

9

Electricity

■ Introduction

Electricity services in South Africa are at a crossroads. National economic growth has outstripped available generation capacity, while regulatory uncertainty has undermined the effective management of distribution assets at the municipal level. Consumers are now experiencing significant price rises that are necessary to pay for expanding generation capacity, but there are still financial and operational challenges in securing municipal distribution networks.

National economic growth has outstripped the available capacity for electricity generation

Electricity is vital to households, businesses and municipalities. For most households, electricity is the principal source of energy, and extending electricity to households that do not already have access offers a cleaner and safer alternative to other current sources of energy. Businesses need electricity to undertake production, communication and a host of other uses. For municipalities that provide electricity to households and businesses, it is also a major source of revenue and can generate surpluses that can be used to fund other municipal functions.

The supply of electricity involves three phases: generation, transmission and distribution. National government is responsible for ensuring the generation of electricity and its transmission across the country. The state-owned electricity company, Eskom, is responsible for over 95 per cent of electricity generation and all transmission in the country. As a sphere of government, municipalities are responsible for the distribution of electricity to consumers. However, not all households and businesses are supplied with electricity by municipalities as Eskom supplies a large number of customers directly. This can have important implications for municipal revenues, as well as municipalities' ability to manage outstanding debtors.

Municipalities are responsible for the distribution of electricity to consumers

This chapter gives an overview of:

- the generation and transmission of electricity

- electricity distribution
- financing electricity distribution
- promoting access to electricity.

Overview of the generation and transmission of electricity

The distribution function is shared between municipalities and Eskom

Electricity provision involves three phases: generation, transmission and distribution. Generation is the process by which electricity is produced; transmission is the transportation of electricity that has been generated in power stations via high voltage, long distance power lines to local networks for distribution; and distribution is the actual delivery of electricity to end consumers. Electricity generation and transmission together constitute electricity supply and in South Africa this is largely the function of Eskom (in some cases, municipalities have their own generation capacity, but on a very limited scale). The distribution function is shared between municipalities and Eskom.

Shortages of electricity were first experienced in early 2008, when the country's growing economy began to make full use of the electricity generation capacity

Between 1970 and the early 2000s, South Africa enjoyed a long period of plentiful electricity supply at some of the lowest prices in the world. This situation changed dramatically in June 2006 as the country's growing economy began to make full use of the electricity generation capacity that had been built in the 1970s and 1980s. This led to shortages of electricity and load shedding as the country was not able to generate enough electricity to meet demand, while preventing a collapse of the transmission system.

In response to the shortage of supply, a number of measures were put in place, including immediate efforts to reduce the demand for electricity, and plans to expand generation capacity were fast-tracked. The global recession that began in 2008, and saw South Africa's GDP contract by 1.7 per cent in 2009, resulted in reduced demand for electricity, helping to ensure that demand has remained below the available supply and that there has been no load shedding since April 2008. From the supply side, the other critical factor in keeping the lights on during this period has been improved plant reliability achieved by Eskom technicians.

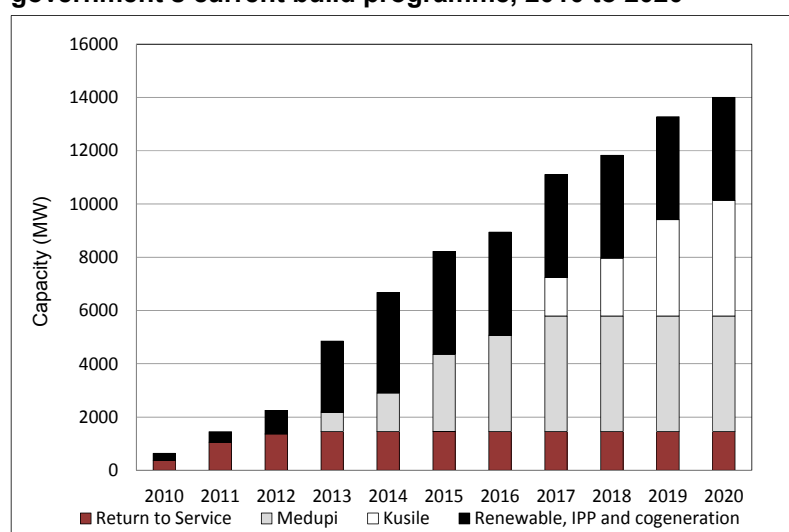
As the South African economy begins to recover (GDP growth is expected to rise to 4.4 per cent by 2013 from the 2.7 per cent estimated for 2010) demand for electricity will also increase, placing strain on the country's ability to generate enough power to meet demand. The ability to avoid load shedding over the coming years will depend on both the success of efforts to limit demand through increased energy efficiency and the timing of the completion of new and refurbished electricity generation capacity, and the pace and nature of economic growth.

Increasing generation capacity

Government's integrated resource plan for electricity outlines a strategy for increased generation capacity

Government's integrated resource plan (IRP) for electricity, approved by Cabinet in March 2011, outlines a strategy for increased generation capacity. This strategy commits government to completing the programme of constructing new generation capacity that is already being implemented and then provides options for further capacity that will allow the country's electricity supply to keep pace with the projected future growth in demand.

Figure 9.1 Generation capacity to be added in terms of government's current build programme, 2010 to 2020



Source: Department of Energy (Integrated Resource Plan for Electricity, 2010)

The current electricity generation build programme added 640 MW to the electricity supply in 2010 and will add another 1 009 MW in 2011. By 2020, the current build programme will have added a total of 14 000 MW to the country's generation capacity. Although over 70 per cent of this capacity will come from coal-fired power stations, the current build programme will go some way towards diversifying the country's sources of electricity. This is because almost 90 per cent of current generation comes from coal-fired power stations. Of the committed new capacity, 1 020 MW will come from an independent power producer (IPP) (using an open cycle gas turbine) and a total of 1 125 MW will be added by projects using wind, solar, water and landfills as sources of energy. The additional generation capacity already committed to, when combined with the impact of demand side management (DSM) measures, will ensure that, from 2013 to 2018, the country will be able to meet the demand for electricity (as well as provide for 15 per cent reserve margin) under all current demand forecasts.

Over 70 per cent of committed capacity will come from coal-fired power stations

Generation capacity may be less than peak demand for electricity again in 2011 and 2012, and depending on the pace of growth in consumption could fall below demand again after 2018. The IRP therefore proposes an ambitious set of options for building additional generation capacity up to 2030 that include: an additional 8 400 MW from wind, 8 400 MW from photo-voltaic solar generation, 1 000 MW from concentrating solar power, 2 609 MW from imported hydro sources, 6 250 MW from coal, 3 910 MW from open cycle gas turbines, 2 370 MW from closed cycle gas turbines and up to 9 600 MW from nuclear energy. After 2018 it is envisaged that renewable energy sources will contribute 47.9 per cent of the new build options, fossil fuels make up 29.5 per cent and nuclear energy accounts for 22.6 per cent. This represents a significant shift away from coal-based technology in the country's electricity generation capacity, an effect that will be reinforced by the decommissioning of several coal-based power stations that will come to the end of their expected lifespans over the next two decades.

Renewable energy sources make up 47.9 per cent of the new build options

Eskom and government agree that the IPPs must play a greater role in electricity generation in South Africa

Government has decided that the IPPs will play a greater role in electricity generation in South Africa in the period ahead. As noted, an IPP is expected to contribute 1 020 MW of generation capacity by 2013. The Department of Energy is also considering several legislative and policy changes to enable IPPs to sell electricity to the national grid.

Over the next few years (particularly in 2011 and 2012), the lack of an adequate reserve margin between demand for electricity and generation capacity will mean that the country's electricity supply will be at increased risk of interruption. The declining quality of coal delivered to power stations, the reduced time available for scheduled maintenance due to the low reserve margins and the fact that many aging plants are in need of refurbishment will heighten these risks.

Reducing demand for electricity

Eskom, national government and municipalities will all contribute to demand side management programmes

Reducing demand for electricity plays a key part in government's strategy to make sure that there is a sufficient supply of electricity to meet demand. Eskom, national government and municipalities (who are responsible for 42.9 per cent of electricity sales) have all made significant commitments to contribute to demand side management programmes.

Local government's role in responding to climate change

Globally, average temperatures are rising as a result of the increased emission of greenhouse gasses such as carbon dioxide. These gasses create a "greenhouse" effect by trapping heat in the earth's atmosphere. South Africa's economy is one of the most carbon-intensive in the world, in large part because of its heavy reliance on coal to generate electricity. South Africa is a signatory to the Kyoto Protocol and accepts the need to find a sustainable path for its future development.

Municipalities are on the frontline of the impact of climate change. Municipalities will have to provide the first response to disasters caused by the extreme weather events that are likely to become more frequent as a result of climate change. Municipalities will also need to invest in infrastructure that can withstand these extreme weather conditions, particularly flooding.

The electricity and transport sectors are two of the largest sources of carbon dioxide emissions in the country and municipalities have substantial influence over the size and shape of both these sectors. South African municipalities have been proactive in responding to these challenges, with the South African Local Government Association (SALGA) and several larger municipalities participating in the African Local Government Climate Roadmap summit in Tshwane in July 2009. The summit's declaration emphasised the key role municipalities can play in mitigating the causes and impacts of climate change, particularly through their role in spatial planning. Several cities are already exploring innovative interventions, including installing solar water heaters to reduce demand for electricity. Cape Town metro intends to buy electricity from renewable sources such as the Darling Wind Farm just north of the city, and eThekweni is producing electricity from landfill gas. These efforts in the electricity sector will be complemented by the rollout of improved public transport that should help to encourage residents to reduce their use of private vehicles – resulting in reduced emissions and improved air quality in urban areas.

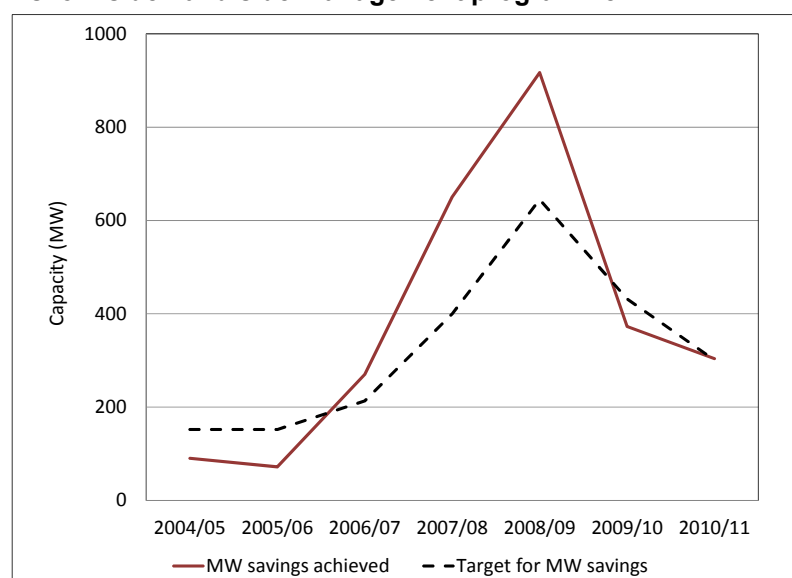
The new South African Energy Development Institute will research and promote energy efficient technologies

National government committed R978 million to electricity demand side management grants to both Eskom and municipalities over the three years from 2009/10 to 2011/12. This funding has been used to install energy efficient lighting and subsidise solar water heating systems. National government has allocated R66.5 million over the 2010/11 MTEF to establish the South African Energy Development Institute that will research and promote energy efficient technologies. The National Energy Regulator of South Africa's (NERSA) three-year price determination for electricity generation from 2010/11 to 2012/13

also provides Eskom with a margin within its generation tariff to fund demand side management measures, amounting to R5.4 billion over the three years.

The Department of Energy's integrated resource plan for electricity summarises the capacity savings Eskom expects to achieve between 2010 and 2020 through a range of demand side management programmes, including energy efficient lighting, heat pumps, solar water heating, efficient shower heads and process optimisation. These projects were expected to have saved 252 MW in 2010 (actual amount saved was 304 MW), rising to expected savings of 1 310 MW in 2013 and 3 420 MW per year by 2017 – roughly the same capacity as the massive Matla coal-fired power station in Mpumalanga. The plan suggests that in future, costed energy-saving measures should compete with supply-side options when deciding the most desirable way to ensure that the demand and supply of electricity match each other.

Figure 9.2 Targeted and achieved MW savings per year from Eskom's demand side management programme



Source: Eskom, 2010

Eskom's 2010 annual report estimates that demand side management could reduce the need for electricity generation capacity by between 8 per cent and 15 per cent over the next decade. Since the start of Eskom's demand side management programme in 2003, 2 767 MW have been saved, 304 MW of which were saved in 2010/11. Figure 9.2 shows that after achieving impressive savings through demand side management in 2007/08 and 2008/09, when load shedding was actually taking place, the level of savings has declined. This was not unexpected as initial savings are always more easily implemented.

Demand side management could reduce the need for electricity generation capacity by between 8 per cent and 15 per cent over the next decade

Electricity distribution

In South Africa, the responsibility for distributing electricity to end-users is shared between Eskom and municipalities. This creates a complex situation in some municipalities, where different areas are served by different service providers, with different tariff structures for consumers and revenues going to different institutions.

The sharing of the responsibility for distributing electricity to end-users between Eskom and some municipalities creates numerous problems

This creates numerous problems for municipalities, including reducing the value of municipal balance sheets, their ability to raise revenue and manage outstanding debtors. It also creates confusion among consumers about whom they should hold accountable for the delivery of electricity services.

Attempts to regionalise distribution

Over the last decade, attempts to resolve this situation have centred on efforts to regionalise the distribution of electricity. Government's initial plan was to establish six regional electricity distributors (REDs) that would take over the assets and functions of both Eskom and municipal distributors.

In December 2010, Cabinet announced that the process of establishing the REDs would be discontinued

In December 2010, government decided that the process of establishing the REDs would be discontinued and that Electricity Distribution Industry Holdings, the company set up to establish the REDs, would have an administrator appointed to wind down its operations. The Department of Energy will now undertake a review of the whole electricity value chain and develop a holistic approach to revitalising infrastructure in the sector as several of the challenges that the REDs were intended to respond to, including poor infrastructure maintenance and weak capacity in some municipal distributors still need special attention.

The uncertainty created by the proposed restructuring of the sector has resulted in serious underinvestment in the maintenance and refurbishment of distribution infrastructure

The uncertainty created by the proposed restructuring of the sector meant that many municipal distributors neglected the maintenance and investment needed on their own infrastructure in the expectation that these assets would be transferred to another entity. This has resulted in serious underinvestment in the maintenance and refurbishment of distribution infrastructure, raising the risk of power outages caused by faults in aging infrastructure. The situation has been compounded by the effects of the electricity supply crisis, where unplanned supply interruptions placed distribution infrastructure under additional pressure and often accelerated the emergence of distribution faults. In 2008, the Department of Energy estimated that R27.4 billion would be needed to upgrade electricity distribution infrastructure.

Eskom and municipalities as distributors

In 2009, 56 local municipalities did not provide electricity to any of their residents and relied solely on Eskom to provide the distribution function in their area

Schedule 4 of the Constitution makes electricity reticulation a municipal responsibility. However, in practice, Eskom and municipalities both distribute electricity to consumers. No district municipality is authorised to distribute electricity. According to Statistics South Africa's Non-financial Census of Municipalities for 2009, 56 local municipalities did not provide any electricity to their residents and relied solely on Eskom to provide the distribution function in their area. Of these municipalities, 43 are large rural municipalities with relatively dense rural populations and only small core towns, like Engcobo in Eastern Cape; another 11 are rural municipalities in low density rural areas and small towns, like Kopanong in Free State; and the remaining two municipalities have large towns like Mafikeng in North West. This confirms that it is typically the most rural municipalities with the least alternative sources of own revenue that do not supply electricity to their residents and therefore cannot use this as a source of revenue. In a number of

municipalities, some areas are supplied by Eskom while others are supplied by the municipality.

Table 9.1 Electricity sales by category for Eskom and municipalities, 2006

Category	Average sales price (c/kWh)	Eskom		Municipalities and other		Total			
		No. of customers	GWh sales	No. of customers	GWh sales	No. of customers	% of total	GWh sales	% of total
Domestic	37.49	3 829 986	9 736	4 043 471	29 339	7 873 457	94.4%	39 075	20.3%
Agriculture	33.52	82 583	4 732	21 162	1 110	103 745	1.2%	5 842	3.0%
Mining	16.90	1 127	32 421	16	197	1 143	0.0%	32 618	16.9%
Manufacturing	20.71	2 955	52 251	30 504	23 305	33 459	0.4%	75 556	39.2%
Commercial	33.90	45 233	7 842	225 847	20 924	271 080	3.2%	28 766	14.9%
Transport	21.13	510	3 069	330	207	840	0.0%	3 276	1.7%
General	28.78	—	—	60 432	7 638	60 432	0.7%	7 638	4.0%
Total	25.60	3 962 394	110 051	4 381 762	82 720	8 344 156	100.0%	192 771	100.0%

Source: National Electricity Regulator of South Africa, Electricity supply statistics for South Africa, 2006

Table 9.1 shows that in 2006, while domestic users made up 94 per cent of customers using electricity, they accounted for only 20 per cent of electricity consumption. However, because of the large number of individual connections dispersed over a wide area required to service households, the average cost of distribution to households is higher than for commercial users. This is reflected in the higher average sales price for domestic users.

While domestic users make up 94 per cent of customers using electricity, they account for only 20 per cent of electricity consumption

Table 9.1 shows that although Eskom has almost as many domestic customers as municipalities, Eskom sells only about a third as many GWh to domestic consumers as municipalities. This is consistent with the fact that Eskom tends to supply electricity to poorer consumers (who use less electricity) while municipalities tend to provide electricity to wealthier households (who consume more electricity). Although there are exceptions to this pattern (the wealthy area of Sandton in Johannesburg is supplied by Eskom, for example), it is easy to understand why this pattern holds. Well-capacitated municipalities with established distribution networks in relatively wealthy areas can use the sale of electricity to generate significant revenue that they use to help fund other municipal activities. In poorer areas of the country, where electricity connections may not have been supplied during the apartheid years, municipalities often do not have the requisite technical capacity or funds to expand their reticulation systems to connect non-electrified households. In rural areas it is particularly expensive to extend distribution systems to widely dispersed households. As a result of these difficulties with infrastructure and technical capacity, as well as the limited scope for municipalities to generate revenue from poor areas, municipalities have been slow in extending electricity services to poor households. Eskom has therefore taken on the role of providing connections in these areas (with the help of government funding), resulting in the current pattern of suppliers for domestic users.

In rural areas, it is particularly expensive to extend distribution systems to widely dispersed households

This pattern is reversed in the distribution of electricity to the manufacturing sector (the largest consumer of electricity), with Eskom having a much smaller number of customers consuming a much larger amount of electricity. Eskom also supplies the majority of electricity to the agricultural sector and to industries such as mining and transport, while municipalities are the main distributors to commercial customers such as local businesses. This suggests that municipalities

Eskom supplies the majority of electricity to the agricultural sector and to industries such as mining and transport

have very limited ability to raise revenue from electricity sold to industries in the primary sectors of the economy (mining and agriculture) that are located within their boundaries.

There are a number of important financial implications for municipalities that do not provide electricity to their residents. As electricity sales account for a high proportion of municipal revenues and can generate significant surpluses (see following section), not providing electricity in some or all areas under their jurisdiction means that municipalities lose a significant source of own revenue. (The Municipal Fiscal Powers and Functions Act does allow municipalities to levy a surcharge on electricity tariffs, even if it is provided by Eskom. However, in the absence of guiding norms and standards no municipalities have done so.)

■ Financing electricity distribution

Electricity is a major source of both revenue and expenditure for municipalities

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Revenues from electricity services

Electricity sales are a major source of revenue for municipalities. Table 9.2 shows the amounts of revenue the sale of electricity is expected to generate for different categories of municipalities and table 9.3 shows budgeted electricity operating revenue as a percentage of total budgeted operating revenue.

Table 9.2 Budgeted electricity operating revenue, 2006/07 – 2012/13

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
R million	Medium-term estimates						
Operating revenue							
Category A (Metros)	16 811	18 759	21 978	30 931	39 440	48 662	60 516
Category B (Locals)	9 209	9 838	11 412	16 322	19 520	20 244	23 647
<i>Secondary cities</i>	5 321	5 511	6 447	9 449	11 893	12 819	15 446
<i>Large towns</i>	1 679	1 857	2 140	2 940	3 715	3 652	4 000
<i>Small towns</i>	1 864	2 058	2 387	3 294	3 384	3 266	3 626
<i>Mostly rural</i>	345	412	438	639	528	506	574
Category C (Districts)	8	14	17	14	18	10	10
Total	26 028	28 611	33 408	47 267	58 978	68 916	84 172

Source: National Treasury local government database

There is great potential for municipalities to generate revenue from electricity distribution

Revenue from the sale of electricity accounted for over a quarter of total revenue for municipalities before the rapid tariff increases that began in 2009/10. When only municipalities that sell electricity are considered the proportion of operating revenue coming from electricity rises to around 40 per cent by 2012/13. Given that even in these municipalities there are large areas that are supplied directly by Eskom, the potential for municipalities to generate revenue from electricity is even greater.

Table 9.3 Budgeted electricity operating revenue as a percentage of total budgeted operating revenue, 2006/07 – 2012/13

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
					Medium-term estimates		
Operating revenue							
Category A (Metros)	26.2%	26.4%	27.6%	33.7%	32.6%	35.1%	38.6%
Category B (Locals)	26.0%	24.6%	23.8%	27.6%	28.1%	29.8%	31.7%
<i>Secondary cities</i>	31.5%	28.6%	27.7%	34.1%	36.9%	39.3%	41.9%
<i>Large towns</i>	26.2%	25.1%	24.5%	26.4%	27.4%	29.5%	30.6%
<i>Small towns</i>	23.5%	24.7%	22.9%	25.2%	23.7%	23.8%	24.6%
<i>Mostly rural</i>	8.2%	8.1%	8.0%	8.8%	5.6%	5.5%	5.8%
Category C (Districts)	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%
Total Operating revenue	24.3%	24.2%	24.6%	29.1%	28.8%	31.3%	34.1%

Source: National Treasury local government database

A simple comparison of operating revenue in table 9.3 and operating expenditure in table 9.4 shows that there is substantial scope for municipalities to generate surpluses from their electricity operations. These surpluses can then be used to fund other municipal functions. However, it is important not to simply take the full difference between budgeted revenue and expenditure as the surplus, as this does not take account of the need to recover funds for capital investment in the supply of electricity or the impact of non-payment on the cash flow of a municipality. The allowance that needs to be made for these factors will differ from municipality to municipality and so no general figure can be given here.

Electricity tariffs

South Africa is currently facing steep annual increases in the tariffs for electricity as a result of the need to fund the massive build programme that Eskom has undertaken in order to increase its generation capacity. Electricity tariffs are regulated by NERSA. It sets the tariffs that Eskom can charge for generating electricity and that municipalities and Eskom can charge for distribution.

South Africa is currently facing steep annual increases in the tariffs for electricity in order to fund Eskom's massive build programme

Bulk supply tariffs

In mid-2009, in response to an extraordinary application from Eskom as a result of its need to raise funds required for capital investments to increase generation capacity, NERSA allowed Eskom to implement a 31.3 per cent increase in the average standard tariff for the last nine months of the national financial year 2009/10. This was followed in 2010 by NERSA granting Eskom further price increases of 24.8 per cent for 2010/11, 25.8 per cent for 2011/12 and 25.9 per cent for 2012/13 for the generation and sale of bulk electricity. Eskom has indicated it will request further tariff increases in the region of 25 per cent in 2013 and 2014, before returning to inflation-based tariff increases from 2016 onwards. If NERSA approves the proposed increases for 2013 and 2014, then by 2014, electricity generation tariffs will be roughly four times higher in nominal terms than they were at the start of 2009/10. After adjusting for projected inflation, electricity generation tariffs in 2014/15 will be a little over three times higher than at the start of 2009/10 in real terms.

Electricity generation tariffs in 2014/15 will be over three times higher than at the start of 2009/10 in real terms

Retail tariffs

The cost of generating electricity is the largest, but not the only, component of the tariff municipalities charge consumers for the distribution of electricity. Consumers must pay a tariff that includes charges for the generation, transmission and distribution of electricity. NERSA-approved tariffs include provision for the costs of staff and repairs and maintenance for the distribution system, assumptions which are made explicit in the case of tariffs approved for municipal electricity distributors. Because these costs increase by much less than the generation tariff, the net effect is that the percentage increase in the retail price to consumers is somewhat lower than the increase in the generation tariff. While Eskom's generation tariff increases by 25.8 per cent for 2011/12, NERSA's guideline for the increase in municipal tariffs is 20.4 per cent.

For the first time in 2011/12, NERSA's guidelines for increases in municipal tariffs were published with sufficient time for municipalities to use them in planning their budgets

For the first time in 2011/12, NERSA's guidelines for increases in municipal tariffs were published with sufficient time for municipalities to use them in planning their budgets and apply to NERSA for approval of their final increases in tariffs. Any application for an increase in excess of NERSA's guideline amount must be strongly motivated. Reasons for above-guideline increases usually approved by NERSA include increases to fund repairs and maintenance, capital projects, critical vacancies, municipalities in financial distress and raising funding for demand side management or other electricity related projects. NERSA publishes the approved tariff increases for each municipality.

In Eskom-supplied areas, the increase in tariffs for consumers is also approved by NERSA. The same tariff structure applies to all Eskom supplied areas, though with different rates for urban and rural areas, which reflect the different costs of distribution in these areas.

The inclining block tariff system divides consumers into four groups based on the amount of electricity they use

In 2010, NERSA announced a new system of inclining block tariffs (IBT). The inclining block tariffs divide consumers into four groups or blocks based on the amount of electricity they use. Higher-use blocks pay tariffs that include a surplus which is used to cross-subsidise tariffs in the lower-use blocks. This new tariff structure is intended to be both pro-poor and promote energy efficiency. However, it is encountering a number of teething problems in its implementation, particularly in municipalities that do not have sufficient customers in the higher-use blocks to pay for the cross-subsidisation of the lower-use blocks. The low-use customers targeted for cross-subsidies in this policy do not always correlate with the poor households that most need relief from the rising cost of electricity, particularly where several poor households use one connection or wealthy households own a holiday home (which they seldom use). The inclining block tariffs also obscure the actual costs of service provision to any one consumer block. Over time, this can result in service providers capturing the intended subsidy to consumers through raising prices for all groups. However, the strengths of the system are that it is easily understandable and simpler to implement than an indigence-based system and it also promotes the reduced consumption of electricity.

Electricity and credit control

While providing electricity reticulation services places significant technical and administrative burdens on a municipality, it also gives them a lever they can use to ensure that consumers pay monies owing to the municipality. It is neither legal nor practical for municipalities to penalise households for non-payment by cutting off other basic services: water is essential for life and municipalities cannot legally cut off residents (though they can restrict flow); not removing refuse poses a public health risk and penalises neighbours as much as it does the non-paying household; and it is not technically feasible to disconnect households from sanitation services. This means that electricity is the only basic service that municipalities can cut off to penalise non-paying households and motivate them to pay their arrears owed to the municipality. At present, Eskom may not cut off supplies to customers that fail to pay municipalities for their other services. Consequently municipalities that do not supply electricity to households directly have reduced leverage in ensuring that those households pay for the other basic services the municipality does provide to them. This exposes municipalities to much higher risks of not recovering revenues owed to them.

Electricity is the only basic service that municipalities can cut off to penalise non-paying households

It should also be noted that even if municipalities move to pre-paid electricity meters, they can still structure their policies to allow some of the customers' payments to settle other municipal accounts, and to allow the electricity to be cut to enforce payment of other municipal accounts

The amount a municipality is able to borrow in order to finance the rollout of infrastructure is in large part determined by the size of its balance sheet and expected future revenues. Not selling electricity to some or all of its residents reduces the amount of revenue it is able to collect now and in future, and consequently will also reduce the amount it is able to borrow.

The amount a municipality is able to borrow to finance the rollout of infrastructure is determined mainly by the size of its balance sheet and expected future revenues

Electricity expenditures

Table 9.4 show that municipal operating expenditure on electricity has grown dramatically as a result of the increase in tariffs to fund the construction of new generation capacity.

Table 9.4 Electricity operating expenditure by category of municipality, 2006/07 – 2012/13

R million	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	Medium-term estimates						
Operating expenditure							
Category A (Metros)	9 746	10 884	13 040	19 934	25 546	32 547	41 556
Category B (Locals)	5 406	5 855	7 113	10 869	13 238	14 403	17 450
<i>Secondary cities</i>	3 154	3 426	4 109	6 376	8 087	9 035	11 362
<i>Large towns</i>	958	1 015	1 236	1 952	2 451	2 621	3 000
<i>Small towns</i>	1 092	1 180	1 494	2 130	2 343	2 342	2 682
<i>Mostly rural</i>	201	235	275	412	358	405	407
Category C (Districts)	20	29	46	27	10	10	12
Total	15 172	16 769	20 199	30 831	38 794	46 960	59 018

Source: National Treasury local government database

The table shows that in 2007/08, budgeted expenditure on electricity for all municipalities increased by 11 per cent, followed by a 20 per cent increase in 2008/09. In 2009/10, municipalities'

expenditure on electricity shot up by 53 per cent. This followed the normal increase and then the additional tariff increase granted to Eskom by NERSA in response to the need to rapidly commit to building additional generation capacity in the wake of the rolling load shedding at the beginning of 2008. Over the 2010/11 MTEF, expenditure is expected to rise by 26 per cent, 21 per cent and 26 per cent respectively – roughly in line with the tariff adjustments approved by NERSA for the period. Payments to Eskom for the supply of bulk electricity are not the only component of municipal operational spending on electricity, which also includes staff costs and repairs and maintenance. In approving municipal tariffs, NERSA assumes that bulk purchases make up 70 per cent of the cost of municipal electricity services. This explains how it is possible for the average budgeted increase for 2011/12 to be lower than the tariff increase for Eskom approved by NERSA. It also means that the higher increases in 2010/11 and 2012/13 hopefully include increased spending on much needed repairs and maintenance.

Efficiency and electricity losses

Very few cities in South Africa achieves the international benchmark for electricity losses in distribution systems

There is substantial scope for both reducing the amount of electricity demand and increasing revenue by reducing losses in the distribution of electricity. Some losses in the system are inevitable as a certain amount of power is consumed during the transmission and distribution of electricity along long cables. Internationally, the acceptable margin of electricity losses in distribution systems is 3.5 per cent. As table 9.5 shows, very few cities in South Africa achieves this benchmark.

Table 9.5 Electricity distribution losses, 2005/06 - 2009/10

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Metros							
Nelson Mandela	6.5%	6.0%	6.7%	7.5%	7.5%	7.5%	7.5%
Ekurhuleni		1.0%	3.0%	7.0%	7.0%	7.0%	7.0%
City of Johannesburg		12.0%	12.0%	12.0%	12.0%	12.0%	11.0%
City of Tshwane	7.7%	10.0%	12.1%	12.0%	10.0%	10.0%	10.0%
eThekweni	5.1%	5.1%	5.0%	5.0%	5.1%	5.0%	5.0%
City of Cape Town	8.9%	8.3%	8.4%	9.3%	9.3%	9.3%	9.3%
Secondary cities							
Buffalo City	10.7%	11.9%	14.0%	7.5%	8.0%	8.0%	8.0%
Mangaung	8.3%	9.4%	9.1%	15.0%	16.0%	16.0%	
Matjhabeng							
Emfuleni							
Mogale City	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Msunduzi		9.5%	9.1%	8.9%	9.5%	9.5%	9.5%
Newcastle							
uMhlathuze	7.0%	4.0%	6.0%	4.0%	5.0%	5.0%	
Govan Mbeki	5.6%	10.6%	12.7%	12.0%	16.0%	16.0%	16.0%
Emalahleni	22.7%	21.7%	33.4%	28.0%	30.0%	30.0%	
Steve Tshwete	8.8%	10.5%	7.3%	10.0%	10.0%	10.0%	10.0%
Mbombela							
Sol Plaatje	18.0%	18.0%	18.0%	15.0%	16.0%	16.0%	
Polokwane	12.6%	12.2%	8.1%				
Madibeng							
Rustenburg	22.1%	18.3%	20.8%	16.3%			
Tlokweng	10.1%	2.4%	0.7%	2.0%	2.0%	2.0%	
City of Matlosana							
Drakenstein	5.0%	7.0%	7.0%	7.5%	7.0%	7.0%	7.0%
Stellenbosch							
George	12.3%	3.7%	5.5%	7.0%	9.0%	9.0%	9.0%

Source: National Treasury local government database

Among the metros, eThekweni has the least losses, at around 5 per cent, while Johannesburg loses 12 per cent of the electricity it purchases, either through technical losses (perhaps indicating the need for urgent refurbishment of aging infrastructure) or through theft. Among secondary cities, losses can be as high as a third of bulk electricity purchased and it is common for municipal distributors to lose in excess of 10 per cent of electricity purchased. These losses represent the loss of a significant amount of revenue, which needs to be recovered from other users, thus unfairly raising the cost of electricity to them.

Among secondary cities, losses can be as high as a third of bulk electricity purchased

It is not only municipalities that experience the problem of losses in electricity. It was estimated that in 2008/09 alone, Eskom lost more than R2.5 billion worth of electricity to illegal connections or technical losses in distribution. Reducing technical losses would mitigate the need to add generation capacity to the system, while reducing electricity theft would raise revenues. Both measures could help to lower prices for all consumers. While law enforcement agencies should play a greater role in reducing electricity theft, municipalities and Eskom can achieve far greater efficiency by reducing the technical losses on their distribution systems.

In 2008/09 alone, Eskom lost more than R2.5 billion worth of electricity to illegal connections or technical losses in distribution

Investment and maintenance

In 2008, the Department of Energy estimated a backlog of R27.4 billion in maintenance, refurbishment and short-term strengthening in the electricity distribution industry. This figure is inclusive of both Eskom and municipal backlogs. Both municipalities and Eskom should be increasing the portion of their operating budgets dedicated to the maintenance of electrical distribution infrastructure and their capital budgets for refurbishment.

Capital expenditure

Table 9.6 reflects budgeted capital expenditure on electricity by municipalities. The table shows that capital expenditure grew strongly in 2007/08 and 2008/09, at an average annual rate of 24 per cent.

Table 9.6 Budgeted capital expenditure on the electricity function, 2006/07 – 2012/13

Rmillion	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	Medium-term estimates						
Operating revenue							
Category A (Metros)	2 311	2 793	3 342	3 392	3 705	3 734	3 696
Category B (Locals)	780	1 037	1 406	1 390	1 975	1 333	1 167
<i>Secondary cities</i>	382	551	874	737	854	474	426
<i>Large towns</i>	158	243	218	323	405	376	234
<i>Small towns</i>	149	193	215	288	399	249	225
<i>Mostly rural</i>	91	50	98	43	318	234	282
Category C (Districts)	1	2	0	2	43	40	35
Total	3 093	3 833	4 748	4 784	5 724	5 107	4 898

Source: National Treasury local government database

Capital spending, for expanding and upgrading infrastructure, remained flat in 2009/10 but was expected to grow by 20 per cent again in 2010/11. Of great concern, is that on average, municipalities are budgeting to decrease their capital spending by 11 per cent in 2011/12 and a further 4 per cent in 2012/13. Over R1 billion is allocated to municipalities for capital investment in expanding access for poor households through the integrated national electrification programme grant. If this grant, which grows with inflation over the

MTEF period, is subtracted from the budgeted capital expenditure, then capital investment budgeted by municipalities declines by 14 per cent in 2011/12 and 7 per cent in 2012/13.

If municipalities recognise the importance of investing in electricity, this decrease could still be corrected

Given the growth in population and the increasing number of households, especially in urban areas, along with the high levels of historical backlogs and the need for upgrading or replacing aging infrastructure, one would expect municipal budgets for capital expenditure on electricity to increase over the medium term, and not decrease. If municipalities recognise the importance of investing in electricity, this decrease could still be corrected in future budgets.

Repairs and maintenance

It is now clear that municipalities are responsible for electricity infrastructure and so they should now plan to ensure that it is properly maintained

Aging distribution infrastructure in municipalities requires significant investment in repairs and maintenance if supply disruptions are to be minimised. The uncertainty in the distribution industry during the debate over the REDs led to many municipalities delaying necessary maintenance work. It is now clear that the responsibility for this infrastructure lies with municipalities and they should now plan accordingly and step up efforts to ensure that their infrastructure is properly maintained. Funding this increased investment in the repair, maintenance and upgrading of municipal electricity distribution infrastructure will require municipalities to either increase tariffs to consumers or find the funds from elsewhere in their budgets.

It is difficult to get a clear picture of municipal expenditure on repairs and maintenance for electricity infrastructure due to the previous budgeting reporting formats, which combined repairs and maintenance expenditure for all services (including roads, water and sanitation and solid waste). While there are indications that spending on maintenance increased from 2006/07 to 2009/10, given the uncertainty on the future ownership of electricity infrastructure created by the REDs policy, it is unlikely that electricity was the main beneficiary of this increase.

If municipalities continue to not invest in the maintenance and upgrading of their electrical infrastructure there will be breaks in supply

As has been demonstrated earlier in this chapter, electricity distribution can be a very good business for municipalities. It has the potential to generate significant surpluses. The revenues it generates can be used to leverage debt finance. And it provides a powerful lever in managing debtors and collecting revenue owed for other services. However, municipalities cannot take advantage of any of these if they are unable to maintain the supply of electricity to consumers. If municipalities continue to not invest in the maintenance and upgrading of their electrical infrastructure there will be breaks in supply. In addition to being expensive to repair, these interruptions in supply will cause a loss of revenue in the short-term and a breach in the contract between municipalities and their paying consumers that could cause long-term damage to the reputation and trust between the municipality and its residents and customers. It is therefore in the interests of municipalities that distribute electricity to ensure that they budget to reinvest a sufficient portion of the surpluses from the sale of electricity in the maintenance, upgrading and expansion of their electricity supply infrastructure before using the remaining surpluses

for other purposes. Failure to do so would be akin to killing the goose that lays the golden egg.

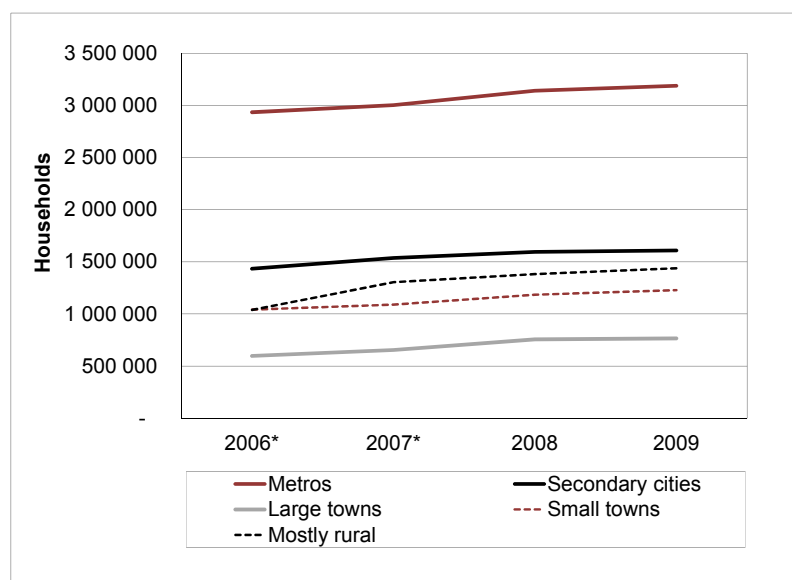
Promoting household access to electricity

Access to electricity is determined by two factors: the number of households connected to electricity, either through the national grid or alternative sources such as solar panels; and the affordability of that electricity - poor households need to be able to afford electricity in order to benefit from its use.

Connecting households to electricity

Progress is being made in increasing the number of households with access to electricity.

Figure 9.3 Number of households with access to electricity, 2006-2009



Source: Stats SA, Non-financial census of municipalities

As figure 9.3 shows, between 2006 and 2009, all types of municipalities increased the number of consumers supplied with electricity. Over this period, the total number of connections increased by 1.3 million, from 7.1 million to 8.4 million. While not all of these new connections are households, it is likely that the vast majority are, given that 92 per cent of all consumers are domestic users.

National government funds the rollout of energy distribution infrastructure through the integrated national electrification programme (INEP) grants. R9.1 billion has been allocated to these grants over the current MTEF period, with 38.2 per cent of this allocated directly to municipalities and the rest allocated to Eskom. The high level of funding allocated to Eskom recognises the high levels of backlogs in Eskom-serviced areas.

Past performance on this grant shows that 60 726 households were connected to the grid in 2009/10, significantly less than the 123 362 households connected in 2008/09. This decline in the number of new connections was the result of more households being

Between 2006 and 2009, the total number of connections increased by 1.3 million, from 7.1 million to 8.4 million

National government funds the rollout of energy distribution infrastructure through the INEP grants

INEP allocations are intended to fund the capital costs of providing electrical connections to poor households and providing the bulk infrastructure needed to ensure a stable supply of electricity

connected in rural areas. Due to their distance from the existing grid, it takes much longer and is more expensive to connect these households.

INEP allocations are intended to fund the capital costs of providing electrical connections to poor households and providing the bulk infrastructure needed to ensure a stable supply of electricity. Municipalities should not rely on INEP funds to provide electricity to new commercial developments or wealthy suburbs. Extending electrical infrastructure to these areas should be funded through development charges or debt financed against the future income from rates and levies that these consumers will pay to the municipality.

It is not practical or cost-effective to connect all households to the national grid. In remote areas it can be cheaper to provide households with alternative sources of energy, such as through solar panels. In these areas INEP funds are used to connect households and schools to alternative sources of energy.

Free basic electricity

The Department of Energy's free basic electricity policy is that every indigent household should receive 50kWh of free electricity per month

The free basic electricity policy was announced in 2003 by government and has been funded through the equitable share to municipalities since 2004/05. In terms of this policy every indigent household should receive 50kWh of free electricity per month. In 2011/12, the equitable share includes R9.5 billion in funding towards the provision of free basic electricity

As this is a national policy that applies to a municipal service and is funded through an unconditional allocation, national government does not prescribe how municipalities implement the free 50kWh. Municipalities have therefore had to make their own decisions on how to implement it, with some providing it to all households and some only to households that fall below a poverty line or indigence measure determined by that municipality. Over the last few years, several municipalities have changed their policies from providing free basic electricity to all households to targeting poor households only. This is the most likely explanation for the decline in the number of consumer units receiving free basic electricity reported in Statistics South Africa's annual Non-financial Census of Municipalities (from a peak of 3 351 388 in 2006 to 2 781 043 in 2008). In 2009, the number of consumer units increased to 2 952 682, presumably reflecting an increase in the number of poor households accessing free basic electricity.

More than 4.3 million households received free basic electricity in 2009

Statistics South Africa collects data on the level of access to free basic electricity through its annual Non-financial Census of Municipalities. Table 9.7 provides the figures for consumer units receiving basic electricity services from both Eskom and municipalities, and the figures for consumers receiving free basic services from municipalities. An additional 1.3 million consumer units received free basic electricity in Eskom-supplied areas. Note that the figures from both the non-financial census and Eskom are based on consumer units and not households, and are therefore not comparable with household data collected in the census and community survey. Eskom and municipalities have no way of estimating how many households are serviced by a connection, so the number of households receiving free

basic electricity could be larger than the 4.3 million consumer units recorded by Eskom and municipalities in 2009. In addition, in areas where it is not possible to provide connections to the grid, residents should be provided with free basic alternative energy. Sources of this kind of energy include paraffin, liquefied petroleum gas, coal and bio-ethanol gel. The non-financial census recorded 107 105 households benefiting from free basic alternative energy.

Table 9.7 Consumer units receiving free basic electricity services from municipalities, 2008 and 2009

Province	2008			2009		
	Number of consumer units receiving basic electricity services	Free basic electricity services		Number of consumer units receiving basic electricity	Free basic electricity services	
		Number of consumer units	%		Number of consumer units	%
Eastern Cape	811 953	282 175	34.8%	872 170	312 975	35.9%
Free State	576 790	345 545	59.9%	602 434	379 981	63.1%
Gauteng	1 802 607	706 822	39.2%	1 829 044	724 178	39.6%
KwaZulu-Natal	1 283 813	165 505	12.9%	1 327 485	192 265	14.5%
Limpopo	1 072 824	271 992	25.4%	1 157 388	319 559	27.6%
Mpumalanga	559 499	220 106	39.3%	591 867	234 183	39.6%
Northern Cape	227 033	100 021	44.1%	243 075	107 788	44.3%
North West	579 004	119 919	20.7%	588 298	129 443	22.0%
Western Cape	1 173 637	568 958	48.5%	1 209 566	552 314	45.7%
Total	8 087 160	2 781 043	34.4%	8 421 327	2 952 686	35.1%

Source: Stats SA, Non-financial census of municipalities for the year ended 30 June 2009

At the guideline municipal tariff set by NERSA for the lowest-usage block in the tariff structure (63 cents per kWh for 2011/12) it will cost a municipality R31.50 to provide 50 kWh to a poor household for a month. The tariff in the lowest usage block is cross subsidised and so may not offer a fair reflection of the cost of providing electricity, but even at the highest guideline tariff for domestic users in the NERSA guidelines (114 cents per kWh for 2011/12) it will cost only R57.00 per month to provide 50 kWh to a household. These amounts are well within the average R188.04 per poor household per month provided through the equitable share to enable municipalities to provide free basic electricity to poor households connected to the grid. The equitable share also includes funding for water, sanitation, refuse removal and institutional costs.

In Eskom-supplied areas, municipalities are expected to pay Eskom for any free services provided to their residents. In its annual report for 2009/10, Eskom records invoicing an amount of R308 million to the 243 municipalities it has contracts with to provide free basic electricity to 1.3 million consumer units. This amounts to an average cost of R235 per consumer unit per year. This is a great deal less than the average subsidy to municipalities through the equitable share of R2 256 per year for poor households connected to electricity services. Eskom's charge to municipalities for providing free basic electricity to households in its areas is based on a standard tariff for free basic services. There is an under-recovery between this tariff and the consumer tariff that would otherwise have been charged for the electricity. Between 2006 and 2010, the cumulative value of this under-recovery was R165 million. Even taking this under-recovery into account, the low cost of Eskom supplying free basic electricity in its areas of supply relative to the funding made available for free basic

In Eskom-supplied areas, municipalities are expected to pay Eskom for any free services provided to their residents

Many poor households still cannot afford to use electricity as their primary source of energy

electricity to municipalities through the equitable share, demonstrates that the free basic electricity policy is amply funded.

Many poor households still cannot afford to use electricity as their primary source of energy and opt to use their free basic electricity allocation for lighting while continuing to use more dangerous and environmentally damaging materials such as wood, coal or paraffin as their primary energy source for more energy-intensive activities such as cooking and heating. This situation will be worsened by increases in the cost of electricity, though the system of inclining block tariffs will help to mitigate this impact for low-usage households.

Conclusion

Significant annual tariff increases are set to be a feature of the electricity industry for a few more years. Increases already approved by NERSA are needed to fund the building of the increased generation capacity required to meet the demand for electricity from a growing economy. The poor condition of distribution infrastructure (in part as a result of past uncertainty over the future ownership of this infrastructure) means that there is a great need for increased investment in maintenance and refurbishment. Funding this investment may require additional increases in tariffs. While higher tariffs will place an unwelcome burden on households and increase the costs of business, one positive effect is that they will incentivise consumers to use less electricity, thereby reducing the need for additional generation capacity and the environmental damage associated with high levels of electricity use.

For poor households these increases are cushioned by the free basic electricity policy, as well as the implementation of inclining block tariffs that will see the tariffs for low-use households increase at a lower rate, roughly in line with inflation.

After the disbanding of the REDs policy, municipalities are assured that electricity distribution will remain their responsibility. Electricity distribution is a service that can provide many benefits to municipalities, including increased revenue, greater ability to borrow funds and leverage to improve the collection of other monies owed to the municipality. However, these benefits can only be realised if municipalities provide an efficient and reliable service - that will require much greater investment in infrastructure.

The sale of electricity is a major source of revenue for municipalities, but also a technically difficult operation, requiring skills and investment that not all municipalities have the capacity to manage. Municipalities will have to carefully manage their relationship with Eskom in areas where Eskom distributes electricity. Municipalities must ensure that they have supply contracts with Eskom for these areas and, together with NERSA, develop the capacity to oversee Eskom's operations.