ENERGY DEMAND SIDE MAGEMENT POLICY

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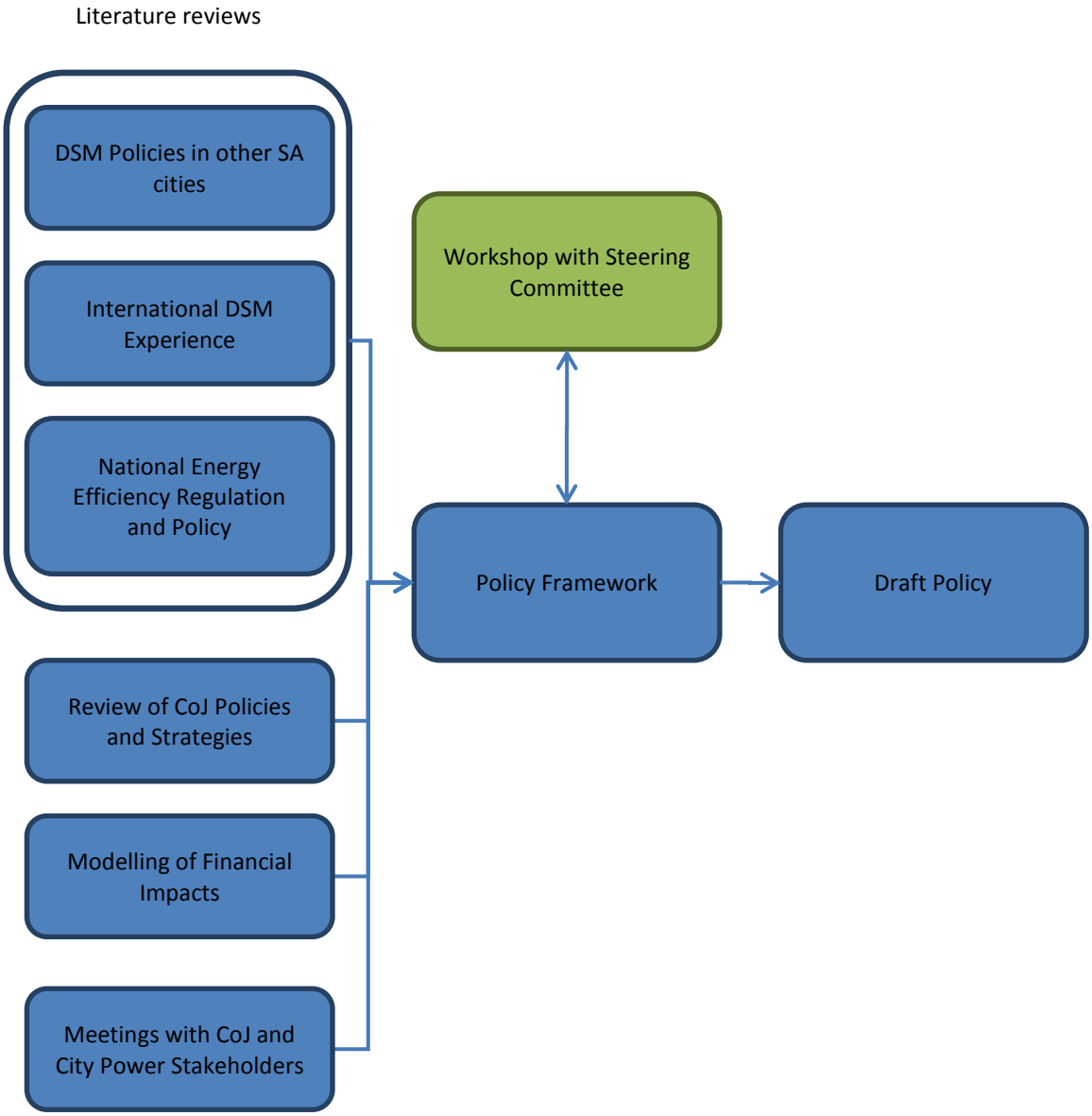
Contents

Background to this document version

The process in developing this draft to date is represented below:



The Policy content was 'workshopped' with a steering committee consisting of Environmental Management, ISD (Energy), City Power, DPUM, Community Development and Finance on 14 July 2011. At the workshop, the findings of the preparatory work were presented along with policy options. Preferred options were then selected by the workshop delegates.

A draft Energy DSM Policy was submitted to Environmental Management on 22 July 2011, based on the preferred options identified at the workshop.

Comments on the draft Policy were received from and discussed with the Environmental Management Department, and this second draft produced in November 2011.

Draft v2.1 contains no content changes compared to v2. The only change has been formatting.

List of definitions

Demand Side Management (DSM) refers to activities designed to change the amount, timing and/or composition of current and/or future energy use

Distributed Renewable Generation (DRG) is a part of DSM that refers in this document to small-scale local generation of energy from renewable sources.

DSM activities: in this document, Energy Efficiency, Load Management, Distributed Renewable Generation and Fuel Switching are referred to as 'DSM activities'

DSM interventions or programmes: these terms are used in this document to refer to one/a mix of several DSM tools implemented in the CoJ.

DSM tools: in this document, the term 'DSM tools' is used to refer to the various ways of implementing DSM, including (but not limited to) education and information campaigns, audits, standards, market transformation and direct interventions.

Electricity is a secondary energy source, obtained by converting a primary energy source into electricity. Electricity can be generated from non-renewable sources (such as coal) or renewable sources (such as wind).

Energy Efficiency (EE) is a part of DSM that refers to activities that result in a reduction in the energy used for a given energy service or level of activity.

Energy is the ability to do work. Energy sources include coal, nuclear, hydro, petroleum, gas, solar, wind, biomass and so on.

Fuel Switching (FS) is a part of DSM that refers in this document to shifting energy use away from centrally distributed electricity and towards some other centrally distributed fuel source.

Load Management (LM) is a part of DSM that refers to activities that even out the timing of electricity use, typically shifting use away from peak periods.

List of boxes

Box 1: Before you start…

This box provides some background on energy and electricity in the City of Johannesburg (CoJ).

Energy and electricity

It is important to have a sound understanding of the difference between 'energy' and 'electricity'.

Energy is the ability to do work. Energy sources include coal, nuclear, hydro, petroleum, gas, solar, wind, biomass and so on.

Electricity is a secondary energy source, obtained by converting a primary energy source, such as those listed above, into electricity. Electricity can be generated from non-renewable sources (such as coal) or renewable sources (such as wind). In South Africa, electricity is generated primarily from coal and distributed by Eskom and other distributors (City Power in the CoJ).

Energy and electricity in the CoJ

Gathering data on the total demand for energy in a City is a complex task. Data on total electricity demand is relatively easy to obtain, but data on broader energy use must be compiled from a large number of sources. The most comprehensive picture of energy use in the CoJ is presented in the State of Energy Report for the City (CoJ, 2008) although that document notes that much data is missing.

Table 1: Energy balance for the CoJ (2007 data)

TJ	Coal	Petroleum products	Gas	Electricity	Other	Total
Total primary energy supply						153,505
Distribution losses						7,585
Total final consumption	1,229	93,655	1,690	49,183	380	145,920
% of final consumption	1%	64%	1%	34%	0%	
Total final consumption omitting Transport	1,299	3,674	1,690	49,183	380	55,929
% of final consumption omitting Transport	2%	7%	3%	88%	0%	

Data taken from State of Energy Report (CoJ, 2008) p. 8

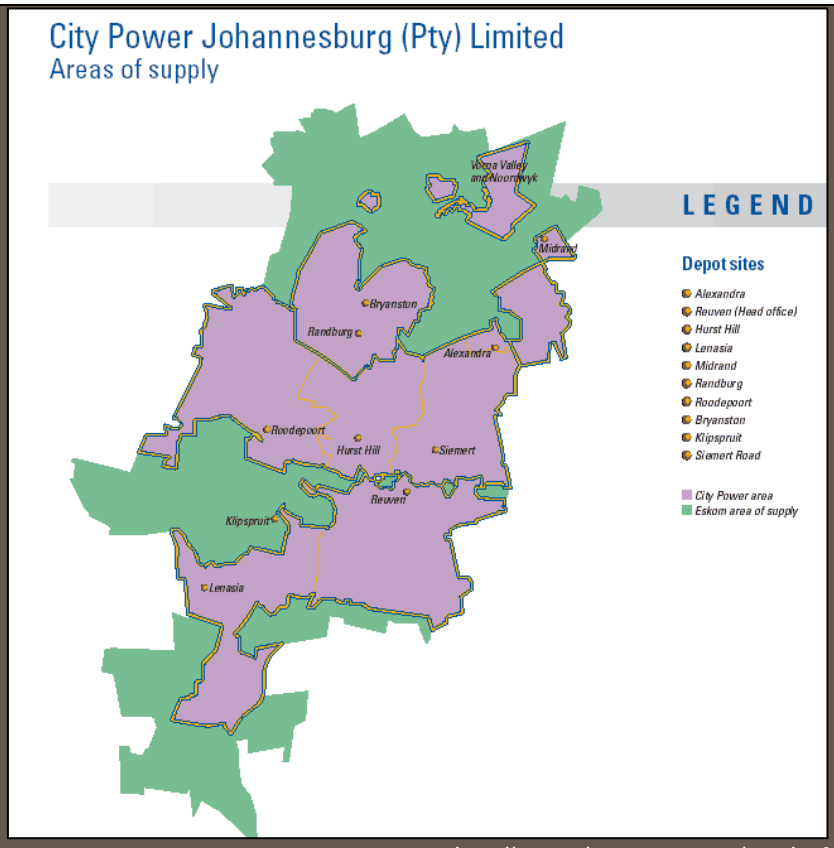
Key points to note from the table above are:

- Total final consumption of energy throughout the CoJ is 145 920 TJ. 64% of final consumption is petroleum products and almost all (96%) of this petroleum product usage is by the Transport sector.
- If the Transport sector is omitted, total final consumption of energy in the CoJ is 55 929 TJ. 88% of this final consumption (omitting Transport) is electricity.

In other words, Transport is a big user of energy in the CoJ. If Transport is omitted, then energy consumption in the CoJ is heavily dominated by electricity.

Institutional arrangements for the distribution of electricity

The distribution of electricity in the CoJ is split between Eskom and City Power. City Power is a so-called Municipal Owned Entity of the CoJ, established in terms of the Companies Act on 1 November 2000 and wholly owned by the CoJ. The geographic distribution of Eskom and City Power supply areas is shown in the figure below.



http://www.citypower.co.za/service%20areas.html

The State of Energy Report (supplemented by data received from Eskom) provides the following picture of electricity provision.

Table 2: Electricity provision by City Power and Eskom in the CoJ (2007 data)

MWh	City Power	ESKOM	Total
Domestic sales	4,923,864	1,097,678	6,021,542
Non-domestic sales	5,879,716	1,265,647	7,145,363
Total sales	10,803,580	2,363,325	13,166,905
Non-Revenue Electricity	1,604,576	502,467	2,107,043
NRE %	13%	18%	14%
Total demand	12,408,156	2,865,792	5,273,948
Share of demand	81%	19%	
Residential connections	286,780	293,761	580,541
Share of domestic connections	49%	51%	

Data taken from State of Energy Report (CoJ, 2008) supplemented by Eskom data

Eskom supplies about 18% of the electricity in the City and is responsible for 51% of the residential electricity connections.

Introduction

As part of its broader strategy to transform the energy sector, the City of Johannesburg (CoJ) has identified the need for an Energy Demand Side Management (DSM) Policy. The Policy will guide energy DSM activities of within the municipal boundaries of the CoJ, covering the supply areas of both City Power and Eskom.

This Policy document focuses on **why** the CoJ is embarking on Energy DSM, and broadly **how** the City plans to go about DSM. The Policy will be followed by an Implementation Plan that will provide greater detail with regard to **what** will be done, by **when**, and **who** will do it.

Box 2: What is a Policy?

A policy is a document that outlines what an organisation intends to achieve and the broad methods and principles that will be used to achieve it. It is a statement of intent with a description of the decisions, guidelines or priorities that address that intent. It is a guiding principle that sets the direction for an organisation.

A policy is not a law, although it will often identify new laws (or, in the case of a municipality, by-laws) that are needed to achieve its goals.

A policy is also not a procedure or protocol. It does not normally describe what is actually to be done. A policy should explain the 'how' and the 'why', but not the 'what', the 'where', and the 'when'.

In order to ensure that a policy is implemented, it should be followed by some sort of procedure or plan that interprets the broad principles of the policy into actions. A plan or procedure outlines the steps that will be followed to reach the goals outlined in the policy.

This Energy DSM Policy will be followed by an Implementation Plan that provides greater detail with regard to targets and actions to be implemented, as well as responsibilities and timeframes for those actions.

What is Demand Side Management?

'Demand Side Management' (DSM) refers to activities designed to change the amount, timing and/or composition of current and/or future energy use in the CoJ. In this document, DSM is considered to include the following:

Energy Efficiency (EE) refers to activities that result in a reduction in the energy used for a given energy service or level of activity.

Box 3: Example of Energy Efficiency activity: Compact Fluorescent Lightbulbs

CFLs use energy, but use less energy than standard incandescent lightbulbs. The demand for electricity from City Power and ultimately Eskom is reduced, but the user receives the same amount of light and there is no accompanying increase in the use of another energy source.

Impact on demand for energy and electricity: The demand for both energy and electricity is reduced.

Load Management (LM) refers to activities that even out the timing of electricity use, typically shifting use away from peak periods. LM does not affect the total energy use, but rather the timing of that use.

Box 4: Example of Load Management: Remote Geyser Control

City Power installs technology that allows them to switch off household geysers during peak times. The geysers may cool and have to reheat during off-peak times, so total electricity use is not necessarily reduced. But it is shifted away from peak times and towards off-peak times.

Impact on demand for energy and electricity: The demand for both energy and electricity may remain unchanged. The impact is on timing of use.

Distributed Renewable Generation (DRG) refers in this document to small-scale local generation of energy from renewable sources. DRG does not reduce total energy use, but does reduce total electricity use, because it removes demand from the electricity network.

Box 5: Example of Distributed Renewable Generation: Solar photo-voltaic panels on roofs

The panel generates some (or all) of the electricity required by the household or business, and so the demand for electricity from City Power and ultimately Eskom is reduced. The user is using the same amount of energy, just less electricity.

It is possible that a panel may in fact generate more energy than is required by the household or business to which it belongs. Ultimately, it is possible to move towards a situation where energy that is generated on a distributed basis is fed back into the electricity grid. This requires a significant change in metering and billing technologies.

Impact on demand for energy and electricity: This intervention changes composition of energy use. It reduces demand for electricity, but not energy.

Fuel Switching (FS) refers in this document to shifting energy use away from centrally distributed electricity and towards some other centrally distributed fuel source. This differs from DRG in two respects: firstly, the switch is towards a centrally distributed fuel source, rather than a locally generated one; and secondly, the switch is towards a fuel source that is not necessarily renewable. Like DRG, FS does not reduce total energy use, but does reduce total electricity use, because it removes demand from the electricity network.

Box 6: Example of Fuel Switching: Switch from electric to gas stoves

If a user switches from an electric to a gas stove, total energy use is not reduced, but use is switched away from electricity and towards gas. Gas is not a renewable source, nor is it locally generated (so this is not DRG), but it is environmentally cleaner than coal-fired electricity.

Impact on demand for energy and electricity: This intervention changes composition of energy use. It reduces demand for electricity, but not energy.

EE, LM, DRG and FS are referred to later in the document as ‘DSM activities’.

Scope of the Policy

An Energy DSM Policy, not electricity

This is an Energy DSM Policy, and as such its scope is broader than electricity alone.

Box 7: Energy, electricity and the impact of DSM activities

DSM, as defined in this policy document, refers to activities that relate to the demand for energy. These activities may have different impacts on the demand for electricity. The impacts of different DSM activities on energy and electricity demand are summarised in the table below.

Activity	Impact on energy use	Impact on electricity use	Comments
Energy Efficiency	Down	Down	Reduces demand for energy and electricity.
Load Management	Constant	Constant	Changes timing, typically of electricity use although possibly of energy use more broadly.
Distributed Renewable Generation	Constant	Down	Changes composition of energy use. Reduces demand for electricity, but not energy.
Fuel Switching	Constant	Down	Changes composition of energy use. Reduces demand for electricity, but not energy.

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Excludes Transport

The Policy excludes the Transport sector. Transport is a significant user of energy in the CoJ (refer back to Table 1 earlier in this document for further detail) and it is recognised that transforming the transport sector has the potential to make the City more energy efficient overall. This is not, however, considered to be part of DSM.

Box 8: Where is Transport dealt with?

Planning for the Transport sector overall is guided by the Integrated Transport Plan. The current plan is out of date (2003 to 2008) and at the time of writing this Policy the Transportation Department had embarked on an update of the Integrated Transport Plan.

The Climate Change impacts of the transport sector are dealt with in the CoJ Energy and Climate Change Strategy (2011), which sets targets for reductions in CO2 emissions from the transport sector and lists short term, medium term and long term actions required to achieve these.

Excludes spatial planning

The Policy also excludes planning activities that relate to the spatial form and overall structure of the CoJ. It is recognised that spatial planning, most notably densification, has the potential to make the City more energy efficient overall. This is not, however, considered to be part of DSM.

Box 9: Where is Spatial Planning dealt with?

Overall spatial planning for the CoJ is covered in the Spatial Development Framework for the City. This Framework covers strategic densification (important for improving the overall energy efficiency of the CoJ) as well as supporting sustainable environmental management of the City as a whole.

Excludes supply side energy interventions

As the name should make clear, DSM focuses on the demand for energy, not the supply of that energy[1].

Box 10: Where is the supply side dealt with?

DSM is not the only way to transform the energy sector. It is also important to change the supply of energy, most significantly (in a country like South Africa) to change the composition of electricity supply, moving away from coal fired electricity generation and towards renewable electricity generation. This is not considered to be part of DSM.

The supply of energy is not a municipal function, and as such it falls largely outside of the scope of the CoJ's responsibilities. The over-arching plan for grid connected power generation is the National Department of Energy's Integrated Resource Plan 2011 (IRP2011). The IRP2011 includes targets for increasing the share of renewable energy. The Renewable Energy Independent Power Producers Procurement Programme, which also sits under National DoE, outlines the process for implementing the IRP2011 with respect to renewable energy.

The CoJ Energy and Climate Change Strategy (2011) includes targets for the Renewable Energy Sector, but (appropriately) these focus largely on solar photo-voltaic technologies and solar water heaters. There is also a target for the purchase of renewable power from Independent Power Producers.

Types of energy users covered

The Policy covers the use of energy by the CoJ itself (including its Municipal Owned Entities) as well as in domestic and commercial buildings and in industrial processes.

Geographic scope

The Policy applies in all areas of the City, those in which electricity is distributed by Eskom as well as those in which distribution is by City Power.

A broader set of interventions relating to energy

DSM is part of a broader set of interventions in the CoJ that focus on changing the energy sector. At the time of writing this Policy, the Think 2040 Growth and Development Strategy for the CoJ is still in draft form and subject to consultation and revision. However, it envisions a complete transformation of the energy sector in the CoJ, with demand side interventions accompanied by a significant supply side change, namely a move away from coal fired electricity and towards renewable electricity, possibly generated within the City. The Think 2040 GDS also highlights the need for a transformation of the transport sector and for attention on the spatial form of the City.

It is important when reading this Policy to thus bear in mind that this is only part of a broader set of strategies that relate to energy. A specific DSM policy is required because DSM affects the relationship of the CoJ to its citizens and customers and has direct cost and revenue impacts on the CoJ and City Power as an electricity utility. A policy framework is therefore needed to provide guidance to DSM decisions and actions.

Target audience

This Policy is intended for:

Councillors who must oversee the implementation of DSM in the CoJ.

[1] Note that although supply side issues are not considered to be part of DSM, the distinction between 'demand side' and 'supply side' is not completely clear. DRG and FS, included in this Policy, could be defined as supply side interventions. They have been included here because of their impacts on electricity (but not energy) demand.

Officials and staff at the CoJ and City Power who must decide how to allocate budgets and select DSM interventions for implementation.

Residents of the City who want to understand why the CoJ is implementing DSM and what the principles underlying its implementation are.

Policy drivers

This Policy has not been written in a vacuum. It is a response to a particular context, the key elements of which are summarised below.

Increasing acknowledgement of the impacts of climate change

Climate change is caused by the rise in average global temperature due to increasing levels of greenhouse gases in the earth's atmosphere. This in turn causes rises in sea level, increased surface ocean temperatures and changes to weather patterns. There is overwhelming scientific evidence that human activity is the primary cause of this change, and that action is needed within the next five to ten years to cut emissions to a level that would avoid catastrophic and irreversible climate change[2]. Transforming the energy sector is a key component of climate change mitigation.

Box 11: The environmental impacts of electricity use

According to CO2 conversion factors quoted in the State of Energy Report (CoJ, 2008):

- 0.958 kg of CO2 emitted for every kWh of electricity consumed
- 0.2 kg of CO2 emitted for every kWh equivalent of Egoli Gas burned
- 0.3 kg of CO2 emitted for every kWh equivalent of coal burned

The Eskom electricity 'crisis' of 2007 and 2008

Towards the end of 2007, Eskom began implementing a programme of 'load shedding', disconnecting electricity supply in certain areas in order to allow for maintenance and repair of generators. Load shedding continued until May 2008.

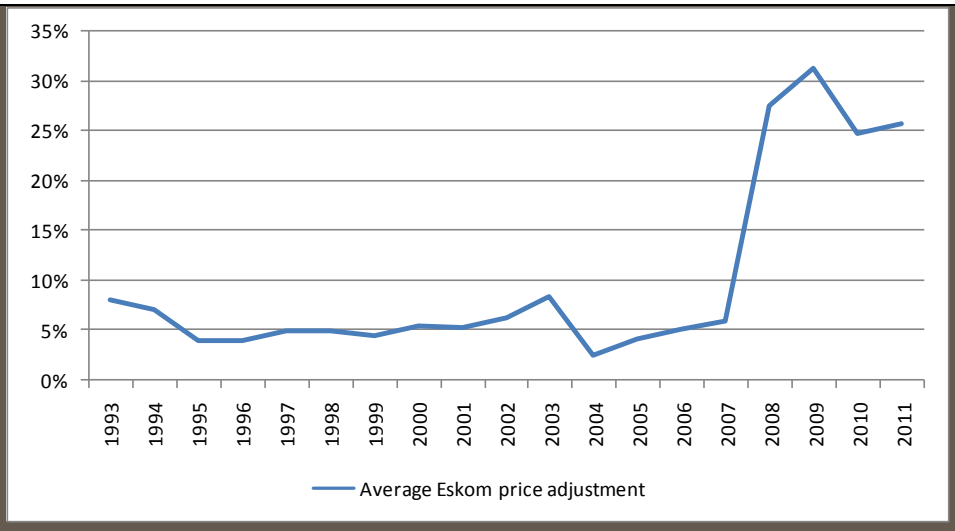
Rising electricity prices

The Eskom crisis highlighted issues regarding Eskom's reserve margins, and the lack of sufficient generation capacity to meet rising demand for electricity in South Africa. As a result, the National Energy Regulator of South Africa (NERSA) began approving significant increases in the tariffs at which Eskom sells electricity in South Africa. While average Eskom tariff increases between 1994 and 2007 were 5.2% p.a., average increases from 2008 to 2011 have been 27.4% p.a.. NERSA has also granted approval for increases of similar magnitude in tariffs by municipal electricity distributors. These tariff increases place pressure on the affordability of electricity to households in particular, and most notably to poor households.

Box 12: Eskom price increases

Annual increases in the Eskom electricity price are shown in the figure below.

[2] Pachauri R.K, Reisinger, A and IPPC Review Team (2007), Climate Change Synthesis Report: The Fourth Assessment Report of the IPCC, Geneva, Switzerland, quoted in CoJ (2011) *Johannesburg Energy and Climate Change Strategy and Action Plan DRAFT*

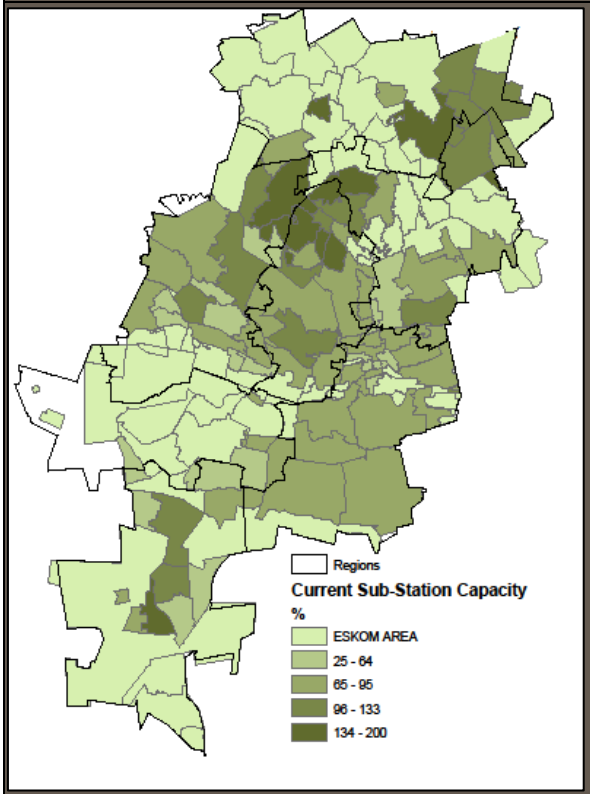


Average price increases up until 2009 from http://www.eskom.co.za/c/article/143/average-price-increases/ *accessed 22 July 2011*
Average price increases thereafter are from NERSA's Multi-Year Price Determination for 2010/11 to 2012/13

City Power infrastructure constraints in the CoJ

The Growth Management Strategy for the CoJ (CoJ, 2008) highlighted the fact that insufficient capacity of electricity transmission and distribution networks was inhibiting or preventing growth in parts of the City. Infrastructure constraints are isolated in particular geographic areas of the CoJ, identified as Consolidation or Expansion areas in the Growth Management Strategy. In these areas, development is currently only allowed if they are self-sufficient in the provision of bulk infrastructure and will not negatively affect existing demand in the CoJ.

Box 13: City Power infrastructure constraints



'Encumbered infrastructure areas' are areas identified in the CoJ's Growth Management Strategy as having no additional capacity to accommodate development. No development will be allowed in these areas in the short to medium term. Of the City's ±4,500 townships, approximately 1,700 townships (38%) fall within this category (Growth Management Strategy, 2008, p.47).

The adjacent map taken from the Growth Management Strategy (2008) illustrates the geographic nature of the infrastructure constraints currently experienced by City Power. Constraints are currently being experienced in the North and South of the City.

According to data from a Powerpoint summary of the City Power Bulk Infrastructure Master Plan obtained from City Power in 2010, City Power require capital expenditure of more than R15 billion by 2028 to expand bulk and transmission networks to allow for growth.

Growth Management Strategy (2008) Figure 6a

A growing City

The CoJ is a growing city. Population projections produced as part of the Think 2040 Growth and Development Strategy review suggest that the population will increase from 3.8 million people in 2010 to about 4.1 million by 2015 with a corresponding increase in number of households from 1.3 million in 2010 to about 1.45 million in 2015[3]. This household growth is accompanied by economic growth rates which are anticipated to reach 4.5% p.a. by 2014.

Electrification and Free Basic Energy

Although good data is not available, it is estimated that approximately 15% of households in the CoJ are currently not electrified. These households are almost all located in informal settlements, and will receive electricity only when they receive formalised housing. In the interim, the CoJ is currently investigating options for ensuring that all households have access to at least a basic level of safe and preferably clean energy.

Box 14: Access to electricity in the CoJ

According to the latest estimates, there are about 1.3 million households in the CoJ[4]. 15% of these are currently not electrified (this is an estimate based on estimates of numbers of households in informal settlements in the CoJ according to CoJ officials). This implies that about 195 000 households currently have no access to electricity.

Legislative and policy environment

A very brief overview of policy and legislation relevant to Energy DSM is provided below.

National government

National Energy Efficiency Strategy (2005, updates in 2008 and draft 2011)

This is the over-arching national framework for energy efficiency. It sets targets for energy efficiency against a 'business as usual' baseline scenario, including targets per sector. There are not strong implementation mechanisms or responsibilities and obligations placed on municipalities in the Strategy. Responsibilities are largely placed on national government, the private sector, para-statals and others.

Box 15: National Energy Efficiency Strategy targets per sector

Targets in the 2011 draft of the National Energy Efficiency Strategy are as shown below:

National energy efficiency targets	2015		2020	2030
	2008	2011 draft		
Electricity – National	***12%***	***9%***	***18%***	***41%***
Residential	10%	12%	23%	34%
Industrial (and Mining)	15%	10%	15%	22%

[3] Udjo, EO (2010) *Demographic projections of city of Johannesburg 2010-2015 and implications*, Study commisssioned by the Central Strategy Unit, CoJ

[4] Udjo, EO (2010) *Demographic projections of city of Johannesburg 2010-2015 and implications*, Study commissioned by the Central Strategy Unit, CoJ

Commercial (and Public Buildings)	20%	10%	16%	23%
Power Generation (parasitic electricity use)	15%	15%		

The National Energy Efficiency Strategy necessitates the inclusion of energy efficiency in this Policy document. Energy efficiency targets, to be set in the Implementation Plan to follow this Policy, must be set with reference to the national targets.

National Building Regulations and Standards Act (1977)

This Act, together with the associated National Building Regulations and Deemed-to-Satisfy Standards, set standards for the approval of new buildings. A new Deemed-to-Satisfy Standard (SANS 10400XA) is currently being drafted that makes provision for energy efficiency standards.

The CoJ must comply with these Regulations and Standards when approving new buildings. This sets a requirement for consideration of energy efficiency criteria in building plan approval. Note that in many respects the CoJ has already implemented (and sometimes exceeded) the likely requirements of SANS 10400XA in the Policy for the Promotion of Energy Efficiency in Land Use Management (2009).

Electricity Regulation Act: Norms and Standards (2008)

The Electricity Regulations for Compulsory Norms and Standards for Reticulation Services (GN 842) outline specific requirements for EE and LM infrastructure to be put in place by municipalities.

A target date of 1 January 2012 is placed on the establishment of remote control of various energy end-use equipment and on the implementation of smart metering and Time of Use tariffs for certain end-use customers. It is very unlikely that any municipality will meet this deadline. The Act is silent on the implications of not meeting the norms and standards.

Box 16: Energy Efficiency and Load Management requirements in the Electricity Regulation Act: Norms and Standards (2008)

The regulations state that:

"The following norms and standards for reticulation services must be maintained in an area of jurisdiction:

a) In respect of lighting:
   i. energy efficient fittings must be used in all buildings except where a specific fitting is required for some purpose and the nature of the purpose does not allow an energy efficient fitting;
   ii. street and highway lighting must be energy efficient and licensee must ensure that it is switched off during the day;
   iii. Street lights must be fitted with systems that allow for remote reduction of power especially during capacity constraints.

b) In respect of existing buildings, where an electric water heating facility is required:
   i. a licensee should install a facility to remotely control the supply of electricity to any electric geyser that does not incorporate a solar heating water facility;
   ii. sub-regulation (b)(i) must be in place not later than 01 January 2012;

c) In respect of space heating, ventilation or cooling in existing buildings, to be in place not later than 01 January 2012, a licensee must:
   i. install a facility to remotely control the supply of electricity to heating, ventilation

and cooling system in its area of supply.

ii. Link a swimming pool drive and heating system to a facility that enables the licensee to remotely control its supply of electricity;

d) An end user or customer with a monthly consumption of 1 000 kWh and above must have smart system and be on time of use tariff not later than 01January 2012;

e) Sub-regulations (b) and (c) do not apply in an event where the licensee can remotely reduce or increase the supply of electricity to the building using a smart system."

The requirements of the Electricity Regulation Act: Norms and Standards must be considered when preparing the Implementation Plan to follow this Policy. Activities to meet these requirements must be given due consideration.

The Integrated Resource Plan Revision 2 (2011)

The Second Revision of the Integrated Resource Plan (IRP2) is the over-arching electricity generation plan for the country and seeks to balance demand and supply for electricity nationally (DoE, 2011). The IRP is based on very conservative assumptions with regard to DSM, and only considers existing planned programmes. New options to improve EE were not considered. As a result, IRP2 assumes only a 5.2% contribution by DSM to the national energy balance by 2020.

Eskom

Although not legislation or policy as such, Eskom's plans for DSM provide relevant context to the CoJ and are thus included here.

Eskom has embarked on a DSM drive, much of this taking place in residential areas and within urban municipal service areas. The demand management interventions within Eskom have been structured into an Integrated Demand Management (IDM) strategy with a number of sub programmes.

Box 17: Sub-programmes in Eskom's Integrated Demand Management strategy

Sub-programmes include the following:

- *Energy Efficiency Demand Side Management (EEDSM)* to identify and promote more efficient electricity use through technology enhancements and behavioural change
- *Energy Management Programme* assisting corporate customers to enhance energy efficiency
- *Solar Water Heating Programme* providing financial incentives for consumers to switch to solar water heating
- *Power awareness and communications campaigns*
- *Energy conservation scheme* aiming to achieve a 10% energy reduction amongst consumers using more than 25 GWh per annum
- *Demand Response* where the system operator pays customers to reduce load on instruction in order to balance demand and supply
- *Internal energy efficiency programme* aiming to achieve a 15% energy reduction for non essential consumption (Eskom buildings and substations) by 2015
- *Standard Offer Programme* which is a mechanism used by Eskom for acquiring demand-side savings under which Eskom shall pay for verified energy savings using a pre-determined and pre-published rate in c/kWh for the implementation of an approved technology

Further detail is available at http://www.eskomidm.co.za/.

Eskom's DSM plans do not place any requirements on the Energy DSM Policy, but CoJ activities should be coordinated with Eskom activities where possible. In addition, when sources of funding for DSM are considered in the Implementation Plan, the Energy Conservation Scheme and Standard Offer Programme should be included.

Provincial government

Integrated Energy Strategy (2010)

The Strategy includes energy efficiency targets, which are roughly aligned with those in the National Energy Efficiency Strategy, although slightly more stringent. Like the National Strategy, targets are against a 'business as usual' baseline.

Box 18: Gauteng Integrated Energy Strategy (2010) targets.

Targets in the Gauteng Integrated Energy Strategy are shown below:

Provincial energy efficiency targets against business as usual scenario	2014	2025	National Strategy 2015
Electricity - National	***7%***	***15%***	
Residential	13%	17%	12%
Industrial	10%	15%	10%
Commercial	13%	25%	10%
Government	13%	25%	
Efficient water heaters			
Mid/Hi income	20%	95%	
Low income (SWHs)	20%	50%	
Free Basic Alternative Energy Access in informal households	20%	80%	

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The Strategy notes the intention to engage with municipalities to determine areas where support would further their municipal energy efficiency programmes and needs.

The targets in the Integrated Energy Strategy should be considered when setting energy efficiency targets in the Implementation Plan to follow this Policy. However, note that the Provincial targets outlined here are not completely aligned with the targets in the National Energy Efficiency Strategy.

City of Johannesburg

There are a number of existing policies and strategies in the CoJ that are directly relevant to Energy DSM.

Think 2040: Revised Growth and Development Strategy (draft 2011)

Still in draft form, the revised GDS for the CoJ focuses on changing the City's carbon footprint largely by shifting supply away from coal-fired electricity and towards green energy sources and by changing transport patterns to shift users away from private cars and towards public transport. In terms of the demand for energy, the GDS focuses on improving the energy efficiency of buildings.

The proposals of the Think 2040 strategy have been considered when drafting this Energy DSM Policy. The Policy will support the broad goals in the draft GDS

Integrated Development Plan (2011/12)

The current IDP places a high level of focus on DSM. The IDP identifies seven areas of priority, one of which is Sustainable Development. The importance of reducing demand rather than expanding supply is noted under this priority.

This Energy DSM Policy is aligned with the current IDP, and will support the achievement of IDP targets for reduced electricity demand.

Draft Energy and Climate Change Strategy (2011)

This Strategy is currently in draft form. It provides an over-arching framework for energy, with a strong focus on climate change mitigation. The Strategy includes very stringent targets for reductions in Greenhouse Gas emissions.

The Strategy has a broader focus than this Energy DSM Policy, looking as it does at the reduction of Greenhouse Gas emissions broadly. The Energy DSM Policy is aligned with the strategy.

Policy for the Promotion of Energy Efficiency in Land Use Management (2009)

The Policy is intended for use by City of Johannesburg officials and aims to enable them to develop a cohesive approach on energy efficiency in land use planning and management. It outlines criteria for assessing the energy efficiency of new buildings, to be applied when granting development approval.

The Policy for the Promotion of EE in LUM has a narrower focus than this Energy DSM Policy, focussing as it does on Land Use Management only. The broad principles followed in the two policies are aligned.

Policy goals and objectives

There is a large number of potential goals for DSM in a City such as the CoJ, as DSM brings a wide range of benefits. Different goals will result in focus on different 'groupings' of DSM activity. For example, a goal relating to environmental benefits will result in a focus on EE or DRG, while a focus on relieving constraints on infrastructure might result in a programme that places more emphasis on LM.

The CoJ recognizes a set of immediate goals, as well as a longer term view.

Immediate goals

Given the current context in the CoJ and nationally, the immediate motivations for introducing an Energy DSM Policy in the CoJ are two-fold.

Firstly, to **relieve current constraints on electricity infrastructure** (City Power distribution and transmission networks).

Box 19: DSM and electricity infrastructure constraints

This motivation relates to the fact that City Power distribution and transmission networks are currently at or above capacity in many parts of the CoJ. 38% of the 4 5000 identified townships in the CoJ in 2008 were encumbered infrastructure areas, according to the CoJ's Growth Management Strategy (2008). In the North of the CoJ, it is estimated that networks are operating at 106% of capacity. DSM reduces demand, most notably peak demand, on the network and thus relieves infrastructure constraints in the short to medium term. This can be achieved through a large extent through Load Management, shifting demand away from the peak times, when the pressure on infrastructure is greatest. Over the longer term, DSM interventions reduce the need to reinforce networks.

Secondly, to **reduce the risk of further load shedding** and improve the security of electricity supply.

Box 20: DSM and Eskom load shedding

In addition to relieving pressure on City Power infrastructure, DSM in the CoJ will reduce demand on Eskom's ability to supply electricity. This reduces the risk of further load shedding and improves the security of electricity supply in the short term.

Over the longer term, DSM activities that focus on Distributed Renewable Generation or Fuel Switching also improve the security of supply by diversifying the supply base. In other words, the CoJ becomes less dependent on Eskom and thus less exposed to risks related to Eskom's ability to supply electricity.

These goals can be achieved through a short term focus on Load Management, accompanied by some Energy Efficiency, Distributed Renewable Generation and Fuel Switching.

Longer term goals

Over the longer term, the CoJ sees the **environmental benefits** of DSM as a primary goal. The potential of DSM to **improve the cost efficiency of City Power** is also important over the longer term.

Box 21: DSM and environmental benefits

DSM activities that reduce the demand for electricity bring significant environmental benefits in terms of reductions in Green House Gas and particulates emissions associated with the generation of electricity from coal. This would apply to Energy Efficiency, Distributed Renewable Generation and Fuel Switching (as long as the switch is to a fuel source that is greener than electricity). Load Management does not bring direct environmental benefits (although it should be noted that Load Management does have some impact on overall demand, as reduced load results in reduced technical electricity losses and thus some reduction in demand).

Box 22: DSM and the cost efficiency of City Power

Depending on which activities are favoured, DSM can have a negative financial impact on City Power. However, there are also positive efficiency benefits related to DSM. For example, Load Management reduces the cost of bulk purchases by moving purchases away from peak times, when Megaflex tariffs are highest. DSM also results in increased focus on the sale of energy to efficient users. Reducing peak loads on infrastructure also has strong efficiency benefits.

These goals imply a greater focus on Energy Efficiency and Distributed Renewable Generation over the longer term.

Other recognised benefits

In addition to these primary motivating factors, the CoJ recognises the benefits of DSM in terms of **relieving fuel poverty** and **creating jobs**. These benefits will be maximised where possible.

Box 23: DSM and fuel poverty

Fuel poverty exists when households do not have the ability to pay for energy, most often heating materials. In the UK, households are said to be in fuel poverty if they would have to spend more than 10% of their income on fuel to keep their households in a 'satisfactorily' warm

condition (www.poverty.org.uk).

Improving Energy Efficiency reduces the amount that households need to spend on energy, and thus reduces fuel poverty.

Box 24: DSM and job creation

Promoting DSM has the potential to grow industries that provide products and services related to DSM. This in turn creates jobs.

Policy principles

The following policy principles will guide the selection of DSM activities and tools in the CoJ.

Principle 1: A balanced mix of activities

DSM is a broad term that covers a range of activities. The CoJ will seek to use a balanced mix of DSM activities that are mutually supportive and optimally suited to fulfilling the motivations for DSM, as outlined in this Policy document. Changing circumstances may require a change in the mix of activities applied.

Load Management is recognised as an important element of the DSM mix. Over the longer term, Energy Efficiency and Distributed Renewable Generation are most strongly favoured due to their strong environmental benefits.

Principle 2: An optimal mix of tools

There is a wide range of tools that can be used to implement DSM. The CoJ may choose to use a number of these tools in order to fulfil the motivations for DSM as outlined in this Policy document.

Box 25: Examples of DSM tools available

The following is a list of some DSM tools available. The list is not comprehensive, nor does it indicate favored tools. It has been compiled based on a review of what is being done in other South African Cities and what has been proposed in various documents or discussions for the CoJ.

Broad category	Example of interventions
Information and education	Electricity bill review and presentation Information and awareness campaigns Municipal Energy Efficiency Accord Promotion of Distributed Renewable Generation or Fuel Switching
Audits	Industrial energy audits and publicity for results
Standards	Energy efficient building standards
Pricing	Rising block tariffs Time of Use tariffs Emergency DSM tariffs
Incentives	Rates rebates for EE buildings

Market transformation	Green Procurement Policy Competitions/awards for suppliers Database of suppliers of solar water heaters, solar photovoltaic and other EE equipment
Direct interventions	Smart metering and ripple control extension SWH roll-outs EE lighting roll-outs Ethanol stoves or alternative FBE option roll-outs Retrofit ceilings in subsidised housing EE in municipal services (most notably water and wastewater pumping efficiencies) EE street and traffic lighting EE retrofit programme in municipal buildings EE in municipal planning and new build

There is a vast international literature relating to DSM that can be used to guide the choice of appropriate tools.

Although equity will be given due consideration, the mix of DSM tools applied may vary for different types of consumer and for different parts of the CoJ.

Box 26: What does 'equity' mean in relation to DSM?

Equity here refers to treating similar users of electricity in a similar manner. It is most significantly a concern for domestic consumers. There may be reasons why different DSM activities or tools are favored for low income households compared to high income households. This can lead to a perception that one or other category is being discriminated against in some way. All efforts will be made to implement DSM in an equitable manner, treating all households fairly.

Principle 3: Due recognition of spatial considerations

The mix of DSM activities applied, and the tools used to implement those activities, may differ in different parts of the CoJ. In addition, implementation may be phased in such a way as to focus early attention on particular parts of the City.

The current constraints on City Power infrastructure are spatially located. DSM interventions should focus, at least initially, on those areas where infrastructure constraints are most severe. Focusing interventions on those areas where lack of electricity infrastructure is constraining growth (the Expansion areas identified in the Growth Management Strategy (CoJ, 2008)) will free up growth, which has long term positive impacts for the City.

Principle 4: Balancing existing and future demand

DSM interventions that focus on existing demand for energy will be balanced with those that focus on future demand. The CoJ will put measures in place to ensure that new growth is energy efficient, but the benefits of managing existing demand are also recognised.

Box 27: Existing vs future demand for energy

A DSM intervention that focuses on future demand for energy might include introducing building

standards that require all new houses built in the CoJ have solar water heaters (and even solar photo-voltaic panels) on their roofs. The CoJ has already gone a long way to promote Energy Efficiency in new buildings through its *Design Guidelines for Energy Efficient Buildings* (2008) and even more notably through the Department of Planning and Urban Management's *Policy for the Promotion of Energy Efficiency in Land Use Management* (2009).

Planning for future demand for energy includes implementing the necessary processes to ensure that all new development meets or exceeds the new SANS 10400XA standards when they are finally in place. It should be noted that this is expected to create a step change in the energy efficiency of building stock, particularly subsidised RDP-style housing.

A DSM intervention that focuses on existing demand would be a programme of installing solar water heaters (and solar photo-voltaic panels) on existing houses in the City.

Interventions that focus on future demand are often lower cost. However, it is recognised that there is significant potential for DSM on existing demand which should not be neglected.

Box 28: Energy Efficiency in new buildings

The CoJ is already quite far advanced in putting tools in place that support Energy Efficiency in new buildings in the CoJ (a key component of the future demand for energy).

A Policy for the Promotion of Energy Efficiency (EE) in Land Use Management (LUM) (2009) is in place, and is accompanied by a manual that contains criteria for promoting EE in LUM as well as a set of benchmark criteria.

There is also a Design Guideline for Energy Efficient Buildings (2008) in place that provides architects, designers, planners and developers with practical guidance on how to improve energy efficiency through the entire design process.

Principle 5: Favouring supply-side interventions for Emergency DSM

Emergency DSM measures are those that are required to reduce demand at very short notice, should Eskom indicate that load shedding is required. The CoJ will put systems in place to ensure that Emergency DSM measures can be implemented rapidly and effectively when required.

Box 29: Examples of systems required for Emergency DSM

Systems required for Emergency DSM are likely include (but not be limited to): Emergency DSM tariffs; communication procedures; legal and contractual.

The CoJ will favour emergency measures that boost the short term supply of energy within the CoJ over those that shed demand.

Box 30: What are the options for supply-side interventions for Emergency DSM?

Many large commercial enterprises in the CoJ have diesel generators. They can switch over from electricity to these generators as a temporary measure if required. An example of an emergency DSM measure that favours boosting energy supply would be an 'emergency DSM tariff' that allows City Power to buy energy from these enterprises during times of temporary electricity supply stress. This would reduce the load on the electricity network and avoid the need for load shedding. City Power itself has a number of gas turbines that can be used to generate electricity in times of temporary supply stress.

Principle 6: Placing a high priority on municipal use

Measures that reduce or otherwise manage demand for energy by the CoJ Metropolitan Municipality and its Municipal Owned Entities will be introduced as soon as possible.

Box 31: Why focus on municipal use?

The State of Energy Report (2008) indicated that the Local Authority accounted for 13% of all electricity use in the CoJ in 2007 (if City Power's distribution losses are included in Local Authority use). Electricity use by the Local Authority in 2007 was broken down as shown in the table below.

Table 3: Breakdown of municipal electricity use (2007)

	Electricity use (MWh)	% of electricity use
Buildings (administrative as well as Community Development buildings)	28,704	1.5%
Water and wastewater pumping	180,000	9.5%
Streetlights and signals	80,000	4.2%
Distribution losses	1,604,576	84.8%

Focusing on municipal use can have a significant impact on overall demand. It is also important that the municipality is seen to be 'leading the way' on DSM.

This will include programmes to reduce City Power's electricity losses (both technical and non-technical) where a cost/benefit analysis shows these to be favourable.

Box 32: Some background and discussion on electricity losses

Electricity losses refer to the amounts of electricity injected into the transmission and distribution grids that are not ultimately paid for by users. Losses have two components. 'Technical' losses are largely due to the dissipation of electricity in transmission and distribution lines, transformers etc. They can be reduced, but never fully eliminated. Electricity lost due to technical losses is truly lost; no-one is consuming this electricity. 'Non-technical' losses refer to losses primarily due to electricity theft, non-payment by customers, or errors in metering and billing. Non-technical losses are financial losses. The electricity is not really lost; someone is consuming it, they are just not paying.

Reducing technical losses reduces the total demand for electricity directly. It also has positive financial benefits for an entity such as City Power, as it reduces the amount of electricity purchased from Eskom but not paid for. However, reducing technical losses is typically capital intensive. A full cost/benefit assessment would be required to determine whether the benefits in terms of DSM and reduced cost of bulk purchases are out-weighed by the capital costs incurred. (It is worth noting that technical losses are higher when networks are heavily loaded, so Load Management measures will reduce technical losses).

Reducing non-technical losses reduces the total demand for electricity through the tariff mechanism: people who were formerly using electricity but not paying for it must now pay; as a result, they tend to reduce consumption. Reducing non-technical losses also has a financial benefit for an entity such as City Power, as revenue is received for electricity that was previously not paid for. Reducing non-technical losses typically also requires capital expenditure (for example, rolling out prepaid electricity meters) but is usually less capital intensive than technical loss reduction programmes.

In 2009/10, City Power estimated their total losses to be in the order of 13% of total electricity purchased from Eskom, broken down into about 9% technical and 4% non-technical losses. Recent data is not available for Eskom. Total Eskom losses in the CoJ were 17.5% in 2007. The split into technical and non-technical losses is unknown, but non-technical losses are likely to be high due to high levels of non-payment for electricity in areas such as Soweto.

Principle 7: Balancing impact on demand with impact on production

Maximum impact on overall demand for energy in the CoJ (obtained by focussing DSM measures on managing the demand of the biggest individual consumers) should be achieved with minimum impact on overall productivity (obtained by focussing on the demand of the least productive consumers).

Box 33: Who are the 'biggest' consumers of electricity in the CoJ?

From the table below, it is clear that industry (large business) are the largest individual users of electricity in the areas of the CoJ served by City Power, followed by commercial and then domestic.

Table 4: City Power customer base (2009/10)

Customer category	Number of customers		Total consumption		Average consumption per customer
	Number	%	MWh pa	%	kWh per month
Domestic with prepaid meters	104,497	33%	430,761	4%	344
Domestic with conventional meters	195,030	62%	3,738,293	37%	1,597
Agriculture	32	0%	1,304	0%	3,395
Business with prepaid meters	100	0%	1,200	0%	1,000
Business with conventional meters	10,833	3%	519,445	5%	3,977
Large business	5,902	2%	5,397,182	54%	76,205
Total	**316,444**		**10,088,185**		**8,270**

Data provided by City Power (2009/10)

As such:

- The domestic sector should carry all DSM measures possible.
- The commercial sector should carry all measures possible without impacting on productivity.
- Measures should be introduced in the industrial sector with care, preferably on a case-by-case basis, with consideration given to maximising reductions possible without impacting on productivity.

Box 34: What is meant by productive vs non-productive demand for energy?

'Productive' energy is energy used to produce goods and services.

Domestic consumption of energy is non-productive.

Commercial consumption of energy is primarily lighting and so called 'HVAC' (Heating, Ventilation and Cooling) of office space. This is productive to some extent, as the physical comfort of workers impacts on productivity.

Industrial consumption of energy is regarded as productive. Although there are inefficiencies in productive processes, much of the energy used goes directly into producing goods. Once inefficiencies are eliminated, reducing the amount of energy used means reducing the amount of goods produced.

Principle 8: Maximising impact while ensuring equity in the domestic sector

Within the domestic sector, DSM measures will be applied in a balanced manner across all income groups in order to ensure equity. However, measures may be phased in such a way as to achieve maximum impact on overall demand for energy by focussing first on the biggest individual consumers of energy (typically high income households).

The costs of DSM measures should be fully recovered from high income energy users. For low income users the CoJ will consider subsidising DSM measures where they provide benefits in terms of poverty alleviation.

Managing the financial implications of DSM

Operating surpluses generated by City Power are an important revenue source for the CoJ as a whole.

Box 35: The contribution of electricity to CoJ finances

R7 369 million revenue was generated from electricity service charges in the 2009/10 Financial Year. This is 29% of all revenue generated by the CoJ. Some of this revenue is retained by City Power and used to provide the electricity distribution service. However, some is transferred to the CoJ and used to pay for roads, public transport and other publicly accessed community services.

DSM will have a number of direct financial impacts on City Power and thus on the CoJ. Many of these impacts counteract each other:

- DSM *reduces operating expenditure* on bulk electricity purchases from Eskom. This is true for all DSM activities.
- Almost all DSM interventions have operating costs associated with them, so there is also an *increase in operating expenditure* associated with DSM.
- Measures that reduce electricity purchased from City Power (EE, DRG and FS) *reduce revenue generated from electricity sales*.
- DSM measures *reduce or defer capital expenditure required* to reinforce or expand transmission and distribution networks.
- Some DSM interventions have capital costs associated with them, so there may also be an *increase in capital expenditure* associated with DSM.

There are also some less direct financial impacts:

- Improved payment for electricity if household bills become more affordable due to DSM.
- Higher levels of growth if DSM frees up growth in currently constrained areas.

The net financial impact will depend on the mix of activities applied and the stringency of the targets set.

Box 36: A financial rationale for Load Management

Note that there is a strong financial rationale for implementing LM. City Power buys the bulk of electricity (99%) from Eskom on the Megaflex tariff. This is a very complex tariff, with a number of components. The largest components of the tariff are a number of demand/access charges, which are related to the total electrical capacity required by the CoJ (which in turn is a function of the peak capacity required, and thus peak demand), and an active energy charge, which is a charge per kWh purchased.

The breakdown of payments made by City Power to Eskom in 2009/10 per tariff component is shown in the table below.

Table 5: Breakdown of City Power payments to Eskom (2009/10)

Tariff component	Payments made (Rmillion)	% of total payments
Demand/access charges	496,019,634	11%
Active energy charge	3,195,653,427	74%
Environmental levy	256,926,613	6%
Electrification and rural subsidy	328,102,685	8%
Other	43,595,776	1%
Total	**4,320,298,135**	

Data provided by City Power

Active energy charges paid vary with the season (higher in winter and lower in summer) and with time of day. In winter, the peak charge is 4 times more expensive than the standard charge, which in turn is twice as expensive as the off-peak charge; in summer the peak charge is 40% higher than the standard charge, which is 30% higher than the off-peak charge.

The breakdown of purchases and payments made on the Megaflex tariff into the various time periods is shown in the graph below.

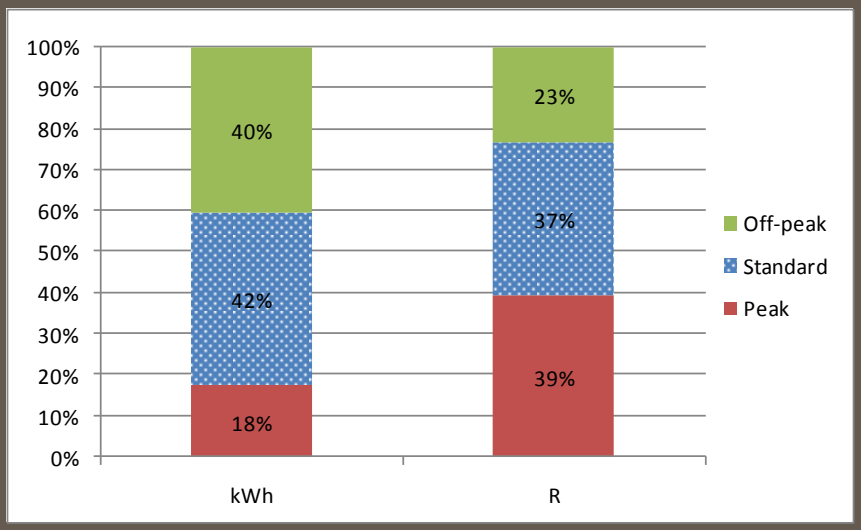

Figure 1: Composition of City Power purchases and payments to Eskom on the Megaflex tariff (2009/10)

The figure shows that although only 18% of kWhs purchased are at the peak times (7am to 10am in the morning and 6pm to 8pm at night), these purchases account for 39% of the active energy charge payments made to Eskom.

This provides a strong financial rationale for implementing Load Management: shifting load away from peak times to standard or even off-peak times reduces the active energy charges paid to Eskom, and also reduces the demand and access charges.

It is important to note that in a review of barriers to DSM in South African municipalities, Clark (2000)[5] identifies the most significant barrier to effective DSM to be the disincentives associated with reducing electricity demand in a context where electricity sales are a large component of municipal revenues.

It is recognised that targets relating to the reduction in electricity demand in the CoJ will have financial implications for City Power. Depending on the mix of activities applied and stringency of targets set, DSM may mean lower growth in the financial surpluses generated by City Power in future.

This impact will be reduced wherever possible through:

1. Efficiency improvements in City Power operations. Such improvements could include reducing technical and non-technical losses, as well as the introduction of other operational efficiencies.
2. Factoring impacts of electricity demand reduction targets into annual tariff applications to NERSA; and
3. Accessing compensatory revenues from sources such as the Clean Development Mechanism where possible, although it is acknowledged that funding from the Clean Development Mechanism and other such sources is likely to be limited.

Where impacts of electricity demand reduction targets cannot be mitigated, they will given due consideration when setting annual operating surplus requirement for City Power and when setting overall revenue targets and rates levels for the CoJ as a whole.

Policy implementation

This Policy document has outlined broadly **why** the CoJ wishes to embark upon a programme of Energy DSM and the broad principles guiding **how** that programme will be conducted. The Policy will be supported by an Implementation Plan that will identify in more detail **what** will be done, by **when** and **who** will do it. It is envisioned that the Implementation Plan will cover a five year period, after which a new Plan will be developed. Implementation Plan periods should be aligned with the Mayoral term of office[6].

[5] Clark, Alix. December 2000. *Demand-side Management Investment in South Africa: Barriers and Possible solutions for new power sector contexts*. Energy for Sustainable Development. Volume IV No. 4.

[6] This implies that the time period covered by the first Implementation Plan should be 2011/12 to 2016/17.

The Environmental Management Department at the CoJ will be primarily responsible for ensuring that an Implementation Plan is put in place. This should be done in close cooperation with the Infrastructure and Services Department (Energy)[7].

The Implementation Plan will cover the following.

Establish a baseline

The Implementation Plan will establish a baseline for DSM. This is a 'business as usual' projection of the magnitude, timing and composition of energy demand against which implementation can be monitored. 'Business as usual' refers to a projection where no DSM interventions are assumed.

Set targets for DSM outcomes

The Implementation Plan will set outcomes-based targets for each of the DSM activities, in line with the following principles:

- Long term targets will be set for 2051[8]. Intermediate targets will be set for 5 year time intervals up until 2051. Intermediate target dates will be aligned with the Mayoral term of office.
- Targets will be set for each of the DSM activities considered in this Policy, namely Energy Efficiency, Load Management, Distributed Renewable Generation and Fuel Shifting.
- Energy Efficiency targets will be set against the 'business as usual' baseline and broadly aligned with national and provincial EE targets (noting that national and provincial targets are slightly different).
- Where relevant, overall targets for the CoJ as a whole will be disaggregated into targets per sector and targets for particular spatial areas in the City.

Identify interventions to be applied and quantify implications

The Implementation Plan will identify a range of DSM interventions to be applied during the term covered by the plan.

The Implementation Plan will include a realistic assessment of the *magnitude of the potential DSM benefits* from each intervention, and its contribution to the overall DSM impact targets for the term of the Plan.

The Implementation Plan will also include a full estimate of the *financial implications of each intervention for City Power and the CoJ*. This will include:

- The once-off capital costs of the intervention.
- The on-going operating costs of the intervention.
- The likely impact of the intervention on City Power's financial performance over the medium term (10 years). This will include the likely impact on the costs of bulk electricity purchases, revenue received, overall operating performance as well as capital requirements for bulk infrastructure reinforcement or expansion.

Finally, the Implementation Plan will include an estimate of the *implications of each intervention for the targeted customers*, both in terms of expected reductions in energy use per customer and financial impacts.

[7] The Implementation Plan may affect the Service Level Agreement between the CoJ and City Power and Key Performance Indicators for City Power. As the key custodian of the relationship between the CoJ and City Power, ISD must be closely involved in developing the Implementation Plan.

[8] The Draft CoJ Energy and Climate Change Strategy (2011) proposes a target date of 2050. 2051 is selected instead of 2050 as it is aligned with the Mayoral term of office.

Identify roles and responsibilities

The Implementation Plan will identify roles and responsibilities for each DSM intervention. The following 'hierarchy' of roles and responsibilities will be applied:

- Primary stakeholders: without their direct involvement and participation, implementation will not take place.
- Secondary stakeholders: those whose guiding role is important for effective and efficient implementation.
- Affected parties: those whose use of energy will be affected by implementation.

Set targets for performance monitoring

The Implementation Plan will establish performance management targets related to DSM for the term of the Plan.

Performance management will be against programmatic targets, rather than out-comes based DSM targets.

Box 37: What are outcomes-based and programmatic targets?

Programmatic targets measure the extent to which the activities included in a programme or project have been implemented. In other words, 'have we done what we said we would do?'

Outcomes-based targets measure the impact of a programme or project. They assess whether a desired change has in fact come about. In other words, 'have we made a difference?'

For example, a DSM programme might aim to reduce energy demand by 10% over 10 years. The programme includes the roll-out of 150 000 Solar Water Heaters. The reduction in energy demand is the outcomes-based target; the number of SWHs to be installed is the programmatic target.

If a programme has been well designed, then the achievement of programmatic targets will lead to the achievement of outcomes-based targets. If the incorrect activities have been included in the programme, then achievement of programmatic targets may not ensure achievement of outcomes-based targets. It is also possible that outside factors, not anticipated and not under the control of the CoJ, could mean that the outcomes-based target is not achieved, even if the programmatic one is.

So why use programmatic targets for performance management? Because of the problem of *accountability* and *attributability*.

Two characteristics regarded as important when setting performance management targets are *accountability* and *attributability*. Accountability means that the person or entity whose performance is being evaluated has a high degree of control over the parameter monitored. Attributability means that changes in the parameter monitored can be regarded as largely due to the actions of the person or entity being evaluated.

In the case of DSM programmes, outcomes are influenced by a large number of factors, many of which are out of the control of the CoJ. CoJ (or City Power) officials can be held accountable to only a limited extent for DSM outcomes; and those outcomes can be attributed only to a limited extent to the CoJ or City Power officials. Programmatic targets for DSM are thus considered more desirable for performance management than outcomes-based targets.

This is not to say that outcomes-based targets should not be set and monitored. See Box 38 below for further explanation.

Principles to guide monitoring and reporting

Performance management targets and a detailed monitoring and reporting plan will be established as part of the Implementation Plan to follow this Policy document.

Monitoring and reporting will be guided by the following principles.

Responsibility for monitoring

The Environmental Management Department will be primarily responsible for monitoring progress with Energy DSM in the CoJ.

Monitoring against programmatic targets

Monitoring will take place on two levels.

Intermediate monitoring of progress in fulfilling the Implementation Plan will take place through the performance management processes of individuals identified as responsible for each DSM intervention.

Monitoring against outcomes-based targets

Monitoring of progress in achieving the overall outcomes-based DSM targets will be conducted at the end of each term.

Establishing a feedback loop

Progress against programmatic targets will be evaluated against progress against the outcomes-based DSM targets at the end of each term. The extent to which achievement of programmatic targets has resulted in achievement of outcomes-based targets will be assessed, and the findings will be used as input into preparation of the Implementation Plan for the next term.

Box 38: If programmatic targets are used for performance management, then why monitor outcomes-based targets at all?

Programmatic targets measure 'how well we have done what we said we would do'. Outcomes-based targets measure 'how much difference it has made'. Overall, the goal is very definitely to achieve the outcomes-based targets!

It is important to monitor the extent to which achieving programmatic targets results in achieving outcomes-based targets. If the programmatic targets have all been achieved, but the impact on the outcomes-based targets has been small, then this is an indication that the CoJ is doing what they said they would do, and is doing it well, but they are doing the wrong things, or perhaps are not doing enough. If this is the case, then the Implementation Plan for the next term should consider a different mix of activities or possibly an expansion of activities.

Reporting through the State of Energy Report

A programme for reporting on progress towards targets will be identified in the Implementation Plan.

It is envisioned that reporting on overall progress in achieving both the programmatic and outcomes-based DSM targets will take place via a State of Energy report or similar document for the CoJ at the end of each 5 year term.

The Implementation Plan will also develop a programme for intermediate reporting on programmatic targets, and possibly outcomes-based targets.

Incorporating DSM into infrastructure planning

Over the long term, DSM will be incorporated into infrastructure planning by City Power in order to ensure that planning is economically and environmentally efficient. In

particular, the costs of DSM programmes to manage demand will be balanced against the costs of expanding supply infrastructure.

It is acknowledged that including DSM in infrastructure planning will be difficult initially. The impact on energy use associated with many DSM interventions is typically somewhat uncertain, especially in the case of new interventions. As a result it is difficult to include demand management projections in future demand estimates and infrastructure planning in the short term. However, over time there will be increasing confidence in the likely impacts of DSM programmes. These can then be incorporated into future demand estimates and supply planning in an integrated manner. In particular, the costs of DSM programmes in reducing demand will be balanced against costs of additional supply infrastructure to allow economically efficient planning to occur.

…….