

CONFERENCE PAPER

**MIGRATION OF ELECTRICITY TARIFFS TO COST REFLECTIVITY IN THE SADC
REGION – A CASE STUDY OF ZAMBIA**

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ABSTRACT

In 2008, at a meeting in Lusaka Zambia, the Southern Africa Development Community (SADC) Council of Ministers approved the migration of electricity tariffs towards cost reflectivity within five years and set a deadline of 31st December 2013. However, only Tanzania and Namibia are reported to have achieved cost reflective tariffs today. Consequently, during the SADC council of Ministers meeting held in South Africa on 24th July 2015, member states were urged to produce road maps for transitioning their electricity supply industries towards cost reflective tariffs by 2019. A cost-reflective tariff ensures recovery of all the allowable costs of each regulated and licensed activity within the generation, transmission, distribution and supply value chain and also ensures a reasonable rate of return on investment. The impact of non-cost reflective tariffs is manifested in power deficits, poor state of infrastructure, higher system losses and failure to attract investment. Most SADC countries have made little progress in diversifying their electricity generation mix and rely on already established power stations. This is despite the countries being endowed with other alternative forms of generation resources. The electricity sector in the SADC region requires cost reflective tariffs to be sustainable so as to support the economic growth in the region. This paper will therefore seek to answer the big question on what challenges SADC countries have been experiencing with special reference to Zambia in migrating to cost reflective tariffs, impact of non-reflective tariffs, lessons from the Namibian and Tanzanian achievements and the potential solutions.

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1.0 INTRODUCTION

The purpose of this paper is to discuss the challenges that countries in the Southern African Development Community (SADC) region are facing in migrating electricity tariffs to cost reflective levels. The SADC region is a political and economic institution that provides a framework for regional integration and comprises of 15 member states¹. According to the Regional Electricity Regulators Association (RERA) cost reflectivity is attained when the tariff can recover all the allowable costs of each regulated and licensed activity within the generation, transmission, distribution and supply value chain. 'Allowable Costs' in this case are all operating costs reasonably incurred, a fair rate of return on used and useful utility assets plus any other unique cost components allowed to be included in the calculation of the tariff level. Cost reflective tariff structures usually include two basic categories, an energy charge(s) for the power used, and a delivery charge(s) to cover the cost of transporting the power to the user.

However, it is important to note that the concept of cost reflectivity can have more than one meaning. In a study conducted by Deloitte Access Economics in 2014 to review residential electricity tariffs in Australia, the concept of cost reflectivity included prices reflecting any combination of the fixed, variable or marginal costs of the generation, network or retail segments of the electricity system. This definition included the aspect of marginal costs. In determining whether a tariff is cost reflective or not, the consideration of the drivers of future network expansion costs were also included (Deloitte Access Economics, 2014). This approach is similar to the one that was adopted by the South African Trade and Industry study into the approaches to minimize the impact of electricity tariff increases on the poor in 2010. The definition of cost reflective used implied that the revenue received from electricity tariffs covers the full and efficient operating and maintenance costs (including staff costs and overheads), primary energy costs (fuel costs such as gas and coal) and the full capital costs associated with using the assets (including interest and depreciation costs) which enable the asset to be replaced (or refurbished) as necessary and for the assets to be expanded as demand for electricity grows (Trade and Industry Chamber of South Africa, 2010).

This paper adopted the RERA definition of cost reflectivity because it takes into consideration that different regulators may apply the concept of cost reflective tariffs differently. Thus, RERA's definition takes a holistic approach as it provides room for allowable costs by the regulator to be included in arriving at a tariff. Further, since the focus of this study is the SADC region, the RERA definition provides a common understanding of the concept of cost reflective tariffs.

¹ SADC member states includes Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe.

As at July 2015, it was reported that only Tanzania and Namibia had attained cost reflective electricity tariffs and most of the other SADC countries were still far from attaining cost reflective electricity tariffs². This is despite the SADC council of Ministers adopting the principle of cost reflective tariffs as far back as 2004. Further, in 2007 the SADC council of Ministers reaffirmed this decision and in 2008 resolved that member countries should endeavor to reach cost reflective tariffs within a period of 5 years, i.e. by 2013.

Cost reflective tariffs enable utilities to raise adequate capital to expand generation and transmission networks and provide the right signals for investment in the sector. Further, it promotes economic efficiency as consumers make better consumption decisions when the true cost of power supply is reflected. This enables the utility to make informed investment decisions as it gives better signals in deciding when demand management is more appropriate than network investment.

The power challenges facing the SADC region today can partly be attributed to the non-cost reflective tariffs. These challenges include inadequate investments in infrastructure especially in the generation and transmission sectors. In addition, non-cost reflective tariffs do not encourage refurbishment and upgrade in infrastructure and other equipment leading to power outages and low voltages.

During the 34th meeting of SADC Energy Ministers held in July 2015, it was observed that the region is faced with a capacity shortfall of 8,247 Megawatts to meet the current energy demand³. The energy deficit is of concern and threatens the economic viability and development prospects of the region. The region is highly dependent on hydroelectricity generation except for South Africa which is predominately coal (Regional Electricity Regulators Association, 2015).

The recent poor rainfall patterns experienced in the region has further worsened the energy deficit in countries like Zambia and Tanzania where the generation of electricity has significantly reduced. In 2015, Zambia's utility power company ZESCO, had projected to generate 12,900GWh of power compared to the actual 10,800GWh creating a deficit of 2,100GWh⁴. Similarly in Tanzania capacity has reduced for almost all the dams at the six hydro power stations to less than 50% of installed capacity⁵. The power utilities have been consequently carrying load shedding which have well documented adverse effects on the economy. ZESCO had increased load shedding hours, to at least 8 hours per day on a rotational basis for its customers except for the mines in July 2015.

² www.sadc.int

³ www.sadc.int

⁴ (Economics Association of Zambia, 2015)

⁵ <http://allafrica.com/stories/201402140084.html>

This paper will therefore discuss the migration to cost reflective electricity tariffs in the SADC region with special reference to Zambia and attempt to offer explanations on challenges SADC countries have been experiencing in migrating to cost reflective tariffs. The paper will also highlight the impact of non-reflective tariffs and lessons from the Namibian and Tanzanian experience in migrating to cost reflective tariffs.

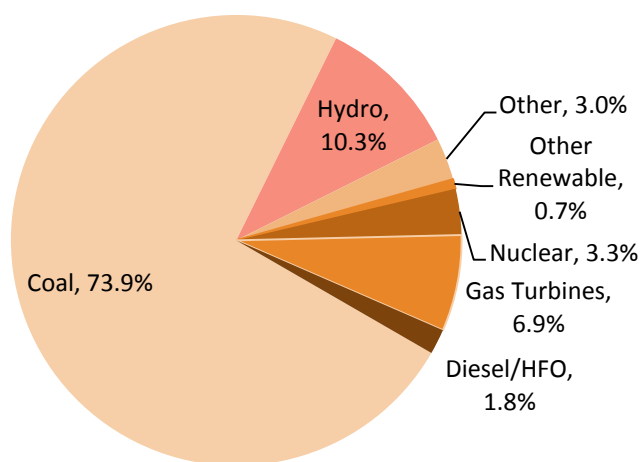
The paper shall proceed as follows section 2 will discuss the situational analysis in the SADC region, section 3 will discuss tariff setting methodologies, section 4 will discuss the migration to cost reflective tariffs, section 5 will discuss the role of cost reflective tariffs in the electricity supply industry, section 6 will discuss the challenges in migrating to cost reflective tariffs, section 7 will discuss the options to address the challenges in migrating to cost reflective tariffs in the SADC region and Section 8 concludes with recommendations.

2.0 SITUATIONAL ANALYSIS

SADC Generation Mix

According to RERA (2015), in 2013 the majority of SADC total installed capacity was powered by coal (74%). This is largely attributed to South Africa's extensive reliance on coal fired plants. This was followed by hydro (10%), gas turbines (7%), nuclear (3%), diesel/HFO (2%), other renewables (1%) while other generation technologies accounted for 3% of total installed generation mix. The generation mix is summarized in figure 1

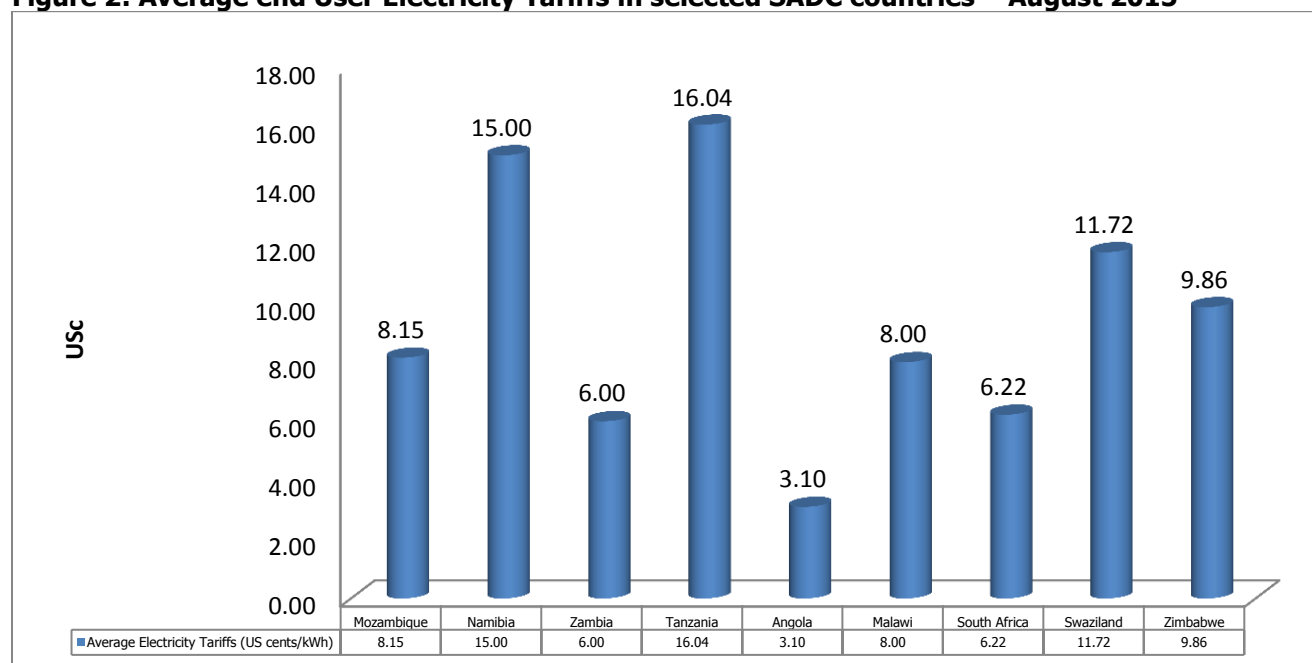
Figure 1: Generation Mix in SADC Region – 2013



Source RERA

Meanwhile, the generation mix picture is different if South Africa is excluded as hydro generation dominates in most SADC countries. In 2013, hydro generation accounted for approximately 58.2% of the total generation excluding South Africa followed by coal (15.8%), diesel/HFO (11.8%), Gas turbines (11.6%) and other renewables (2.5%). The electricity generation mix in a country has an effect on the average end user electricity tariffs in the country. For instance, hydroelectricity generation is one of the cheapest forms of power production compared to thermal and coal. Therefore it is expected that average end user tariffs would vary in each country depending on the generation mix. Figure 2 shows the average end user electricity tariffs in the SADC region based on the survey conducted by RERA, as at August 2015, the average end user electricity tariffs in the SADC region ranged from USc 3.10/kWh to USc 16.04/kWh. The United Republic of Tanzania had the highest tariff at USc 16.04/kWh followed by Namibia at USc 15.00/kWh, while Angola had the lowest tariffs at USc 3.10/kWh, followed by Zambia at USc 6.00/kWh.

Figure 2: Average end User Electricity Tariffs in selected SADC countries – August 2015



Source RERA

According to a press release following the 34th meeting of SADC Energy Ministers in July 2015, the electricity tariffs for most SADC countries were not cost reflective except for Tanzania and Namibia⁶. However, it is important to understand the average end user tariffs in terms electricity generation mix in the each of these countries. In Tanzania, the installed capacity is almost equally shared between hydro (35.4%), natural gas (33.3%) and HFO/Diesel (31.3%). On the other hand, Namibia is predominantly hydro (60%) and thermal (40%)⁷. However, the installed capacity is not adequate to meet the national demand and as result it imports over 50% of its electricity consumption⁸ from the region through the Southern Africa Power Pool (SAPP). The rest of the countries are predominantly hydro except for South Africa with over 50% of the electricity generated from coal. Thus, despite Tanzania and Namibia having one of the highest average end user tariffs, it is important to understand that cost reflectivity does not necessary imply a higher tariff. A country may have a relatively low tariff but can still be cost reflective. The electricity supply structure in the country determines the average end user electricity tariffs. For instance, since Namibia relies mostly on imports the cost of electricity is likely to be higher relatively to a country with own generation.

⁶ www.sadc.int

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<http://www.gst.go.tz/images/TANZANIA%20ELECTRICITY%20SUPPLY%20INDUSTRY%20REFORM%20STRATEGY%20&%20ROADMAP.pdf>

⁸ <http://www.engineeringnews.co.za/article/namibia-2013-02-22>

3.0 REGULATORY TARIFF SETTING METHODOLOGIES

There are various methodologies that can be applied in the process of tariff setting. However, the methodology applied will be dependent on the state of development of the electricity industry and nature of the business of the regulated entity (e.g. asset-intensity (Lawrenz, 2014). The various tariff setting methodologies are described in table 1:

Table1: Regulatory Tariff Setting Methodologies

Method	Definition
Price Cap	A ceiling on the price to be charged on consumers is established. The main feature of this regulatory approach is that it puts incentives on the operators to control costs. As the regulated operator knows the maximum price that it is able to charge, the saving on costs during the term of the price-cap becomes part of the rate or return to the operator. In principle, if regulation focuses exclusively on upper limit of the price, the operator might respond by cutting costs on items that affect the quality of the service, or simply reducing investment in the development of infrastructure ⁹ .
Yardstick/Benchmark	The regulation scheme based upon yardstick competition consist on setting prices by using data that have been compared to those provided by "similar" providers. In the case in which no "similar" operator exists, yardstick competition may also involve defining a "model (Carlos & Miguel, 2002)
Incentive Based regulation (IBR)	A mechanism for the electricity tariff determination, focusing more on efficiency gains and a structured process in tariff evaluation also known as performance-based regulation. In this methodology only the efficient cost (capital expenditure and operation expenses) in electricity supply are considered in the tariff calculation. It also requires the setting of key performance indicators for the utility which is motivated by incentives or penalties on the operational performance ¹⁰ .
Rate of Return (RoR)	The Revenue Requirement (RR) Methodology also known as the Rate of Return (RoR) or the Cost of Service approach in determining electricity tariffs is based on the principle that the revenues of the regulated companies have to cover their operating expenses, taxes and depreciation, and have to ensure a fair rate of return (profit) on assets utilised for production and supply of electricity and energy services.

⁹ <http://www2.udec.cl/~mquirog/OECD%20Water%202.pdf>

¹⁰ <http://www.st.gov.my/index.php/download-page/category/107-briefing-session-on-electricity-tariff-in-peninsular-malaysia-19-december-2013.html?download=427:briefing-session-on-electricity-tariff-in-peninsular-malaysia-19-december-2013>

The type of methodology applied has an impact in the process of migrating to cost reflective levels. This is because each methodology has some demerits in a way. However, despite this, it is also important to note that the way in which a tariff is implemented can also have an impact in the process of attaining cost reflective tariffs. A tariff can be implemented as a one off or in a phased approach. In both cases, these should be followed by regular reviews in order to ensure that the utility is collecting adequate revenue to cover its costs. In the SADC region, the commonly used tariff setting methodology is the rate of return.

4.0 MIGRATION TOWARDS COST REFLECTIVE TARIFFS – SADC REGION

According to RERA (2015), the process of migrating to cost reflective tariffs can be accomplished in different ways. However, most migrations will involve the following three principal steps as they collectively determine the tariff path that will be followed in achieving cost reflective tariffs.

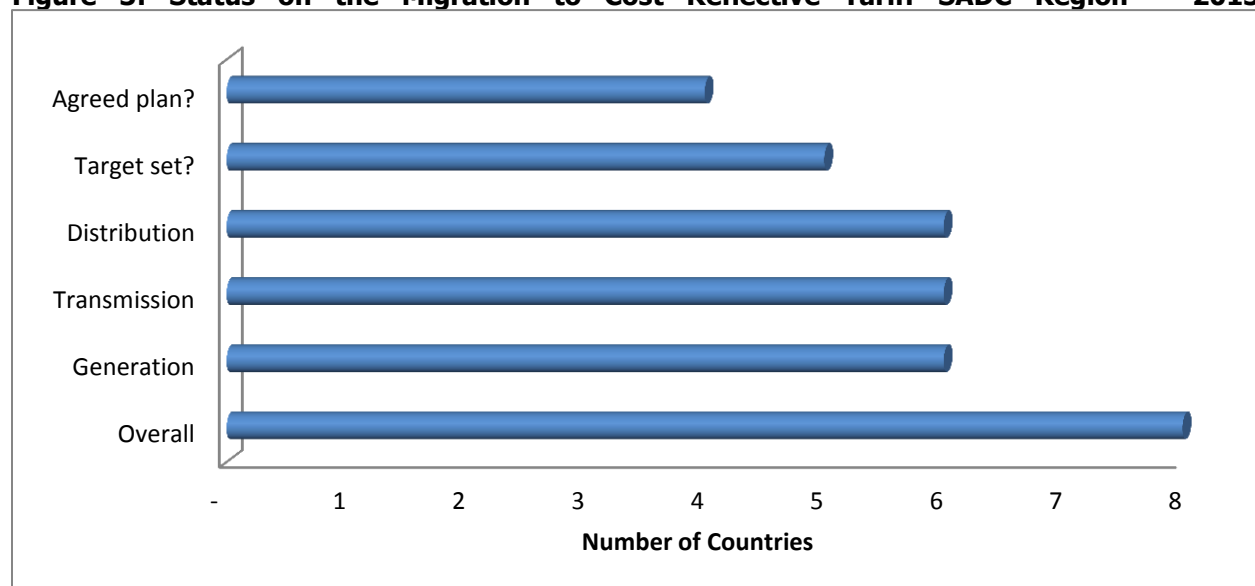
Determination of Required Revenues: migration to cost reflective tariffs will involve a thorough analysis of the costs incurred in providing the electricity service to all customers. This analysis forms the basis of the required revenues determination. A comprehensive revenue requirement determination will ensure that the utility will remain financially sound and will be able to fully recover prudently incurred expenses, including a fair return on its necessary investments.

Performance of a Cost of Service Study (CoSS): Making a full determination of revenue requirements often requires conducting a CoSS. The purpose of CoSS is to compare the utility's revenues to revenue requirements by customer class. The process of determining the cost of service and therefore establishing a cost reflective tariff for each customer category will at the least require disaggregating the utility's costs into functions (generation, transmission, and distribution), and services rendered by the utility.

Design New Tariff Rates: The final component in the migration to cost reflective tariffs is the design of new electricity tariffs. The results of the CoSS will indicate the degree to which existing rates recover revenues from each customer classification on a cost of service basis, and can be utilized by the regulator to design new rates that will fully cover the required revenues and sustain the utility, and the sector, going forward.

Figure 3 shows the status on the migration to cost reflective tariffs in the SADC region as at 2013.

Figure 3: Status on the Migration to Cost Reflective Tariff SADC Region – 2013



Source RERA 2015

As depicted in figure 3, only five countries in the SADC region had indicated that there has been a date set to achieve cost reflective tariffs. The target dates ranged from 2012 to 2014. Further, four countries indicated that there is an approved/agreed plan to achieve cost reflective tariffs. Six of the countries indicated that cost reflective tariffs have been computed for generation, distribution and transmission. However, although most countries have not attained cost reflective tariffs, progress has been made as eight countries indicated that overall cost reflective tariffs had been computed.

The Zambian Experience – Migration to Cost Reflective tariffs

In the Zambian case as a prerequisite to the attainment of cost reflective tariffs, the Energy Regulation Board (ERB) commissioned a CoSS for ZESCO in 2006 that was intended to determine the cost incurred by the utility in generating, transmitting, distributing and supplying electricity to its various customers and at various supply points. The study established that the tariffs were not cost reflective and recommended that the base tariffs for 2006 are increased by an average of 45.4% in the 2007/2008 financial year for ZESCO. With such a rise the residential customers would have carried the highest increase of the tariff at 147.6%, followed by large power customers at 46.3%. The least incidence would have been borne by commercial and services customers at 2.4% and 6.3% respectively. Thereafter, it was assumed that tariffs would be adjusted annually to account for changes in economic fundamentals. This is because cost reflectivity is a shifting target and a change in economic fundamentals such as

inflation, exchange rate and any other allowable operating costs requires an adjustment in the tariff.

ZESCO has since made four separate tariff applications from the CoSS resulting in the ERB approving average tariff increases of 27%, 35%, 26% and 16% in 2008, 2009, 2010 and in 2014 respectively. This increase enabled ZESCO to raise sufficient revenue to meet its costs and earn a reasonable return on assets. The CoSS assumed that the utility would be making annual tariff applications. However, the utility did not make applications in some years. In the current legislative framework, a tariff adjustment can only be effected once a licensed entity applies for a review. Therefore, the regulator has since proposed a change to the current legislation guiding the tariff review process that would allow for a Multi-Year Tariff Framework (MYTF) among other aspects.

Further, the CoSS was based on the assumption that the utility (ZESCO) was the only electricity service provider then, but this has since changed as the market structure has evolved with the entry of Independent Power Producers (IPPs). Meanwhile, the industry is based on the single buyer model where ZESCO is the off taker for power generated by the IPPs. The current average tariff ZESCO is paying to purchase power from IPPs ranges from USc 7/kWh to USc 13.23/kWh and yet the current average end user tariff charged by ZESCO is USc 6/kWh. Thus, there is a tariff differential between the cost of the power and the tariff. The regulator shall undertake a CoSS in 2016 to determine the cost of supplying power to the different customer categories, and the cost reflective tariffs.

In 2015, following Government's decision to migrate to cost reflective tariff levels, ZESCO made an application to increase tariffs by a weighted average of 216% across all customer categories except the mines and exports. Specifically on average, ZESCO proposed that tariffs move from K0.37/kWh to K1.17/kWh or in US Dollar terms; USc 3.39/kWh to USc 10.71/kWh, at an exchange rate of K10.92/US\$. The ERB rendered its decision on the matter on 2nd December 2015. However, ZESCO made an application to withdraw the tariff increase and the decision was reversed. This was in reaction to a public outcry against the increased tariffs. Public outcry against tariff increase is not unique to the Zambian. In 2013, TANESCO, in Tanzania withdrew its application to increase tariffs by 155%¹¹. In South Africa there were massive protests against a proposed tariff increment of 16% by Eskom¹² in January 2016. Similarly Ghana experienced public outcry in January following a 67% tariff increment and in February 2016, the public in Nigeria protested against a tariff increase 45%.

¹¹ <http://allafrica.com/stories/201301310067.html>

¹² <http://allafrica.com/stories/201601191459.html>

5.0 THE ROLE OF COST REFLECTIVE TARIFFS IN THE ELECTRICITY SUPPLY INDUSTRY

AusNet Electricity Services Private Limited, an electricity distributor in Australia, in their tariff structure statement for 2015 indicated that the absence of cost reflective tariffs leads to inefficiencies in the sector. This is because if the price charged for a service does not reflect the costs incurred by the supplier or the benefits available to a customer or to society, then too much or too little of that service will be supplied. Therefore the society is likely to benefit if inefficiencies are removed. Inefficiencies are likely to occur as consumers will consume more, as the price paid is lower than the true cost of supply or consume less if overpriced¹³. Consumers make better consumption decisions when the true cost of supply is reflected. In this regard, the utility will make informed decision on the actual costs of supplying power to customers. The reduced energy consumption due to changed behaviours by consumers, benefits the utility through lower costs as it will invest to match the preferences of its customers. It also receives better signals when deciding when demand management is more appropriate than network investment.

Cost reflective tariffs ensure that there is investment in the new generation, transmission and distribution infrastructure required to meet continued increase in demand for electricity. Increased investment in the electricity sector is crucial in increasing electricity access to a larger population in the country. According to Renewable Energy Policy Network, as at 2012 access to electricity in SADC region was at 42%, of these 60% were in urban areas while 31% were in rural areas¹⁴. The migration to cost reflective tariffs is important in connecting more customers to the national grid and enables people to have access to clean energy.

The World Bank stressed that non-cost reflective tariffs limit the extent to which the existing generation and grid network is maintained and investments in new generation capacity and network expansion by the service provider. Electricity tariffs that are lower than the cost of service only benefit those with existing electricity connections in the short-term and in the long-term compromise the quality and reliability of supply. Furthermore, low tariffs slow down the rate at which those without access, which is the majority of the population, can receive connections (The World Bank, 2015).

An electricity sector which is self-financing, economically viable and sustainable, would enable the Government utilise the money spent in the sector on other competing sectors in the economy such as education and health care (Lawrenz, 2014). In 2013, five countries in the SADC region indicated that still received subsidies. However, in reality, all utilities in the region received subsidies from their Governments especially in the wake of capital expenditure projects being undertaken to increase generation

¹³ <http://www.ausnetservices.com.au/Electricity.html>

¹⁴ <http://www.ren21.net/>

capacity (Regional Electricity Regulators Association, 2015). As an example in 2013, ZESCO received US\$ 69 million and US\$186 for power distribution projects and Kafue George lower power project respectively from the Government's Eurobond funds¹⁵. Further, in light of the current power deficit the World Bank projected that the Zambian Government would spend US\$ 44 million in emergency power imports in 2015 and a further US\$ 340 million in 2016 at the prevailing tariffs (The World Bank, 2015).

Non-cost reflective tariffs also contribute to the failure for projects to reach financial closure. This is because the utilities do not obtain sufficient revenue as the tariffs are not cost reflective. The implication is that most utilities have small balance sheets relative to the sizes of the regional projects under consideration and are not investment rated (Utho Capital, Ndivho and Consulting & Africa Next Investments Holdings, 2008).

In addition, insufficient investment and aging infrastructure in the power sector is also as a result of non-cost reflective tariffs imply load shedding will be the order of the day in the future. However, load shedding has costs to the economies in the SADC region. Sing'andu (2009) conducted a study to assess the impact of load shedding on selected manufacturing firms in Lusaka province. It was established that that among the sampled firms, load shedding had negatively impacted on the firms productivity and profitability. Productivity had reduced by a monthly average of 11.8% for six firms in the food beverage and tobacco sub-sector, 5% in the non-metallic mineral products sub-sector, 15% in the chemical, rubber and plastic products sub-sector and 30% in the paper and paper products sub-sector (Sing'andu, *ibid*). Further, Sing'andu argued that due to load shedding the firm's profitability had reduced by 15% in the paper and paper products sub-sector, 20% in the chemical, rubber and plastic products sub-sector, 12.6% in the food beverage and tobacco sub-sector and 5% in the non-metallic mineral products sub-sector.

Further, the Zambia Chamber of Commerce and Industry, an organisation for private sector business, indicated that due to the load shedding in 2015, the production across the industry had been adversely affected. It estimated that on average the production had declined to the range of 10% to 50% for industrial players not using alternative sources of energy. In addition, the production costs had increased for these firms in form of overtime payments as employees were made to work in times when power was available. Meanwhile, for players using alternative sources of energy such as generators, the production costs had increased by an average of 15% per month thereby impacting negatively on productivity (Economics Association of Zambia, 2015).

¹⁵ www.lusakatimes.com

6.0 CHALLENGES IN MIGRATING TO COST REFLECTIVE TARIFFS IN SADC REGION

One of the challenges facing most SADC countries today is the need to balance the act between access and affordability. According to Maria & Cecilia (2011), most policy makers are caught in between balancing the act between cost reflectivity and affordability. On one hand, regulators must balance the financial sustainability of the sector against the well-being of various segments of society especially the poor residential customers in determining tariffs. Affordability in the context of electrification and use of electricity, means, whether or not households can afford to actually use electricity once they are connected to the grid. The cost of electricity for consumers is assessed in relation to household incomes, purchasing power (opportunity costs of other goods), and relative cost of electricity compared with other commodities. In a region where half of the population is estimated to live below the international poverty line of US \$1 per day¹⁶, regulators in the SADC region must decide the tariff rate that would be affordable and yet not making the utility worse off.

In Zambia the Living Conditions Monitoring Survey showed that 60.5% of the population was living in poverty in 2010. Further characterization of the population by rural/urban poverty showed that poverty was more prone in rural areas at 77.9% than urban areas at 27.5%. (Central Statistics Office, 2012). The National Assistance Energy Directors Association survey conducted in the United States to assess the changes in the affordability of energy bills, established that when faced with unaffordable energy bills, an increase in energy costs harms people's health. This is because, energy use is so fundamental to modern life that it takes precedence over other household expenses including health¹⁷.

Further, Sebbowa (2010) argued that there is still political interference in the operations of the regulator. In his presentation, on licensing and regulation concepts in selected African countries, he argued that political interference still persists (Sebbowa, 2010) in African countries. It is argued that the Government will always attempt to protect the poor against high tariff increment¹⁸.

For the business sector, the affordability of electricity is assessed in relation to production costs and costs of other energy forms. SADC relies on energy intensive primary and secondary industries which support significant employment of semi-skilled

¹⁶ <http://www.sadc.int/themes/social-human-development/>

¹⁷ <http://fee.org/articles/the-poor-need-affordable-energy/>

¹⁸ <http://country.eiu.com/article.aspx?articleid=411503225&Country=Tanzania&topic=Economy&subtopic=Forecast&subsubtopic=Economic+growth&u=1&pid=493948833&oid=493948833&uid=1>

and unskilled labour. Therefore the challenge lies with regulators in balancing the utility viability against the socio economic needs of the country. According to a study undertaken by Deloitte on the economic impact of electricity tariff increase on various sectors in the South African economy respondents representing the mining, manufacturing and metal manufacturing industries were asked if they thought they would be able to pass on a 50% nominal increase in electricity tariffs to their customers. The vast majority of respondents felt they would not be able to pass on the cost, none of the mining companies, only 14% of the metal manufacturers and 30% of the 'other' manufacturers stated that they would be able to pass on the cost (Deloitte, 2011). These results are plausible, since most mining and metal manufacturing companies produce basic commodities that are relatively homogeneous, so they have little influence over the price of their output which is set and traded in highly competitive global markets. It is worth noting that mining and metal manufacturers are among the 30 sub-industries that are the most heavily dependent on electricity as an input (% of costs and intensity measures) and could also be vulnerable in terms of their limited ability to pass on costs. Therefore, the short term reactions to electricity tariff increment would be job losses or shut down of the plant.

These research findings could be generalized to the Zambian economy as well, which is largely dependent on copper production. The mining sector accounts for 50% of the total national electricity consumption, as such is highly dependent on the use of electricity. However, since the products produced are sold in highly competitive markets, the mine is a price taker and has little influence on the price of the commodities. Thus, a rise in electricity tariffs cannot be easily passed on to consumers in form of increasing the commodity prices. The implication is that the cost of production will increase for the companies. Therefore, most companies lay off workers, as a mitigation measure against the rising costs.

In addition, as part of a broader study around meeting South Africa's future electricity needs, Conningarth economists (2011) explored the 'profit vulnerability' of different sectors of the economy to increases in real electricity tariffs, where 'profit vulnerability' was defined as the real electricity tariff, an industry could absorb before becoming unprofitable. According to Conningarth (2011), the extent to which a sector can absorb tariff increases before becoming unprofitable, depends on, the weight of electricity costs in total production costs and the sector's current level of profitability (Deloitte, 2011). It was established that it is the relatively electricity-intensive mining and manufacturing sectors that suffer the largest declines in output and employment as electricity tariffs increase.

The model suggest that electricity tariff increases are likely to result in a fairly significant decrease in output and employment across all of the major service sectors, because they are exposed to the second-round effects of price increases on consumer

spending. The results suggest that the negative impact of rising prices on employment is particularly severe in the transport and communications sector (Deloitte, 2011).

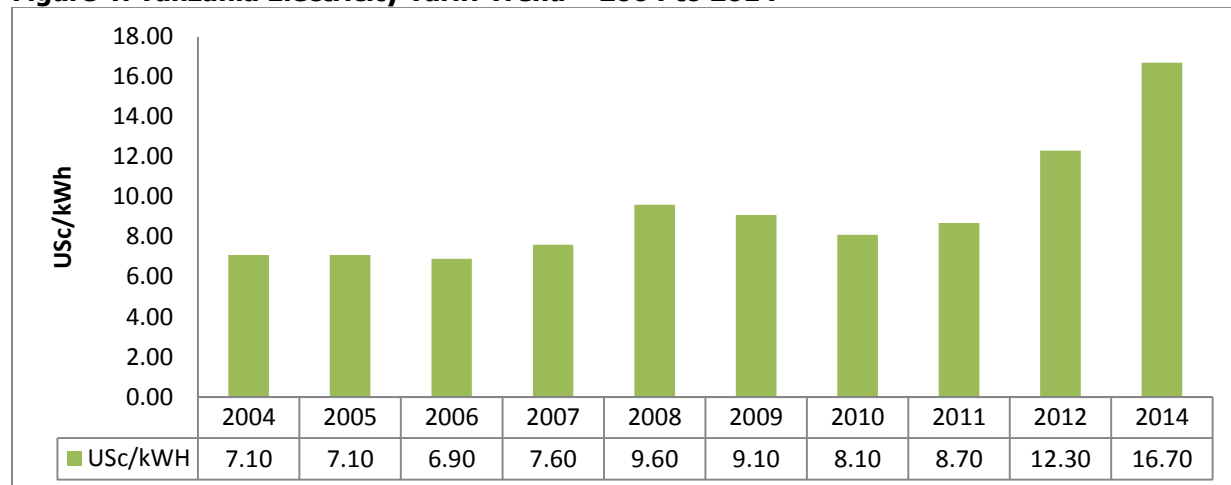
Information asymmetry is another challenge in the migration to cost reflective tariffs. The tariff setting methodology used by regulators usually requires assessment of the prudence of costs and the removal of inefficiencies within the utility (Lawrenz, 2014). The regulatory effectiveness in the setting of electricity tariffs is dependent on the provision of quality information. Also, improvement in the efficiency of utility operations is dependent on the availability of information that is available for the evaluation of the utility by the regulator. In the electricity tariff determination process, the utility will typically always have better information than the regulator. Thus, this might present a challenge for the regulator in that it might approve a tariff that over compensates the utility or is not adequate.

The absence of a MYTF supported by automatic adjustments mechanisms in some SADC countries like Zambia also poses as a challenge in migrating to cost reflective tariffs. A MYTF is defined as a framework for regulating the licensees over a period of time wherein the principles of regulating the returns/profits of licensees and the trajectory of individual cost and revenue elements of the utility are determined in advance¹⁹. It provides clarity on the rules to be applied over a pre-defined future time period. It seeks to eliminate the control aspects of regulation and replace them with a system of incentives and penalties. In this way, all stakeholders are made aware of the outcome of various actions/events for the pre-defined future time period, and are able to plan accordingly.

A good example where a MYTF is in place is in Tanzania. The Electricity Act allows the Energy and Water Utilities Regulatory Authority (EWURA) to make automatic tariff adjustments to reflect periodic changes the cost of fuel, the cost of power purchases or the rate of inflation, and the currency fluctuation. It also directs EWURA to make amendments or review tariffs once in every three years and such amendments. Thus, Tanzania follows a three year MYTF, with annual adjustments for particular cost items. Figure 4 shows the annual changes in electricity tariffs over the period 2004 to 2014.

¹⁹ <http://www.ijser.org/researchpaper%5CReview-of-Multi-Year-Generation-Tariff-structure-in-India.pdf>

Figure 4: Tanzania Electricity Tariff Trend – 2004 to 2014



Source EWURA

The figure shows that tariffs have gradually been migrating to cost reflective through annual adjustments increasing from USc 7.1/kWh in 2004 to USc 16.70/kWh in 2014. The importance of a MYTF cannot be emphasized. However, implementation of a MYTF often requires a change in the existing legislation. Currently, the legislation in Zambia is undergoing review to incorporate the MYTF amongst other aspects.

According to SARDC (2010) most SADC countries have determined tariff levels only for retail (i.e. end-consumer price levels) while very few countries have tariff levels across the value chain from generation to transmission and transmission to distribution and/or retail. This is partly due to the market structure of most utilities which are presently unbundled. This observation was echoed in the RERA 2015 publication on electricity and selected performance indicators for 2012 and 2013. According to RERA only 6 countries had determined tariffs for generation, transmission and distribution in 2013 (Regional Electricity Regulators Association, 2015). This failure to break down costs is another challenge that policy makers will need to overcome in determining the real cost-reflective tariffs and how to introduce them (SARDC, 2010). The absence of properly broken down costs, across the supply chain network poses a challenge to potential investors to know the actual gains or costs of investing in a particular stage in the supply chain such as the generation or transmission. Table 2 shows the status on cost reflective tariff determination in the various supply chain in the SADC region.

Table 2: Status of Tariff Determination in Various Supply Chain

Country	Generation	Transmission	Distribution
Angola	×	×	×
Botswana	×	×	×
DRC	-	-	-
Lesotho	•	•	•
Madagascar	×	×	×
Malawi	×	×	×
Mauritius	•	•	•
Mozambique	-	-	-
Namibia	•	•	•
RSA	•	•	•
Seychelles	-	-	-
Swaziland	×	×	×
Tanzania	•	•	•
Zambia	•	•	•
Zimbabwe	×	×	×
Total	6	6	6

Source RERA

Table 2 shows that six countries had determined the cost reflective tariffs for generation, transmission and distribution in 2013.

7.0 OPTIONS FOR ADDRESSING CHALLENGES IN MIGRATING TO COST REFLECTIVE TARIFFS

In migrating to cost reflective tariffs, it is important to understand that the Government has a major role to play as it is a critical stakeholder. In the Namibian case, the resolution by Cabinet in 2009 that the power utility should reach cost reflectivity in 2011/2012 has had an impact in the migration to cost reflective tariffs. Similarly, in the Tanzania case the legislation empowers the regulator to review electricity tariffs once every three years, while periodic adjustments are allowed to compensate for changes in economic fundamentals such as inflation, currency devaluation and increase in fuel prices. Therefore, Government's policy pronouncements to migrate to cost reflective tariffs should be accompanied by the successful implementation of such policies as was the case in Namibia.

According to the World Bank there is need to strengthen sector planning to ensure the long-term sustainability of the power sector. The financial sustainability of the sector requires adequate planning (The World Bank, 2015). One way this could be achieved is through an integrated resource plan. Most SADC countries like Zambia do not have an integrated resource plan in place. The integrated resource plan is a comprehensive decision support tool and road map for meeting the company's objective of providing reliable and least-cost electric service to all of our customers while addressing the substantial risks and uncertainties inherent in the electric utility business²⁰. The integrated resource plan should include Least Cost Power Development Plan (LCPD) that lays out the investments required in all the segments of the power sector i.e. generation, transmission and distribution (The World Bank, 2015). For generation, the LCPD should contain a pipeline of projects ranked by cost i.e. the most economically and financially viable projects should be developed first. The LCPD process should be anchored by a load-forecast that is also routinely updated.

Further, in the process of migrating to cost reflective tariffs, there is need for a comprehensive energy sector reform plan entailing clear long-term objectives, analysis of the impact of reforms, and consultation with stakeholders (Lawrenz, 2014). Tariffs have been lower for a long period of time such that the public considers this normal and unaware that tariffs are much higher in the rest of the world. An attempt to migrate to cost reflective tariffs in Zambia was received with a public uproar following Cabinet's resolution that the country adopts cost reflective tariffs. Therefore in order for the public to appreciate the importance of cost reflective tariffs, a comprehensive energy

²⁰ <http://www.pacificorp.com/es/irp.html>

reform should include an extensive communications strategy to raise awareness on the implications of low tariffs. The public must be made to understand the relationship between lack of investment, load shedding and low tariffs. Communicating the electricity supply industry reform strategy is critical to ensuring smooth implementation of the reforms. Key stakeholders such as Government institutions, civil societies, Development Partners, media and the public at large must be aware of the reform process as they are likely to be affected in one way or the other. Namibia is one good example where a communication strategy to the citizens on how the increases of electricity tariffs translate to improved power supply has been implemented²¹. The SADC region can learn from these experiences.

There is need for a coordinated approach between different Government agencies and ministries in the process of tariff determination. This is because tariff decisions have an effect on the attainment of other Government social and economic policies such as inflation. In this regard, different Government agencies and ministries should be encouraged to take part in the public consultation process during the tariff review process.

In addition while cost-reflective tariffs are important, a utility's ability to collect payment for the electricity it delivers is also a vital component of a healthy power system (Lawrenz, 2014). If a utility has cost-reflective tariffs in place, but is unable to collect the revenues that it is owed by its customers, the sustainability of the industry is again threatened. However, global experiences in developing countries indicate that customers are generally willing to pay for the full cost of power, provided they receive an improvement in reliability and service delivery. For this reason, an increase in electricity tariffs should be accompanied by an improvement in the utility's performance with regards to debt collection and thus will eventually lead to more revenue that can be invested in power generation projects, thereby increasing electricity access. The performance of a utility can be improved through the use of incentive based regulation tools such as Key Performance Indicators.

²¹ https://www.academia.edu/9365189/UNDERSTANDING_ELECTRICITY_TARIFFS

8.0 CONCLUSION

In conclusion this paper attempted to discuss the challenges that SADC countries have been experiencing with special reference to Zambia in migrating to cost reflective tariffs, impact of non-reflective tariffs, lessons from the Namibian and Tanzanian achievements and offer options in addressing the challenges. The paper adopted the Regional Electricity Regulators Association definition of cost reflective tariffs as a tariff level that can recover all the allowable costs of each regulated and licensed activity within the generation, transmission, distribution and supply value chain. 'Allowable Costs' in this case are all operating costs reasonably incurred, a fair rate of return on used and useful utility assets plus any other unique cost components allowed to be included in the calculation of the tariff level.

The average end user electricity tariffs in the SADC region ranged from USc 3.10/kWh to USc 16.04/kWh in 2015. The United Republic of Tanzania had the highest tariff at USc 16.04/kWh followed by Namibia at USc 15.00/kWh, while Zambia and Angola had the lowest tariffs at USc 6.00/kWh and USc 3.10/kWh respectively. According to a press release following the 34th meeting of SADC Energy Ministers in July 2015, the electricity tariffs for most SADC countries were not cost reflective except for Tanzania and Namibia. Cost reflective tariffs play a major role in ensuring the sustainability of the electricity supply industry as well as promoting investments in the sector. The average end user tariffs in the SADC region do not provide the right signals for investment.

The dilemma facing most countries in SADC region today is to balance access and affordability. This is because half of the population lives on less than a dollar per day²². Therefore, regulators are faced with the challenge of determining a tariff rate that would be affordable for consumers and yet not making the utility worse off. Further, most SADC countries, as indicated earlier in the paper, depend on energy intensive primary and secondary industries which support significant employment of semi-skilled and unskilled labour. In Zambia, the mines account for the largest consumption in electricity and the sector is vulnerable to electricity tariffs as it is unable to pass on the costs to the consumer.

The absence of a MYTF supported by automatic periodic adjustments is another challenge in migrating to cost reflective as indicated in the discussion. In the Zambia case, the current legislation does not support automatic review of the tariff adjusted

²² <http://www.sadc.int/themes/social-human-development/>

and depends on the utility to make an application. This is different from Tanzania where the legislation allows for a tariff adjustment once in three years with periodic adjustments are made to compensate for changes in economic variables.

The absence of cost reflective tariffs has contributed to the energy deficit that most SADC countries are experiencing including Zambia today. Therefore, there is need for the countries to gradually move to cost reflective tariffs. However, tariffs should be carefully designed to strike a balance between affordability and accessibility.

Recommendations

This paper makes the following recommendations;

- There is need to move to cost reflective tariffs in the SADC region;
- There is need for SADC countries to conduct Cost of Service Studies to ascertain the actual costs in the supply of electricity;
- The implementation of cost reflective tariffs should be a phased approach. Whilst cost reflective tariffs are necessary to ensure investment in electricity in the electricity supply chain, sudden or unpredictable tariff increases have an impact on economic growth such as inflation;
- Research is undertaken to determine the issue of affordability. This issue must be real and not perceived. This will help Government design subsidies that are targeted at the poor;
- Regulators should be encouraged to work autonomously;
- Development of an integrated resource plan; and
- Development of a comprehensive communication strategy to raise awareness on the importance of cost reflective tariffs.

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