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The 'User Pays' Principle and the Electricity Sector: A South African Case

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Abstract: This paper discusses the 'user pays' principle (UPP) within the South African developmental state concept. The essence of the paper is to ascertain whether UPP can be implemented in the electricity sector without necessarily harming the developmental state agenda taking into account the challenges of inequality, unemployment and poverty in South Africa. In this paper, we present the arguments in support of the UPP in the electricity supply industry (ESI) and its building blocks. The paper analyses the role of regulatory authority in the implementation and adoption of the UPP. Finally, the paper analyses the role of UPP in the developmental state concept and the challenges of implementing it. The analysis shows that adoption of inclining block tariff (IBTs) was based on the individual's perceived ability to pay and not on UPP while the free basic electricity (FBE) policy is a government-funded initiative meant to provide electricity to poor households. The paper also found that the ESI currently has high levels of inefficiencies in production and use, procurement and operation of utilities, cross-subsidisation, infrastructure and maintenance backlogs which may hinder the full implementation of UPP. Lastly, although the full implementation of UPP could incentivise efficient operation of the ESI and attract the much-needed investment in the sector, the UPP system will pose serious challenges considering the country's three main problems: inequality, unemployment and poverty.

Keywords: *'User pays' principle, electricity, South Africa, developmental state*

1. Introduction

There is a global movement towards the implementation of the 'user pays' principle (UPP) in infrastructure projects around the world. The main point of discussion over the past three decades in most developing countries has been the costs and benefit of implementing the UPP. The UPP is based on the idea that the most efficient allocation of services is achieved when end users pay the full costs of services rendered (Nelson & Orton, 2013; Kanakoudis & Gonelas, 2014). The UPP is well established in the literature and provides that the price of service should reflect the full range of costs involved in using a particular infrastructure. Studies (see for example, Snyder & Stegman, 1986; Pagano & Perry, 2008; Engel, Fischer, & Galetovic, 2013; Lossa & Martimort, 2015; and Delmon, 2017 among others) indicate that there is consensus among policymakers that the UPP approach has a superior potential to attract finance for the much-needed economic infrastructure mainly in developing countries. For example, the study by Engel et al. (2013) demonstrates the importance of UPP in replacing or complementing the public provision of economic infrastructure over the past decades. In the developed world, the United States, United Kingdom and Australia are examples of countries that have successfully implemented UPP in a number of economic sectors.

In South Africa, Government's National Development Plan (NDP) of 2012 envisaged a developmental state economy that is capable of transforming the country through the rollout of bulk infrastructure in electricity, water and sanitation, housing, telecommunications, etc. The NDP highlights low levels of public infrastructure funding, especially in electricity, roads, rail, water and sanitation, public transport and housing. However, there seems to be a consensus that, given the limited government financial resources, some of the funds for economic infrastructure will need to be sourced through Public-Private Partnerships (PPP). In the electricity sector, the current investment levels are insufficient and accompanied by high maintenance backlogs, especially at the local distribution level. This threatens the security of supply in the future. There is an urgent need for an additional capacity of ±40 000MW by 2030, with ±20 000 MW from renewable sources (National Planning Commission, 2012). This is necessitated by the fact that some of the current existing generation plants will be retired as they reach the end of their useful life. There is a consensus that, in order to overcome the challenges of access to electricity and infrastructure, electricity prices need.

To increase in short to medium term in order to finance capital and operational expenditure requirements and remain sustainable. This is based on the fact that some of the existing electricity tariffs are below cost,

with most based on the individual's ability to pay (perceived affordability) rather than on the 'user pays' principle. However, there is a fundamental turning point regarding the funding of infrastructure projects around the developing world. Recently, the World Bank, as the largest development finance institution, declared that no funds would be advanced to ESI projects in developing countries unless tariffs reflect the true underlying costs of supply (Patterson, 2013). Our approach in this study entails a detailed analysis of the main characteristics of the electricity supply industry (ESI) in South Africa as well as government policies/plans that anchor the industry. Our analysis of the ESI focuses more on the role of utilities and customers and the key challenges (capacity and inefficiencies) faced by the ESI, whilst our attention to government policies/plans focuses on the National Development Plan (NDP), Integrated Energy Plan (IEP) and Integrated Resources Plan (IRP), free basic electricity (FBE), Electricity Pricing Policy (EPP), etc. Furthermore, we review international best practices on the 'user pays' pricing approach (UPP) and map out possible approaches for its successful implementation and propose reasons why the UPP is necessary for South Africa. Importantly, we establish the key relationships between FBE, inclining block tariffs, cost reflectivity and the 'user pays' approach implementation in an environment of high inequality, unemployment and poverty. This paper, therefore, discusses the 'user pays' principle in detail, focusing on its implementation in the electricity industry. The paper provides reasons why the 'user pays' approach makes sense for South Africa, outlines its building blocks, summarises the role of the economic regulator, and looks at the 'user pays' principle versus the developmental state. The paper then draws conclusions and gives recommendations.

2. The 'User Pays' Pricing Approach

Literature suggests that UPP is the most practical solution for promoting equity, efficiency and sustainability in most economic sectors. The UPP is mostly used to collect revenue from road infrastructure financing, transport congestion management, environmental management, etc. However, the implementation of the UPP system has proved to be difficult, especially in developing countries with high levels of inequality, unemployment, poverty and low growth. The successful implementation requires extensive support from government and politicians, as well as customer/end-user education on the costs and benefits. In the ESI, the price of electricity is normally a function of available capacity where excess or underinvestment has consequences (Kirschen & Strbac, 2004). Excess capacity leads to high prices while on the other hand underinvestment also leads to high prices, supply shortages and disruptions in economic activity. Kirschen and Strbac (2004) argued that allowing regulated utilities to recover their full cost of capacity investment enables them to remain sustainable in the medium to long-term. However, they also suggest that this does not necessarily guarantee that the investment made is economically optimal. Other studies suggest that the most efficient way of limiting further infrastructure-induced price increases is through UPP, which incentivises investors/utilities to be efficient in infrastructure procurement and operation, while at the same time incentivising consumers to shift their demand from peak to off-peak periods (Hall, Jeanneret & Rai, 2016). Hall, Jeanneret, and Rai (2016) indicate that, in most instances, knowledge of their consumption empowers users to maximise the potential benefits of cost-reflective pricing. Nijhuis, Gibescu and Cobben (2017) further highlight that the UPP system penalises those users that put a greater strain on the system. In mature electricity markets, the UPP system has been successfully used as a new approach to congestion management.

User Pays' Pricing Approach and Cost-reflective Tariffs: The UPP approach is premised on the fact that the price paid by end users signals the true costs of electricity supply. Kirschen and Strbac (2004) indicate that electricity tariffs should be equal to the long-term marginal costs of supplying electricity to all customer classes. The tariff that users pay should signal to them the costs that their decisions impose on the electricity system and society. In other words, users should be exposed to the consequences of their consumption. Tariffs that mirror the true costs promote efficient investment in electricity infrastructure and innovative technology (Maphosa & Mabuza, 2016). Recently, Hobmann, Frederiks, Stenner and Meikle (2016) suggested that a solution to the current disparities is to move electricity tariffs closer to the actual costs incurred by utilities to provide users with a price signal that accurately conveys the true costs of power generation. However, the efficiency of the costs incurred in supplying electricity is also important in achieving this goal. The importance of cost-reflective electricity tariffs is well recognised around the world. In South Africa, this is recognised through the Electricity Pricing Policy (2008) which states that 'electricity prices should reflect

efficient market signals, accurate cost of supply and concomitant price levels that would ensure the financial viability of the electricity sector in its entirety'. There is a consensus that there are disparities between the actual costs incurred by utilities and the tariffs charged to some users. Suggestions to migrate from the perceived non-cost-reflective tariffs to cost reflectivity date back to 2004. However, target dates set have constantly been shifted from the initial target of 2013 to 2015 and then 2019, owing to difficulties in balancing access and affordability of energy services. From a regulatory perspective, setting tariffs requires a balance between a number of competing objectives i.e. economic efficiency, revenue sufficiency, fairness and equity, social orientation of electricity, simplicity, transparency and consistency with government policy. The tariffs must be set in such a way that they establish the efficient costs incurred by utilities to cover their prudently incurred operational (Opex) and capital expenditure (Capex) costs. Furthermore, the tariff should establish the share of Opex and Capex costs to be recovered through user charges versus the ones to be subsidised, i.e. through government subsidies.

User Pays' versus Inclining Block Tariffs (IBTs) and Free Basic Electricity (FBE): In an effort to ensure access to affordable, reliable, sustainable and modern energy for all, South Africa adopted the free basic electricity (FBE) policy and later the inclining block tariffs (IBTs). The FBE policy was developed in 2003 mainly to provide indigents with the free electricity deemed necessary to support their basic energy needs. FBE facilitates the provision of basic energy to poor households to address the socio-economic issues of inequality, unemployment and poverty. The FBE programme is funded through the South African government's equitable share grant, which funds the FBE programme. FBE varies from one local distributor to the other; however, the majority of distributors provide 50kWh/month per indigent household. On the other hand, IBT is a residential tariff structure that seeks to make electricity affordable to low-income households by providing lower tariffs for low consumption. The IBT is divided into four consumption blocks with each block having a different tariff per kilowatt-hour (kWh) of energy consumed. The first IBT block normally corresponds with the 50kWh FBE allocation per month. Another important feature of the IBT tariffs is that they allow for cross-subsidisation of low-income users by other customer categories, i.e. high-income households, industrial and commercial. Some have also urged that IBTs promote energy efficiency to a certain extent through higher charges for higher consumption.

However, both the FBE policy and IBT approach are based on perceived affordability (the individual's ability to pay) and promotion of access to affordable electricity and do not address the sustainability of the electricity industry. Tariffs charged under both approaches do not reflect the true costs of consumption – government funds the 50kWh FBE, while the IBT rates are cross-subsidised by other customer categories. Various studies show that cross-subsidisation is not a long-term solution to affordability since most of the high energy-intensive users meant to subsidise low-income consumers are slowly switching to off-grid solutions in South Africa (Willems & Ehlers, 2008; Maphosa & Mabuza, 2016). Financial sustainability and electricity provision is affected in local distributors mainly dominated by users on the IBT structure. The main arguments in support of moving towards the 'user pays' principle for these users are a locative efficiency, covering costs incurred in a generation, fiscal and monetary objectives, incentivising investment, price stability and environmental sustainability.

Why 'User Pays Makes Sense for South Africa: The South African electricity sector is characterised by a number of challenges. Some of these challenges emanate from the utilities, while others are from the users of electricity. It is our view that the introduction of a full user pays pricing approach will help address some of these challenges. At the top of the agenda is the high level of inefficiency in the usage of electricity by various users in South Africa. Appropriate implementation of 'user pays' tariffs can help change South African consumers' behaviour in various sectors. Importantly, in Sydney, Australia, laid (2001) found that the implementation of the 'user pays' pricing principle in Sydney's water sector resulted in the indefinite deferment of a proposed new dam on the Shoal Haven River due to a 20% decline in overall water consumption. High levels of inefficiencies in the procurement and operation of utilities in the country also exist. Recently, there has been a heated debate among electricity consumers and the public at large on inefficiencies (imprudent costs) and the perceived irregular expenditure on some capital and operation costs. The argument is that these inefficiencies have far-reaching negative effects on households and firms which are dependent on them as their only energy source. Delays and subsequent cost overruns in some instances

result in the overstatement of the regulatory asset base (RAB), which results in higher revenue request by utilities. It has also been argued that, in some instances, consumers pay the price for utilities' inefficiencies. It is our view that isolating the true underlying costs of electricity, excluding inefficiencies, will pave the way for the full implementation of the 'user pays' principle.

Currently, there is no mechanism in place to validate the extent of non-cost-reflectivity of tariffs in the ESI. Compounding the problem is also the high level of cross-subsidisation in the ESI, which Maphosa and Mabuza (2016) argued against in light of their long-term sustainability. Therefore, cross-subsidies are a short-term solution that should be used while addressing the inefficiencies in the industry. The high levels of electricity infrastructure maintenance and refurbishment backlogs also pose a challenge to the industry. The electricity distribution infrastructure is estimated to be ±40 years old with the majority of it requiring major refurbishment or replacement. In this regard, the UPP approach would assist in attracting investment to eradicate or reduce these backlogs. The government's fiscal budget is unable to fund all highly capital-intensive infrastructure projects adequately on its own. Proper implementation of the UPP will incentivise the private sector to partner with government to address this challenge. Positive economic benefits have already been seen in various sectors where the 'user pays' approach has been implemented, for example in national roads, public transport (Gautrain), water (raw water), national environment management, prisons and office blocks.

However, since electricity consumers in South Africa view electricity as a public good, the implementation of such an approach in the ESI might pose serious challenges due to the three problems mentioned above. Although the NDP concedes that tariffs should increase in short to medium term to fund capital expenditure and maintenance programmes, it is not quite clear whether tariffs are indeed low, taking into consideration the level of inefficiencies in the capital and operational expenditure discussed above. Furthermore, another part of the debate is the notion that state-owned utilities, for example Eskom, should not be allowed by the regulator to earn a profit. Consumers do not understand the need to pay high tariffs that are equivalent to their strain on the electricity grid. However, Patterson (2013) rejects this notion and argues that as much as private entities are allowed to earn profits, so are state-owned utilities for them to remain self-sustainable and avoid over-reliance on government bailouts. The NDP also supports this view by conceding that electricity tariffs need to increase in short to medium term to fund capital expenditure and maintenance programs.

Building Blocks: 'User Pays' Principle: There are various ways to promote efficiency, equity and sustainability in the electricity sector and the 'user pays' approach is the simplest in theory, but very difficult to implement in practice (Rogers, De Silva & Bhatia, 2002). In this section, we propose possible building blocks for the successful implementation of the 'user pays' approach in the ESI. A rigorous public participation process before and during the construction of infrastructure projects, e.g. power stations, is required. The UPP requires the provision of adequate information related to costs and benefits of every project undertaken, especially the ones to be paid for by users. These costs and benefits must be properly articulated to encourage user buy-in. However, in South Africa, the procurement and construction of power stations are not under the ambit of the regulator, therefore the enforcement of efficiency in these projects poses a slight challenge. It is recommended that a body like a regulator responsible for tariff/price setting in the ESI should also be responsible for awarding construction tenders and oversee the procurement of assets to enforce efficiency. An open competitive bidding process in the procurement of utility assets is important in convincing electricity users. Again, the bidding process should be open to all stakeholders and their inputs properly considered in making the final decision. Ideally, this process should lead to the selection of the most capable service provider.

Furthermore, transparency during the construction phase is also important in order to keep users abreast of timelines, possible delays and any foreseeable cost escalations. This should be done to demonstrate that due care is applied at all times and that any inefficiencies are identified and corrected without affecting project timelines. Importantly, both utilities and government need to manage perceptions and misconceptions about particular projects actively, for example, affordability, corruption, beneficiaries, the full disclosure of all costs incurred, subcontractors, and their shareholders. The costs and benefits of such projects should be properly

motivated to prepare users in advance. Lastly, the general political will is a critical factor needed for proper implementation of the UPP system. Williams (1995) opined that the nature of infrastructure funding systems is solely dominated by political considerations.

3. The Role of the Regulator

Available electricity literature shows that the price that users pay is a function of the capacity in the system (Patterson, 2013). If electricity utilities are allowed to build too much generation capacity, the electricity users ultimately pay more for unused capacity. However, if too little capacity is built, the electricity network will be congested, leading to load shedding, price increases and ultimately, low economic growth. It is, therefore, important to recognise the role of the regulator like the one of striking a balance between generation capacity and prices. The uncertainties between demand and generation create a difficult task for regulators. Regulators should be constantly aware of the costs and benefits of both under-and over-investment in generation capacity to determine the efficient price. Furthermore, the role of the regulator is to implement tariff structures that eliminate inefficiencies in the usage of electricity as provided by government policies; for example, in South Africa, the Electricity Pricing Policy (EPP) is important in this regard. It is our opinion that the successful implementation of the UPP requires the regulator to rigorously develop and implement prudency rules around procurement, construction and operation costs of utilities. These rules should clearly state how inefficiencies, construction delays, cost overruns and a lack of due diligence by utilities will be penalised. Importantly, efficiency must also be instilled in the day-to-day operations of utilities to isolate prudently incurred costs from inefficient costs. Regulatory mechanisms should also be in place to protect users from paying for utilities' inefficiencies.

Recent studies (see, for example, Ouyang & Sun, 2015; Nazemi & Mashayekhi, 2015) stressed that inefficiencies distort pricing and affordability levels in electricity regulation around the world. The regulator needs to develop frameworks to classify and disqualify costs imprudently incurred to instil confidence in users and possibly encourage them to accept a full UPP as a future useful method of payment of electricity. On the other hand, this will also encourage utilities to be more efficient in their capital and operational expenditure. Proper classification and disqualification of costs might possibly instil confidence in consumers about the work of the regulator and encourage users to consider moving towards the full 'user pays' system. Procedures and methodologies for the evaluation and revaluation of the RAB must be reinforced.

Regulating utilities in terms of a rate of return methodology may, in some instances, encourage the utilities to overstate their RAB to increase the allowed revenue collected from end users (Kirschen & Strbac, 2004). The gradual movement towards a full 'user pays' system must be encouraged to eliminate cross-subsidisation. Although cross-subsidies are important for equity reasons, they are considered highly inefficient and regressive; therefore, they should be gradually phased out to relieve the subsidising population (Chattopadhyay, 2004; Fattouh & El-Katiri, 2013; Maphosa & Mabuza, 2016). Studies show that cross-subsidisation is gradually moving industrial and commercial users towards off-grid solutions, while others have also considered downscaling or relocating their operations. In reality, the subsidising population is slowly shrinking, while the subsidised population is ever increasing.

'User Pays' and the 'Developmental State': The 'developmental state' concept is not new in the developing world. It is a concept that was developed in policy discussions regarding the three problems – unemployment, inequality and poverty (Burger, 2014). The 'developmental state' concept is therefore linked to high levels of economic growth and large infrastructure projects that grow at rapid rates, for example, Japan and China in the 1980s and Brazil in the 2000s. In South African, the National Development Plan (2012) proposed the idea of transforming South Africa into a 'developmental state' through massive capital-intensive infrastructure construction. The plan envisaged aggressive savings channelled for industrialisation to reduce inequality, unemployment and poverty in South Africa. One of the key building blocks identified in the NDP is to work with the private sector in building the required bulk infrastructure, mainly in the economic sectors. Given that South Africa lags behind in infrastructure investment, there is a serious need to induce high levels of capital spending, especially in the electricity and the energy sector.

In the absence of adequate funds for expanding and maintaining electricity infrastructure, the 'user pays' system offers a meaningful approach that can drive electricity sector growth. In other words, the 'user pays' approach offers potential benefits that can be harnessed in the electricity sector. There is an estimated gross fixed capital formation of 30% of GDP required by 2030 to realise sustained growth; however, this will not be possible through state-led funding alone. Statistics show that there is an overreliance on government to fund all required infrastructure. However, due to low economic growth over the past five years, approximately only 10% of the population contribute to government revenue through taxation (National Treasury, 2015). The introduction of the full UPP can potentially bridge the ESI funding gap and transform into a self-sustainable industry capable of transforming the economy. It could help attract the much needed private sector investment to meet the 40 000 MW additional capacity by 2030, of which approximately 20 000 MW is envisaged to come from renewable energy sources. Furthermore, this will help to address the huge maintenance backlogs, especially at the local distribution.

4. Summary of Results

Our analysis shows that, first, the 'user pays' principle is the most practical, promoting equity, efficiency and sustainability in the ESI. This is reinforced by recent seminal works of Hall et al. (2016) and Nijhuis et al. (2017). The UPP approach is successful in limiting further infrastructure-induced tariff increase since it incentives consumers to change their consumption behaviour. Second there is a strong link between cost reflectivity and UPP. Both principles are premised on end-users paying the actual costs of the strain they impose on the system (i.e. tariff paid must be equal to the long-term marginal costs). This is confirmed by Kirschen and Strbac (2004), Maphosa and Mabuza (2016) and Hobmann et al. (2016). Importantly, there is recognition in South Africa through the EPP that cost reflectivity is important for the sustainability of the ESI. There is a need to strike a balance between access and affordability in order to achieve cost-reflective tariffs. Third, we observe that both the FBE policy and IBTs are approaches based on perceived affordability (the individual's ability to pay) and only centred on the promotion of access to affordable electricity and do not address the sustainability of the ESI. The two are anchored by government funding and cross-subsidisation respectively and raise sustainability problems. This is confirmed by Willems and Ehlers (2008) and Maphosa and Mabuza (2016) in similar studies. The benefit of this is that the government can focus on other priorities areas, such as building social infrastructure related to health care, social welfare, housing, etc.

Fourth, the implementation of the UPP approach is ideal for South Africa, especially for the ESI. The UPP will help address all the inefficiencies and challenges raised above (i.e. usage, procurement and utility operation). Furthermore, the UPP will help attract the much needed private investment into the ESI. Fifth, although very effective, the implementation of UPP in a developing country suffering from the three main problems (inequality, unemployment and poverty inequality) would pose serious challenges. A rigorous public participation process would be required and political will to secure the buy-in by end users. Sixth, the role of the regulator should be reinforced in issues around procurement of utility assets, construction and utility operations. Modern regulatory instruments are required to enforce compliance. This analysis is in line with Ouyang and Sun (2015) and Nazemi and Mashayekhi (2015), who stressed that protection of end users from utilities' inefficiency was important. Finally, the UPP system is useful in attracting the much needed private investment to bridge the funding gap in the ESI to enable the government to fund social infrastructure in the country.

5. Conclusion and Recommendations

This paper analysed the 'user pays' principle within the South African developmental state concept. The objective was to ascertain whether UPP can be implemented in the electricity sector without necessarily harming the developmental state agenda, taking into account the challenges of inequality, unemployment and poverty in South Africa. We examined the interplay between UPP, free basic electricity, inclining block tariffs and cost-reflective tariffs in the ESI; the building blocks in adopting the UPP; presented the arguments for the adoption of UPP in South Africa; and the role of the regulator in the implementation and adoption of the UPP. Finally, the paper analysed the role of UPP in the developmental state concept and the challenges of implementing it. The study found that there are potential benefits of fully implementing the UPP in the

electricity supply industry to attract much-needed capital investment. We also found that the UPP can be effective in limiting wastage and inefficiencies in the ESI.

However, policies such as free basic electricity and cross-subsidised tariff structures (i.e. inclining block tariffs) are only a temporary measure which does not augur well for the sustainability of the sector and hinders the successful implementation of UPP. On the role of the regulator, we found that inefficiencies in operational and capital expenditure distorted electricity tariffs and that it was necessary to instil efficiencies through the electricity value chain. Thus, while the full implementation of the UPP will be an important addition to the electricity sector, we recommended gradual implementation to counter the potential negative effects it will have on universal access and affordability. The regulator needs to develop regulatory tools to monitor compliance with efficiency standards in order to limit tariff distortions. A countrywide public participation process is required to convince end users of the importance of moving towards the UPP system and the sustainability of the sector.

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