DEPARTMENT OF ENERGY

NOTICE 948 OF 2016

DRAFT POST-2015 NATIONAL ENERGY EFFICIENCY STRATEGY

I, Tina Joemat-Pettersson, Minister of Energy, hereby publish the draft post-2015 National Energy Efficiency Strategy for public comments.

Interested persons and organisations are invited to submit, within 30 days, written comments on the draft post-2015 National Energy Efficiency Strategy on any of the following:

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Kindly provide the name, address, telephone number, fax number and email address of the person or organisation submitting the comments.

Please note that comments received after the closing date may be disregarded.

TINA JOEMAT-PETTERSSON, MP
Minister of Energy

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

Post-2015 National Energy Efficiency Strategy

1st DRAFT

September 2016

Draft Version 1.2

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ABBREVIATIONS

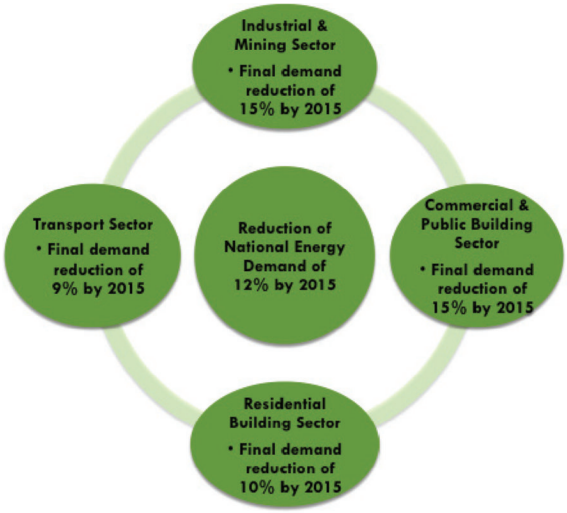
AFASA	African Farmers' Association of South Africa
CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DoE	Department of Energy
DoHS	Department of Human Settlements
DoT	Department of Transport
DPW	Department of Public Works
DST	Department of Science and Technology
DTI	Department of Trade and Industry
EEDSM	Energy Efficiency Demand Side Management
EnMS	Energy Management Systems
EPC	Energy Performance Certificate
ESCO	Energy Service Company
GHG	Greenhouse Gas
GJ	Gigajoule
HVAC	Heating, ventilation and air conditioning
IEA	International Energy Agency
IEE	Industrial Energy Efficiency
IEP	Integrated Energy Plan
IFI	International Financing Institution
IGCC	Integrated Gasification Combined Cycle
INDC	Intended Nationally Determined Contribution
IPP	Independent Power Producers
IRP	Integrated Resource Plan
M&V	Monitoring and Verification
MEPS	Minimum Energy Performance Standard(s)
Mt	Megatonne
MW	Megawatt
NCPC	National Cleaner Production Centre
NDP	National Development Plan
NEES	National Energy Efficiency Strategy
PJ	Petajoule
PSEE	Private Sector Energy Efficiency
REIPPP	Renewable Energy Independent Power Producer Procurement

	Programme
REITs	Real Estate Investment Trusts
SANS 204:2011	SANS 204 (2011) (English): Energy efficiency in buildings[1]
SANS 10400- XA	SANS 10400-XA (2011) (English): The application of the National Building Regulations Part X: Environmental sustainability Part XA: Energy usage in buildings[2]
SANAS	South African National Accreditation System
SAQA	South African Qualifications Authority
TJ	Terajoule
TWh	Terawatt hour
WESSA	Wildlife and Environment Society of South Africa

[1] https://law.resource.org/pub/za/ibr/za.sans.204.2011.pdf

[2] https://law.resource.org/pub/za/ibr/za.sans.10400.xa.2011.pdf

1. Energy efficiency policy in South Africa



The Government of South Africa through the Department of Energy (DoE) released the first National Energy Efficiency Strategy (NEES) in 2005. This strategy aimed to respond to the increasing demand for energy alongside a growing commitment to improving resource use and reducing South Africa's national environmental footprint. The NEES set an overall reduction target in energy intensity of 12% by 2015, and sectoral energy intensity improvements as follows: industry and mining (15%), power generation (10%), transport (9%), commercial and public building sector (15%), and residential (15%). The NEES derived its mandate from the White Paper on Energy Policy (1998) and it was subsequently revised in 2011. A National Energy Efficiency Action Plan was developed in 2012 describing the implementation of the strategy.

The Energy Efficiency Target Monitoring System was established in 2014 to monitor the progress made towards meeting the original targets (based on a year 2000 baseline). The results of the analysis, which relied to a large extent on existing data[3], confirmed that significant progress has been made between 2000 and 2012 in improving energy intensity, exceeding expectations for most sectors. The improvements in energy intensity reflect a combination of autonomous change, technological advancements, and deliberate interventions to improve energy efficiencies.

Table 1: Improvements in energy intensity (2000-2012) compared to the 2005 targets (DoE, 2015)

Sector	2015 target (based on 2000 baseline)	Performance to 2012
Economy-wide	12%	23.7%
Industry	15%	34.3%
Residential	10%	28.2%
Commercial & public	15%	0.3% (electricity only, 2003-13)
Transport	9%	14.1% (reduction in sector-wide energy intensity)
Power sector	15%	26% (estimated by Eskom)

[3] It should be noted that there are some limitations to the quality and coverage of data that is available for the public, commercial, transport, and power sectors. The DoE was able to undertake primary data collection to support the analysis for the residential and industrial sectors.

This post-2015 NEES aims to build on these achievements, stimulating further energy efficiency improvements through a combination of fiscal and financial incentives, a robust legal and regulatory framework, and enabling measures. The strategy has been framed to complement the policies and strategies of the Department of Environment Affairs (DEA), the Department of Public Works (DPW), the Department of Science and Technology (DST), Department of Trade and Industry (DTI), Department of Transport (DoT) and the National Treasury.

2. Vision and mission

The Department of Energy's Vision

Our vision is to promote energy efficiency as the 'first fuel'[4] in driving balanced, socially inclusive and environmentally sustainable economic growth, boosting job creation and leading technological innovation across the region.

The Department of Energy's Mission

Improving energy efficiency is a strategic priority in both the National Development Plan 2030 and South Africa's Intended Nationally Determined Contribution (INDC) under the UN Framework on Climate Change. This post-2015 strategy considers the current economic and development context in South Africa, and aims to encourage continued growth by **reducing energy *in*efficiency as a barrier** to future progress. The South African Government is committed to seizing the possibilities that energy efficiency represents in:

- improving **energy security**, reducing dependence on energy imports[5] and improving reliability by freeing generation capacity to support future growth;
- optimising resource to **safeguard environmental sustainability**;
- improving **competitiveness** by supporting users to reduce their energy intensity but also to support South African industry and commerce in exploiting the energy efficiency market opportunities within the region;
- stimulating **inclusive economic growth** by releasing generation capacity to all citizens of South Africa and developing the regulatory framework and incentive measures to make affordable, energy efficient technology widely available.

The Department of Energy undertakes to support businesses, households and government departments to take advantage of the energy efficiency opportunities by:

- facilitating the increased availability of affordable, good quality, energy efficient **technologies** on the local market;
- supporting **job creation**, in the implementation of energy efficiency measures and through the redeployment of wealth to other economic activities;
- supporting energy efficiency **investments** through the provision of fiscal and financial incentives that improve the business case and encouraging increased **confidence** in energy efficiency in the financial sector;
- promoting the **sharing of knowledge and best practice** across sectors, technologies, processes, and behaviours;
- fostering a **vibrant and professional energy services sector** that is self-

[4] The "first fuel" concept is gaining increased credence worldwide. Energy efficiency is considered to be a *hidden energy resource* that should be fully exploited before considering other sources as it takes less time to implement, lasts longer and keeps producing without the negative effects of generation. (IEA. (2014), Capturing the Multiple Benefits of Energy Efficiency: A Guide to Quantifying the Value Added, IEA, Paris.) Energy efficiency measures are not only the fastest way to ensure the path towards a low-carbon transition, but also improve the economic output, productivity and energy security of South Africa.

[5] Although South Africa is a net exporter of energy, as of 2012 it depended on imports for about 85% of its total supply of oil and gas.

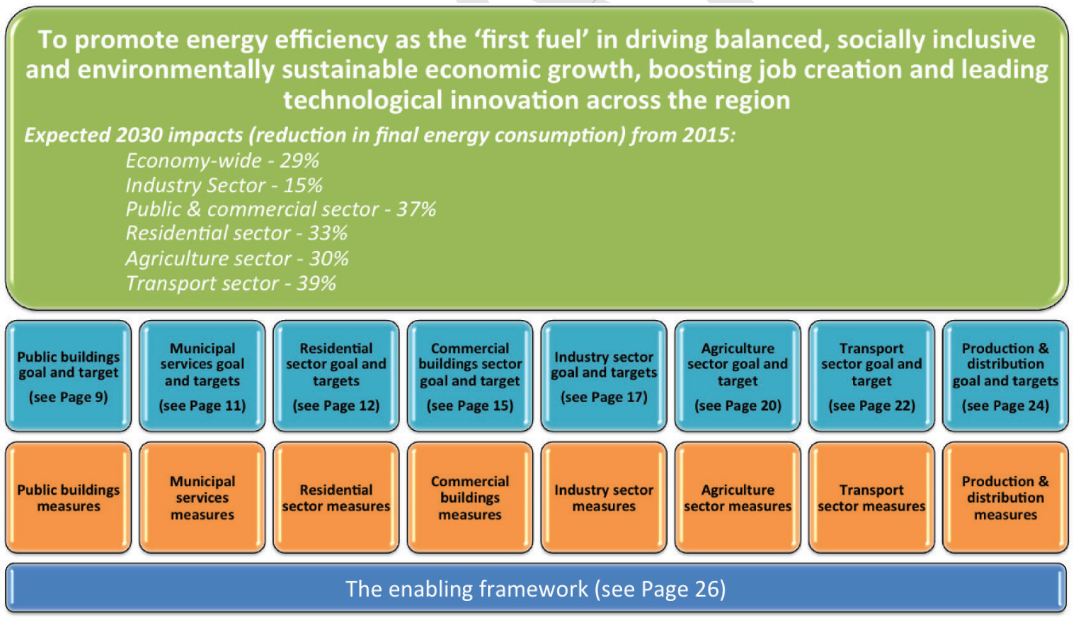
sustaining and can both drive and meet demand for the implementation of energy efficiency measures.

3. The results framework

The results framework (Figure 1) establishes a coherent logic between the policy measures, the sectoral impact, and the anticipated overall impact. This is important not only to facilitate the definition of a package of appropriate, relevant measures for each sector that will yield significant impact, but also to make simpler the measurement of the impact of the policy measures put in place. As illustrated below, the package of measures for each sector combined with the supporting measures are expected to realise sectoral goals and targets, which are linked to the projected overall impact of the specific measures. Improvements at a macro-economic level are subject to a significant number of factors external to the policy measures relating to energy efficiency and therefore, the sectoral targets will provide the performance assessment that will inform how effective the policy measures put in place affect implementation.

Annex 1 contains a detailed description of the results framework, including the actual measures and the targets associated with each sector and level.[6]

Figure 1: The post-2015 NEES results framework



[6] At the highest level (impacts), the reduction in final energy consumption is targeted in terms of end use. This explains why there is no target for production and distribution of energy at this level. The targets for each sector are explained in more detail in sector-specific chapters and the results framework is described in Annex A.

4. Energy efficiency and savings potentials

To promote a common understanding of energy efficiency in the South African context, the definition of energy efficiency, the benefits of and barriers to improvements, and potential energy savings opportunities that exist in South Africa are described below.

4.1. South Africa's energy consumption profile

4.1.1. Energy consumption by energy carrier

Between 2000 and 2012, a significant shift occurred in the relative roles played by different energy different energy carriers in South Africa's total final energy consumption. In 2000, coal and electricity coal and electricity accounted for similar shares of total final consumption, with the share of petroleum share of petroleum products somewhat higher. By 2012, the consumption of electricity and especially electricity and especially petroleum products had increased significantly, while that of coal had declined. coal had declined. These trends are shown in

Table 2 and Figure 2 below.

It is worth emphasising here that these figures represent total final energy consumption, rather than primary energy demand. They do not therefore include energy that is consumed or transformed in the energy conversion processes (for example, power generation and the synthesis of liquid fuels from coal). Although the final consumption of coal has fallen over the time period covered in this analysis, the large increases in the final consumption of electricity and petroleum products have largely been met through coal-based energy conversion processes. Hence the reduction in total final consumption of coal does not imply an overall reduction in the South African economy's dependence on coal.

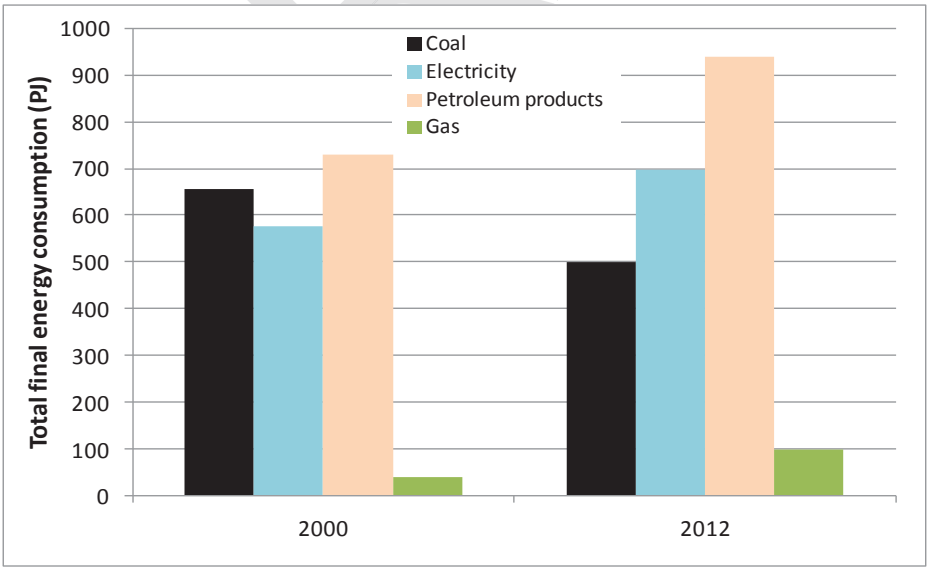


Figure 2 Fuel mix of final energy consumption for the South African economy – 2000 versus 2012

Table 2 Composition of total final energy consumption (PJ) by energy carrier, 2000 and 2012

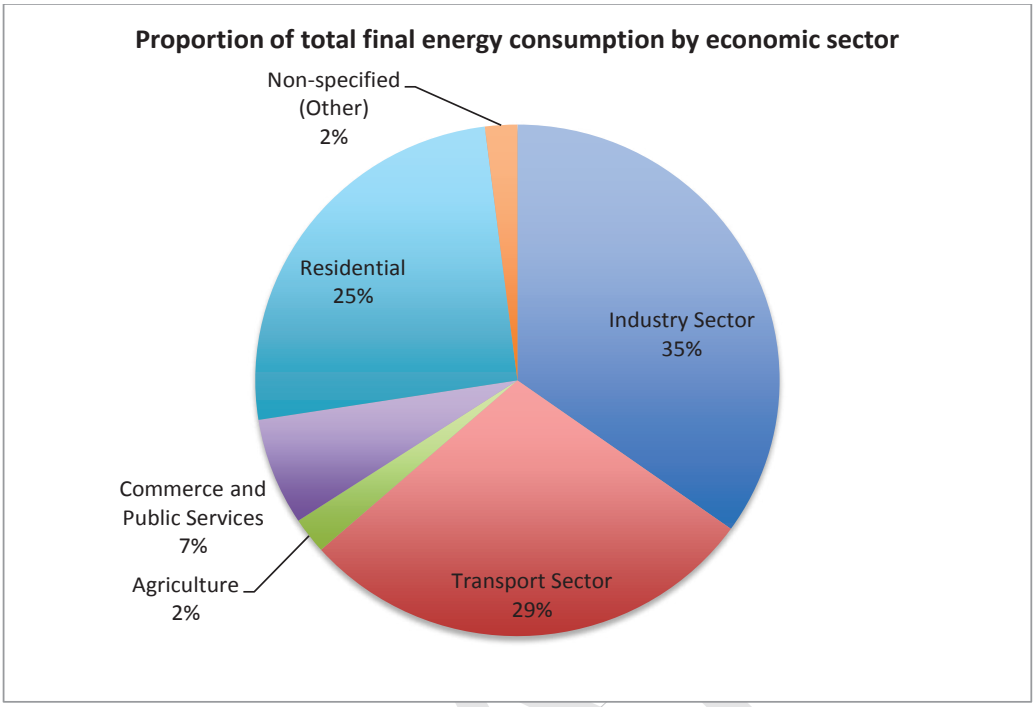
	2000	2012	% change in consumption
Coal	655 (33%)	401 (22%)	-24%
Petroleum products	731 (36%)	938 (42%)	+28%
Gas	40 (2%)	99 (4%)	+148%
Electricity	577 (29%)	698 (31%)	+21%
TOTAL	**2,003**	**2,236**	**+12%**

Note that these figures include the portion of total final energy consumption that is not attributable to any sector (referred to in the Energy Balance Table as 'Non-specified'), whereas this component has been excluded from the detailed analyses described below. Overall total figures may therefore not agree.

4.1.2. Energy consumption by sector

Three sectors denominate the total final energy consumption in South Africa: Industry & Mining, accounting for 35%; Transport, accounting for 29%; and Residential, accounting for 25%. The full sectoral breakdown of total final energy consumption, according to the 2012 Energy Balance Table, is shown in Figure 3 below. Note that the share of the residential sector is very strongly influenced by estimates of the total consumption of biomass in households. Although the sector shares in Figure 3 include the DoE's best estimate of biomass energy consumption, this quantity has been omitted from the detailed analyses described below. Overall total figures may therefore not agree.

Figure 3: Proportion of total final consumption per sector based on Energy Balance Tables (2012)



4.1.3. Energy intensity trends

As of 2012 (the most recent year for which aggregate data is currently available), the total final energy consumption of the South African economy stood at about 2,108 PJ, an overall increase of 4.8% from its 2000 baseline of 2,011 PJ. Over the same period, the total GVA[7] of South Africa's productive sectors increased by about 44%, from about R1,798 billion up to R2,588 billion, while the number of households increased by about 42% from an estimated 10.3 million in 2000 up to 14.6 million in 2012. Considering the productive sectors alone, energy intensity decreased from 1.02 MJ/R in 2000 to 0.73 MJ/R in 2012, equivalent to an annual compounded reduction in energy intensity of about 2.7%.

Figure 4 below shows how energy intensity has changed in each of the main sectors. In order to make these trends easier to observe, this graph shows five-year rolling average to smooth out the wide fluctuations sometimes seen between consecutive years. In addition, the figures have been indexed to the base year of 2004. The graph indicates that the commercial & public sector saw a substantial increase in energy intensity to 2009, after which it has fallen back to close to its 2000 level. The energy intensity of the transport sector has changed relatively little over the 12-year analysis period, while that of the other three sectors has fallen by significant and similar amounts, with their average energy intensity over the five years to 2012 being approximately 20% lower than for the five years to 2004.

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7 At constant 2010 prices

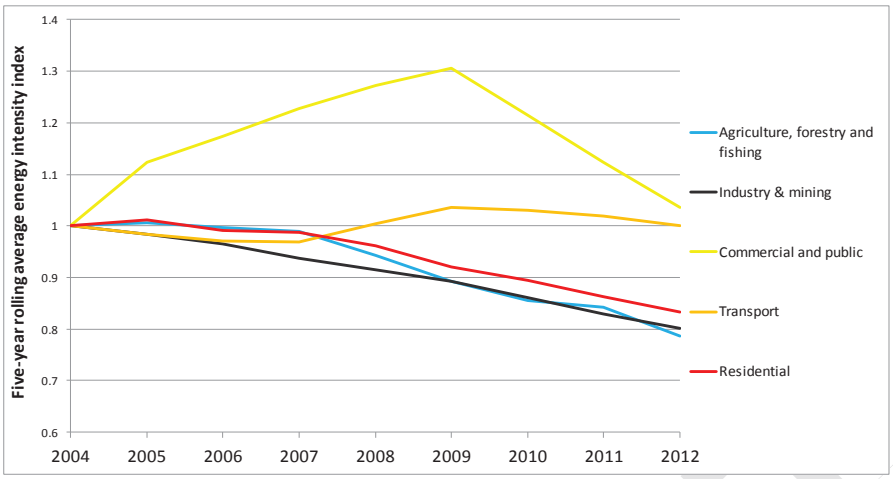

Figure 4 Trends in sector energy intensity. For clarity, five-year rolling average figures are shown in order to smooth out sharp fluctuations. Figures are expressed as an index relative to the value for 2004

4.2. Defining energy efficiency

The most strictly 'correct' definition of energy efficiency would be the ratio between the theoretical minimum energy requirement for performing task and the amount of energy actually used. However, this definition would be virtually impossible to apply on a large scale. Instead, energy efficiency is usually defined as the amount of useful output obtained divided by the energy used to produce that output. This is the reciprocal of a quantity that is generally referred to as 'energy intensity' – the energy used per unit of output obtained.

However, this apparently straightforward definition begs the question of how output is to be quantified. Output can be measured either in physical units (tonnes of steel produced, square metres of office space heated, etc.) or in monetary terms (value-added produced). For the purposes of this strategy, the use of the term 'energy intensity' generally implies the use of monetary units for measuring output. Where output is quantified in physical units, the term 'specific energy consumption' will be used. While a fall in energy intensity *may* signify an improvement in energy efficiency, it must be remembered that energy intensity can be affected by many factors other than changes in efficiency. Energy intensity is therefore only an imperfect proxy for 'real' changes in energy efficiency.

4.3. The energy efficiency opportunities

Considering energy efficiency as the 'first fuel' has direct effects on demand reduction, decreasing the costs of energy infrastructure expansion, and diminishing greenhouse gas (GHG) emissions. However, the benefits of energy efficiency are far-reaching. The improved trade balances and employment creation that can be achieved through energy efficiencies boost macro-economic development. As illustrated in the figure below, the benefits also extend to social, environmental, and financial gains at an individual, community or society level.

The introduction of energy efficiency measures in the industrial and commercial sectors has a direct impact on company competitiveness, productivity and profitability. According to the IEA, the value of the improvements in productivity and product quality can be as much as 2.5 times the value of the energy savings (IEA, 2011).

South Africa's standing as a regional centre for technology innovation, manufacturing and the supply of goods presents a unique and exciting opportunity. As energy efficiency becomes increasingly important for surrounding countries some of which have or are developing their energy efficiency strategies, such as Botswana and Malawi, there may be opportunities to export goods and expertise, boosting regional trade and fundamentally the South African economy.

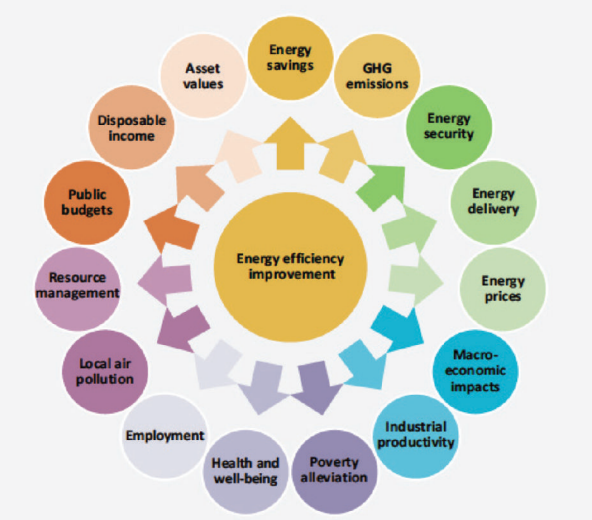

Figure 5: IEA multiple benefits of energy efficiency (IEA, 2014)

Energy security is extremely important for the continued development and growth. The improvement of energy efficiency in power generation reduces the need for additional, costly investments in expanding the infrastructure. If this results in improved affordability of services, it frees up disposable income within households, improving quality of life.

Non-electricity related energy efficiency measures, such as the use of improved biomass cook stoves, improve the indoor climate and reduce smoke inhalation-related illnesses.

As described in Section 1, significant progress has been made in improving energy efficiency since the 2005 NEES. However, despite the benefits, there are still significant barriers to further improving energy efficiency, including the economic downturn and decreases in commodity prices, which is reportedly encouraging industry and mining to focus on increasing throughput. Market failures, such as energy service companies that do not have the capacity to adopt innovative financing and technology solutions, the high costs of energy efficient appliances, and the negative incentive of high borrowing rates, reduce the uptake of energy efficient solutions. The work to address some of these failures has begun through the introduction of labelling of appliances and vehicles, and the introduction of energy efficiency standards for appliances and in buildings. However, more needs to be done.

Within the private sector, particularly in the energy intensive sub-sectors, the feedback from consultations indicates that many of the most easily achieved savings have been implemented. Without additional incentives, the payback period on investments to implement the more challenging savings is considered to be too long

for investors.[8] There are often operations and transaction costs of implementing energy efficiency measures, such as energy audit costs and time spent researching and discussing options, that are an added disincentive. The emphasis is mostly placed on expanding operations where possible, as increasing throughput is the highest priority for many businesses.

The 12L tax rebate mechanism for energy efficiency projects aims to trigger investments that are currently considered to have a weak business case. It is already apparent that this has been successful in sparking new interest in implementing projects, particularly following the recent increase in the level of rebate offered. However, the mechanism does preclude some key players that could make use of the incentive, such as real estate investment trusts (REITs) as they are not the final tax payer.

The planned introduction of a carbon tax during 2017 will put pressure on industry in particular to reduce their energy consumption and the indications are that the tax combined with increased electricity prices are placing a significant strain on the sector. The 12L and other suggested incentives will support industry in implementing energy efficiency projects that result in significant savings but are more challenging.

4.4. Energy efficiency potential in the South Africa

The efficiency savings made since 2000 illustrate that significant achievements have been made across particularly the industrial and residential sectors, primarily due to the reaction to increased energy prices and technology improvements.[9] Based on international comparisons and historical trends, there is potential to continue making improvements, some of which are happening autonomously.

The energy intensity of South Africa is higher than the other BRIC countries. In comparison to similar[10] economies, South Africa's industry sector is far from being amongst the worst performing, but is somewhat more energy intensive than Macedonia, Serbia and Australia, for example (Table 3 below).

Table 3: Industrial energy intensity – a comparison of South Africa with similar economies (World Bank, 2016)

	Industry sector energy intensity (MJ/$)	Relative to South Africa
Australia	2.8	0.67
Serbia	3.3	0.79
Macedonia	3.7	0.88
South Africa	**4.2**	
Brazil	6.1	1.45

[8] Based on stakeholder feedback during preliminary consultations, the significant measures that make business sense to invest in have largely been implemented. There are some less significant savings to be made (e.g. lighting).

[9] Energy Efficiency Target Monitoring System Report, 2015

[10] Similar economies in terms of economic activities and proportion of GDP from the industrial and mining sub-sectors.

China	6.3	1.50
Kazakhstan	12.0	2.86

Based on the current data that is currently available[11], the following energy savings potentials were identified, taking into account the historical trends and comparing this against international best practice. *The secondary data that was used as the foundation for the analysis were questioned on the basis that they are not reflective of the local context.* The potentials reflected below do not translate into targets, so a bottom-up approach has been used for the estimation of targets for each sector.

Industrial and mining sectors

In order to achieve the world average performance levels within the iron and steel industry, a reduction in specific energy consumption of 38% (from 24.3 GJ/tonne to 15GJ/tonne) would be required, based on South Africa's current technology mix in iron and steel production. Based on a comparison with international best practice, a 46% reduction in energy intensity (from 24.3 GJ/tonne to 13.2GJ/tonne) may appear to be possible for the industrial sectors if the improvements in specific energy consumption are also combined with the shift in the iron and steel production technology mix. However, the consultations with sub-sector representatives indicate that there are significant factors that affect the feasibility for the iron and steel sector to achieve these potentials, specifically due to the quality of coal available to the processes.

For the various mining sub-sectors that includes coal, gold, platinum and other non-ferrous metals an overall energy savings of 8.7% (6.4PJ or 1.43TWh) could be achieved by conforming to best practice methods. However, if further research and development (R&D) activities are undertaken, particularly in grinding techniques, an overall energy saving of 24.5% (18PJ or 5TWh) could be achieved. Consultations with the Chamber of Mines and some of its members highlighted the challenges for underground mining in achieving energy efficiencies. As excavation goes deeper, specific energy consumption increases.

Transport sector

Due to the lack of data for the transport sector, a number of assumptions were made to establish the savings potentials that could be realized by 2030. As described below, the range of savings potentials is wide. The passenger vehicle parc average fuel economy (taking into account the mix of vehicle vintages; their corresponding fuel economies and annual mileage) ranges from an improvement of 16% to 31% (gasoline cars). The CO_2 intensity for transport sector improves by between 3% and 27% for passenger vehicles. The potential for improvements in freight are between 18 % and 37%.

[11] The following analysis made use of existing data, including the Green House Gas mitigation studies produced by the Department of Environmental Affairs, and analysis of municipal energy savings potentials by Surya Power. Refer to the Energy Savings Potential report (September 2015) for further information.

Residential sector

Three energy savings opportunities were identified as having sizeable potential, appliances, lighting and buildings. Significant energy savings are possible if the Solar Water Heating (SWH) and Mass Roll Out (MRO) programmes are continued within the residential sector. From the period of 2010-14, 600 GWh of electricity has been saved through the SWH programme resulting in an abatement of 630 kt of CO_2 emissions. Through the MRO initiative a saving of 729 GWh of electricity and an abatement of 765.45 kt of CO_2 has been achieved.

The electricity savings (12.1 TWh) proposed within the cost effective scenario would contribute to roughly 20% of revised 2030 baselines. These savings would then translate to roughly 12.75 Mt of CO_2 emissions. The proposed savings would mean a 6.8% decrease in household electricity intensity between 2010 and 2030.

Energy efficiency possibilities using passive thermal design could bring about additional energy efficiency of around 5% within the residential sector. The costs associated with refurbishment are cited as the low applicability and uptake of this measure. Improving the energy efficiency of new buildings is much more cost-effective than the refurbishing existing building stock. Therefore, improving the existing building codes are a priority and should be emphasised as part of the National Energy Efficiency Action Plan (NEEAP).

In the case of the residential sector, within the lower income households, the use of biomass for cooking is significant. Within LSM1 (the lowest bracket of the 'Living Standards Measure' stratification system developed by SAARF[12]), biomass fuels are used for both cooking and water heating by 60% of households (EETMS, 2015). Supporting the propagation of energy efficient cooking technologies has the potential to reduce the consumption on wood by between 40-60%[13], equivalent to a saving of about 10PJ for the residential sector if these savings were achieved in all households using woodfuel. The contribution to overall efficiency is not significant, because only about 7% of households in total depend on wood for cooking. However, the impact of these savings on the individual households affected is potentially huge, not only in terms of money, time and effort, but also the added health and environmental benefits from the reduction of indoor pollution. Note that the potential for savings from more efficient biomass stoves will continue only while the low LSM households do not have access to modern energy sources such as electricity and / or liquefied petroleum gas (LPG).

Public and commercial sector

End-use energy consumption within the public building sector is expected to increase to 125.13PJ in 2030 from 62.4PJ in 2012 levels. These increases can be curtailed by 19.7PJ, which is a decrease of roughly 16%, by conducting refurbishments and interventions in space heating, lighting and improved building practices based on the current version of the SANS10400-XA. Future tightening of the standards and enforcement would achieve greater savings, provided they are

[12] South African Audience Research Foundation – see for example http://www.saarf.co.za/lsm/lsms.asp

[13] http://cleancookstoves.org/resources_files/household-cookstoves-1.pdf

enforced. A reduction of 4.21 Mt of emissions can be achieved via interventions, mainly through solar water heating and roof top photovoltaic systems. The largest potential of saving is from the new stock of office building category and renovations to existing stock, although the most cost-effective is in addressing the new stock.

Within municipal services, based on interventions in a sample of major municipalities, energy savings of 47% for bulk-water supply and water treatment, 32% for the municipal vehicle fleet, 25% for street lighting and 16% for buildings and facilities could be achieved.

Utilities sector

Considerable reductions in coal usage (22.9%), CO_2 emissions (15.5%) and overall electricity usage (15.7%) can be achieved by the year 2030 within the electricity (utilities) sector, if the savings scenario that constitutes a greater share of renewable technologies and advanced coal technologies, is considered.

The overall thermal efficiencies of the power plant can be improved from the current average of 33% to roughly 38% by the year 2030 with the inclusion of super critical boiler higher efficiency coal power plants and integrated gasification combined cycle (IGCC) type power plants. Retirement of older power plants, particularly return-to-service plants, will improve overall power efficiency.

It is estimated that 18% of electricity that is bought from Eskom by municipalities is lost. Based on data provided by Eskom, 22,351 GWh were lost in 2013 in distribution and transmission. The City of Johannesburg has distribution losses of 22%, which comprise both technical and non-technical losses (i.e. illegal connections, inaccurate billing, defective meters, etc). Some municipalities report distribution losses of between 30-40%. Converting long distance transmission lines to a higher voltage or underground cables, which are capital-intensive measures, can reduce transmission losses. Distribution losses can be reduced by minimising theft and tampering via the means of social awareness and programmes.

Agricultural sector

Though the agricultural sector accounts for only 3% of total energy consumption, energy savings measures can bring relief to farmers from rising electricity prices and volatile fuel prices. Major energy consuming activities in the agricultural sector include traction and irrigation. Activities related to traction are mostly petroleum product based whereas irrigation relies on electricity.

Case studies from South American onion cultivation have shown possible fuel savings of 44% by optimising ploughing and raking activities. Fuel savings of roughly 15% can be achieved by regularly maintaining traction equipment. The potential of savings by the means of fuel switching to various blends of biodiesel needs to be investigated.

Case studies in South African farms, where variable speed drives were fitted to pumps used for irrigation and water transfer, were seen to achieve roughly 40% savings in electricity consumption.

5. Pathway to realising South Africa's energy efficient future

By combining fiscal, legal and regulatory, institutional and financial initiatives the Strategy outlines a sectoral approach that will deliver results. A package of measures is described for each sector to address the identified barriers to realising the untapped savings potentials. Each package is framed by a goal(s) and target(s), which link them to the Results Framework in Annex A. This Results Framework presents a 'chain of causality' that outlines the expected outcomes of the measures and the impacts likely to result at the sectoral and economy-wide level.

In order for the DoE to assess its performance, it is necessary to specify targets in a way that is useful and relevant. Where policy measures are operating in synergy as part of an integrated package, it makes little sense to define targets relating to each measure, since it may be impossible or at least impractical to disentangle the effects of the individual measures. However, it is equally unhelpful to set targets at too aggregated a level, because the causal link between the actions taken and the effects observed is then insufficiently direct. This would make it difficult to determine whether the actions have been successful, or whether the observed effects are actually due to some exogenous influences. The targets have therefore been specified in a way that makes them both relevant and feasible to monitor.

The following sections describe the packages of measures for each sector, and an explanation of the basis for the setting of each of the sector targets. In general, the levels at which the targets have been set derive from a combination of the expected effects of the policy measures proposed, plus the estimated effects of the continuation of existing policy measures and an assumed level of autonomous change. Details of the assumptions and approximations underlying these figures are given in Annex D.

Estimates have also been made of the likely sectoral and economy-wide impacts of achieving the targets, in terms of the percentage changes in total final energy consumption that would be revealed by a decomposition analysis conducted in 2030.

The indirect measures that support the successful implementation of the Strategy, ensuring that the institutional framework is in place, are described in Section 6.

5.1. The public sector

PUBLIC BUILDINGS

Goal	**Accelerate the current rate of improvement in the energy consumption per square metre in buildings occupied by the public sector at the national, provincial and municipal levels**
Target	**A 50% reduction in the specific energy consumption (measured as GJ annual energy consumption per m² of occupied floor area) by 2030 relative to a 2015 baseline.**

The Measures

The public sector in South Africa has begun the process of institutionalising the principle of "Leading by Example", which aims to address energy efficiency across national and provincial buildings owned or occupied by government. Although the contribution of the public sector to final energy consumption is only 2-3% of the total, the government recognises the importance of leading by example, demonstrating a commitment to improving efficiency across the public sector. The significant civil service workforce (over 2 million civil servants in 2014[14]) presents an opportunity not only to improve the performance of buildings used by government but also to raise awareness among the civil service.

The two main themes of the package of policy measures for the public sector are therefore to build institutional energy efficiency culture, both within the sector but also in the interface with its clients, and to substantially reduce the average specific energy consumption of the stock of buildings owned or rented by the government.

The "Leading by Example" brand is being developed within the Department of Public Works and supports the programmes of building retrofits, raising awareness and greening of procurement. The Department of Energy intends to take the opportunity to ***develop the brand*** across all government departments, raising the awareness of all government employees of their role in improving energy efficiency and tasking them to make those improvements. This will require that energy efficiency becomes a component of the organisational culture. There is also significant potential to improve public understanding of energy efficiency and influence user behaviour through the mainstreaming of energy efficiency across the public-facing services provided by the sector. For example, the introduction of energy awareness in the national school curriculum, the display of notices in hospitals and clinics, and for municipalities to be a conduit to share energy saving advice with their residents (described further in Section 5.2). A strong element of this culture will be the identification of energy champions in each government department at national, provincial and municipal levels, who will be tasked to drive the initiative forward.

For public buildings, the current initiatives to improve energy efficiency within buildings will be continuously improved and increase in the level of ambition. The energy efficiency of new buildings will be driven by means of ***successive tightening of building standards*** throughout the Strategy period. The intended trajectory for the tightening of standards is being formulated and will be announced well in

[14] Quarterly Employment Statistics, Statistics South Africa, June 2014

advance, to provide sufficient time for both the construction industry and government officials responsible for ensuring compliance to adapt. This will improve energy performance of the new stock of buildings that are either built or bought by the public sector.

The mandatory display of ***energy performance certificates*** (EPCs) in government owned properties is currently being implemented. This will be extended to buildings being rented by government on signing of a new lease. To support this, ***green leases*** will become a standard requirement for all properties rented by the public sector on the uptake of new leases, specifically requiring the provision of information on resource consumption to the building occupiers in managed properties. The nomination of trained energy managers for each publicly owned building will ensure that energy use is being proactively addressed and improve the availability of data for monitoring purposes.

The introduction of ***green procurement*** has been initiated within the DPW and will include life-cycle assessments. The intention is to roll this out across government, reflecting our commitment to reducing the adverse environmental impacts of the goods and services that are purchased.

Mandatory labelling is already in place, and minimum energy performance standards (MEPS) have been introduced or are proposed for most of the major categories of *household* appliance. ***Broadening the scope of mandatory labelling and MEPs*** to cover appliances that are commonly used in the public sector (such as large-scale cooking and heating appliances) will facilitate the implementation of green procurement. In order to ensure that appliance manufacturers and suppliers are able to respond positively to tightening standards, the intended additional categories of equipment and the trajectory for tightening the MEPS will be announced well in advance.

The feasibility will be explored of introducing an ***energy endorsement label*** to run alongside the existing system of comparison labels for appliances. Endorsement labels are designed to provide purchasers with a simple yes/no indication that an endorsed product is among the most energy efficient in its class and could be used as a procurement criterion for the public sector. Experiences in several other countries suggest that a strongly branded endorsement label (of which the 'Energy Star' brand is the most famous) may be a valuable complement to the system of comparison labels already in place.

The renovation of existing building stock in the public sector will require considerable investment. With this in mind, ***innovative financing models*** will be explored for the public sector, such as encouraging partnerships between local and international energy service companies (ESCOs) to secure the financing for large-scale renovations. The feasibility of establishing an ***'ESCO Incubator'*** will be assessed. This would be a public sector body, the main function of which is to implement large public-sector projects through energy performance contracting, using local private sector ESCOs as sub-contractors. Other key functions of an ESCO Incubator may include: providing loans or equity finance for smaller energy performance contract projects, development of standardised energy performance contracts, technical assistance for project development, training and accreditation of ESCOs (see Section 6), developing databases of approved equipment and materials. Although

government would provide the core funding for establishing an ESCO Incubator, this would leverage additional funds from the private sector and from international financing institutions (IFIs) and international donors. This model therefore provides a more cost-effective use of public funds for achieving energy savings in public buildings compared with the provision of direct grants.

Basis for the Target

The target proposed for public buildings is for a 50% reduction in the specific energy consumption (annual energy consumption per m^2) of lettable / habitable floor area across the sector.[15] This target is based on an assumption that successive tightenings of building standards will result in reductions in specific energy consumption of 49% for half of the new buildings added between now and 2030, and 67% for the other half. A concerted programme of eco-refurbishment for buildings that were constructed before 2015 is assumed to result in improvements in specific energy consumption averaging 35%. The weighted mean of these improvements across the whole 2030 building stock gives an overall reduction in specific energy consumption of 50%.

MUNICIPAL SERVICES

Goal	**Accelerate the reduction in the specific energy consumption per resident in delivering municipal services**
Targets	**A 20% reduction in the energy intensity (measured as energy consumption per head of population served) of municipal service provision. The specific services included are streetlighting, traffic lights, water supply and wastewater treatment.**
	A 30% reduction in the fossil fuel intensity of municipality vehicle fleets (measured as total fossil fuel consumption by municipal vehicles per head of population served)

The Measures

The Energy Efficiency Demand-Side Management (EEDSM) programme established by the Department of Energy has been delivering grants to 68 municipalities in South Africa since 2009. The cumulative energy saved as a result of the programme based on projected targets is approximately 1.8 PJ, mainly through street lighting retrofits. The potential for energy saving is considered to be significant based on the measures identified under the EEDSM programme. The Local Government Energy Efficiency and Renewable Energy Strategy developed in 2013 defines a framework under which local government develop their individual energy efficiency approaches. The strategy covers the governance framework, energy efficiency in the provision of services, improving household energy access, improving energy efficiency at end use level, and energy efficiency in spatial planning, amongst other things. Several municipalities have taken the initiative to develop strategies but there is potential to

[15] Although the target for buildings would ideally separate the anticipated improvements from new and existing buildings, this is not possible based on the data that is available and the complexity of the data collection required for monitoring purposes. However, the strategy recognises that the stakeholders involved and the process of addressing the types of measures that relate to new and existing buildings differ.

do much more. Municipalities have up to now identified isolated measures and do not have adequate data to understand their energy use profile.

The measures for municipal services address the need for a holistic approach to energy efficiency as a municipality, and the provision of support to implement the identified energy saving opportunities. The basis of the approach is to empower municipalities to identify the measures that are feasible and bring about the greatest return, both in terms of energy savings and on investment, and to source funding through a variety of mechanisms, rather than relying on the grant mechanism.

Municipalities will be required to submit ***energy efficiency strategies***, which will be informed by a comprehensive energy audit of their services and activities, and aligned with the provincial strategies.

On the basis of the energy audit and municipal strategy, the DoE will assist municipalities in developing energy management plans, associated business plans and financing proposals to source financing for the measures that are prioritised. By demonstrating clearly the current consumption patterns and potential for savings***, alternative financing mechanisms*** could be exploited, such as energy performance contracts with private sector ESCOs, reducing the investment burden on the government and the municipality.

To contribute to the development of the "Leading by Example" brand, municipalities will participate in an ***energy-rating scheme***. This could be incorporated into existing schemes that are recognised in South Africa, such as the green star rating. The emphasis will be on establishing a system that reflects the diversity of municipalities (in terms of population density, standard of living, population, etc.) and the energy efficiency of the services they offer.

Basis for the Targets

Two targets are proposed for the municipal services sector:

- 20% reduction in the energy intensity (measures as energy consumption per head of population served) in the provision of electricity-intensive municipal services (namely, street lighting, traffic lights, water supply and wastewater treatment)
- 30% reduction in the fossil fuel intensity of municipal vehicle fleets (measures as total fossil fuel consumption per head of population served).

The municipal services target is based on results of a simple spreadsheet model for estimating the potential savings from retrofitting streetlights and optimising pumping systems between now and 2030. The estimates were adjusted to take account of the savings that have already been achieved to date through the EEDSM programme.

The vehicle fleet target is based on the assumption that a 20% improvement in the technical efficiency the fleet (as per the Transport Sector target) is complemented by additional savings of 10% from a combination of driving training, optimising vehicle usage and substitution of alternative fuels.

5.2. The residential sector

Goals	Transform the market for household appliances in favour of more energy efficient models
	Substantially reduce the average specific energy consumption of the stock of residential buildings
Targets	A 33% reduction in the average specific energy consumption of new household appliances purchased in South Africa by 2030 relative to a 2015 baseline
	A 20% improvement in the average energy performance of the residential building stock by 2030 relative to a 2015 baseline, as measured by the energy consumption (excluding plug loads) per square meter of habitable space.

The Measures

South Africa's residential sector currently consists of about 16 million households, a number that is expected to increase to 19-20 million by 2030. The National Development Plan (NDP) emphasises the need to ensure that this growth in household numbers is accompanied by improved living standards and reductions in energy poverty and income inequality. As a consequence, the next 15 years will see a huge increase in the rate of ownership of household appliances, with many households acquiring a range of appliances for the first time. The NDP also commits to the provision of adequate housing for all, while the Department of Human Settlements (DoHS) has committed to ensuring that the goal of delivering affordable housing in sufficiently large volumes to meet the needs of the poor does not lead to compromises with regard to the energy efficiency of homes.

The two main themes of the package of policy measures for the residential sector are therefore to transform the market for household appliances in favour of more energy efficient models, and to substantially reduce the average specific energy consumption of the stock of residential buildings.

For household appliances, mandatory labelling is already in place, and minimum energy performance standards (MEPS) have been introduced or are proposed for most of the major categories of appliance. ***Successive tightening of appliance MEPS*** will ensure that the market is continually pushed in the direction of improved energy efficiency for the duration of the Strategy period. In order to ensure that appliance manufacturers and suppliers are able to respond positively to tightening standards, the intended trajectory that MEPS will follow will be announced well in advance.

While MEPS provide a "market push", appliance labelling aims to pull the market towards improved energy efficiency by providing consumers with the information they need to choose more energy efficient models. The feasibility will be explored of introducing an ***energy endorsement label*** to run alongside the existing system of comparison labels for appliances. Endorsement labels are designed to provide appliance purchasers with a simple yes/no indication that an endorsed appliance is among the most energy efficient in its class. Experiences in several other countries suggest that a strongly branded endorsement label (of which the 'Energy Star' brand is the most famous) may be a valuable complement to the system of comparison labels already in place.

While appliance MEPS and labelling are expected to have a strong influence on the energy efficiency of new appliances, their effect may be significantly weakened if older, less efficient appliances are not removed from the stock of equipment in use. In particular, many lower-income households acquiring appliances for the first time may be tempted to purchase second-hand items which, although costing less up-front, will lock the owners into several years of higher energy bills. The feasibility of a ***scrappage scheme for appliances*** will therefore be investigated, whereby householders are incentivised to ensure that old appliances are disposed of (for example, by offering a trade-in against the purchase price of a new appliance).

For residential buildings, continuous improvement in the energy efficiency of new dwellings will be pushed by means of ***successive tightening of building standards*** throughout the Strategy period. As with appliance MEPS, the intended trajectory for the tightening of standards will be announced well in advance, to provide sufficient time for both the construction industry and the municipal officials responsible for ensuring compliance to adapt. For smaller municipalities in particular, this measure will probably require some degree of capacity building to be provided for building control officers. Efficient enforcement will also be a crucial element of strengthening compliance, which implies the need for effective sanctions for builders and authorities that fail to comply.

The issuing of mandatory ***energy performance certificates*** (EPCs) for new construction provides a simple means of checking compliance with building standards. The cost-effectiveness and feasibility of introducing EPCs for existing dwellings will also be assessed (possibly on a voluntary basis initially), which would serve to provide a market pull in favour of more efficient buildings. A range of options may be explored, including incentivising the obtaining of an EPC through a small rebate on Transfer Duty to partially cover the cost, or making EPCs mandatory upon the transfer of a property. Mandatory EPCs will be considered for the rental sector, where the issue of split incentives is likely to limit the extent to which energy efficiency interventions take place. This would be consistent with the NDP, which acknowledges that insufficient attention has been paid in the past to the importance of the rental and social housing.

The aim of EPCs for residential buildings is to influence the property market through a price premium on more energy efficient homes, which would give householders an additional incentive (as well as the direct energy cost savings) to invest in energy efficiency measures with a longer payback period. However, experience from some countries suggests that this internalisation of energy performance into the property market is slow and uncertain. Consideration will therefore be given in the medium-term to the provision of ***financial incentives to undertake thermal improvements*** of existing residential buildings. These may take the form of direct grants for lower income groups, partial grants, low-interest loans, or rebates against Transfer Duty when the property is next sold.

To ensure that households are able to respond positively to market signals, programmes of ***awareness-raising and the provision of information*** will continue to be implemented, building on the Department of Energy's recently initiated energy efficiency campaign as well as other successful initiatives such as Eskom's 49M campaign, the energy education material developed by Eskom in partnership with the Department of Education, the Department for Environmental Affairs 'MY2050'

calculator and the Eskom / WESSA (Wildlife and Environment Society of South Africa) resources on sustainable energy for use in schools the community.

A possible future direction for awareness-raising efforts is to ***engage municipalities in developing and disseminating materials*** that are specifically targeted at local populations. This is likely to be particularly important for lower income groups for whom energy consumption patterns have a disproportionately strong influence on the quality of life of the lowest income households. Firstly, energy costs constitute a much larger fraction of total household expenditure in low-income groups[16]; hence the inefficient use of energy represents a heavier financial burden for poorer households. Secondly, the types of energy carrier that are prevalent in low income households lead to a wide range of adverse effects (e.g. indoor air pollution, fire risks). Because the technologies used for cooking, water heating and space heating by the lowest income groups are not amenable to regulation or efficiency standards, the provision of targeted information and awareness-raising is likely to be the most effective means for bringing about improvements in efficiency and accelerating a shift towards more modern energy technologies such as SWHs and LPG.

Given the success of the Department of Energy's Energy Efficiency Demand Side Management programme in mobilising municipalities to deliver energy savings in municipal services, opportunities will also be explored for municipalities to play a direct role in achieving energy efficiency improvements in the residential sector. Areas where the involvement of municipalities may enhance the delivery of household energy efficiency programmes include:

- using their purchasing power when implementing retrofits on their own buildings to bulk-procure equipment and materials that is then made available for use in local residential sector projects
- facilitating the formation of residents' action groups as vehicles for the bundling of individual household energy efficiency project into packages that may be more attractive to local contractors

As described in the section 'Generation and distribution' below, consideration will also be given to placing an ***energy savings obligation on distributors*** of energy. Such obligations would require municipalities, in their role as suppliers of electricity, to implement measures to bring about energy savings among the customers they serve – in particular, household customers. Since the sale of electricity to residential consumers is an important source of municipal income, the design of an obligation scheme would need to ensure that successful implementation does not reduce the income stream of municipalities to the extent that the delivery of other key services is compromised.

Basis for the Targets

Two targets are proposed for the residential sector:

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[16] According to the StatsSA report "Income and Expenditure of Households 2010/11", households in the lowest expenditure decile spend 6.4% of their total household expenditure on energy, versus 1.7% for those in the highest expenditure decile.

- 33% reduction in the average specific energy consumption of new household appliances purchased
- 20% improvement in the average energy performance of the residential building stock

The appliances target is based on an assumption that there will be two successive tightenings of minimum energy performance standards (MEPS) between now and 2030, as described in Annex D. The overall targeted reduction in average specific energy consumption is derived from a weighted mean of the individual reductions by appliance type, weighted according to expected sales.

The buildings target is based on a combination of a 38% average improvement in the energy performance of new buildings by 2030 through tightening of building standards[17], and a 15% improvement in the thermal performance of dwellings built before 2015, achieved through thermal retrofits. Since new dwellings built after 2015 are expected to account for 20% of all homes by 2030, the weighted mean of the two factors described above leads to an overall average improvement of approximately 20% across the whole 2030 stock of buildings.

[17] Based on a low turnover of residential building stock than in the commercial and public sectors.

5.3. The commercial sector

Goal	**Accelerate the current rate of improvement in the energy consumption per square metre of lettable/ inhabited floor space in the commercial sector**
Target	**A 37% reduction in the specific energy consumption (measured as GJ annual energy consumption per m² of lettable / habitable floor area) by 2030 relative to a 2015 baseline**

The Measures

The commercial sector in South Africa includes a very broad range of activities, including wholesale and retail trade, the motor trade, the hospitality industry, and a range of business services. The commercial sector accounts about 4-5% of total final energy consumption, primarily in the form of electricity. Due to the varied nature and scale of the activities, measures for the commercial sectors have generally focused on improving the energy efficiency of the building envelope. SANS 204:2011 and SANS 10400-XA address the efficiency standards to be reached by new buildings (notwithstanding the need for a significant tightening of SANS 10400-XA at the earliest opportunity). However, as with other buildings sectors, the energy efficiency in the existing building stock is challenging to address. The commercial property sector has been specifically active in improving energy efficiency, specifically of managed buildings for which the landlord is responsible for energy bills.

The two main themes of the package of policy measures for the commercial sector are therefore to continue the significant progress made by tightening regulation, and providing financial incentives to improve the business case for deeper improvements.

For commercial buildings, the current initiatives to improve energy efficiency within buildings will be continuously improved and the level of ambition increased. The energy efficiency of new buildings will be driven by means of ***successive tightening of building standards*** throughout the Strategy period. The intended trajectory for the tightening of standards is being formulated and will be announced well in advance, to provide sufficient time for both the construction industry and government officials responsible for ensuring compliance to adapt.

The mandatory display of ***energy performance certificates*** (EPCs) in buildings will be extended to all rented commercial properties. The introduction of ***green leases*** in buildings occupied by public sector institutions is likely to make these leases more commonplace (see Section 5.1). These measures need to be accompanied by awareness raising in the sector to stimulate demand for greater efficiency in buildings, thereby affecting market prices.

Mandatory labelling is already in place, and minimum energy performance standards (MEPS) have been introduced or are proposed for most of the major categories of *household* appliance, some of which may also be used in the commercial sector. ***Broadening the scope of mandatory labelling and MEPs*** to cover appliances that are commonly used in the commercial sector (such as large-scale cooking appliances, refrigeration, space heating, ventilation and air conditioning) will gradually improve overall appliance efficiency as they are replaced. In order to ensure that appliance manufacturers and suppliers are able to respond positively to

tightening standards, the intended additional categories of equipment and the trajectory for tightening the MEPS will be announced well in advance. Where the use of specific types of appliances is considered to having a significant effect on energy consumption in the commercial sector, a ***scrappage scheme*** could be considered to encourage the replacement of old appliances however sector-specific research would need to be performed by the innovation hub (see Section 6) to identify the significance of the potentials and understand the implications of this.

The feasibility will be explored of introducing an ***energy endorsement label*** to run alongside the existing system of comparison labels for appliances. Endorsement labels are designed to provide purchasers with a simple yes/no indication that an endorsed product is among the most energy efficient in its class. Experiences in several other countries suggest that a strongly branded endorsement label (of which the 'Energy Star' brand is the most famous) may be a valuable complement to the system of comparison labels already in place.

The renovation of existing building stock in the commercial sector is challenging as, for the most part, tenants are responsible for the energy bills, removing the incentive for landlords to take action as they do not see a return on the investment. Therefore, until the display of EPCs has an affect on demand for greater energy efficiency in the commercial sector, ***alternative financing solutions*** need to be exploited. The 12L, which currently cannot be accessed by property trusts, will be reviewed to establish how it can become relevant for the commercial sector. However, the business case for deeper energy efficiency retrofits may require a specific incentive mechanism, targeting large impact initiatives, where the incentive is provided to ESCOs to achieve high levels of savings, while levels of activity are maintained.

Basis for the Targets

The target proposed for the commercial buildings sector is a 37% reduction in the specific energy consumption (annual energy consumption per m^2) of lettable / habitable floor area across the sector. This target is based on an assumption that successive tightening of building standards will yield an average improvement in specific energy consumption across all new buildings of 54% by 2030. Retrofits of existing buildings are assumed to result in an average improvement in specific energy consumption of 20%. Since new buildings are assumed to account for half of the 2030 building stock, the weighted mean of these improvements in a 37% reduction in specific energy consumption across the whole sector.

5.4. The industry and mining sector

Goal	**Create an enabling environment for the full exploitation of energy efficiency opportunities across the manufacturing and mining sectors**
Targets	**A 16% reduction in weighted mean specific energy consumption in manufacturing by 2030 relative to a 2015 baseline**
	A cumulative total annual energy saving of 40 PJ arising from specific energy saving interventions undertaken by mining companies

The Measures

South Africa's industry and mining sector accounted for about 23% of total GDP in 2014, and employed around 2.2 million people. As of 2012, the sector was responsible for about 34% of the country's total final energy consumption. The iron & steel industry and the mining industry each accounted for about one-fifth of the sector's total energy consumption, while non-ferrous metals, non-metallic minerals and chemicals were together responsible for a further 27% of consumption.

At about 12 MJ per US$ of value-added in 2012, the energy intensity of manufacturing in South Africa was over twice the average level in the European Union. However, international comparisons of this kind must be approached with caution because of the widely differing circumstances in different countries. In fact, a study by the International Energy Agency suggests the scope for energy savings beyond business as usual is a relatively modest 10% by 2030. Most of this potential exists outside of the main energy intensive processes (blast furnaces, smelters, cement kilns etc.), in areas such as heating, ventilation and air conditioning (HVAC), lighting, generic motor-driven systems and energy management.

The focus of the industry and mining sector policy measures is to build on the significant progress already being made by the front-runners, while creating an enabling environment for all players within the sector to fully exploit all available cost-effective energy efficiency opportunities. Shorter-term actions are particularly important, to ensure that the whole sector is equipped to respond effectively to the current challenges of the current global economic climate and rapidly increasing electricity prices.

Current efforts to ***promote the widespread adoption of energy management systems*** (EnMS) will be continued. The mandatory preparation and submission of energy management plans will be introduced for enterprises whose annual energy consumption exceeds 180 TJ. Alongside this, a second phase of the previously successful UNIDO Industrial Energy Efficiency programme will continue to mainstream the introduction of EnMS through capacity building, policy development and demonstration projects. To support and complement these efforts, consideration will be given to the development of appropriate schemes to incentivise the introduction of EnMS and ISO 50001 certification, particularly among enterprises that are not directly reached by the Industrial Energy Efficiency (IEE) programme and are not covered by the regulation for mandatory energy management plans.

The approach of providing a comprehensive service of ***targeted advice, information, assistance and subsidised energy audits*** has proved successful in

South Africa. The Private Sector Energy Efficiency (PSEE) programme run by the National Business Initiative provided such a service, but it ended at the end of 2015. Potential sources of funding, effective delivery mechanisms and an appropriate hosting body will therefore be identified to allow the development of a permanent successor scheme to PSEE, particularly focussing on the needs of small and medium-sized enterprises (SMEs). Recognising that improved energy efficiency impacts positively on the financial strength of SMEs, the potential role of the banking sector as delivery agents will be explored. Consideration will also be given to integrating the provision of these services into the broader functions offered by the proposed sectoral innovation hubs (See Section 6).

While the provision of advice and audits and the wider adoption of EnMS are important in increasing awareness of the opportunities for improved energy efficiency, significant energy savings will result only if these initiatives are coupled with programmes and measures to enhance the flow of investment into energy efficiency. At present, this role is being fulfilled mainly by the Green Energy Efficiency Fund (GEEF) operated by the Industrial Development Corporation, since both the Manufacturing Competitiveness Enhancement Programme and much of Eskom's Integrated Demand Management are currently on hold. The Department of Energy will therefore continue to collaborate with the National Treasury, the Department of Trade and Industry and other government departments, with international financial institutions and donor organisations, with the local banking sector and with industry sector stakeholders to ensure that appropriate and effective ***financing schemes for energy efficiency*** continue to be developed and sustained.

The 12L tax incentive scheme will remain a key component of the Department of Energy's approach to encouraging energy efficiency improvement in the industry and mining sector. The uptake of 12L is likely to improve following the recent increase in incentive levels and the extension of eligibility to include cogeneration projects. However, it is recognised that a number of outstanding issues limit the attractiveness of the scheme to some of its intended target group. Efforts are currently in progress to address these constraints, and in particular to streamline and simplify the monitoring and verification (M&V) procedures. Moving forward, a process will be put in place for the ***continued review and improvement to the 12L scheme***, to ensure that it remains effective and relevant. Associated with this, work will continue with the Measurement and Verification Council of South Africa, South African National Accreditation System (SANAS) and other key stakeholders to facilitate the continued development of a dynamic and competitive monitoring and verification (M&V) sector.

Minimum energy performance standards (MEPS) for industrial electric motors and motor-driven systems have been shown to be effective in many parts of the world. However, the impact of MEPS may be constrained if they are introduced in isolation, so they will be introduced as part of a wider coordinated approach to transforming the market for industrial electric motors. This will also include: awareness-raising and support relating to the importance of overall system optimisation; tighter regulation of the motor rewinding industry; the use of differential import duties to reduce / eliminate the price differential between standard and premium efficiency motors. MEPS may also be extended to include packaged motor-driven systems (pumps, compressors, fans etc.).

For industrial boilers, MEPS are impractical because of the wide range of different operating conditions under which boilers are used. Instead, a more effective means of ensuring satisfactory levels of performance are achieved is to specify mandatory minimum design standards. These would generally require the inclusion of design features such as combustion controls, an economiser and a variable speed drive on the combustion air blower. The feasibility will therefore be explored of introducing ***mandatory minimum design standards for industrial boilers*** in South Africa.

While MEPS / mandatory design standards will ensure that the worst-performing devices are removed from the market, the process of energy efficient procurement would be greatly simplified with the use of a simple, well-recognised ***endorsement label for high energy performance*** to run alongside MEPS. The most well known example of this is the Energy Star brand in the US, which provides an independent and trustworthy indication that the device in question is among the best-performing in its class. The feasibility of developing a clearly branded endorsement label specific to South Africa will therefore be evaluated.

Basis for the Targets

Two targets are proposed for the industry & mining sector:

- 16% reduction in the weighted mean specific energy consumption of manufacturing
- 40 PJ cumulative annual saving from energy efficiency interventions in mining

The manufacturing target is based on an assumption of an average 5% energy saving in the energy-intensive process-specific activities (e.g. blast-furnaces, smelters, cement kilns etc.) along with an average 35% saving in generic energy-using activities (HVAC, lighting, pumps, conveyers etc.) including the effects of behavioural change.

The mining sector target is based on an estimate of the typical savings achieved by the major mining companies over recent years combined with a synthesis of their stated energy saving targets expressed for the near future. Note that the mining target is expressed as a bottom-up summation of the effects of individual energy savings initiatives, because neither specific energy consumption (energy per unit of product mined) nor energy intensity (energy per unit of economic output) is a satisfactory proxy for energy efficiency in mining.

5.5. The agriculture sector

Goal	**Contribute to the modernisation of the sector and the rebuilding of an inclusive rural economy by addressing the inefficient use of energy in agriculture**
Target	**A total electricity saving of 1 PJ through officially supported projects by 2030**

The Measures

The agriculture sector (including forestry and fishing) accounts for only about 2% of South Africa's total final energy consumption, and a similar fraction of total GDP. However, it is a key sector from a social perspective, as it has been estimated by Statistics South Africa that as many as 20% of all South African households are directly connected with agriculture. Addressing the inefficient use of energy in agriculture therefore has the potential to contribute to the modernisation of the sector as part of the process of rebuilding an inclusive rural economy.

Relatively little research has been conducted in opportunities for energy savings in the agricultural sector. A few case studies have highlighted the considerable savings potential in motor-driven systems (irrigation pumps, fans, dryers etc.), but given the large fraction of energy consumption that is accounted for by petroleum products, it is likely that significant energy savings are possible in agricultural vehicles. Despite the opportunities for energy savings in agriculture, and the potential for multiple benefits in terms of building a modern, thriving rural economy, there have been no energy efficiency programmes specifically targeting the sector to date. Exploratory consultation is required with stakeholders from the agricultural sector to gain a better understanding of energy use patterns and the opportunities for energy savings, particularly among the smaller farms and smallholders.

Large percentage savings in electricity consumption have been shown to be possible through the optimisation of motor-driven systems. The ***provision of training and high-quality targeted awareness-raising material*** may therefore be expected to yield significant impacts. Partnerships will be developed with the Agricultural Research Council (ARC), the Council for Scientific and Industrial Research (CSIR) and with sector associations such as the African Farmers' Association (AFASA) and Agri South Africa for the design, development and dissemination of such materials. In particular, the possibility will be explored for including modules on energy efficiency in the training courses run by ARC and by SABI (the South African Irrigation Institute).

Since two-thirds of the energy consumed in agriculture is in the form of petroleum products, this suggests a significant savings potential in vehicles. More research is required to derive a full understanding of the patterns of fuel use, and to identify specific areas where fuel savings may be realised. Based on the findings of this research, the DoE will work in partnership with the relevant sector stakeholders to develop ***awareness-raising campaigns around vehicle use*** in the agricultural sector.

Avenues for mobilising funding for energy efficiency improvements will be assessed and developed. For small farmers, it is likely that the use of ***direct grants to support capital expenditure on energy efficiency improvements*** would be the most effective route. Efforts will therefore be made in partnership with DAFF to

secure a National Treasury budget allocation for this purpose. For larger projects, mobilising funding will involve working with SANEDI and the National Treasury to ensure that the ***12L tax incentive scheme*** meets the needs of the sector. The agricultural sector is also likely to prove an attractive source of ***carbon-offset projects***, since the sector will fall outside of the scope of the proposed carbon tax. A further potential source of finance is through energy performance contracts with ESCOs, financed through normal bank financing, or through Eskom's ESCO programme. The scope will be explored for providing targeted training to support the development of ***specialist agricultural ESCOs***.

Basis for the Targets

The target proposed for the agriculture sector is a total electricity saving of 1 PJ from officially supported energy saving projects. This target is based on an assumption that sector-wide savings from the optimisation of motor-driven systems (mainly irrigation, but also drying, cooling and ventilation) amount to about 2-4 PJ annually, with a significant fraction of that potential being realised though official support. Note that no target has been set for fuel savings in agricultural vehicles, because it is not certain that the data would be available to allow such a target to be monitored. However, it is recommended that the situation is periodically reviewed and a target set if future data availability permits.

5.6. The transport sector

Goal	**To bring about significant improvements to the average fuel efficiency of the fleet of road transport vehicles in South Africa.**
Targets	**A 20% reduction in the average vehicle energy intensity (measured in MJ/km) of the South African road vehicle fleet relative to a 2015 baseline.**

The Measures

The transport sector in South Africa accounts for 27% of total final energy consumption (Energy Balance Tables, 2012), 90% of which is attributable to road transport. Between 2004 and 2012, the energy intensity of the transport sector has been relatively constant as compared to other sectors, although there are structural changes (such as modal shifts) that have occurred during this period that cannot be identified due to the current lack of data (EETMS, 2015). When it comes to improving energy efficiency in the transport sector, the most effective measures are complex and the largely fall outside the mandate of the Department of Energy, for example improving public infrastructure, town planning, and incentivising modal shifts. The Department of Transport has developed a Fuel Reduction Strategy (2015) and a GHG Emissions Reduction Strategy (2015) that aim to address these measures.

Because of the dominance of road transport in terms of energy consumption, and the limited remit of the DoE in the transport sphere, the package of policy measures for the transport sector in this Strategy focuses on two main themes: to encourage the increase in supply of affordable and efficient vehicles, and to improve user behaviour, both of private drivers and commercial drivers. Inter-departmental collaboration is vital in this sector and therefore the Department of Energy will work closely with the Department of Transport and the Department of Environmental Affairs, as well as the South African National Roads Agency (SANRAL).

For all vehicles, the display of labels has been obligatory since 2008. These labels include average fuel consumption and CO_2 emissions. ***Vehicle efficiency standards*** will be introduced to avoid new, inefficient vehicles being sold on the market. This naturally has implications for local vehicle manufacturers and therefore adequate notice will be provided to ensure that the industry can adapt. This will provide the push factor to filter out bad performing new vehicles.

However, in order to raise the average fuel efficiency of the vehicle parc, ***voluntary agreements*** will be established with manufacturers in the automotive industry to improve the average fuel efficiency of the vehicles they manufacture over and above the regulated minimum. The introduction of an ***incentive scheme*** will be considered that will levy an importation tax on vehicles on low efficiency vehicles that could be used to subsidise the purchase of efficient vehicles. To incentivise vehicle replacement, the feasibility of introducing a ***scrappage scheme*** will be assessed, with the aim of encouraging vehicle owners to replace old vehicles, effectively subsidising the individual to purchase a more efficient vehicle.

To improve the performance of vehicles on the road, the feasibility of incorporating fuel efficiency tests on vehicles during the ***roadworthiness test*** on change of ownership will be investigated. In the long term, the Department of Energy will work

with the Department of Transport and the Department of Environmental Affairs and municipalities to establish an annual environmental fitness test for vehicles, contributing to both fuel efficiency and a reduction in CO_2 emissions.

Improving driver behaviour is an effective mechanism through which to improve energy efficiency. The introduction of ***eco-driving*** will be incorporated into the curriculum for driving schools in order to raise the awareness of new drivers to the impact they have on how much fuel they consume. ***Voluntary agreements*** will be established with owners of large vehicle fleets, both freight and passenger companies, to define actions that can be taken to improve the performance of the vehicle fleet. This will include eco-driving education but also address the condition of their vehicles, specifically tyre condition and pressure.

Across the transport sector and for all modes of transport, ***knowledge sharing*** on best practice and improved technologies will be facilitated by the innovation hubs. The provision of specialised technical expertise for the transport sector will be promoted through the ***professionalization of ESCOs*** with transport-specific experience (see Section 6).

Basis for the Targets

The target proposed for the transport sector is a 20% reduction in the average energy intensity of the road vehicle fleet (determined from the vehicle energy consumption per km as specified on the fuel economy label). This target is based on an assumption that the average fuel efficiency of new vehicles will be about 50% lower than today (based on IEA estimates), combined with conservative assumptions about the rate of turnover of the stock of vehicles.

5.7. Production and distribution

Goal	**Accelerate the improvement of energy efficiency in the generation, transmission and distribution of energy**
Target	**A total of 10 PJ of electricity derived from grid-connected cogeneration plant by 2030**
	Average total electricity distribution losses below 8% by 2030, and average non-technical losses below 0.5%
Goal	**Accelerate the improvement of energy efficiency in the generation, transmission and distribution of energy**
Target	**A total of 10 PJ of electricity derived from grid-connected cogeneration plant by 2030**
	Average total electricity distribution losses below 8% by 2030, and average non-technical losses below 0.5%

The Measures

The Department of Energy Integrated Energy Plan (IEP) and Integrated Resource Plan (IRP) jointly define the anticipated energy mix with a view to informing policy to address future energy service needs efficiently and in the most socially beneficial manner. While the dominant role of coal-fired power is expected to continue through to 2030, solar PV, wind and other renewable energy sources are anticipated to increase in importance in the energy mix. The main mechanism for the promotion of renewable generation is the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which was launched in 2011 after earlier moves to introduce a feed-in tariff were unsuccessful.

Recent shortages of generation capacity have highlighted the necessity to improve energy efficiency at all points in the supply chain from generation through to end use. The National Development Plan specifically refers to energy generation and distribution as a pressing constraint on growth, investment and job creation. Although receiving little attention in the IEP / IRP, considerable potential exists in South Africa for the production of electricity from industrial cogeneration plant as well as from waste heat recovery. Eskom launched a procurement process for independent power producers (IPPs) using cogeneration in the mid-2000s but this was unsuccessful. High investment costs and the lack of incentives provided by the current regulatory framework present barriers to the exploitation of the available potential.

Although bids for up to 800 MW of cogeneration capacity have recently been invited under the CogenIPPP programme, the level of response appears to be well below the capacity available. To expedite the full exploitation of the available resource, there is a need to review and address any remaining regulatory and financial barriers, and ensure that the terms of future procurement rounds (including the price cap) are attractive to prospective investors. At the same time, appropriate efficiency thresholds should be defined for plant to qualify, and steps taken to ensure that power produced qualifies for credits against any future carbon tax, to reflect the average carbon intensity of the grid power displaced. Further tenders may then be launched for the ***procurement of power from high-efficiency cogeneration and waste heat recovery***.

An internationally proven approach to stimulate significant end-use efficiency savings is to place ***energy efficiency obligations*** on various players in the energy sector. Such obligation schemes require obligated parties to achieve quantified savings among particular end-user groups (usually households, and sometimes also SMEs). Schemes are generally designed such that obligations must be at least partly met by achieving energy savings in certain specific target groups (e.g. low income households). The most common model places an obligation on distributors / suppliers of electricity, but in some cases the obligation also extends to suppliers of other energy carriers and / or the operator of the high-voltage transmission network.

Assessments will be conducted to identify the optimum model for an energy efficiency obligation scheme in South Africa. One possible model would be to place the obligation on Eskom and on those municipalities that are involved in the supply of electricity. Setting a size threshold for such an obligation would ensure that only the largest municipalities would be obligated at the outset. Since schemes do not usually restrict obligated entities to achieve energy savings among their own customers, the potential may therefore be created for larger municipalities to achieve savings by forming partnerships with smaller non-obligated municipalities.

An alternative model is to place an obligation only on Eskom in its capacity as operator of the transmission grid. One route to meet its obligation would then be for Eskom to "buy" the savings that municipal suppliers of electricity were able to achieve among their customers.

A further measure to be considered is to set ***mandatory targets on all generators for the achievement of efficiency savings*** within their 'internal' operations (i.e. any operations not directly involved in the generation of power, such as buildings and vehicle fleets). Eskom has already made significant progress in this respect, through its Internal Energy Efficiency programme, but as more IPPs begin to emerge it is essential that all meet the same high standards of internal energy efficiency. This will ensure that the power generation sector is seen to be leading by example.

Basis for the Targets

Two targets are proposed for the power generation and distribution sector:

- 10 PJ of electricity derived from grid-connected cogeneration and waste heat recovery plant
- Electricity distribution losses below 8%

The first target derives from a relatively conservative assumption regarding the extent to which the identified potential may be exploited (equivalent to a capacity of about 500 MW_e operating at 60% load factor). The second target is based on an assumption that internationally acceptable levels of distribution loss (technical plus non-technical) can be reached and sustained.

5.8. Sector-level and economy-wide impacts

In most cases, the impact seen at the sectoral level includes not only the effects of the targeted savings but also a range of other factors such as autonomous change,

and the continuing effects of policy measures that were already in place before the current strategy period commenced. The relationship between the sectoral targets and the sector-level impacts is explained in more detail in Annex A.

Industry & mining sector: Available data in 2030 is likely to be sufficiently disaggregated to allow a detailed decomposition analysis to be conducted on the industry & mining sector. The combined effect of the 16% improvement in weighted mean specific energy consumption in manufacturing, and the 40 PJ energy saving in mining are expected to result in a sector-wide saving of about 15% after the effects of structural change between industrial sub-sectors have been allowed for.

Commercial & public sector: It is assumed that the availability of aggregated data in 2030 will be similar to that of today, which would preclude anything other than a very approximate decomposition analysis to be conducted of the combined commercial and public sectors. Assuming the individual targets are met, the overall result of a decomposition analysis conducted in 2030 would show a 37% reduction in energy consumption attributable to efficiency improvements. This is the weighted mean of the separate targets (37% from commercial buildings, 50% from public buildings, 20% from municipal services and 30% from municipal vehicle fleets).

Residential sector: A decomposition analysis conducted in 2030 (using shifts in the relative size of LSM bands as an analogy for structural changes) would show a 33% reduction in sector-wide energy consumption attributable to efficiency improvements.

Transport sector: The detailed data necessary for a decomposition analysis of the transport sector is unlikely to be available, so the overall impact of the expected energy savings is expressed as a simple reduction in sector-wide energy intensity of 39%.

Agriculture sector: The detailed data necessary for a decomposition analysis of the agricultural sector is unlikely to be available, so the overall impact of the expected energy savings is expressed as a simple reduction in sector-wide energy intensity of 30%.

Economy-wide impact: This is a weighted mean of the individual sector-level impacts described in the preceding sections, which indicates that a decomposition analysis conducted in 2030 would show an economy-wide reduction in energy consumption of 29% attributable to efficiency improvements.

6. The enabling framework

The enabling framework covers measures and activities that will support the achievement of objectives, building a strong institutional basis on which to promote, support and monitor energy efficiency. These initiatives are designed to improve the professionalization of the sector, grow the knowledge base around energy efficiency, as well as gather the information necessary for evidence-based decision-making.

6.1. On-going strategic planning

The initial formulation of the strategic plan is the first step in a 15-year, continuous process from 2015 to 2030. The plan will be reviewed every five years to assess the progress made towards the targets, the outcomes of the measures, and to make adjustments as necessary. The first comprehensive review will take place in 2020 however annual brief reviews will be undertaken based on an annual progress report. The resources to support the strategic plan will need to be secured and therefore it may be necessary to review the strategy in light of this. The review process will be collaborative and will engage stakeholders across the sectors.

New opportunities and technologies are likely to arise during the 15-year time span of this strategy, necessitating flexibility to take advantage of these opportunities. As government policy develops, specifically in relation to climate change, the harmonisation of policies will also be considered at each five-year review.

6.2. Overcoming market barriers

There are a number of market barriers, including the availability of investment financing, misplaced incentives to purchase inefficient appliances, equipment and vehicles, and a lack of information. Within each sector, measures have been put forward in this Strategy to address the majority of barriers however the professionalization of the energy efficiency sector is a measure that cuts across sectors and is an enabler to facilitate the uptake of energy efficiency opportunities.

The role of ESCOs in promoting and facilitating energy efficiency projects has primarily been limited to functioning as implementing agents for Eskom's Integrated Demand Management (IDM) programme. However, the potential that ESCOs have to support the implementation of energy efficiency extends to undertaking energy audits of all processes and activities, delivering on renovation work, bringing in capital investment, taking on the investment risk by guaranteeing minimum savings, monitoring and verification, facility management, and supply of energy. However, current capacity to provide these services is limited, specifically in the industrial, transport and agricultural sectors. The ESCO incubator described in Section 5.1 is intended to nurture smaller ESCOs to eventually provide comprehensive services.

A cornerstone of achieving this level of service is the ***professionalization of services***. This not only means having the technical skills to understand complex processes, but also specialised sectoral experience to know the limitations of the theory and how to overcome them to deliver effective solutions in practice.

Accreditation of ESCOs will be developed and promoted in collaboration with the South African National Accreditation System (SANAS) and the South African Qualifications Authority (SAQA). The accreditation system will allow for progressive

levels of attainment, allowing for ESCOs to gradually build towards full accreditation, based on similar models adopted internationally, such as Singapore and the United Arab Emirates. It is expected that by increasing the availability of qualified and reliable ESCOs, the services offered will stabilise.

6.3. Knowledge sharing, data collection and performance monitoring

Data required for policy-making and monitoring needs to be reliable and timely, covering markets, technologies, and efficiency opportunities[18], as well as strategy performance monitoring data. With respect to the first three information needs, innovation hubs will primarily be responsible for producing and sharing this information.

Innovation hubs

There are a number of activities being implemented to develop a knowledge base in the energy efficiency field, such as the Energy Resource Centre and the National Cleaner Production Centre. The DoE and DST have established an Energy Efficiency Demand-Side Management Hub at the University of Pretoria. This concept will be taken further and revised to broaden the scope to include sector-specific divisions that can engage in activities that are relevant to the specific sectors and sub-sectors, thereby increasing the relevance of the innovation hubs across all sectors.

The emphasis of the hubs is to develop **knowledge partnerships** and test technologies and processes in the South African context. The modality of implementing the hubs will be defined in collaboration with relevant government departments, academia and with relevant sectoral stakeholders, although it is recommended that the hosts of the hubs are diverse to test different approaches. Issues of confidentiality and anti-competitive information sharing would need to be addressed carefully.

The main functions of the hubs are envisaged to be:

- To encourage knowledge transfer by partnering experts and academia with sectoral organisations;
- Under the partnerships, undertake research on technologies and processes to understand how international best practices could be applied in the South African context;
- Collaborate with sectoral stakeholders to identify specific barriers and challenges in achieving optimum energy efficiency that warrant research;
- Identify areas of innovation and to share this information (within the confines of confidentiality) across the sector and more broadly;
- Establish a community of practice constituted of sectoral energy stakeholders bringing together the creators of knowledge on energy efficiency and the users of that knowledge, including local manufacturers of energy efficient technologies;

[18] IEA 25 Recommended Policy Interventions, 2011

- Where possible, develop demonstration sites and showcases of successful technology innovation;
- Collating international and national research on energy efficiency and producing synthesis papers to summarise findings on specific themes.

Data collection for performance monitoring

Building on the establishment of the Energy Efficiency Target Monitoring System in 2014, the importance of data for evidence-based policy making is underlined by the current lack of reliable data. Developing data collection and performance monitoring systems is an area that will require significant investment of time, expertise and infrastructure. The results-based framework detailed in Annex A should form the basis for developing the data collection and on-going monitoring systems. Annex D (Basis for the development of the targets) provides details of the targets, how they were derived and defined, and how they will be measured.

The data collection needs should be considered across departments, taking into consideration the reporting required for the purposes of the carbon tax, 12L, and energy management plans. The DoE will deepen its collaboration with Statistics South Africa to incorporate energy consumption patterns and levels as a core element in routine data collection exercises. A household energy survey will be designed and administered every 3 years to inform the strategy review process.

6.4. Monitoring compliance, enforcement and evaluating the policy measures

The authorities and organisations responsible for implementing the measures within this strategy will need to take into consideration the monitoring, enforcement and evaluation framework when designing the specific policy measure. One of the main challenges of enforcement is ensuring that objectives, processes, and procedures are well defined and consistently followed where measures are obligatory.

The points at which the verification of compliance with or enforcement of requirements in accordance with defined regulations will be identified. For example, the enforcement of regulations on the importing of equipment of certain standards would take place at the port of entry and through routine spot checks of equipment suppliers. In the case of building regulations, verification of compliance is currently undertaken during the planning phase, without any further inspection of the actual construction. As with other standards and regulations, spot checks by an independent body may prove effective to ensure that the expected savings are realised.

7. The way forward

The following section provides an overview of the implementation plan for the first five years, the details of which are provided in Annex E.

Reference no.	Measure	Timelines				
		Year 1 2016-2017	Year 2 2017-2018	Year 3 2018-2019	Year 4 2019-2020	Year 5 2020-2021
PUBLIC SECTOR						
P1.1	The introduction of mandatory EPC certificates in all rented properties and publicly accessible buildings					
P1.2	Develop the public sector awareness raising campaign to facilitate the "leading by example" approach					
P1.3	Introduce standards and labelling relevant for public sector appliances and equipment					
P1.4	Announce a 15-year trajectory for the successive tightening of the energy performance component of building standards and successively tighten standards					
P1.5	Roll-out of the provision of energy and activity data to the public sector					
MUNICIPAL SECTOR						
P2.1	Develop municipal energy efficiency strategies					
P2.2	Support the implementation of energy savings measures					
RESIDENTIAL SECTOR						
R1	Announce a 15-year trajectory for the successive tightening of minimum energy performance standards for household appliances and successively tighten standards					
R2	Develop a strongly branded energy performance **certification** mark for household appliances (modelled on the 'Energy Star' brand), in addition to the planned EE labels.					
R3	Announce a 15-year trajectory for the successive tightening of the energy performance component of building standards for residential buildings and successively tighten standards					

Ref no.	Measure	Timelines				
		Year 1 2016-2017	**Year 2 2017-2018**	**Year 3 2018-2019**	**Year 4 2019-2020**	**Year 5 2020-2021**
R4	Build on the existing awareness-raising activities targeting households and the school curriculum					
R5	Roll-out of the provision of energy and activity data from the residential sector					
R6	Support technology innovation and dissemination of energy efficient cookstove technologies					
COMMERCIAL SECTOR						
C1	The introduction of mandatory EPC certificates in all rented properties and publicly accessible buildings.					
C2	Revision of 12L to ensure it provides an incentive to commercial property owners					
C3	Introduce standards and labelling relevant for commercial sector appliances and equipment					
C4	Roll-out of the provision of energy and activity data from the commercial sector					
INDUSTRIAL SECTOR						
I1	Adjustment of the 12L tax incentive scheme					
I2	Minimum energy performance standards for motors and motor-driven systems					
I3	Provision of targeted support and advice on energy efficiency to enterprises					
I4	Incentivise enterprises to introduce EnMS and achieve ISO50001 certification standards					
I5	Roll-out of the provision of energy and production data from the manufacturing sub-sector					
I6	Develop standardised tools for voluntary reporting of energy savings from initiatives in the mining sector					
I7	Creation of technology/ learning hubs for energy efficiency					

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Ref no.	Measure	Timelines				
		Year 1 2016-2017	Year 2 2017-2018	Year 3 2018-2019	Year 4 2019-2020	Year 5 2020-2021
AGRICULTURE SECTOR						
A1	Explore the potential for savings in agricultural vehicle use, and develop appropriate awareness-raising material					
A2	Development of targeted awareness-raising and training material on potential savings in motor-driven systems					
A3	Provide direct grants to small farmers / smallholders for all or part of the cost of interventions					
TRANSPORT SECTOR						
T1	Develop fuel efficiency standards for light and heavy vehicles to improve the overall efficiency of the vehicle stock					
T2	Improve systems for ensuring road worthiness					
T3	Roll-out of the provision of energy and activity data from the transport sector					
PRODUCTION AND DISTRIBUTION SECTOR						
G1	Developing the enabling framework for cogeneration and trigeneration					
G2	Expansion of internal efficiency programmes for producers					
ENABLING FRAMEWORK						
E1	Ongoing strategic planning					
E2	Overcoming market barriers					
E3	Knowledge sharing, data collection and performance monitoring					
E4	Monitoring compliance, enforcement and evaluating policy measures					