Power Sector Reform in Nigeria: Implications and Impacts on the Nation’s Economy

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Abstract - For more than a decade and half now a number of African countries have embarked on implementing power sector reform programme in a bid to address the deficiencies in the management and operations of their power utilities. The rationale for power sector reforms was to improve the technical, commercial and financial performance of utilities, boost sector cash flow and enhance utilities’ creditworthiness, facilitate mobilization of resources for capital investment on a commercial basis thereby releasing public funds for other investments and extend access to electricity to poor and rural communities. One of the most critical drivers for power sector reform is linked to lack of capital to expand and rehabilitate existing systems. This is probably due to pressure from the development finance institutions including the World Bank. Nigeria like most African countries have thus decided to embark on reforming their power sectors, following the announcement of the 1993 World Bank’s Electric Power Lending Policy calling developing countries to demonstrate a clear indication to implement comprehensive power sector reform programme; as a precondition of the Bank’s continued assistance in the sector.

Index Terms- Reform, Power Sector, Corporatization, Electricity, Lending Policy, Independent power producers (IPP), Independent power distributors (IPD).

1. INTRODUCTION

As a follow-up to its new electric power lending policy, the World Bank Energy Sector Management Assistance Programme (ESMAP) organized a symposium on Power Sector Reform in Efficiency Improvement in sub-Saharan Africa (McGraw Hill, 1992). This took place in Johannesburg South Africa in December 1995. This was with a view to addressing the problem of inefficiencies in operations and management of the power utilities. The purpose of the symposium was to provide an open forum in which high-level decision makers in the Ministries of Finance and Energy of sub-Saharan African countries, along with the utility managers could critically and cooperatively examine the issues and challenges firing their power sector. Senior officials were able to conduct extensive discussions on planning and implementing the best sector reforms and efficiency improvements.

In a report published by Reyes et al., in 2004, the World Bank recognizes that it underestimated the complexity of the reforms needed and the time required for those reforms to mature and achieve lasting and equitable country sector outcomes. The report also stated that the Bank mostly advocated privatization and private sector participation rather than the staged approach called for, in its 1993 Electric Power Lending Policy. It was also recognized that much work remained to be done to integrate poverty reduction and environmental mainstreaming into the design of power sector reform and PSDE strategies, which to date have focused mostly on sector efficiency and macro fiscal objectives.

It is therefore not surprising that a number of recent global studies, which also considered the socio-economic impacts of power sector reforms in some sub-Saharan African countries. In the case of Nigeria, study (IMF) revealed that, few of these reform initiatives have not resulted in significant improvement in the provision of electricity services to the poor, especially with regard to rural electrification. In addition, some analysts contend that, although power sector reforms have produced positive outcomes in a few sub-Saharan African countries, there is some evidence that in many countries far from reducing energy poverty, market oriented reforms in particular may have increased energy poverty.

Yet some proponents of the market-oriented power sector reforms have argued that by making utilities technically and financially efficient power utilities would then be able to afford provision of electricity
to the poor. However, when one compares the current pace of electrification with population growth rates in sub-Saharan Africa, it appears that the region will be the only region in the world whose population without electricity will increase by 2030. (Markus E.N 1991).

It is against this background that Economic Commission for Africa (ECA), decided in partnership with the United Nations Environment Programme (UNEP) to carry out within UN Energy/Africa framework the study on “Making African’s Power Sector Sustainable”. While there is a growing number of studies of power sector reforms in Africa, most publications focus on the economic impacts of reforms, few assess the social impacts, and almost none analyzes in a comprehensive manner the full impact of reforms on the sustainable development objectives of African countries. Therefore, the study referred to in this paper, assesses the socio-economic and environmental impacts of power sector reforms especially on the poor in fourteen selected countries and uses the results of the assessment to analyze the extent to which reforms have contributed the sustainability of the reforming power sectors in Africa.

2. OVERVIEW OF THE AFRICAN POWER SECTOR

The African power sector is characterized by small systems with over three quarters of the continent's installed capacity coming from South Africa and North Africa. The installed capacity of most sub-Saharan African countries ranges from some 10MW to 2,000 MWT with the exception of South Africa with more than 40,000MW; Nigeria with more than 5,000 MW as can be seen in Table 1 and DR Congo and Mozambique with more than 2,000 MW (T.W Berrie 1992). In addition, only 14 out of the 53 African countries (the five North African countries and eight sub-Saharan African countries) have an installed capacity of 1000 MW and above. These include the five North African countries of Algeria, Egypt, Libya, Morocco and Tunisia, and nine sub-Saharan African countries (Cote d’ivoire, DR Congo, Chain Kenya Mozambique Nigeria, South Africa Zambia and Zimbabwe). This means that over 80 per cent of sub-Saharan African countries have small systems with less than 1000 MW of installed capacity. It should be mentioned that, in all countries the effective power capacity are only fraction of the installed values due to diverse causes, including mostly maintenance, faulty design factors, and poor operation conditions.

The African power sector is also overwhelmingly dominated by conventional thermal power generation due to large coal-fired power plants. In Southern Africa and large oil and gas fired power plants in North Africa and Nigeria Thermal power generation accounted for 80.4 per cent of Africa’s total electricity production in 2004 while hydropower generation contributed 16.5 per cent nuclear power 2.5 per cent and renewable energy sources 0.6 per cent (IEA 2006). Total Africa’s electricity consumption was also overwhelmingly dominated by South Africa and the five North African countries which accounted for 80 percent of the 477 TWh of Africa’s total electricity consumption in 2004 Nigeria accounted for 3 percent of this total. This means that the 46 sub-Saharan Africa (excluding South Africa and Nigeria) accounted for only 17 percent of the total (IEA 2006).

Table 1: Power generation stations in Nigeria

<table>
<thead>
<tr>
<th>S/N</th>
<th>Generating Station</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Egbin Thermal Station</td>
<td>1,320 MW</td>
</tr>
<tr>
<td>2</td>
<td>Kanji Thermal Station</td>
<td>760 MW</td>
</tr>
<tr>
<td>3</td>
<td>Jebba</td>
<td>580 MW</td>
</tr>
<tr>
<td>4</td>
<td>Shiroro</td>
<td>600 MW</td>
</tr>
<tr>
<td>5</td>
<td>Sapele Coal Station</td>
<td>1,200 MW</td>
</tr>
<tr>
<td>6</td>
<td>Geregu Station</td>
<td>414 MW</td>
</tr>
<tr>
<td>7</td>
<td>Omotoso</td>
<td>335 MW</td>
</tr>
<tr>
<td>8</td>
<td>Papalanto</td>
<td>335 MW</td>
</tr>
<tr>
<td>9</td>
<td>Ughelli</td>
<td>920 MW</td>
</tr>
</tbody>
</table>

2.1 Barriers to the Performance of the Power Sector in Nigeria

The performance of any power sector can be broadly categorized into (i) technical performance and (ii) financial performance.

2.1.1 Technical Performance

Electrification access levels

National electrification access levels in many sub-Saharan African countries are very low and are estimated at less than 30 per cent. Rural electrification access levels are even much lower with the majority of the countries recording levels of less than 10 per cent in the rural areas. In some least developed

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countries rural electrification access levels can be as low as 1 per cent or less.

**Electricity consumption**
The average electricity consumption per capita in sub-Saharan Africa (excluding South Africa) is estimated to be about 135 kWh. This level is well below the figure of 4976 kWh per capita for South Africa or even 1058 kWh per capita on average for North African countries. Compared to northern African countries and South Africa, Many sub-Saharan African countries register electricity consumption levels well below 100 kWh per capita, particularly in West Africa and the Great Lakes regions. In some countries it is reported that the per capita consumption of electricity has been declining since population growth rates have been higher than electricity production increase rates (TAP, 2006).

**System losses**
Partly due to poor maintenance on the transmission and distribution system, many countries in sub-Saharan Africa are characterized by high system losses that can be as high as 41 percent when compared with the international target of about 10 per cent to 12 percent. High levels of system losses not only further constrain the amount of electricity delivered but also affect the financial performance of the power utilities (Gupta, 2010).

### 2.1.2 Financial Performance
One of the major drivers for power sector reforms in almost all reforming countries in sub-Saharan Africa has been the poor financial performance of their power utilities. Prior to reforming their respective power sectors a sizeable number of utilities recorded a string of loss making experience. By reducing the high system losses and improving electrification access levels, as well as applying higher tariff levels, electricity utilities should be able to realize higher revenue levels. ‘Tariff reform will particularly continue to play a significant role in the profitability of electricity utilities in sub-Saharan Africa.

### 2.2 Status of Reforms in Africa’s Region
#### 2.2.1 Reform options
The major reforms that have been taking place in Africa have involved structural changes and ownership/management changes, including privatization. Structural changes refer to the process of unpackaging vertically integrated utilities into separate generation transmission and distribution entities (vertical unbundling) and conversely unpackaging national utilities into smaller utilities (horizontal unbundling). On the other hand, management/ownership changes involve the following options:

1. Commercialization/corporatization of the power utility while leaving its ownership in the public sector and its management with managers under performance contracts;
2. Giving responsibility to the private sector to run the public utility tender management contracts, including operations and maintenance expenditure;
3. Allowing the private sector to own and operate specific new generation facilities using independent power producers (IPPs) under long-term concessions; and
4. Allowing the private sector to take full responsibility for operation of existing assets and for investment, whether through a long term concession or through full change in ownership.

In terms of structural changes, some countries such as Kenya have opted to only unbundle the generation segment while others such as Uganda and Zimbabwe have taken the extreme option of completely unbundling the entire formerly integrated utility into generation transmission and distribution. However, horizontal unbundling has been effective in the distribution segment of the electricity supply industry of South Africa and Namibia with the creation of regional electricity distributors (RECs) (McGraw Hill Book 1990).

The most common privatization path undertaken by most African countries in power sector reforms has been the commercialization/corporatization management contract and stop at allowing the entry of independent power producers (IPPs). However with the private sector participation in the electricity supply industry, there has been need to establish a legal and regulatory framework to safeguard the interests of all stakeholders, that is, the government, the private investors, the power utility and the consumers by enacting new electricity acts/laws and establishing independent electricity distributors (RECs) (McGraw Hill Book 1990).

#### 2.2.2 Status of Reform Implementation
(i) Commercialization/corporatization
Commercialization and corporatization of power utilities in many African countries have often involved awarding management contracts to private managers as a means to improve efficiency and profitability of the utilities. The foreign firms involved in management contract in Africa have mainly been dominated by French entities. However South African firms (Net Group Solutions and Eskom Enterprises - a sub-subsidiary of the South African utility, Eskom) have recently begun showing interest...
in the African power utility management contract market. South African-led management contract initiatives are now underway in Malawi, Uganda and Tanzania.

Commercialization/corporatization has also involved reforms in the tariff setting process. The resulting increase in tariff levels was expected to help achieve the following objectives: (i) to recover the cost of electricity generation, transmission and distribution, (ii) to fairly and equitably spread the above costs to consumers based on the true cost service delivery consumption levels & patterns and affordability to pay, and (iii) to promote the efficient use of electricity. To mitigate the negative impact of tariff increase on the poor, some countries have adopted a tariff structure that provides for a lifeline tariff, for the first 50 kWh aimed at the poor. South Africa has made a step further by introducing a new tariff structure that provides for basic free electricity services amounting to 50 kWh of electricity per household per month (Sharma, 2006).

(ii) New/Amended electricity act/law
In the countries covered in the ECA/UNEP study the Electricity Act often provides the legal and regulatory framework. In these countries the legal and regulatory framework was originally designed for state owned power utilities, with little or no provision for private sector participation. Recently with the exception of Tanzania, all other countries have amended their Electricity Acts leading to a number of important regulatory changes.

The key changes that have taken place include:
(a) Redefinition of the state owned power utility from a welfare-driven government agency to a limited liability commercial entity and providing for it unbundling and privatization;
(b) Dismantling the monopoly of the state owned power utility to encourage private participation specifically in electricity generation and distribution; and
(c) Minimizing direct intervention of the Government by shifting its role of policing the electricity sector from the Ministry to an independent Electricity Regulatory Body/Agency.

(iii) Establishment of electricity regulatory agencies
The establishment of independent regulatory bodies for the power sector alongside the amendment/enactment of new Electricity Acts is the second most desirable reform options implemented in most countries. However although the regulatory bodies are expected to be independent, past developments in some countries cast doubt over the autonomy of these bodies, notably in Kenya, Malawi and Uganda. BUT it is to be noted that delays in putting in place electricity regulatory agencies may result in preventing the governments to be provided with advice needed in taking informed decisions in such matters as awarding concessions/licenses for private participation into the development, management and operation of the power sector (Fernando et al., 2004).

(iv) Independent Power Producers (IPPs)
Independent Power Producers (IPPs) constitute an important form of private sector participation in Africa’s power sector. With demand outstripping supply in many African countries independent power projects are expected to become a major source of new power generation capacity in these countries. In this regard it can be noted that less than half of the counties covered in the study succeeded to attract private investors in the development of IPPs. Côte d’Ivoire succeeded to attract IPPs totaling more than 500 MW. Other countries that succeeded to attract IPPs include Ghana, Kenya, Senegal and Tanzania. However, it is worth noting that some countries have been facing problem with regard to win-win power purchase agreements (PPA) and to easily comply with the fuel supply agreements for fossil fuel based power plants. Inefficient or inexistent electricity regulatory authorities may result in mixed results of IPPs’ experience in these countries (Charles R Mischke, 2004).

(v) Independent Power distributors (IPD)
In the countries covered in the study and indeed in the sub-Saharan African region, very few independent power distributors (IPDs) have been established. The only countries where IPDs have been established are Namibia, South Africa, Zimbabwe, Uganda and Ghana. In other countries, privatization of power utilities through long-term concessions for the operation and management of power system assets and for the supply of electricity is facing the risk of being renegotiated or terminated, as this has been the case in Senegal and Mali in 2000 and 2005 respectively. It is expected that the developments in Senegal and Mali might deter other countries in the region from privatizing their utilities. On the positive side, Côte d’Ivoire appears to be a success story of power sector reform in Africa since it was able to attract IPPs for 510 MW and to renew the concession awarded to the Compagnie Ivoirienne d’Electricité (CIE) for another 15 year term.
3. KEY FINDINGS AND LESSONS LEARNT

Power Sector Reforms in Africa are at various stages in different countries and drawing general conclusions is not an easy task. However, the findings of this study converge with other previous works on some key findings and lessons that constitutes overall trends of the various country experiences.

3.1 Key findings

The first key finding is that power sector reforms were not explicitly designed to ensure socio-economic and environmental sustainability of the power sector. They were primarily designed to bridge short term generation shortfalls and enhance the financial health state-owned power utilities. It is, therefore, not surprising that they have marginally contributed to socio economic and environment improvements in the power sector.

This paper regarded socio-economic impacts of reforms, especially electrification of the poor, as an important indicator of the power sector’s sustainability. In overall terms, socio-economic impacts of reforms on the poor appear to be negative or neutral. This is because first and foremost electrification of the poor was not significantly addressed in the reform process and in several cases, almost an afterthought with the exception of Cote d’Ivoire, Cameroon, Malawi Burkina Faso, Senegal Zimbabwe South Africa and Mauritius. As a result electrification access or levels of the poor (especially in rural areas) in many reforming sub-Saharan countries except in the aforementioned countries have either stagnated or declined altogether.

While increased access to electricity especially in rural areas is important, its affordability is widely recognized as a vital impetus to economic development. A key finding with regard to the impact of reforms on the poor is the increase in the cost of electricity and the associated reduction or removal of subsidies for the poor. Tariff increases were motivated by the desire to improve the financial health of the state-owned utilities as well as to attract private investors. These are desirable attributes as far as the sustainability of the power sector is concerned. Placing a heavy financial burden on the poor to the extent of leading to disconnections (e.g. in Ghana) is neither desirable nor does it contribute to a sustainable power sector. It is for this reason that the World Bank has in its recent study on subsidies for the poor advocated for continued subsidization of the poor however more-targeted (Komives et al., 2005).

However, an important positive outcome of power sector reforms is the establishment, in many countries, of Rural Electrification Agencies and associated Rural Electrification Funds. These have begun delivering benefits to the rural areas in some countries where adequate means were bestowed to the Agency. For example, in Zimbabwe, the Rural Electrification Agency (REA) established in 2002 has designed a programme to expand rural electrification dubbed the Accelerated Rural Electrification Programme with End Use Infrastructure Development. The Zimbabwe programme covers the eight regions in Zimbabwe, and in only 3 years, rural electrification levels rose from 20 per cent to 25 per cent (Kayo, 2001), while in Uganda no significant progress in terms of electrification of the poor has been reported 6 years after the advent of the Rural Electrification Authority. The limited or no results obtained by REA are in part, due to the fact that the rural electrification funds and boards have not provided effective and innovative mechanisms that would ensure they achieve their objectives. Their design appears to have largely replicated that of past (and failed) mechanisms.

Another key finding is that overall, reforms have failed to boost investments in the sector and attract the private sector as initially expected. In countries such as Malawi and Cameroon, in spite of reforms, not a single Independent Power Producer (IPP) has invested in the country. In other countries despite the presence of some IPPs, investments in new generation capacity were insufficient to meet demand, and load shedding has ensued (e.g Tanzania and Uganda).

It is also important to note that, in part the involvement of IPPs has led to aforementioned increase in tariffs. Based on the experiences of Kenya and Ghana, this is mainly due to three key reasons: Firstly, most of the IPPs use fossil fuel based electricity generation plants. Therefore the high and rising cost of fuel has been transferred to the consumers. Secondly, a significant number of IPPs have been invited in on an emergency basis thereby escalating the cost. Thirdly the licenses and Power Purchase Agreements (PPAs) issued to the IPPs appear to have a short time span leaving IPP’s with no choice but to ensure that they recover their investment costs and make attractive returns within the limited time. In Kenya, for instance the selling price of electricity front one IPP fell by about a half when the license and PPA was renewed but for a much longer period.
Another key finding is that, in many countries in the region power sector reforms appear to have marginalized local private investment in the power sector. Current trends seem to indicate that in the medium term the state will be effectively handing over a significant share of electricity industry to non-national operators. In the long term this may be an unsustainable arrangement. In part local private participation, especially in IPPs has mainly been hampered by the emphasis on large-scale investment. However, there are examples in Zimbabwe and Mauritius that indicate that potential exists for local private investment in the power sector especially using decentralized energy systems based on small hydro, wind, solar, and bagasse-based cogeneration and as long as the entry requirements are designed to accommodate local investors (Ahmed Ashfaq, 1999).

With regard to the financial sustainability of the electricity utilities reforms appear to have largely met the objective of turning electricity utilities into profitable entities. Good examples include Ghana, Zimbabwe, Kenya and Uganda. This is important as it ensures that the resources that previously went into salvaging the utilities are utilized to meet other social and economic needs such as health, education and infrastructure. Furthermore, reforms also provided more sustainable financing mechanism for rural electrification through the introduction of a levy mainly imposed on urban electricity consumers.

On the environmental impacts of power sector reforms, one of the key findings is that, the amendments of the Electricity Acts have partially contributed to the sustainable of the power sector by ensuring that Environmental Impact Assessments are carried out prior to major electricity generation transmission and distribution installations. However, the amended Acts are silent on environmentally unfriendly installations that were established prior to the new Electricity Acts.

One should note that major concern has been raised over the development of large scale hydropower plants, especially the proposed Bujagali Dam in Uganda. Environmental lobby groups in the region have put up a substantial amount of resistance citing potential environmental destruction associated with the proposed dams. However, although environmental lobby groups appear to gradually accept well-designed hydropower dams, continued resistance and stringent disbursement conditionality might affect the development of hydropower.

Analysis of the performance of Electricity Regulatory Agencies indicates that they have done little to ensure the sector’s sustainability. In part this is attributed to the weakness of the regulatory agencies to enforce the Electricity Act as a result of two key factors: Firstly the electricity regulatory agencies are relatively new entities and have, therefore not built significant capacity. Secondly, in some instances, even where capacity exists the ability of the regulatory agency to perform its duties has been compromised by its lack of the requisite independence as a result of politically motivated appointments of the members of the respective agencies’ boards. The fact that limited intervention has been made by the regulatory agencies to protect the poor from negative impacts of the high cost of electricity and ensuring their electrification is a clear indication of the regulatory agencies disinterest among the poor.

Furthermore, the regulatory agencies have done little to promote an environmentally sustainable power sector by reviewing electricity generation options. For example, there is no indication of regulatory agencies setting specific targets for the share of electricity generated from renewable energy technologies. In addition, with the exception of Mauritius, the regulatory framework in most of sub-Saharan African countries does not provide for attractive tariffs to sustainable energy generation options such as small hydro, wind, bagasse-based cogeneration and geothermal.

3.2 Lessons learnt

Perhaps the most important lesson learnt is that reforms do not appear to have solved the power sectors problems. With the exception of increased profitability of the utilities key issues that provided the impetus for reforms continue to prevail long after reform have been implemented. For example, generation capacity shortfalls still persist in most sub-Saharan African countries. Furthermore, several countries have put in place the requisite reform measures but that has not guaranteed the desired results.

Another important lesson learnt is that private sector involvement in the power sector is not the ultimate solution. Developments in the management contracts in Mali, Senegal Cameroon and to a lesser extent Cote d’Ivoire indicate a significant degree of dissatisfaction in the private sector involvement. In Mali and Senegal, for example the involvement of the private sector in the power sector has been reversed.
4. POLICY GUIDELINES FOR SUSTAINABILITY OF THE POWER SECTOR

The possible policy strategies proposed by this study were drawn from highlighting opportunities and options for making the power sector sustainable by focusing on four key issues (i) Enhancing access to electricity among the poor (ii) Technical Options for Improving Access to the Poor, (iii) Ensuring the use of environmentally sound electricity generation options and (iv) Addressing gaps and barriers in the legal and regulatory framework.

The need for enhancing access to electricity among the poor cannot be overemphasized. In sub-Saharan Africa, the poor - especially in rural areas form the majority of the population therefore access to electricity is likely to widen their scope of income generating opportunities. There are several options for enhancing the poor’s access to electricity.

Sequencing reforms sub-Saharan African countries whose reforms are not at advanced stages should ensure that they establish structures and mechanisms for increased rural electrification before embarking on large scale privatization reforms Evidence from Ghana, Zimbabwe, South Africa Mauritius and other developing countries indicates that higher levels of access to electricity among the poor, especially in rural areas have been achieved when rural electrification initiatives precede major market oriented reforms such as privatization.

Linking electrification targets to contract renewals REM Boards Members: The newly formed rural electrification agencies should have specific targets for electrifying the poor. This should be enforced through making the targets as part of the agencies’ annual reporting as well as renewal of the contracts of the board members as well as the executive employees of the agencies. A similar system is already in place in Kenya.

5. CONCLUSION

Based on the assessments of the socio-economic and environmental impacts of power sector reforms done by this study, it was concluded that recent reforms have not done enough to ensure the sustainable of power sector in Nigeria. To ensure the sectors sustainability, reforms have to be redesigned to ensure that access to the majority of the population (the poor) is enhanced. In addition, the sustainability of the power sector can also be enhanced by ensuring a favourable share of renewables in electricity generation mix. Above all, the electricity regulatory agencies must carry out their mandate of protecting the poor by ensuring increased access to electricity and provision of subsidies as well as promoting proven renewable energy options lot electricity generation. There is also need to address the identified gaps and barriers in the legal and regulatory framework as proposed in this papers to ensure that the power sector is sustainable.

REFERENCES