The rationale for preferential electricity tariffs for poor households and certain industries, amidst rising electricity prices.

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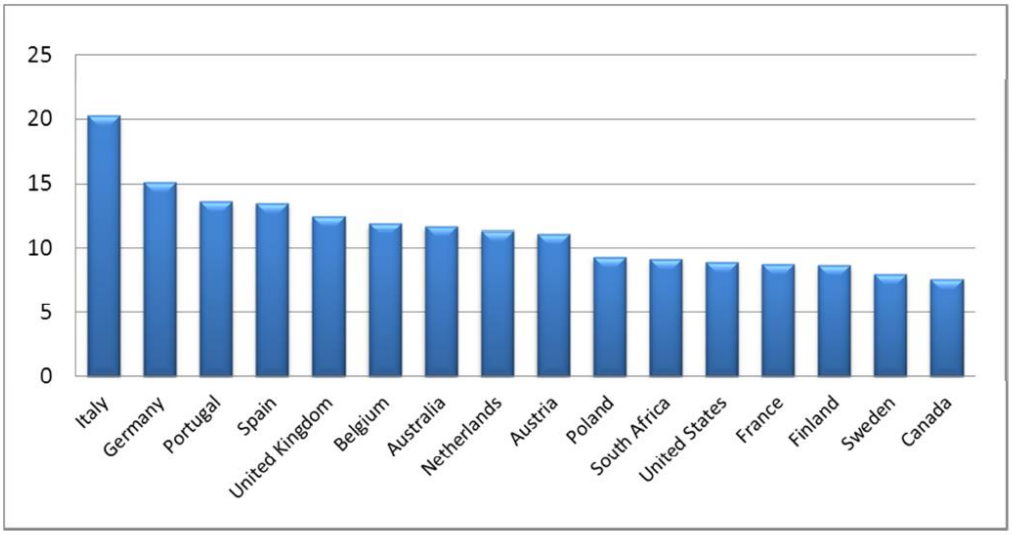
Introduction

Electricity prices in South Africa have always been at historical lows and are amongst the lowest in the world (Amusa, Amusa and Mabugu 2009). The price of electricity in the past was often lower than the cost of producing it (Erero 2010). Inglesi (2010) sights five reasons for low electricity prices namely; large coal reserves, maximising economies of scale through technology use, the exclusion of externality costs, the exemption of Eskom from taxation & payment dividends and the exchange rate fluctuations forward cover of Eskom investments by the Reserve Bank. In 1995, Eskom agreed to cut the real price of electricity by 15% over five years. Inglesi-Lotz and Blinaut (2011a) concur that real prices fell drastically until 2002, when price reform began to take effect. This meant that price increases were at least 2% lower than the existing inflation rate (Eskom 2011). Figure 1 shows that electricity prices in South Africa are among the lowest in the world, although they are not at the extreme right of the graph. These are electricity prices as of 2012.

Figure 1: Average electricity prices for industrial countries measured in US cents per kilowatt hour



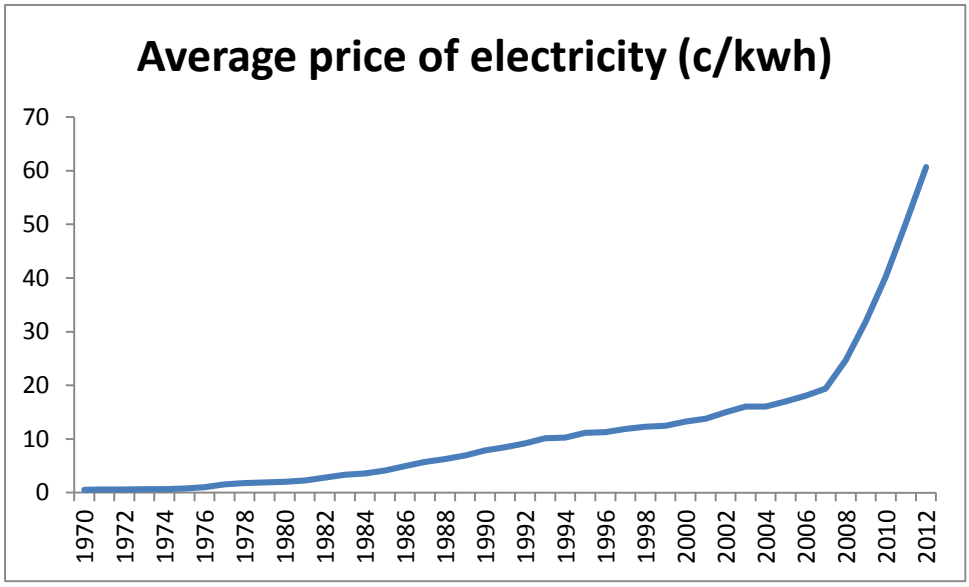
Source: NUS Consulting Group, an international energy consultancy (2012)

It was not until 1998 that it became evident that electricity supply capacity was starting to lag the growth in demand (Department of Minerals & Energy 1998). Signs of demand outstripping supply started in 2005 when power outages affected the Western Cape Province. Power outages gained momentum in 2006 and 2007 but culminated in January 2008 in the closure of the local mines for

four to five days (Erero 2010). It became clear that South Africa faced an electricity crisis. Consequently, the reserve margin narrowed gradually. Odhiambo (2009) states that in 2002, South Africa's reserve margin stood at 25 percent but subsequently fell to 20 percent and 16 percent in 2004 and 2006, respectively. In 2008, the electricity reserve margin fell below the minimum target of 15 percent, a little below 10 percent.

The problems of supply and demand soon translated into a sudden surge in electricity prices from the year 2007. Figure 1 shows how the average price remained below 10 cents per kilowatt hour from the 1970s till about 1994. A gradual increase was recorded from 1995 through to 2005. However, from 2007, the average price of electricity shot up significantly and averaged a little over 60 cents per kilowatt hour. This translates into annual growth rates in price of over 20 percent in recent years. These price increases are exacerbated by municipal mark-ups. A study by Eskom (2011) revealed that municipalities charge end users between 40 percent to 110 percent higher than the Eskom tariff hikes.

Figure 1: Average price of electricity



Source: Inet-Bridge

According to the National Development Plan (2012), new power demand of approximately 29 000 megawatts can be expected between now and 2030. A further 10 900 megawatts of old power will have to be replaced, resulting in about 40 000 megawatts of new capacity required. Thus a wide gap between electricity demand and supply is expected to exist well into the future. In order to close this gap, investment of approximately R1.3 trillion between now and 2025 is required. While much of the spending on increasing capacity will come from borrowing and government transfers, it is generally understood that going forward, electricity prices will have to rise to fund the current infrastructure program of Eskom (Amusa et al. 2009). Securing electricity supply is critical if the South African economy is to grow above 7 percent as envisioned by the NDP.

Another area of concern is that 75 percent of South Africa's greenhouse gas emissions originate from the electricity generation sector which is heavily reliant on coal-fired power stations (Inglesi-Lotz and Blignaut 2011b). In this respect the government has proposed a carbon tax in attempts to

mitigate the effects of climate change and to encourage energy-efficiency measures (National Treasury 2013). A carbon tax at a rate of R120 per ton of carbon dioxide will be implemented from 1 January 2015. It goes without say that the carbon tax will add upward pressure on electricity prices.

Given the historically low electricity prices, rising electricity demand, large capital investment requirements of Eskom and the proposed carbon tax; electricity prices simply have to increase. Even the National Development Plan (2012) admits that electricity prices have to increase while Eskom continues to demand cost-reflective prices (Eskom 2011). Against this backdrop, I advocate for preferential electricity tariffs for poor households and specific sectors of industry in South Africa. I provide empirical evidence of the close link between electricity consumption and economic activity in South Africa. This analysis is undertaken to show that high and unexpected electricity price hikes can have adverse effects on economic growth and hence employment. I also suggest ways in which the government can improve efficiency in the electricity market in order to ensure a smoother increase in prices.

The rest of the essay is structured as follows: the next two sections discuss why there is a need to provide preferential electricity tariffs for poor households and certain industries in South Africa. These discussions are then followed by a section on how the preferential tariffs can be funded. Thereafter I propose ways of improving efficiency in the electricity market followed by a number of recommendations for policymakers and government. The conclusion will be the last section.

Preferential electricity tariffs for poor households

According to the 2011 Census, 84.7% of households in South Africa had access to the electricity grid in 2011 compared to 69.7% in 2001. The rise in electrification is in line with achieving government's objective of universal access to electricity, particularly for poor households and rural development (National Electrification Programme 1994). In the context of South Africa, electrification is a social issue because it supports development and improves the quality of life.

A World Bank (2004) study which analyses the benefits of rural electrification shows that access to electricity enhances the quality of life at a household level and consequently stimulates the broader economy through increased consumption. The results of the study show that the total income of poor households rose by approximately 30 percent due to electrification. Inglesi (2010) reported that poor households use electricity mainly for lighting as water geysers and electric cooking appliances are uncommon. The immediate benefits of bright and sustained light encourages extended hours of study and in turn results in better educational achievements. Thus in the long-run electrification redeems poor households from poverty. Barnes et al. (2004) highlighted that electrical appliances such radio and television improve access to information and educational programs for rural households, whilst providing entertainment at the same time. Also cheaper and affordable electricity encourages small business development in rural areas and allows businesses to be operated for longer hours into the evening. In addition, electrification improves the delivery of health services and reduces environmental degradation. Thus affordable electricity will have significant developmental benefits for poor households.

It is for these reasons that I propose preferential electricity tariffs for poor households. Poor households cannot spend much on electricity and may continue to use wood and other biomass, even when electricity is available due to lack of affordability (Gaunt 2003). Gaunt (2005) notes that in many cases where electricity was available, expensive distribution costs for utilities made electricity expensive for poor households. This makes access to electricity an issue of affordability and derails government's objective of providing electricity for all households in South Africa. Amusa et al. (2009) cautions that cost-reflective tariffs in a country where a larger share of the population live below the poverty line is likely to result in a situation where (1) poor households who cannot pay higher prices lose access to commercial energy and (2) in the long-run, additional electricity investment would be focused on profitable market segments.

Furthermore, the launch of the Free Basic Electricity Policy by government in 2001 emphasizes electrification as a tool to help reduce poverty (Gaunt 2003). This policy argued that the average poor household consumes less than 50 kilowatts per hour of electricity per month and hence this amount should be offered free of charge. However, the implementation of this policy failed as it lacked a specific criterion of who is poor and who qualifies for the subsidy. As a result, the subsidy was made available to all consumers, regardless of their income levels and geographical stay.

In attempts to correct the shortcomings of Free Basic Electricity Policy, the guide lines of Gaunt (2005) can be used in formulating policy for preferential electricity tariffs targeted at poor households. According to Gaunt (2005) the tariff should:

- include a subsidy to reduce the costs to customers to levels below a fully cost-reflective tariff. However the subsidy should not be so large as to damage the viability of the utility.
- promote perceptions of fair pricing by incorporating geographic uniformity
- restrict the terms of the service provided, such as by limiting the maximum current
- deliver the benefits to a clearly identified group of beneficiaries with as little as possible leakage to those outside the group
- have a simple tariff structure that promotes understanding and reduces the costs of implementing the tariff
- be implemented in a way that does not reinforce long-term social dependence.

In addition to these guide lines, I propose that government should continue with the Free Basic Electricity policy, but must set a specific criterion to identify beneficiaries. Over and beyond the free 50KW h units, tariff hikes for poor households should not exceed single rate increases. In this way poor households will be protected from the full impact of significant price increases in electricity.

Preferential tariffs for certain industries

Industry is the largest consumer of electricity in South Africa, accounting for 63 percent of total electricity consumption (Ziramba 2009). Inglesi-Lotz (2012) confirms that electricity plays a critical role in the production process of the country. Therefore, knowing and understanding the behaviour of the different industries with regards to electricity consumption will help determine whether preferential electricity tariffs are necessary for certain industries. The share of electricity costs to total costs, the electricity intensity of the industry and the ability of the industry to pass on the costs

will assist in determining the vulnerability of the industry to electricity price increases and subsequently the need to provide preferential tariffs (Deloitte 2012).

Upon investigating the price elasticity of demand of electricity by sector in South Africa, Inglesi-Lotz and Blignaut (2011a) made interesting observations about the agricultural and transport sectors. They established that the agricultural sector in South Africa is highly labour-intensive and still uses traditional methods of production. Hence output should not be adversely affected by higher electricity prices. In the same study Inglesi-Lotz and Blignaut found that the transport sector uses minimal electricity because of the shift from freight rail to road and long-haul. Thus for these two sectors, preferential tariffs would not be necessary due to their low electricity intensity. A study by Deloitte (2012) shows that the finance & business sector, the community, social & personal services sector and construction appear to be less sensitive to higher electricity prices.

Unlike the agricultural, transport, services and construction sectors, the mining and manufacturing sectors are quite electricity intensive. The results of Inglesi-Lotz and Blignaut (2011b) show that the electricity consumption behaviour of the manufacturing sector is sensitive to price fluctuations. Electricity is an irreplaceable input for the manufacturing sector. Within manufacturing, non-ferrous metals, iron & steel and chemical & petrochemical were the largest users of electricity in South Africa (Inglesi-Lotz and Blignaut 2011b). The Deloitte study (2012) also makes similar conclusions, stating that all metal manufacturers are heavily dependent on electricity, but ferrochrome and non-ferrous metal producers are the most sensitive to electricity price hikes.

Not very different to the manufacturing sector, the mining sector is heavily dependent on electricity in its production process. Having said that, Deloitte (2012) shows that the use of electricity across the different mining industries varies substantially. Gold and platinum miners are the most sensitive to electricity price increases due to the deep mining operations and their inability to influence the metal price. Because of escalating electricity prices, Inglesi-Lotz and Blignaut (2011a) note that the mining sector started generating its own electricity or creating smaller power units. Coal miners, on the contrary, have low exposure to electricity prices and are less sensitive to price increases. Table 1 below provides electricity supply statistics from the National Energy Regulator of South Africa. The table shows that manufacturing and mining sectors are the biggest consumers of electricity, while the agriculture and transport sectors are less reliant on electricity.

Table 1: End use of electricity, sectoral breakdown

Sector	**Percentage share of total electricity sales**
Residential	17.2
Agriculture	2.6
Mining	15.0
Manufacturing	37.7
Finance and business services	12.6
Transport	2.6
General	12.3
Total	**100**

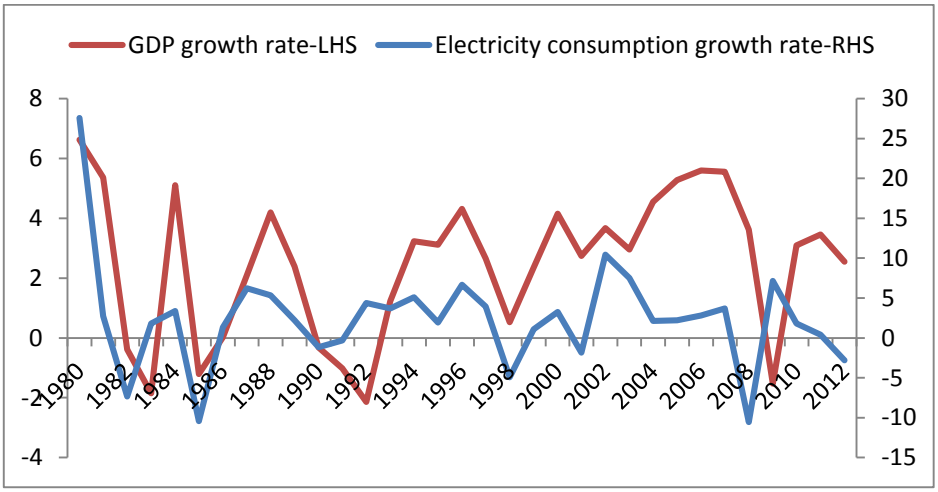
Source: NERSA- Energy supply statistics (2004), cited by Erero 2010

From the above analysis, it is clear that manufacturing and mining sectors are in general vulnerable to rising electricity prices. The vulnerability of these sectors to electricity prices in concerning

because manufacturing is the second largest sector in the economy, contributing 15.3 percent to GDP and accounting for 13.3 percent of total employment in South Africa. Although mining contributes only 5.2% to GDP, about 61 percent of the country's export earnings are derived from the mining sector. The mining sector also employs the low-skilled workers in the country who may not be able to find work in the services sectors. Thus higher electricity prices pose a threat to some industries in the manufacturing and mining sectors given their electricity intensity. Cameron and Rossouw (2012) caution that increasing electricity tariffs will weigh heavily on these industries and profit margins will come under severe pressure. According to Erero (2010) a 35 percent increase in electricity tariffs in South Africa will shave off 1.5 percent from GDP and employment will fall by 3.0 percent. Thus higher electricity prices do not bode well for both economic growth and employment in South Africa. I therefore propose that policymakers should provide preferential electricity tariffs for certain industries within manufacturing and mining. These sectors make a significant contribution to the economy in terms of output, employment and the absorption of low-skilled workers.

Empirical evidence shows that there is a strong relationship between electricity demand, economic growth and employment in South Africa. Wolde-Rufael (2006) found a strong relationship between electricity consumption and economic growth in the long-run. In a later study, Wolde-Rufael (2009) recorded evidence of Granger-causality from energy consumption to economic growth. Ziramba (2008) also found a long-run relationship between residential electricity demand and real GDP. Using the cointegration-based error-correction model, Odhiambo (2009) reported a bidirectional causality between electricity consumption and economic growth in South Africa at both the short-run and the long-run. The coefficients of the abovementioned studies are positive and statistically significant. These results are not surprising given the industrial intensity of the South African economy. Ziramba (2009) points out that the contribution of electricity to economic growth in South Africa is 23%. He explains that in South Africa, electricity plays an important role in the supply chain both as a final good for end users and as an input in the production process. According to Blignaut (2009) electricity is one of the drivers of economic growth in South Africa. Figure 3 below shows a positive correlation between electricity consumption and gross domestic product.

Figure 3: Annual growth rate in Gross Domestic Product and electricity consumption



Source: Inet Bridge

Funding of preferential tariffs for poor households and electricity dependent industries

The funding of the preferential tariffs for poor and electricity dependent industries should be financed through a transparent national cross-subsidy structure (Eskom 2011). Allocation of funds from National Treasury should also be made available for financing the preferential tariffs. This can be done by trimming and reprioritising current expenditure on existing projects. In this way, the fiscal balance will remain intact.

Ways of improving efficiency in the electricity market in order to smooth prices

Efficiency in the electricity market can be achieved through a variety of initiatives including; increased competition, alternative sources of primary energy, demand side management programs, electricity efficient appliances/technology and electricity efficiency awareness. These initiatives will reduce electricity demand and reduce electricity costs (Deloitte 2012). The government should set aspirational electricity reduction targets for each sector since an improvement in efficiency at a sectoral level will lead to a reduction in the overall electricity intensity of the economy (Department of Energy 2012). Inglesi-Lots and Blignaut (2011b) concur that improved efficiency in the use of electricity does reduce electricity demand. Further emphasis was indicated by the International Energy Agency (2011) report that electricity efficiency is the cheapest way of reducing electricity consumption, reducing carbon emissions and securing electricity supply.

In South Africa, Eskom is the dominant player in the electricity sector, accounting for 96 percent of total production. The NDP (2012) highlights that the quality of competition and regulation within the electricity sector is suboptimal. To improve efficiency in the electricity market would require government to encourage independent power producers to enter the market by providing a more conducive regulatory environment. Given the amount of investment needed and Eskom's inability to fully finance the infrastructure build program, private investment in the electricity sector is critical. The entry of independent power producers into the market will also assist in diversifying investment into other sources of energy. According to National Energy Regulator of South Africa (2004) close to 90 percent of South Africa's electricity is derived from coal, while nuclear, hydro, gas and pumped storage account for the remainder. This is depicted in table 2. This table shows that there is a need for investment in alternative sources of primary energy as these sources will make a significant contribution to South Africa's electricity needs and help reduce carbon emissions from coal. In the long-run cleaner sources of electricity will ensure steady price increases as prices will exclude the carbon tax.

Table 2: Sources of electricity capacity in South Africa

Source	Percent of total
Coal	88.8
Nuclear	4.2
Bagasse	0.2
Hydro	1.6
Gas turbines	1.5
Pumped storage	3.7
Total	100

Source: National Electricity Regulator, 2004, cited by Erero (2010)

Another way of improving efficiency in the electricity sector is by promoting the uptake of Demand Side Management (DSM) programs. Under these programs, the utility (in this case Eskom) purchases energy savings/ demand reductions from the end users, either industry or residential customers (Energy Sector Management Assistance Program 2011). The utility undertakes to pay end-users that deliver energy savings a predetermined and pre-published rate per kilowatt hour upon successful completion of the program. The demand side management programs should be undertaken provided that a unit of electricity saving is less than the cost of producing an additional unit of electricity. Such programs reduce the need for additional generating capacity and can smooth electricity price increases (Deloitte 2012). The DSM programs were initially implemented across different states in the US and given the success rates there, were subsequently carried out in Australia, India and other countries (ESMAP 2011).

Further improvements in electricity efficiency can be achieved by publishing electricity efficiency standards for electronic appliances and electricity efficiency requirements for new buildings (Department of Energy 2012). Spalding-Fecher (2002) found that compact fluorescent bulbs use significantly less power than conventional bulbs and can reduce electricity bills markedly. Further supporting evidence was shown by Lave and Spees (2007) who reported electricity efficiency after the introduction of appliance efficiency standards in the US.

In addition to the abovementioned initiatives aimed at improving electricity efficiency, there is a need to raise a general awareness and understanding about the importance of electricity saving. Eskom and government should embark on workshops and seminars that educate the general public about electricity-saving tips and electricity management tools (Department of Energy 2012). Mass media, social networks and various websites can be used to communicate the electricity efficiency message. It is worth noting that Eskom has done well in raising awareness around electricity efficiency, but persist communication will continue to deliver positive results of electricity saving by households and industry.

Recommendations

Acknowledging the need for electricity prices to increase in South Africa to more cost reflective levels, I propose that policy makers introduce price increases gradually as opposed to immediate cost reflective increases. In this way, the short-run impact of escalating prices on economic growth and employment will be minimised (Deloitte 2012). The gradual rise in tariffs will enable households

and industry to adjust and to replace electricity-inefficient technologies accordingly. The HSRC (2008) report notes that electricity efficient technology cannot be implemented within a short period of time as the new equipment and machinery have to identified, ordered and installed. A gradual increase in prices will assist industry to plan and adjust their production processes accordingly.

A point flagged earlier in the introduction is that electricity price increases are exacerbated by municipal mark-ups. In a report on administered prices, National Treasury (2011) revealed that 42 percent of municipalities supplying electricity had illegal tariffs. In other words, tariffs that are not approved by the National Electricity Regulator. I therefore propose that the municipal electricity suppliers should be regulated and a pricing framework be developed for them, which will be subject to the approval of the National Electricity Regulator. This intervention will help curb the increases charged by municipalities and thus smooth electricity prices increases for households and industry.

Conclusion

In this essay, it was established that given the rising disparity between electricity supply and demand in South Africa, electricity prices will have to rise to fund Eskom's infrastructure plans. Securing electricity supply is vital if South Africa is to achieve a GDP growth of more than 7 percent. It was also established that electricity prices in South Africa are low in international standards and there is a need for prices to move towards more cost reflective levels. Against this backdrop, I propose that preferential electricity tariffs be provided for poor households in order to improve their quality of life and to ensure development. I also proposed that preferential tariffs be provided for electricity intensive industries such as manufacturing and mining because they contribute significantly to economic growth and employment in South Africa. Lastly I proposed that efficiency in the electricity market can be achieved through increased competition, demand side management programs, electricity efficient technologies and by raising general awareness about the importance of efficient use of electricity. It was recommended that increases in electricity prices should be gradual in order to minimise the negative short-run impact on economic growth and employment.

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