are made.

Raising awareness regarding the economic benefits of energy efficiency and renewable energy is an important step in increasing the market demand for these technologies. The development of an information strategy for both energy efficiency and renewable energy is therefore an immediate short-term priority.

### 6.3 *Environment and Health*

The lack of infrastructure and inadequate living conditions in many areas of South Africa has meant that millions of people are routinely exposed to fuels, which emit several noxious gases, and particulates, which can be deadly. National statistics show that Acute Respiratory Illness, associated with exposure to particulates, is the second highest cause of mortality in children under the age of five.

The medium term priorities of the *White Paper on Energy Policy* include the mitigation of the negative environmental and health effects of air pollution from coal and wood use in household environments. From this, two initiatives are currently being pursued by the DME:

#### **Low Smoke Fuel Strategy**

This Strategy addresses the winter coal-burning households that create a pollution problem. Several options have been assessed from a cost perspective, ranging from energy management interventions such as the 'Basa Njengo Magogo Project', to developing and manufacturing cleaner fuels for use in conventional coal stoves, to using other fuels such as liquid petroleum gas, to designing houses to require less space heating by means of insulation and ceilings. The first approach is outlined briefly below.

***Basa Njengo Magogo Project*** - The local name for the so-called 'Scotch' Method of lighting a coal fire by inverting the contents, so that the volatiles are burned off first, dramatically reduces the time during which a fire produces smoke and creates a slower-burning fire in a matter of minutes, and in so doing reduces energy consumption by up to 30% or more (depending on the user). This is a 10-year project, which started in 2004 targeting the 1 million homes in the winter coal-burning area.

### **Improved Woodstoves**

The Programme for Biomass Energy Conservation (a Southern African Development Community regional programme) is directed at energy conservation by the use of improved energy efficient woodstoves, which require a fraction of the wood normally required. Reductions from 30-50% are achievable, depending on the stove efficiency and the proficiency of the user. As biomass is approximately 9% of energy demand (as compared to electricity at 22%), this sector is important from a national point of view.

#### **6.4 *The Cleaner Fuels Programme***

Cabinet has approved the phase-out of leaded petrol from 2006, the reduction of sulphur in diesel to a maximum of 0,05% from 2006 and that DME determine the other relevant fuel specification parameters in consultation with the relevant stakeholders. This initiative is in line with the global move towards phasing out leaded petroleum where 86% of the world's supply is unleaded.

This initiative is driven primarily by human health, environmental and air quality criteria but it is also in line with the global harmonisation of standards that are employed in Europe and Japan – those countries whose automotive manufacturers dominate the South African market. The revision of standards and their deployment fits in with the measures proposed in this document to increase energy efficiency in the transport sector.



## 7. References

1. The National Energy Efficiency Strategy, 2005 first edition by David Mercer and the Department of Minerals and Energy
2. DME, 1998, *White Paper on the Energy Policy of the Republic of South Africa*. Department of Minerals and Energy, Pretoria, December 1998.
3. DME, 2006, *Digest of South African Energy Statistics*. compiled by the Department of Minerals and Energy, Pretoria, 2006.
4. DME, 2003, *Integrated Energy Plan for the Republic of South Africa*. Department of Minerals and Energy, Pretoria, 2003.
5. DME, 2003, *Joint Implementation Strategy for the Control of Exhaust Emissions from Road-going Vehicles in the Republic of South Africa*. Department of Environmental Affairs and Tourism, Department of Minerals and Energy, Version 4, November 2003.
6. DME, 2007, Electricity Regulation Act. Department of Minerals and Energy, Pretoria,.
7. Energy Act, 2008, Department of Minerals and Energy, Pretoria, 2008.
8. DME in collaboration with CaBEERE - Danida, 2002, Capacity Building in Energy Efficiency and Renewable Energy,- *Energy Efficiency Baseline Study*. September 2002.
9. DME in collaboration with CaBEERE - Danida, 2003, Capacity Building in Energy Efficiency and Renewable Energy,- *Energy Efficiency Savings Projections*. April 2003.
10. DME in collaboration with CaBEERE – Danida, 2003, Capacity Building in Energy Efficiency and Renewable Energy,- *Capacity Assessment of External Stakeholders*.
11. Energy and Development Research Centre. *Policies and measures for renewable energy and energy efficiency in South Africa*. Sustainable Energy and Climate Change Partnership, 2003,
12. International Energy Agency, 2002. *Energy Balances of OECD countries*.
13. International Energy Agency, 2008. *Worldwide Trends in Energy Use and Efficiency*.
14. The Electricity Act (no 41 of 1987) as amended.