Understanding Structural, Governance and Regulatory Incentives for Improved Utility Performance: A Comparative Analysis of Electricity Utilities in Tanzania, Kenya and Uganda

By Peter Rwakifaari Twesigye

Thesis Presented for the Degree of

Doctor of Philosophy

Commerce Faculty

Graduate School of Business

University of Cape Town

Supervisor: Prof. Anton Eberhard

March 2021

Declaration

I, Peter Rwakifaari Twesigye, hereby declare that this thesis is my own unaided work, both in concept and execution, and that apart from the normal guidance from my supervisor, I have received no assistance. Neither the substance nor any part of this thesis has been submitted in the past, or is being, or is to be submitted for a degree at this University or at any other university, except as stated below.

Abstract

Electricity utilities in most African countries have failed to deliver adequate, reliable and competitively priced electricity to support economic growth and improve the welfare of their populations. Despite more than two decades of power sector reforms, outcomes have been varied and often disappointing with many utilities still experiencing challenges in service delivery, operational efficiency and financial sustainability. Power sector and regulatory reforms involve changes to structural, regulatory and governance frameworks and incentives that potentially impact utility performance in Africa. This thesis draws on the literature of power sector reforms and applies a Principal–Agent theory lens to obtain a deeper understanding of the dynamics between principals (government/regulators/capital providers) and agents (utility managers) and how these impact on performance. A comparative case study analysis was undertaken of power utilities in three East Africa countries that have experienced different levels of reform: TANESCO in Tanzania, KPLC in Kenya and Umeme in Uganda. TANESCO remains a vertically integrated, state-owned utility and has performed the worst. KPLC is an unbundled, mixed capital utility, with a partial listing on the Nairobi Stock Exchange, but still majority government owned, and has performed better. Umeme is fully unbundled, operates as a private concession, is also listed on the stock exchange, and is the most financially sustainable of the three utilities. However, this ranking between the three utilities is not consistent across all performance measures, and an analysis of structural, governance and regulatory incentives, principal–agent dynamics – examining issues such as information asymmetry, moral hazard, adverse selection, amongst others – provides deeper insights into how reforms have impacted technical and economic performance. Findings also show that: (i) the deeper and more extensive the power sector reforms, the more incentives there are for improved performance; (ii) while the existence of an independent regulator is important, capability issues are also critical; (iii) private concessions provide deeper incentives for improved performance; (iv) strong management incentives are critical for the success of any utility; and (v) private capital, either through equity or debt financing, imposes additional compliance obligations and incentives for improved utility performance.

Acknowledgements

This doctoral thesis would not have come to fruition if it were not for the tremendous support and tireless effort of my supervisor Prof. Anton Eberhard. It is his vision, mentorship, unfailing gentle encouragement, kindness, dedication, enthusiasm and friendship that profoundly enabled the author to navigate the doctoral journey to the end despite the COVID 19 lockdowns. Special thanks go to the Power Futures Lab/ MIRA at the Graduate School of Business of the University of Cape Town for the financial support largely for the entire course duration. At the risk of leaving out some, I would like to thank the following:

Wikus Kruger, for the many intellectual discussions, offering useful suggestions, encouragement, guidance and hospitality

My parents Mr. Peter Kibondo Rwakifaari and Mrs. Evah Komujoogo Rwakifaari, for their unconditional love, encouragement and support through the academic journey.

My family and siblings Annet, Addy, Lilian, Maurice and cousin Rose for the continuous support and joint struggle

Gamieda Gierdien, Fazlin Harribi, Rhiyana Bassier for the encouragement, friendship and support in navigating administrative processes

Anja Casper Barretta of the Konrad-Andenauer-Stiftung for the financial support

Dr William Muhairwe, for the professional encouragement and financial support

The interviewees in Tanzania, Kenya and Uganda for their time, and timely answers to a series of questions and clarifications

Mary Lister, for your time and formats of my Literature review references

Dr Christina Swat-Opperman, for discussions and useful suggestions on the methodology chapter

Table of Contents

List of Figures

List of Tables

CHAPTER 1

INTRODUCTION

1.1 Background

The power sectors in most African countries face an enduring problem of poor utility performance – electricity utilities have failed to deliver adequate, reliable and competitively priced electricity to consumers. They have also failed to achieve financial viability to become creditworthy purchasers of power from Independent Power Producers (IPPs), let alone increase access to the large and unserved population (Eberhard & Dyson, 2019; Eberhard, Gratwick, Morella, & Antmann, 2016). This enduring problem constrains economic and social development of countries (International Energy Agency, 2019b). Power sector reforms – encompassing corporatization; establishment of an independent regulator; unbundling generation from transmission and distribution; private sector participation and introducing competition – were adopted to tackle these performance challenges (Bacon, 1995b; World Bank, 1993). However, extant literature shows that outcomes have been mixed and often disappointing, largely resulting in hybrid markets (Gratwick & Eberhard, 2008b) that do not specifically address these failures. In addition, the degree to which power sector reforms were implemented has also varied, with some countries extensively adopting most of the reform steps in "full extent[1]" across all dimensions, while others have exhibited ambivalence towards the process with reforms having stagnated midway (Eberhard et al., 2016) or are being implemented albeit selectively according to ease of implementation, and others having halted the reform process (Foster, Witte, Banerjee, & Moreno, 2017).

This thesis explores the experience of power sector reforms and utility performance in three neighbouring countries in East Africa: Tanzania, which has seen very few reforms; Kenya which has experienced partial unbundling and private sector participation, and Uganda, where the reforms have progressed the furthest, with full unbundling and extensive privatization. Exploration will be done with reference to three case studies of electricity utilities: Tanzania Electric Supply Company Ltd (TANESCO) in Tanzania, Kenya Power and Lighting Company (KPLC[2]) in Kenya and Umeme Ltd in Uganda. These three utilities represent a useful cross-section of power sector and utility reform models, with different governance and regulatory

[1] Foster et al.,(2017) defined the term "full extent" of reforms as establishment of a regulator, full vertical and horizontal unbundling, creation of a power market and some degree of private sector participation for both generation and distribution.

[2] KPLC was rebranded as Kenya Power in 2011. For this thesis we shall maintain the name of KPLC for ease of understanding and harmonization.

incentives for performance. TANESCO is a traditional vertically integrated state-owned utility; KPLC is an integrated transmission and distribution utility that has been unbundled from generation and has been partly listed on the Nairobi stock exchange, and Umeme, which has been unbundled from both power generation and transmission and was concessioned to a private investor and operator. It is currently listed on the Uganda and Nairobi stock exchanges. Both TANESCO and KPLC had private management contracts for limited periods.

Power sector reform theory is partly helpful in explaining the differences in utility performance, but this thesis goes further in seeking to understand the way these reforms alter governance and regulatory incentives for improved performance. It also draws on additional bodies of theory, namely principal agent theory, in order to achieve a deeper understanding of the performance phenomena. These two bodies of literature and theory, combined with a multi-case study approach, provide rich insights, not only as to why utility performance has differed in these three East African countries, but also, more generally, around the linkages between power sector reforms and utility performance. The thesis proposes a new analytical framework which will contribute to new knowledge in this field.

1.2 Problem Statement and Rationale

The state of sub-Saharan Africa's power sector peculiarities has been documented in various sources including Eberhard et al.(2016), Kapika & Eberhard (2013), Eberhard, Rosnes et al. (2011), Dyson & Eberhard (2019), Jamasb & Llorca (2018), Vagliasindi & Besant-Jones (2013) among others. The region is faced with five enduring key power challenges: inadequate generation capacity; low access to electricity; unreliable supply; high cost of power, and poor performance of utilities, all of which have, in combination, constrained delivery of electricity services on a sustainable basis. The sections below give a brief description of each of these challenges.

1.2.1 Inadequate Generation Capacity

Sub-Saharan Africa's power infrastructure is greatly underdeveloped to match the electricity needs of its more than 1.2 billion people. Incidentally, the lack of electricity coincides with high levels of poverty and high population growth. With only about 120 gigawatts (GW) of installed generation capacity for the 48 countries, the region compares much less to a single European country such as-Italy, with installed generation capacity of 130 gigawatts and a much smaller population of 60 million, or compares less to the level of capacity that China installs every one or two years (IRENA, 2012; Power Futures Lab Database, 2020). The inadequacy of generation capacity is reflected in the uneven spread and concentration of

generation capacity in a few countries. For example, South Africa accounts for the largest share by a single country with installed capacity of 50 gigawatts (Eberhard, 2020) and the remainder (70 gigawatts) is spread amongst the other 47 countries. In 2017, 25 countries in the region had power systems smaller than 500 megawatts and 11 countries had power systems smaller than 100 megawatts (International Energy Agency, 2019a).

The inadequate electricity generation capacity constrains economic activity and human quality of life in the region, with multiplier negative effects (International Energy Agency, 2019b). While, in recent years, there have been some improvements and additions in the regions' installed generation capacity catalyzed by IPPs (Power Futures Lab Database, 2020), most countries are still short of power. To meet demand across the continent, power generation capacity will need to double by 2030 (from 2015) and triple by 2040. Annual required capacity additions are of the magnitude 6 to 7 gigawatts per annum (International Energy Agency, 2019a; World Bank & AFD, 2019). Meeting this demand will require investment of about US$835 billion by 2040, of which US$490 billion is for generation, US$80 billion for Transmission and US$ 265 billion for Distribution (Castellano, Kendall, Nikomarov, & Swemmer, 2015; Streatfeild, 2018). The World Bank estimates that sub-Saharan Africa (SSA) requires investments of US$33.4 billion to US$ 63 billion per annum between 2015 and 2040 to meet rising needs. The IEA (2019a) estimates the infrastructure funding requirement at US$1.5 trillion by 2050.

1.2.2 Low Electricity Access

More than 600 million people in the sub-Saharan region do not have access to electricity - more than half of the world total of 840 million without electricity (International Energy Agency, 2019b; World Bank & AFD, 2019). On average, only 45% of the population in SSA had access to electricity in 2018, which is far less than any other developing region (International Energy Agency, 2019a). Only two countries in the region, Mauritius and Seychelles, have near universal electricity coverage. Six countries had access equal to or higher than 75%. The majority of countries in the region (two-thirds) have a household electricity access rate that is less than half their population (Eberhard, 2020; World Bank & AFD, 2019). Average access levels in rural areas are even lower at 35% (World Bank & AFD, 2019). These areas are sparsely populated and far from the grid, which increases the cost of supplying electricity. Annual per capita electricity consumption averages only 375kWh and falls to 153kWh if South Africa is excluded, compared to a global average of 3,127 kWh (Trimble, Kojima, Perez-Arroyo, & Mohammadzadeh, 2016; World Bank & AFD, 2019) or Latin America at 1,981 kWh. SSA is therefore unlikely to realize the United Nations

Sustainable Development Goal (SDG 7) – that is, to ensure access to affordable, reliable, sustainable and modern energy for all by 2030 (International Energy Agency, 2019c, 2019b), because the number of people without access has risen in recent years (with population growth outstripping new electricity connections). The population without access to electricity is expected to rise to over 670 million by 2030 (International Energy Agency, 2019a).

There have been recent improvements in levels of access in some countries, especially Kenya (International Energy Agency, 2019b; World Bank & AFD, 2019). However, many households living near or under the grid remain unconnected (K. Lee et al., 2016; Taneja, 2019). This lack of access imposes significant constraints on modern economic activities, provision of public services and quality of life, as well as the adoption of new technologies in sectors like education, health, agriculture, industry and finance (Blimpo & Postepska, 2017).

1.2.3 Unreliable Supply

For many of those with a connection, electricity supply remains unreliable and of poor quality. Power cuts and load-shedding is a frequent occurrence in many countries due, in part, to inadequate generation capacity but also to inadequate investments and maintenance in the network (Eberhard et al., 2016; Kojima et al., 2016). Recent data on Ease of Doing Business shows that fewer than one-third of firms sampled in 25 countries out of 29 have reliable supply. More than two-thirds of firms experience electricity outages (World Bank, 2018; World Bank, 2020a).

1.2.4 Power Is Costly

Faced with this situation, people and enterprises often have to rely on expensive diesel back-up power generation to meet their electricity needs, costing some economies between 1%–5% of annual GDP (Andersen & Dalgaard, 2013; Eberhard et al., 2016; Kojima et al., 2016). In times of crisis such as drought, governments and utilities are compelled to contract expensive emergency short-term-lease power producers (EPPs) to bridge the supply-demand gap, with tariffs higher than US$0.25per kilowatt hour (Eberhard et al., 2016). The median cost of service in SSA without emergency short-term power is US$0.21 per kilowatt hour which is also high compared to Latin America. Some countries do not have competitive and transparent procurement processes and their poor investment climate, coupled with governance failures, has resulted in expensive generation plants (Eberhard & Dyson, 2019; Eberhard et al., 2016; Kruger, Eberhard, & Swartz, 2018), translating into high tariffs and cost of service. The cost of electricity (median tariff is US$0.15 per kilowatt hour) in Africa is among the highest in the world

(Huenteler, Dobozi, Balabanyan, & Sudeshna, 2017; Trimble et al., 2016), yet poverty levels are also highest in the region. This means that the majority of people in SSA with an income share of the bottom 40 percent of Gross National Income (GNI) cannot afford 30kWh per month per household, as determined in the global criteria of Regulatory Indicators for Sustainable Energy (ESMAP, 2018, p. 51). A consequence is low willingness to pay and pervasive power thefts (Trimble & Kojima, 2016; Trimble et al., 2016).

These four challenges of inadequate generation capacity, low access levels, unreliable power supply and costly power have serious consequences for economic development and human welfare.

1.2.5 Poor Utility Performance

The above problems arise because of the poor performance of utilities which have been technically and commercially inefficient over the years and continue to lumber on. Technical inefficiencies are reflected in high losses implying that a significant proportion of the electricity that SSA utilities distribute is lost and cannot be monetized. The weighted average losses in SSA were 15% and rises to 23% if South Africa is excluded (Foster & Anshul, 2019; Trimble et al., 2016). This is still a very high number by developing region standards – that is, compared to Latin America's average losses of 15% or the QFD international reference value of a well-performing power system for technical losses of 10% and non-technical losses close to zero. In SSA only four countries – Botswana, Lesotho, Mauritius and South Africa – have T&D losses of 10% or smaller (Trimble & Kojima, 2016). In addition, utilities are plagued by inefficiencies in CapEx execution – projects experience huge cost overruns as a result of poor planning, and sometimes corruption (Eberhard, 2020) which results in the high cost of service. The situation is further aggravated by the poor quality of service with a high frequency (SAIFI) and duration (SAIDI) of power interruptions. The median reported System Average Interruption Frequency (SAIFI) indices across SSA utilities reflect 6.3 outages per month (equivalent to 76 outages per year) and a duration of 5.5 hours per outage (Kojima et al., 2016; Trimble et al., 2016). Poor reliability further leads to lower per capita consumption and lower revenues for the utility.

Commercial inefficiencies, on the other hand, are reflected in poor billing and collections. The low billing and revenue collections result in a loss of revenue, as a significant proportion of electricity is used and billed to consumers but not paid for. Against a benchmark of 100% collection efficiency, a total loss of revenue to utilities in SSA amounts to about US$11 billion or 0.2% of current GDP (Trimble et al., 2016). This cumulates into large debts and payment arrears, leading to chronic indebtedness, which further makes utilities financially unsustainable (Eberhard & Dyson, 2019). In addition, many utilities appear to be over-staffed (Trimble et al., 2016) with high staff costs on the payroll. Furthermore, inadequate staff

productivity increases overheads. Staff cost represents a median of 14 percent of operating costs, while in some countries it is as high as 37%. Average staff cost per employee per year is US$ 27,000 in constant 2014 US dollars, although this average is heavily skewed by the example of South Africa where staff costs average US$61,000 per employee. On the other hand, the median overstaffing across utilities in SSA is 41% with most utilities in the range of 25–65%(Trimble et al., 2016).

Other commercial inefficiencies are reflected in underpricing or below-cost tariffs – tariffs are not cost-reflective. Most utilities do not recover their operating and CapEx costs and require significant tariff increases if existing cost structures are maintained to achieve viability. The median level of underpricing at benchmark performance in SSA is US$0.04 per kWh sold which compares to the median tariff of US$ 0.15 per kWh sold. Only 3 countries are at or above cost recovery revels (Trimble et al., 2016). Finally, utilities are beset by poor customer service – revealed in disconnections, erroneous and delayed bills, slow complaints resolution rates, poor staff attitude, inefficient technology interface platforms for bill payments and so on, leading to low customer satisfaction and low willingness to pay.

As a consequence, most incumbent electricity distribution companies (DisCos) are financially distressed and dysfunctional – utilities struggle to gain customer and investor confidence to attract equity and private capital. Because utilities do not cover their cost of service, including operational and CapEx costs, makes it difficult for them to achieve creditworthy balance sheets. For example, only three countries in sub-Saharan Africa: Uganda, Namibia and Seychelles cover their total current cost of service and are financially viable (Trimble et al., 2016). The other remaining utilities experience financial uncertainty that further limits the scope of their operations. The resultant revenue gap imposes an additional burden of subsidies on already strained government fisci – a trend that has persisted in most SSA countries.

Financially distressed utilities are unable to adequately invest either in maintenance or in expansion of assets (generation, networks) because they do not earn an adequate return on their assets and hence have insufficient funds. As a result, infrastructure continues to be underdeveloped and quality of service declines drastically.

A response to these challenges of poor utility performance has been utilizing power sector reforms involving regulation, restructuring, competition and private sector participation. Drawing on the successful electricity sector liberalizations in the U.S and England, the World Bank began to actively promote, including in Africa, significant structural changes in developing countries' electricity sectors alongside the broader structural adjustment programmes for liberalization, due to the growing dissatisfaction with the performance of state-owned vertically integrated electricity utilities (Besant-

Jones, 2006; Foster & Anshul, 2019). Over time, the reforms advanced by the World Bank and other development partners came to be known as the 'standard model' and involved the establishment of an independent regulator, the unbundling of generation, transmission and distribution, private sector participation, and competition. Despite many countries initially committing to the 'standard model', these reforms have progressed only partially, and differently, across the region, resulting mostly in hybrid power market structures, in which dominant incumbent state-owned utilities continue to operate alongside independent power producers (Gratwick & Eberhard, 2008b). In some countries, reforms have also incorporated private management contracts or long-term concessions (Eberhard, Gratwick, Morella, & Antmann, 2017b). These hybrid market structures have resulted in new governance and regulatory frameworks and have generated new operational and commercial issues that have impacted performance in one way or another. In addition, the reforms have sent different sets of signals around incentives in the structural, governance and regulatory frameworks of utilities, unlike what was initially envisaged in the initial standard model reforms.

However, the impact of these reforms on utility performance has been mixed and the reforms are often not well understood. Several studies have been conducted to establish the reform impacts on performance, for example Jamasb et al., (2014); Polemis, (2016); Urpelainen et al (2017); Zhang et al., (2008) and so on. However, these have mostly adopted an econometric/statistical approach and have been narrow in scope, often exploring relationships between a limited number of variables that do not give a complete picture or deep understanding and explanation of drivers of performance in utilities. Yet, the design of power sector reforms involves a range of interventions which play out in different ways depending on the political economy and country context. These need to be adequately taken into account.

One way to explore different reform outcomes is the use of a case study approach. For example, power utilities in East Africa vary significantly in performance. They have also applied the standard model to differing degrees, thus variously impacting performance outcomes. There needs to be a deeper exploration about how the core reform steps of regulation, restructuring, competition and private sector participation impact utility performance. How do these reforms alter structural, governance and regulatory frameworks and in what ways do these incentivize improvements in performance? Not much systematic work has been undertaken on structural, regulatory and governance frameworks and on incentives that impact on utility performance in Africa. For example; a preliminary literature review has found some material on power sector reforms in Tanzania, Kenya and Uganda – such as Godinho & Eberhard, (2018, 2019a); Kapika & Eberhard (2013), Imam et al., (2019) – but minimal studies offer

comprehensive, convincing explanations why some utilities have performed better than others. This thesis seeks to address this knowledge gap by exploring additional bodies of theory, in particular principal-agent theory, and by applying a more rigorous analytical framework to a multi-country set of case studies to create new knowledge.

1.3 The Research Questions

In consideration of the above background and rationale, the thesis will seek to answer the following research questions:

Main research question:

Why does the performance of power utilities in developing countries differ so widely? In particular how can we explain and understand the varied performances of power utilities in East Africa?

Merely examining the different progress in power sector reforms does not appear to fully explain these performance differences.

Therefore, at a more theoretical level, the thesis will probe to what extent principal–gent theory, combined with power sector reform theories, provides a more powerful analytical framework to better explain the varied performance of utilities.

Subsidiary research questions:

- To what extent, and how, do the structural, governance and regulatory frameworks in differently structured power sectors change incentives and impact on power utility performance? For example, how do these incentives for improved performance differ between the unbundled, privatized distribution company in Uganda and the partially unbundled and partially privatized utility in Kenya as compared to the vertically integrated, state-owned utility in Tanzania?
- In which ways do the following power sector reforms alter the principal-agent relationship and incentives for improved performance:
    - establishment of an independent regulator
    - structural unbundling
    - private management contracts
    - partial listing of equity
    - private debt covenants

- private concession contracts

- Finally, to what extent can the difference in performance between the power utilities in Uganda, Kenya and Tanzania be explained by the above analytical framework or are there other important determinants of performance?

1.4 Analytical Framework

To get a deeper understanding of the mechanisms of the structural, governance and regulatory incentives on utility performance, we use a theoretical and analytical framework that is tightly scoped within the context of the literature on power sector reforms but improved to integrate a cooperative Principal-Agent Theory. The analytical framework is informed by empirical case studies that provide rich data, insights and evidence on utility performance in the region. Accordingly, the thesis reviews the extent of adoption of reforms in the three countries.

The most striking difference between the three East African countries in question is their differing power sector reform contexts: TANESCO is a traditional, vertically integrated state-owned utility; KPLC is an integrated transmission and distribution utility that has been unbundled from generation and has been partly listed on the Nairobi stock exchange, and Umeme has been unbundled from both power generation and transmission and was concessioned to a private investor and operator. It is currently listed on the Uganda Securities Exchange and Nairobi Securities Exchanges. Both TANESCO and KPLC had private management contracts for limited periods. Considering this differing context, a useful place to commence our inquiry would be to explore the relevant literature which provides a typology of these reforms and then to examine the history and status of power sector reforms and their impact on utility performance. This would involve examining how the standard reform model and its components – corporatization, regulation, unbundling, competition and private sector participation – were implemented and the resultant outcomes.

Nevertheless, extant literature shows that the experience of power sector reforms has been mixed and sometimes results have been disappointing (Bacon, 2018; Foster & Anshul, 2019; Gratwick & Eberhard, 2008b; Huenteler et al., 2017; Jamasb, Nepal, & Timilsina, 2015; A. D. Lee & Usman, 2018; Pardina & Schiro, 2019). An additional body of literature, mostly using econometric studies, has sought to determine the links between individual reform interventions and specific performance measures; however, these sources have tended to offer only limited insights and often have missed key contextual and political-economy factors which throw more light on the different performance outcomes. These quantitative

studies have ended up being quite narrow and have not offered insights into how power sector reforms change both governance and regulatory incentives for improved performance. From further exploration, it is evident that the link between reforms and performance is not always clear and that we need a complementary literature and analytical framework which investigates how the structural, governance and regulatory reforms embedded in power sector reform literature alter the incentive framework (at implementation level within the energy sector and utilities) for improved performance.

Hence, this thesis also explores the principal-agent theory which helps us to delve into how each of these structural, governance and regulatory reforms impacts the relationship between principals (government institutions or investors) and agents (utility boards or management). Agency theory further helps us to explore the behaviour and incentives accruing to principals and agents as motivation for their actions. Bringing these two bodies of theory together in this thesis provides a potentially powerful analytical framework for a comparison and understanding of utility performance in the three case study countries. The combination of in-depth empirical case studies provides new insights and extends knowledge about power sector reforms and the performance of utilities.

1.5 Research Methodology and Design

1.5.1 Philosophical Stance – Ontological, Epistemological and Methodological

Philosophical assumptions and/or paradigms are described as "a set of beliefs" that dictate what should be studied, how research should be done and how results should be interpreted. In short, they are general orientations about the "worldview" that defines, for the researcher, "the nature of the world", the researcher's "place in it and the range of possible relationships to that world" (Guba & Lincoln, 1994). The paradigm contains the researcher's assumptions about the manner in which an investigation should be performed – that is, ontology, epistemology and methodology (Burrell, Morgan, Burrell, & Morgan, 1979). Therefore, the methodological choice of this thesis is informed by the philosophical assumptions about ontology, epistemology and methodology (Saunders, Lewis, & Thornhil, 2007). According to Guba & Lincoln (1994), ontology is concerned with answering the question: "What is the form and nature of reality and, therefore, what is there that can be known about it?" It assumes a real world and "how things really are and work". In this case, the researcher only considers those views and questions that relate to matters of "real existence and real action which are admissible". There are two streams of ontology: *objectivism* which "portrays the position that social entities exist in reality external to social actors concerned with their existence"; and *subjectivism,* which holds that "social phenomena are created by perceptions and consequent actions of those social actors concerned with their existence" (Saunders et

al., 2007). This creation is a continual process in that, through the process of social interaction, the performance phenomena is in constant revision. “There is therefore a need to study the details of the situation to understand the reality working behind them. This is often associated with the term “constructionism or social constructionism” (Saunders et al., 2007).

The epistemological views seek to answer the questions about the nature of the relationship between the researcher’s views and what can be known. Epistemology is a study of knowledge that is concerned with what we accept as being the valid knowledge (Boru, 2018) or what should be regarded as acceptable knowledge in a discipline (Saunders et al., 2007). Epistemology is usually constrained by the choice of the ontology orientation. Lastly, the methodological stance seeks to answer the question: “How can the researcher go about finding out what he believes can be known?” The methodology approach, therefore, is also constrained by the ontology and epistemology stances.

Whereas there are various paradigms that may be used to explain the performance phenomena of research, this thesis adopts the philosophy of pragmatism and an ontological view that combines the principles of Critical Theory and of Constructivism to understand and explain the structural, governance and regulatory incentives for improved utility performance. The purpose of inquiry under Critical Theory is the critique and transformation of the social, political and economic structures that constrain and exploit mankind through confrontation or advocacy, while under Constructivism, the aim of inquiry is the understanding and reconstruction of constructs that people initially hold, aiming towards a consensus, but which is still open to new interpretations as information and as sophistication improves (Guba & Lincoln, 1994, p. 113) According to Saunders et al.,(2007) and Creswell (2014), pragmatism argues that the most important determinant for the research philosophy utilized is the research question. However, to avoid limitations of one particular philosophy, it is perfectly possible to combine both philosophies if a research problem does not suggest, unambiguously, that one particular type of knowledge or method should be adopted. Tashakkori and Teddile (1998) suggest that it is more appropriate for the researcher to think of the philosophy adopted as a continuum rather than as opposite positions. Pragmatism further recognizes that there are different ways of interpreting the world and undertaking research; that no single point of view can ever give an entire picture and that there may be multiple realities. This philosophical position asserts that concepts are only relevant where they support action. Pragmatism, therefore, strives to reconcile both objectivism and subjectivism, facts and values, accurate and rigorous knowledge and different contextualized experiences (Saunders, Lewis, & Thornhil, 2019). It does this by considering theories, concepts, ideas and research findings, not in an abstract form but in terms of the roles they play

as instruments of thought and action, and in terms of their practical consequences in specific contexts. Saunders et al.,(2019) further argue that for a pragmatist, research starts with a problem and aims to contribute practical solutions that inform future practice. Since the pragmatist is more interested in practical outcomes than in abstract distinctions, their research may have considerable variation in terms of how "objectivist" or "subjectivist" it turns out to be. Since this thesis adopts a pragmatist research, the most important determinant of the research design and strategy is the research problem that it tries to address and the research question/s. The research question, in turn, will likely incorporate the pragmatist's emphasis on practical outcomes (Saunders et al., 2019, p. 151).

1.5.2 Research Approach and Strategy

The overriding research approach adopted for this thesis is a qualitative explanatory case study with embedded mixed methods of data collection (quantitative and qualitative) and analysis (Saunders et al., 2019, p. 175). The term 'qualitative research' is often used as a synonym for any data collection technique or data analysis procedure that generates or uses non-numerical data, while quantitative research uses numeric data. However, this definition is problematic and narrow, since many business and management research designs, such as this thesis, are likely to combine quantitative and qualitative elements (Saunders et al., 2019). Qualitative research data maybe analysed quantitatively (Creswell, 2014). Qualitative research emphasizes processes and meanings that are not measured in terms of quantity, intensity or frequency and provides a deeper understanding of the phenomenon within context (Guba & Lincoln, 1994). Moreover, qualitative researchers stress the socially constructed nature of reality that defines the relationship between the researcher and the phenomenon under investigation. One of the greatest strengths of the qualitative method is that it has the potential to generate rich descriptions of the participant's thought processes and tends to focus on reasons "why" a phenomenon has occurred. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them (Creswell, Plano Clark, & Hanson, 2003). Qualitative research involves conducting interviews during the explanatory stage of research with the aim of uncovering factors that influence the problems being studied (Ragin, 1999). Such interviews aim to uncover new qualitative information rather than gather quantifiable results. As a result, exploratory or explanatory interviews are preferred for this thesis because they are open-ended, unstructured or semi-structured so as to stimulate respondents to share their thoughts and feelings (Bryman, 2008). According to Yin, (2018), explanatory interviews focus on establishing the cause-effect relationship and the analysis of how one variable affects, or is responsible for changes in, another variable.

It explains the phenomenon in terms of "how" and "why" some outcomes have occurred. The emphasis here is on studying a situation or problem to explain the relationships between the variables. Qualitative research, therefore, can be used to probe deeply into a respondent's underlying needs, preferences, perceptions and unpublished information to gain insights and greater familiarity with the research problem being investigated, whose causes are unknown initially to the researcher. Accordingly, this thesis adopts a qualitative case study research strategy to enable us to answer our research questions considering our philosophical stance, time and resources available.

Consequently, the research questions will be answered by making use of a comparative multiple-case study design, at an empirical level, of the three East African power utilities: Umeme Ltd (Uganda), KPLC (Kenya) and TANESCO (Tanzania), analyzed within a theoretical framework of power sector reform and principal-agent theory. The research involved extensive literature searches on international power sector reforms; power sector reform in Tanzania, Kenya and Uganda, and available reports on utility performance. The literature and desk-top research was complemented by in-depth interviews and data collection through field trips (as elaborated in the proceeding sections) in the three case study countries in order to: better understand the design and implementation of the power sector reforms, their impact on structural, governance and regulatory incentives for improved performance, and to collect and analyze detailed performance data. Case study data and information was analyzed within an integrated framework of power sector reform and principal-agent theory.

1.5.3 Comparative Multiple-case Study Strategy – Holistic Design

The overall research strategy is based on a case study design involving multiple cases with the goal of extending theory and knowledge (Eisenhardt & Graebner, 2007). Saunders et al.,(2007) define case study as "a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence". It is often used to narrow down a broad field of research into one or a few easily researchable examples. Eisenhardt (1989b) defines case study as "a research strategy which focuses on understanding the dynamics present within single settings" and notes that "case studies can involve either single or multiple cases, and numerous levels of analysis". Eisenhardt further explains that case studies typically combine data collection methods such as archives, interviews, questionnaires and observations; and that evidence maybe qualitative or quantitative. According to Yin (2003), the evidence from multiple cases is often considered more compelling, and the overall multiple case study is therefore regarded as being more robust. Yin (2003) further highlights the importance of context as it provides a boundaryless but rich understanding of the

research phenomenon and processes being enacted. The holistic design also has considerable ability to generate answers to the questions “why?” and “how?”. As a background, case studies have often been used in power sector reform literature to explain the progress, and sometimes the impacts, of reforms in the electricity sector across countries. Whether using one or more cases, the strategy helps to create and develop theoretical constructs, measures and testable propositions from empirical evidence (Eisenhardt & Graebner, 2007). Multiple case studies offer rich, detailed, empirical descriptions of particular instances of phenomena that are typically based on a variety of sources (Eisenhardt, 1989b; Yin, 2003). For example, when utilized to analyze performance of utilities, multiple case studies offer and reveal patterns of relationships among constructs within and across cases, and their underlying logical arguments beyond vivid but false impressions (Yin, 2018). Hence, the rationale for adopting multiple case studies for this thesis was that it offered a greater benefit of understanding deeply the real-world context in which the performance phenomenon of utilities occurs. Accordingly, the cases are good at revealing the complete picture which takes into account the context (Pettigrew, 1992; Yin, 1994) and identifies causal links/operational pathways to the rich, historical and in-depth information, firmly rooted in the original evidence (Langley, 1999). Because case studies are close to data, they offer deeper insights into structural, governance and incentive arrangements within utilities, and can explain potential causal pathways of institutional and organizational changes that are difficult to identify with econometric models that are limited by a number of variables (George & Bennett, 1997) . Their closeness to data further helps to generate novel and accurate results in an “honest” perspective (Eisenhardt & Graebner, 2007).

A central rationale for using multiple cases is that they are a powerful means to create or extend theory because they permit replication of findings from other cases (Eisenhardt, 1989b) and extension among individual cases. ‘Replication’ simply means that individual cases can be used for independent corroboration of specific propositions (Gioia, Corley, & Hamilton, 2012). In this thesis, this corroboration helped to perceive performance patterns more easily and to eliminate chance associations. ‘Extension’ refers to the use of multiple cases to develop more elaborate theory (Eisenhardt, 1989b). Multiple cases also help us to establish whether the findings of the first case can also occur in other cases and, as a consequence, the need to generalize from those findings (Yin, 2003). Different cases often emphasize complementary aspects of a phenomenon. In relation to this extension, analyzing the multiple case studies in East Africa enabled comparison of results to identify findings that were complementary and not simply idiosyncratic to a single case and those that were consistently replicated in other cases (Eisenhardt, 1991; Ragin, 1999). By bringing together individual performance patterns in a comparative chapter six

helped the researcher to make comparisons; to draw a fuller picture and to make robust, reliable, testable and generalizable results (Eisenhardt, 1991).

The comparative case study design offers an opportunity for a holistic view of the research process as opposed to a reductionist-fragmented view (Patton & Appelbaum, 2003). Hence, the study benefited from within-case and across-case analysis of utilities (unit of analysis) and from comparison of subtle similarities and differences (Eisenhardt, 1989b). Within-case analysis provides familiarity with data and preliminary theory generation, while cross-case pattern-searching enabled the researcher to look beyond initial impressions and to see evidence through multiple lenses. Eisenhardt (1989b) further makes a case for combining qualitative and quantitative evidence as being highly synergistic: quantitative evidence can indicate relationships which may be salient, and qualitative data is useful for understanding the rationale behind the relationships. For example, the thesis used certain qualitative aspects of power sector reforms dynamics and institutional agency processes to explain the efficacy of the reforms and utility performance indicators. These factors are inherently difficult to capture through statistical methods only (Giannakis, Jamasb, & Pollitt, 2003). In addition, the use of case studies allowed us to examine issues that did not easily lend themselves to rigorous quantitative analysis (Eisenhardt & Graebner, 2007) or could not be analyzed because of a lack of comprehensive data (Jamasb, Mota, Newbery, & Pollitt, 2005) Hence, qualitative case studies can overcome issues associated with model specification and accuracy of variables representing the relevant aspects of limitations typical in econometric studies. In sum, the case study approach helped to reconcile evidence between cases, between types of data, and it increased the likelihood of generating a novel theory consistent with empirical observation through a new theoretical lens (Eisenhardt, 1989b).

1.5.4 Data Collection and Analysis

Two distinct methods of data collection were employed and *embedded* within the case studies, namely: quantitative and qualitative data collection and analysis. Quantitative data collection was conducted first from secondary and primary data sources, including annual reports, sector wide data and multilateral development agency databases. The data was analyzed manually using Excel spreadsheets which helped in the interrogation of and engagement with the data.

Qualitative research involved qualitative document analysis (QDA) of secondary data from the three case studies and involved 30 semi-structured as well as unstructured interviews to gain deeper insights from interview participants. The qualitative document analysis (Bowen, 2009; Stritzke, Trotter, & Twesigye, 2021) was highly analytical and entailed filtering and selecting documents according to their relevance to

deepen our understanding of utility performance metrics and to compare outcomes across cases. The documents either contained specific key performance indicator indices, performance targets, applicable governance systems or strategies and instruments necessary to reveal causal pathways. The documents included contracts and agreements, regulations and licences, sector policies, annual reports, management reports backed by primary data, utility policy documents and board charters, company fact sheets, energy sector publications and reports, archival records, observational data from meetings as well as official medial publications from utilities and regulatory agencies. The highly analytical document analysis (QDA) allowed us to identify the most influential factors on utility performance and their causal relationships with the outcomes (measured as KPIs) and further explored these relationships through qualitative interviews both within and across cases. The use of qualitative data then helps to explain existing relationships, bolster findings and corroborates those findings with quantitative evidence (Eisenhardt, 1989b; Johnson & Onwuegbuzie, 2007). The corroboration is made possible because it ties literature to actual empirical data and allows for the development of new theory or observations (Eisenhardt & Graebner, 2007). Because the approach allows for continuous data analysis, it supports or influences stages in the research process enabling the author to address research questions at different levels of the study. Consequently, the approach makes it easier to interpret, describe and explain or report results.

1.5.5 Qualitative Interviews

Interviews are a highly efficient way of gathering rich empirical data for they offer a synergistic view of evidence. Following from the first phase of data analysis – which served the purpose of "illuminating a particular issue" (Creswell & Plano Clark, 2007) – the author identified and purposefully selected 30 participants or interviewees for follow-up, and conducted in-depth interviews to which we gave more priority.

A total of 30 semi-structured and unstructured, in-depth interviews were conducted during the 2018–2019 period in a series of field trips to the sites of the three East African case studies. During this period, the researcher had the benefit of sitting in numerous management meetings of one of the case study utilities – Umeme Ltd – and was exposed to considerable information about the topic, being a staff member of the utility. The researcher was however sensitive to potential biases and maintained neutrality in analysis of data and reporting. The author was not employed by Umeme in the later stages of the thesis writing.

The purpose of the interviews with the relevant participants was to obtain both retrospective and real-time accounts about the performance phenomena. Interviews were conducted in an engaging and

participatory way (research as engagement) for interviewees to comfortably express themselves. The nature of the interviews served to reveal a lot of deep information, often prompted by a quick provocation, revealing important information that organizations usually do not reveal in statistical reports. A purposive and targeted sample of utility top executives (CEOs) and senior managers at head of department level – high priority and highly knowledgeable interviewees who viewed the focal phenomenon of utility performance, governance and incentives frameworks from diverse perspectives – was selected and utilized. A sample of 10 interviewees were selected for each case study country. To limit information bias, a sample of two regulatory authority senior executives or managers – high priority and highly knowledgeable interviewees from each case study country – helped to validate the information provided by utilities. It is unlikely that these various interviewees had engaged in convergent retrospective information sense-making and/or impression management (Eisenhardt & Graebner, 2007, p. 28). This control approach gave more rigor and validity to the entire interview process and helped to generate novel information. During the interviews, field notes were made by the researcher to capture key emergent ideas, justifications, evidence and themes considered vital contextual information which would explain certain occurrences and trends in utility performance. The research also benefited from audio recordings of interviews for memory recollection, and these were transcribed in the analysis phase. Where necessary, follow-up emails and telephone calls were used for clarification purposes. The analyzed data was triangulated, themes developed and connected to the quantitative data to explain the selected KPIs through pattern matching, trend analysis and synthesis across cases in the comparative chapter six.

Combining these methods was necessary to allow for a direct assessment as well as for data validation and rigor. The rationale for integrating qualitative and quantitative methods of data collection and analysis is that neither is sufficient in design to capture the performance trends and details of phenomena situations occurring in the power sector in East Africa, such as the altered structural, governance and regulatory incentives and frameworks within the electricity utilities. When used in combination, quantitative and qualitative data analyses complement each other and provide a fuller picture of the research problem (Creswell & Plano Clark, 2007; Johnson & Onwuegbuzie, 2007; Morgan, 2017).

The data was triangulated along the two data points – qualitative and quantitative data analysis – to ascertain if the findings from one method mutually corroborated the findings from the other method. Triangulation across case studies helps to build credibility of descriptions and findings (Guba & Lincoln, 1994). Triangulation involves using more than one source of data and method of data collection to confirm

the validity/credibility and authenticity of research data, its analysis and interpretation. Triangulation adds depth, breadth, complexity and richness to research (Saunders et al., 2019).

1.5.6 Research Focus and Scope

From a theoretical perspective, the three cases were chosen for theoretical sampling reasons with the goal to replicate or extend emergent theory in line with the Eisenhardt (1989b) case study design and process. In addition, the cases were selected because they were particularly suitable for illuminating and extending relationships and logic among constructs (Eisenhardt & Graebner, 2007) – for example the incentives that stimulate improvements in utility performance. The three case studies also had the likelihood of offering theoretical insights of an unusual phenomenon, replication of findings and elaboration of emergent theory. Finally, consideration was based on cases of 'polar type' (Eisenhardt, 1989b) sampling –that is to say, Tanzania is considered unsuccessful in power sector reforms, unlike Kenya and Uganda – which are clearly more successful in utility performance and thus make the phenomenon easy to observe..

The author also examines the country context as a primer for reforms in the region and establishes the most comparable cases and takes note of the subtle differences (Yin, 2018). By looking at this design, it allows the author to essentially control for several key variables that might explain some variations in how early, rapidly and extensively reforms were adopted (Gerring & Thacker, 2008) as well as the variations in utility performance over the review period (Gore, Brass, Baldwin, & MacLean, 2019). Tanzania, Kenya and Uganda share corresponding colonial legacies as they all experienced British colonial rule and achieved independence relatively quickly in the 1960s. The three countries shared the characteristic of relatively small populations and low levels of economic development in the 1990s prior to the promotion of the standard model of reforms (Gore et al., 2019). All the three cases were relatively weak to moderate states with low state capacity for public service provision, with low electricity access and limited investments in the electricity sector. Tanzania, Kenya and Uganda are considered "early reformers" owing to their earlier adoption of power sector reforms in Africa. Their relatively long experience with reforms gives a long track record of data to analyze. All three countries have witnessed a relatively stable economic growth (GDPs) over the last ten to twenty years and have relatively better developed power sectors compared to their peers in sub-Saharan Africa. The electricity utilities in the three countries have performed comparatively better than others in SSA albeit with some noticeable failures, especially in TANESCO.

At an empirical level, we contrast and focus on the enduring poor performance of utilities in the three case study countries, owing to their inability to provide adequate, reliable and competitively priced electricity to match the demand of their growing populations. We locate and select our sample cases based on extant reform literature that documents the fragile state of majority utilities in SSA, which are financially unviable and continue to operate with high technical and commercial inefficiencies. By focusing the research on these countries, we hope to draw novel, generalizable results that can be replicated in other countries in the SSA region.

Kenya is one of the few countries in SSA with the most extensive experience in independent power production because it has a better investment climate than that of neighbouring Tanzania and Uganda, and has been able to attract over US$2.4 billion in private investment (Eberhard et al., 2016), and about 17 independent power producers (IPPs) with aggregate capacity of 1,013 MW as at end of June 2020, and at a lower cost than the other two countries. In addition, a further 25 IPPs have approved power purchase agreements (PPAs) with an aggregate capacity of about 4,000 MW, though not yet finalized (Godinho & Eberhard, 2019b). Kenya's electricity sector has been unbundled; it has an independent regulator, and it once had a clear power-planning process and competent procurement capability in the Kenya Power and Lighting Company (KPLC), the transmission and distribution (T&D) company. The regulator has helped move tariffs to cost-reflective levels, and the KPLC has been reasonably creditworthy. The consequence is a series of competitive procurements with steadily better price outcomes (Eberhard et al., 2016, pp. 43–44). However, problems persist in planning and procurement as these have not been based on solid independent technical analysis and several governance issues have led to dismissal of management in the utility.

Tanzania, on the other hand, has a weaker investment climate, some ambivalence around private sector investment, a vertically integrated state-owned utility with significant technical and financial performance challenges, and poor planning and procurement practice— this is despite a regulator that seeks to encourage more transparent and competitive procurement. Tanzania has relied more on unsolicited bids and direct negotiations than on competitive tenders. As a result, some IPPs here stand out for their high prices and controversial contracts (Eberhard et al., 2016, p. 44). In addition, the utility lacks some of the basic governance systems and incentives for proper management and is highly influenced by political forces (Kapika & Eberhard, 2013).

Uganda occupies a unique space in the history of power sector reforms and investment in Africa. It was the first country to unbundle generation, transmission and distribution into separate utilities and offer

private concessions for power generation and distribution (Eberhard et al., 2016; Meyer, Eberhard, & Gratwick, 2018a). Uganda currently has the highest number of IPPs in SSA, second after South Africa (Eberhard, 2020). Its recent success has relied less on its overall investment climate and more on a clear power sector structure and a recent competitive tendering programme for small renewable energy power plants. With its power sector unbundled, IPPs contract directly with the transmission company, free of conflicts with state-owned generation, and the privately concessioned distribution company is increasingly more effective in reducing losses and improving its financial viability. The dedicated global energy transfer feed-in tariff (GETFiT) intervention, has provided transaction advice and support for running competitive tenders coupled with standardized contracts. It remains to be seen whether this initiative can be sustained in the future (Eberhard et al., 2016, p. 44). Nonetheless, the country's electricity access rates are among the lowest in the region, reliability is poor and procurement of IPPs continues to be uncompetitively negotiated.

Drawing on the body of literature of the above cases, we develop a research design that reveals potential causal pathways of institutional and organizational change (Stake, 2006). Careful comparative case study analysis, both across cases, and within cases, over time, can shed light on the mechanisms of causal processes (Yin, 2003) to reveal more deeply the structural, governance and regulatory incentives for improved utility performance. We purposefully select three country cases and their electricity utilities in Africa that are similar on several theoretically relevant dimensions shown in the table below.

Table 1.1: Common Reform Features of Case Study Utilities

Reform Actions	**Umeme Ltd - Uganda**	**KPLC - Kenya**	**TANESCO - Tanzania**
Corporatization of Utility	Governed under Companies Act, and Memorandum & Articles of Association	Governed under Companies Act, and Memorandum & Articles of Association	Governed[3]* under a generic Companies Act, no specific law establishes TANESCO with autonomy
Regulatory Reform (model classification)	Regulatory Entity	Regulatory Entity	Regulatory Entity
Power Sector Restructuring Reform (model classification)	Full vertical unbundling and horizontal unbundling G & D	Partial vertical unbundling with horizontal unbundling in G only	Vertically Integrated
Competition reform (model classification)	Single Buyer Model with IPPs	Single Buyer Model with IPPs (and recently, in 2019, bilateral contracting with Third Part Access)	Monopoly with IPPs

[3] While the de jure provisions of the TANESCO Public Corporation's Act of 1992 and the Companies Act of 2002 provide for a board of nine directors responsible for the corporate governance and financial management of the company, at the time of research and writing this thesis, they had been dismissed and there was no fully constituted board of directors apart from the Chairman.

Private Sector Participation reform (model classification)	*Some degree of private sector participation in both generation and distribution*	*Some degree of private sector participation in generation and distribution*	*Some degree of private sector participation in generation only*
Capital Structure	*Private Concession, & Listed on Uganda and Nairobi Stock Exchange*	*Mixed Capital Enterprise, & Listed on Nairobi Stock Exchange*	*Publicly financed by Government*

1.5.7 Key Performance Goals and Indicators

The study undertook a detailed review of key performance metrics over the past 15 years of utility reform experience, and analyzed quantitative data (numeric) to establish trends and patterns of improvement in key performance goals or outcomes based on standard utility key performance indicators (KPIs) in the three case study utilities as shown in the sample table below. The five KPIs were purposefully selected based on their ability and influence to address the enduring problems of utility performance: lack of access, inadequate and reliable electricity supply, technical and commercial inefficiencies, as well as poor financial viability and sustainability – enumerated in section 1.2 of chapter 1 above. The quantitative analysis also focused on identifying trends of performance improvements in the selected KPIs. The thesis partly used data from the work of Trimble et al.,(2016), which highlights the financial viability of electricity sectors in sub-Saharan Africa. The research utilized the qualitative phase of data collection methods to interview and unearth the deep contextual information that explains the causal relationships and mechanics of structural and governance reforms (unbundling, regulation, private sector participation), which, in turn, explain performance outcomes. These relationships and mechanics were then linked to identify associated incentives that catalyze improvements in performance. The term 'performance improvement' for this research refers to better achievement of technical efficiencies, competitive prices, increased access, and financial viability and sustainability relative to where they would have been in the absence of reform.

Table 1.2: Summary of Key Performance Goals and Indicators

	Strategic Key Performance Goal/Objective	**Operational Key Performance Indicators (KPIs)**
1.	**Access to Electricity (%)** *Definition: The percentage of households (or population) connected to grid electricity*	- No. of New Connections (Nos) - Total Number of Connections (Nos) - Coverage ratio (% of population)
2.	**Adequate, Reliable & Quality of supply** *Definition: Generation capacity that is made available for use, regardless of whether that*	- Installed Generation Capacity (MW) - Tested/ Available Capacity (MW) - Peak Demand (MW) - Generation per capita (MWh) - Imports and Exports (MW) - Reserve Margin (MW)

	capacity is used to generate electricity	- Sector Investments – MWs of IPPs as a proxy vs public generation
2(a)	**Reliability of Supply** *Definition: Reliable: Availability of electricity for end use free from number and duration of outages and voltage and frequency changes (Range 1–7)*	- Outages (SAID, SAIFI, CAIDI)
3.	**Affordability** (cost-reflective tariffs or competitive tariffs) *Definition: Ability to spend no more than 5% of household income on 30 kWh a month, which is considered the subsistence level*	- GNI per capita – bottom 40% - Cost of 30kWh as percentage of bottom 40% average GNI - Lifeline Tariffs ((LCU or US cents/KWh) - Average Tariffs (LCU or US cents/KWh) - Average cost of domestic connection (LCU/USD per connection) - Comparison of industrial consumption and expenditure
4	**Efficiency** *Definition: Utility's ability to transmit and distribute electricity in the best way while minimizing waste and inefficiency (productive and allocative efficiency)*	- Transmission Losses (%) - Distribution Losses (%) - Technical Losses (GWh/%) - Commercial Losses (%) - Total Losses as a % of Power Purchases - Collection Rate (%) - Number of employees per kWh - Receivable days (no) - Payable days (no) - Trade creditors (LCU/USD)
5.	**Financial Sustainability** *Definition: Ability to generate sufficient income covering OpEx and full CapEx on new replacement values of existing assets, including macro externalities, to allow for growth while maintaining efficient service levels*	Efficient Revenue Requirement including: - Revenues (LCU/USD) - Net Profit Margin (LCU/USD) - Debt-service coverage Ratio (%) - Debt to Equity Ratio (%) - Cash Ratio (self-financing) (%) - Debt to Assets Ratio (%) - Current Ratio (%) - Interest Coverage Ratio (%) - Quasi-Fiscal Deficits (QFD) (%) - Provision for exogenous factors (foreign exchange, inflation)

1.6 Significance of the Study: Contribution to Knowledge

This thesis will contribute to new knowledge, not only through a better understanding of why different power utilities in Africa have such different performance outcomes, but through combining the literature and theory of power sector reform with principal–agent theory to hopefully provide a more powerful analytical framework for understanding how different power sector structural reforms change the principal–agent relationship, and hence incentives for improved performance. The research will aim to extend the frontiers of knowledge, especially as it relates to power sector reforms in Africa and specifically

identify the un-researched operational matrices (explanatory factors) that drive performance in a unique setting of hybrid power markets drawing from the selected case studies, for policymakers and practitioners. Thus, the novelty of the study will aim to change the conversation already taking place in power sector reform literature. The study will also contribute to theory by seeking to generate new knowledge on the efficacy of principal-agent theory in explaining incentives for performance improvements and other theoretical frameworks and factors that might explain utility performance. Currently there is no strong consensus on what drives performance and whether the productivity arrived at is fair or not.

The study will further lay a strong analytical foundation concerning how modes of performance improvement can be associated with both individual incentives and power utility structures to bring about efficiency improvements. These aforementioned associations further inform policy decisions affecting performance improvements.

1.7 Research Ethics

Ethics approval was granted by the Ethics in Research Committee of the University of Cape Town's Commerce Faculty before commencement of data collection for this thesis. Institutional consent was sought and granted by the case study utilities (TANESCO, KPLC and Umeme Ltd), permitting access to the institution's information sources and approval to conduct interviews with their authorized management teams. In addition, consent was sought from respective individual respondents within the utilities before conducting unstructured interviews. Anonymity and confidentiality of information gathered purposely for this research was ensured. Owing to the sensitivity of some of the data, the names and organization affiliations of interviewees as well as their respective functional roles have been omitted from this research.

1.8 Overview of Subsequent Chapters

The thesis consists of seven chapters. Following this introduction, Chapter 2 presents the review of the relevant literature for the thesis as outlined above. Based on this literature, the conceptual or analytical framework is further outlined in Chapter 2. Chapters 3–5 present the analytical and empirical findings of the three cases – Tanzania, Kenya and Uganda. These chapters provide an in-depth analysis of the structural and governance arrangements of the interaction between power sector reforms and principal–agent theory and their influence on the governance incentives that drive utility performance. Chapter 6 offers a further analytical discussion of the case studies and a systematic cross-case study comparative

assessment of findings and the final chapter, Chapter 7, presents the thesis synthesis, discussion and conclusions. It also includes the extrapolation of the findings and the contribution of the thesis to scholarly knowledge.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The performance of power utilities varies within different power sector reform environments. In general, it has been observed that many unreformed, vertically integrated utilities still experience challenges with financial viability and technical efficiency (Eberhard & Dyson, 2019; Eberhard & Godinho, 2017; Eberhard, Gratwick, et al., 2017b; Kapika & Eberhard, 2013; Trimble et al., 2016). Some utilities which have been unbundled and subject to competition, private capital markets and independent regulation – for example, KenGen – have seen improved performance, as have some utilities that are governed and managed via private management contracts – for example ,TANESCO, during the early phase of its private management contracts, or Umeme, during the latter stage of its private concession (Eberhard et al., 2016; Kapika & Eberhard, 2013). This thesis seeks a deeper understanding of why some power utilities perform better than others and how governance and regulatory reforms alter performance incentives.

As indicated in Chapter 1, the main research question being addressed is how to account for the varied performance of power utilities in East Africa? Merely examining the progress in power sector reform does not appear to fully explain these performance differences. The theoretical research question is to what extent does principal–agent theory, combined with power sector reform theories, provide a more powerful analytical framework to better explain the varied performance of utilities? Subsequent chapters will provide the empirical basis for addressing these questions. However, we also need a theoretical and analytical framework (which will enable a deeper understanding of the two bodies of literature) so as to address the questions in a thorough way.

This literature review has identified two bodies of literature that, together, could provide deeper insights. The power sector reform literature provides insights into how governance and regulatory incentives are altered through structural reforms (unbundling), establishing independent regulators, competition and private sector participation. Principal–agent theory helps us delve deeper into how each of these structural, governance and regulatory reforms impact the relationship between principals (government institutions or investors) and agents (utility boards or management). Bringing these two bodies together

provides a potentially powerful analytical framework for a comparison and understanding of utility performance in our three case studies.

2.2 Power Sector Reforms: Literature

Worldwide, the electricity sector has experienced a paradigm shift towards adoption of market-oriented reforms in the management of the industry: this, in response to a combination of economic, technological, ideological and political factors which peaked in the early 1980s and then gained traction in the 1990s (Bacon & Besant-Jones, 2002; Gratwick & Eberhard, 2008b; Joskow, 2008). The World Bank was the largest source of worldwide multilateral energy assistance, committing US$ 31 billion between 1975 and 1990 to the governments of developing countries for infrastructure investment that was increasingly becoming difficult to recover (Vedavalli, 2007, p. 49). Specifically, the dissatisfaction with the performance of state-owned vertically integrated electricity utilities led to a policy agenda by The World Bank known as the 'Washington Consensus'. According to this agenda, the main objectives of power sector reform were to improve economic efficiency and to attract private sector investment (Foster et al., 2017; World Bank, 2004). The World Bank began to actively promote significant structural change in the electricity sectors of developing countries, pegged to conditional lending alongside broader structural adjustment programmes for liberalization, including in Africa (World Bank, 1993). A core set of reform steps designed as a 'scorecard of reform indicators' (Bacon, 1999) became highly stylized as the 'standard model' or 'standard prescription' for developing countries (Bacon, 2018; Gratwick & Eberhard, 2008b).

In the Organization for Economic Co-operation and Development (OECD) countries, reform was influenced by the desire to promote better use of existing resources through: competition, choice, optimization and efficiency in a power sector that was already mature with over-capacity, while, in the developing countries, poor utility performance and growing public debt were having an impact (Williams & Ghanadan, 2006).

The overarching rationale for power sector reform in Africa was the poor performance of state-owned utilities and an inability to invest in meeting rising demand from customers (Williams & Ghanadan, 2006). This created a huge financial burden on governments to provide finances needed for expansion and maintenance investments, as well as for tariff subsidies to consumers (Bacon, 2018). Poor technical and financial performance was the defining feature of many electricity supply industries in Africa by the end of the 1980s. Generation capacity was dismally low (Bacon, 1995a); transmission and distribution losses averaged about 20% against a world average of approximately 9% for the same period, and blackouts were frequent (Gratwick & Eberhard, 2008b).

Eberhard and Gratwick (Gratwick & Eberhard, 2008b) further highlight indicators of poor financial performance – low debt-service coverage ratios and insufficient cash flows for new investments – as well as low electricity access rates, averaging only 16% in sub-Saharan Africa. Making matters worse, tariffs were generally below cost-recovery levels (Bacon, 2018; Trimble et al., 2016). The poor financial performance prevented many utilities from accessing capital markets, given their perceived lack of creditworthiness, and many could not finance necessary investments (Gratwick & Eberhard, 2008b). These problems were compounded by poor commercial practices such as inefficient meter reading, billing, and revenue collection. Cost containment was weak with over-staffing, inefficient corporate structures, managerial deficiencies, shoddy operations and poor maintenance of plant and equipment (Kapika & Eberhard, 2013).

The burden of subsidies, low service quality, non-collection rates, high network losses and poor service coverage meant that many governments were no longer able to support the existing arrangements (Bacon, 2018; Joskow, 2008). With the power sector in such poor health, and given, partly, the positive reform experiences elsewhere, policymakers and the donor community began to consider options for reform.

Power sector reforms were, therefore, prescribed through a set of measures that came to be known as the 'standard prescription' (World Bank, 1993) or the 'standard model' (Gratwick & Eberhard, 2008b) – as an antidote to poor technical and financial performance in the developing countries. These reform components included commercialization, corporatization, enhanced regulation, private sector participation, restructuring and competition (Eberhard et al., 2016; Gratwick & Eberhard, 2008b). The standard model reform steps, as identified by Bacon (1995b, 1999) and (Bacon & Besant-Jones, 2002) – are enumerated as follows:

(i) *Corporatization:* involves the utility being transformed into a separate legal entity (separate from the ministry/government) with all associated rights and obligations including governance structures, managing budgets, borrowing, procurement, labour employment, payment of taxes and dividends.

(ii) *Commercialization:* represents a move towards cost recovery in pricing, improvements in metering, billing and collections and could involve adopting internationally recognized accounting practices as well as transparent accounting for all subsidies.

(iii) *Passage of the requisite energy legislation:* provides a legal mandate for restructuring as well as the legal framework to allow private or foreign participation/ownership in the sector.

(iv) *Establishment of an (independent) regulator:* aims to introduce efficiency, transparency and fairness in the management of the sector, specifically to prevent anti-competitive activity, to encourage appropriate investment and for the protection of consumers.

(v) *Independent Power Producer*s: introduce new private investments in generation, with long-term PPAs.

(vi) *Restructuring:* involves unbundling the incumbent (state-owned) utility, which may take the form of vertical and/or horizontal unbundling of generation, transmission- and distribution assets as preparation for privatization of (profitable) assets and the introduction of competition. Vertical unbundling refers to separation of generation, transmission and distribution – that is, to separate the competitive elements of the industry from the natural monopoly (transmission and distribution) components. Horizontal unbundling involves the separation of the generation utility into competing companies. New players are allowed into the market. Vertical separation of these distinct activities of the energy supply industry (ESI) was believed to guard against cross-subsidization between competitive businesses and regulated businesses of energy supply, as well as discriminatory practices such as denial of access to networks (Joskow, 2008).

(vii) *Divestiture of generation assets:* divest state ownership, in part or in full, of generation assets to private sector.

(viii) *Divesture of distribution assets:* divest state ownership, in part or in full, of distribution assets to private sector.

(ix) *Competition:* introduction of wholesale and retail markets. Governments are encouraged to open their markets either through liberalization or de-regulation of their economies, to create independent system operators and develop retail competition. Through liberalization, private sector participation was encouraged in the electricity sector. Competition took the form of introduction of wholesale markets or retail markets with the objective of increasing benefits to consumers, including lower electricity prices and access through a wider array of retail services.

The refined elements of the standard power sector reform prescription as presented by Williams and Ghanadan (2006) is shown in the table below:

Table 2.1: Common Elements of Electricity Reform

Policy Dimension	Key Features
Corporatization	Separate utility from ministry Create clear accounting framework Install private management (common in Africa)
Commercialization	Cost recovery in pricing Reduce or eliminate subsidies Enforcement of collections
Energy Law	Legally mandate restructuring Legally permit private participation/ownership Legally permit foreign participation/ ownership/ imports
Regulator	Remove regulatory function from ministry Create independent regulator Locally define scope, authority, methods
Independent Power Producers	Create by privatizing state utility generation Greenfield development Power purchase agreements
Restructuring	Vertical and/or horizontal unbundling Create independent transmission authority/company Separate profitable parts for sale to private investors
Privatization	Outright sale Stock sale Joint venture
Competitive markets	Single buyer Bilateral forward contracts Cost-based pool Bid-based pool

Source: Williams & Ghanadan

The above reform steps are sometimes aggregated into four key reform actions: (a) regulation; (b) unbundling/restructuring; (c) private sector participation/privatization, and (d) competition (Bacon, 2018; Foster et al., 2017). Private sector participation is most common in the form of IPPs, but it could also take the form of private concessions or private management contracts. Concessions ae usually for a long period – typically 20 years – and the concessionaire has full responsibility for operations and investment. Private management contracts are typically for shorter periods – three to five years – and the contractor has responsibility only for operations, investment coming from government or other sources. These contracts may be renewed, or assets returned to government or a decision is made on full divestiture or privatization.

According to Bacon (2018), each of these reform actions is expected to have a role in achieving an overall improvement in sector performance either directly (effect) or indirectly (act as necessary facilitators).

One way of thinking about these reforms is in terms of principals and agents. Reforms involve government's role and risk-shifting from that of an operator (agent) to that of a facilitator and regulator (principal). The logic in this is that utilities should be allowed to operate with greater independence from political interference in order to be financially and technically viable, and also guarantee a stable framework for attracting long-term private capital (Joskow, 2008). In addition, private ownership imposes hard budget constraints, with a greater likelihood that bills are collected and revenues cover costs (Jamasb et al., 2005). By introducing the profit motive, private sector participation creates incentives for efficiency and allows businesses to be run according to commercial principles (Foster et al., 2017, p. 27). The changes in energy market structures, together with changes in the role of the state, were aimed at improving utility efficiency and productivity levels through the introduction of competition and regulation (Jamasb et al., 2015). The reform measures included cost-reflective pricing, such as removal of subsidies and subsidies restructuring; tariff liberalization and price setting (Besant-Jones, 2006); adoption of new energy technology, new financial schemes and community involvement (Prasad, 2008).

Despite these reform efforts, in no country in Africa (and in few other developing regions) has the standard reform model been fully realized (Gratwick & Eberhard, 2008b). Currently, electricity reform in SSA has been very much a process in flux (Kessides, 2012a) and lags far behind what was implemented in developed countries after a period of 25 years (Foster et al., 2017, p. 2). Reform is a work in progress, often moving much slower, or in a different direction, than originally anticipated (Williams & Ghanadan, 2006). The reforms have proven much more difficult to adopt than originally believed (Foster et al., 2017). Nowhere in Africa do we find full wholesale or retail electricity competition. A minority of countries have implemented some form of unbundling. More countries nowadays have only introduced independent regulators and IPPs but shied away from other reform measures. Indeed, the dominant model across Africa could be described as a hybrid-market structure, where the incumbent state-owned utility remains in a dominant position and is the single-buyer of electricity from IPPs (Eberhard et al., 2016). There are a limited number of exceptions – such as Uganda, Nigeria, Cameroon, Cote d'Ivoire and Gabon – where utilities have been unbundled and privatized[4].

We have also seen competition for the market in the form of competitive tenders or auctions for long-term contracts with IPPs (Eberhard, Gratwick, Morella, & Antmann, 2017a). IPPs have been an important

[4] Private sector participation refers to model 3 classification of scope of private sector participation reform as defined by (Foster et al., 2017, p. 28) as "at least one generation company and at least one distribution company has been privatized or has some form of private sector participation".

source of new investment in many developing countries. In parts of SSA, their introduction has led to a major increase in generating capacity (Meyer et al., 2018a). Moreover, many of these IPPs have exhibited superior technical performance relative to the state-owned utilities. While this has led to an investment surge into private generation assets, leaving transmission and distribution infrastructure behind hurts the financial solvency and expansion plans of these utilities. In fact, during 1995–2015, IPP capacity in SSA doubled every five years, primarily in countries with attractive credit ratings and stable investment climates, while investment in transmission and distribution infrastructure lagged significantly during the same period, falling well short of the US$435 billion estimated necessary for universal access by 2040 (Castellano et al., 2015).

Power sector reforms should improve performance. The structures of electricity markets have a strong influence on whether, and the extent to which, reforms can achieve improvements in performance (Jamasb et al., 2014). Successful electricity reforms are expected to enhance the efficiency of the sector, improve energy service reliability and service quality, reduce the price–cost gap through cost-reflective tariffs and increase investments (Kessides, 2012b). Reforms should also enhance the technical, operational (including improved access to energy) and economic efficiencies of the sector. While private participation in infrastructure (PPI) generally has a positive effect on performance, it does not always improve all performance indicators. Eberhard, Rosnes, Shkaratan et al (2011), in their report 'Africa's Power Infrastructure' argue that disaggregated data on PPIs, however, reveals that utilities in countries with independent power producers (IPPs) almost always fare better, and that private concessions are far more effective than private management contracts in improving performance. Countries with management contracts have generally failed to make any major or sustained improvements (except in labour productivity).

The importance of energy as a production input and necessary final consumption good implies that energy reforms should be conducive towards economic growth and poverty reduction (Jamasb et al., 2015). Hence, the improvements from the energy sector reforms can be analyzed from an impact perspective encompassing energy prices/subsidies optimization, and technical/economic/operational efficiency. Indeed, results from an instrumental variable analysis by Urpelainen and Yang, (2017) demonstrate that the effect of IPPs' investment in electricity generation is large and positively related to economic growth. Similarly, an econometric analysis by Zhang et al., (2008) found that in contrast to weak statistical robustness of privatization and regulation effects, there is strong evidence that the introduction of competition leads to significant improvements in performance, since competition appears to bring about

favorable results for service penetration, capacity expansion, labour efficiency and lower prices to industrial users (Vagliasindi, 2012). In addition, more recent studies have found that the introduction of private sector participation is linked to a significant improvement in labour productivity and distribution losses (Bacon, 2018; Trimble et al., 2016).

However, despite more than two decades of implementation of reforms in Africa, with varying starting conditions, the anticipated performance improvements have been disappointing (Jamasb et al., 2015; Sioshansi, 2006). Reforms seem to have failed to correct the chronic under-investment in power supply in many developing countries (Jamasb et al., 2015). Internal reviews by the World Bank determined that the empirical results of private-sector-led electricity reforms were poor (Foster et al., 2017; Nepal & Jamasb, 2012). Sub-Saharan Africa lags behind other regions in installed capacity, electricity production, access rates, costs, and reliability of supply. Many other performance indicators are also sub-par. For example, the utilities have an average of only about 150 customers per employee, compared with an average of more than 500 in the high-income member countries of the OECD. Transmission and distribution (T&D) losses now average 25%. Commercial efficiency, collection rates, and cost recovery are also poor. Electricity continues to be sold at rates below cost recovery and infrastructure is not well maintained. (Eberhard & Dyson, 2019; Eberhard & Godinho, 2017; Eberhard et al., 2011; Jamasb et al., 2005; Kapika & Eberhard, 2013).

To emphasize the persistent failures of reforms in electricity supply industries, a more recent study by Trimble et al, (2016), quantifying the magnitude of certain inefficiencies as quasi-fiscal deficits (QFD)[5] in cost recovery, notes that average electricity access rates of 35% in sub-Saharan Africa are less than half of the average levels of access of 85% found in other regions. They further note low levels of average annual consumption of 375 kWh per capita in SSA, poor quality of service, median cost of electricity of US$0.21 per kWh billed, high tariffs of a median of US$0.15 per kWh (Trimble & Kojima, 2016) and overall quasi-fiscal deficits equivalent to US$21 billion in constant 2014 US dollars. In comparing current costs (aggregated into OpEx and CapEx, with unrebated taxes captured in OpEx) with cash collected, they find that only two countries (Seychelles and Uganda) achieve full cost-recovery for financial viability (Trimble et al., 2016). The study's findings reveal that only 19 of the 39 utilities sampled collected enough cash to

[5] Quasi-Fiscal Deficits (QDF) is defined as "the value of the implicit subsidy computed as the difference between the average revenue charged and collected at regulated prices and the revenue required to fully recover the operating costs of production and capital depreciation".

cover operational expenditures only, hampering their ability to invest capital to meet demand reliably and to keep up with population growth and rising incomes.

In summary, power sector reform in SSA and other emerging economies has not been a uniform progression towards a standard, predetermined outcome, but rather a variable process that involves complex interactions between the state, sector institutions and power market elements (Cubbin & Stern, 2006; A. D. Lee & Usman, 2018). It is difficult to account for present power sector conditions, or to consider future outcomes without considering the reform process itself. We thus need to delve more deeply into the reform dynamic and history in specific countries.

2.3 Prevailing Challenges: Generation and Transmission Expansion Planning

Previously, the incumbent state-owned power utility generally assumed responsibility for generation expansion planning. In many cases, these utilities ran into financial difficulties: investment costs were high, and tariffs were insufficient to fund the required new investment. Today, most utilities in Africa are under-investing: they simply do not have sufficient financial resources. As noted, growing pressure for power sector reforms has encouraged the entry of IPPs and new private investment that supplements the utilities' efforts. However, in these hybrid markets it is often unclear who is responsible for generation expansion planning and, as a result, the function has fallen through the cracks (Eberhard et al., 2016). Today, power sector planning, especially for generation, is still ambiguous and uncoordinated and often shrouded in controversy. Achieving energy security remains a huge planning and procurement challenge for fast-growing developing economies. Foster et al.,(2019) argue that good sector planning entails technically grounded plans for both generation and transmission that are fully integrated with other relevant plans, and they recommend that plans for generation and transmission be coordinated and mutually consistent. Ideally, generation planning should be aligned with the country's broader energy plan (for countries with primary energy resources) and be compatible with the overall national development plan. Consulting with stakeholders during the planning process helps to bring in these wider perspectives. In practice, deficiencies can be found in the planning framework for both generation and transmission (Foster & Anshul, 2019).

In addition, the institutional responsibility for planning needs to be clearly assigned to an entity with adequate technical capacity (Mugisha, 2011; Trotter, McManus, & Maconachie, 2017). A wide range of institutional arrangements for power systems planning can be observed across countries. According to Eberhard et al, (2016), if the planning function remains with the national utility, strong political leadership is crucial to ensure that the incumbent utility works with the state to achieve national goals and objectives.

Alternatively, the planning function may be transferred to another institution—within the government, the regulator, or to a new independent planning body—or attached to an unbundled, independent transmission and/or system operator. If this transfer is to be successful, the planning function needs to be properly resourced in terms of people, software, finances and institutional capacity. Global experience shows that the most prevalent are cases where the planning function is assigned either to the line ministry or to the power utility; in some cases, it is assigned to both. For sectors that are unbundled, it is the transmission utility that may retain the sector planning function (as in Egypt and Pakistan). Planning may also be shifted to an independent entity such as Brazil's Empresa de Pesquisa Energética or the Central Electricity Authority of India. An interesting variation is found in Kenya and in Uganda, where the regulator is given explicit responsibility for power system planning although planning and regulation are two distinct functions, one more strategic in nature and the other more supervisory (Foster & Anshul, 2019; Foster et al., 2017). Most sub-Saharan countries have inadequate capacity and end up contracting out this function to consultants. Master plans for least-cost generation expansion are produced but are often not implemented. Tanzania is a case in point—it has a master plan, but this is not fully used in practice. Meanwhile, the country still experiences power shortages, as do many other countries in the region (Eberhard et al., 2016). In Uganda, the least-cost development plan (LCDP) has not been followed either, for example in procuring Chinese-funded power projects, leading to excess supply compared to available demand while transmission infrastructure is limited and in poor technical condition.

Although the institutional location of power sector planning is important, equally important is the nature of that planning. Planning needs to be up to date and flexible to ensure security of supply, a least-cost mix of generation plants, and the right combination of exports and imports (Eberhard et al., 2016) to guarantee security of supply. Ultimately, the impact of good sector planning depends on its being linked to timely, competitive, and transparent procurement processes for new capacity. This is because critical investments in generation and transmission have significant lead times and must be initiated well ahead of when they are needed, which, in turn, requires that plans be clearly time-bound and that their implementation be mandatory (Foster & Anshul, 2019). Only in South Africa and Nigeria do we have planning that is linked to generation procurement (Eberhard et al., 2016), although its implementation has continuously met significant resistance and delays from political forces and workers' unions.

2.4 The Experience of Latin America: Reforms and Generation Expansion Planning

Latin America is one of the pioneering regions to experience, in the early 1980s and 1990s, a successful deep diffusion and uptake of the first wave of power sector reforms, namely regulation, restructuring, competition and private sector participation (Eberhard et al., 2016; Foster & Anshul, 2019). The region experienced considerable attraction of generation investments, especially IPPs. Today, wholesale and retail competitive arrangements have become the norm compared to other developing regions of the world (Foster & Anshul, 2019). However, Latin American countries still struggled to deliver credible long-term planning and procurement processes, to attract adequate investment, or to address short-term energy security risks in the 1990s. The 1990s model implemented in some Latin American countries such as Brazil had little to say on the issue of planning, with an implicit assumption that the advent of a wholesale power market would somehow circumvent the need for it. The end goal of the 1990s model was to create a competitive market. The supposition at that time was that private investments in power generation could be guided by price signals (Millan, 2005). The role of the state was seen primarily as the regulator of a privately owned and operated competitive sector, and great emphasis was placed on the creation of a capable regulatory institution and associated legal framework (Pardina & Schiro, 2019). Subsequently, central planning functions were overlooked or downplayed. Indeed, in some countries, the planning function, traditionally housed in national power utilities or line ministries, fell between the cracks as power sector reform processes worked toward the unbundling of the incumbent utilities and toward the creation of technical capacity in regulatory agencies outside of line ministries. In practice, power markets proved difficult to establish in all but a handful of developing countries, and even among those countries, price signals have not provided an adequate basis for investment decisions (Rudnick and Velasquez 2018).

With electricity demand in the region growing at rates of 6–7% per year since 1990 (Steinbuks, de Wit, Kochnakyan, & Foster, 2017), achieving supply–demand balance and associated energy security calls for major investments that may entail a doubling of power system capacity every decade. Keeping up with this exacting pace requires countries to develop sound least-cost generation plans that identify the most cost-effective path of generation expansion, and to implement these in a timely fashion by creating a strong institutional link between planning and associated procurement of generation capacity. By contract, investors did not always (until 2004) receive the right signals for the long-term expansion of generation capacity in line with increasing demand (Eberhard et al., 2016). Specifically, the economic signal provided by the spot market was too volatile to correctly indicate and stimulate the entrance of

new capacity. Therefore, prices did not reflect the scarcity of energy (Tolmasquim, 2020). With a significant share of capital-intensive hydropower in the generation mix, Brazil was forced to fall back on energy rationing during dry periods, especially in the period 2001–2002 (Eberhard et al., 2016). This led to a second wave of reverse reforms in some countries and secondary reforms in others – such as the introduction of long-term bidding processes (competition for the market), a larger role for government in procurement and regular generation expansion planning.

Today, most countries in Latin America combine competition for the market with competition in the market (mostly in balancing markets), with government playing a key role in planning and procurement processes (Eberhard & Godinho, 2017; Eberhard et al., 2016). The second wave of reforms, triggered by the energy crisis in Brazil in 2004, focused on delivering adequate power supply and on the centralized planning of power expansion. Competitive tenders or auctions were used to build and operate new generation and transmission facilities. In order to provide more revenue certainty and to attract long-term financing for new power capacity, long-term bilateral contracts between the new IPPs or transmission companies and financially viable distribution companies (DisCos) were made mandatory (Eberhard et al., 2016).

Subsequently, multiple auctions have been held each year, with impressive capacity and price outcomes. In 2016, 65 gigawatts of new capacity have been contracted (40% hydropower, 33% renewable energy, and 27% thermal) and wind prices are now as low as US$ 0.05/kWh (Eberhard et al., 2016). This has subsequently increased to 95 gigawatts of new capacity in 2020 (Tolmasquim, 2020). “PPAs include capacity factors of the plant that have to be guaranteed by the IPP, and penalties in case actual production is lower than the guaranteed value. This analysis of the Brazilian energy auction and contracting system demonstrates the significance of the second wave of power sector reforms that have swept across Latin America (and some other emerging economies), aimed at incentivizing and facilitating new investment in power generation” (Eberhard et al., 2016). This was possible partly because a competitive wholesale market was created with a spot market as well as with independent institutions responsible for sector regulation, monitoring and market administration (Tolmasquim, 2020). “Africa has not progressed as far as Latin America and other regions in the privatization and establishment of wholesale electricity markets; nevertheless, it can learn from Latin America’s second wave of reforms, in particular, the practices and tools used to attract sources of new investment in power generation capacity—and to foster competition among them” (Eberhard et al., 2016).

In general, “even where components of the ‘standard model’ have been implemented, attracting private investment in power infrastructure, improving energy security and increasing energy access have not necessarily followed. As a result, many of the same conditions that drove reforms in the 1990s still stand and continue to undermine economic growth and development”. These include “deep operational and financial crises in utilities; a significant investment gap; insufficient, low quality and unreliable supply, and inadequate access for residential, public, commercial and industrial consumers. Power sector reform remains a developmental imperative, of which the core challenge remains delivering adequate power at the least cost while ensuring that utilities, delivering adequate electricity services at competitive prices, are technically efficient and financially sustainable “(Eberhard & Godinho, 2017).

2.4.1 Lessons from Latin America – Planning as a Trigger for the Second Wave of Reforms

A second wave of reforms especially in Latin America shifted emphasis to long-term generation and transmission expansion. More focus was dedicated to improving the technical and financial performance of electricity distribution. This does not mean the traditional elements —such as unbundling, independent regulation, privatization, and competition—are unimportant or irrelevant. As has been observed, reforms remain important provided they improve sector governance and the enabling environment for IPPs. They also serve to boost a country’s credibility—or reduce the risk perceived by power sector investors. In addition, reforms and private sector participation can improve utility performance. Where there are real conflicts between state-owned generation and the procurement of IPPs, unbundling generation from the transmission company and system operator – or market operator– might make sense. And competition for the market remains critical.

“Latin America’s second wave of power reforms demonstrated how the traditional reform model was tweaked to attract adequate investment in new power generation capacity, especially in capital-intensive technologies such as hydroelectricity and in new, renewable technologies such as wind energy. Most Latin American countries had undergone a process of unbundling, privatization, and the establishment of wholesale spot markets. Even so, it became clear that long-term contracts with financially viable off-takers were critical to generate secure, reliable financial flows to pay for large investments” (Foster & Anshul, 2019). A refocus of a second wave of reforms in “Brazil, Chile, Colombia, Panama and Peru shifted emphasis from prescriptions regarding unbundling, privatization, and the creation of wholesale markets (competition in the market), to the establishment of dynamic plans for long-term generation and transmission expansion. Planning was linked to the timely initiation of competition for the market—through the auction of long-term power contracts backed by creditworthy off-takers” (Foster & Anshul,

2019). Of particular importance were efforts to improve the technical and financial performance of electricity distribution. The proviso remains that unless a utility operates efficiently, and sufficient revenue is being collected to pay for operations and investment (including contracts for power), sector reforms cannot meet their objectives (Eberhard et al., 2016).

The power sectors in Africa, however, face two enduring challenges – accelerating investment in generation capacity to power economic development, and, secondly, improving performance of utilities so that they are creditworthy purchasers of power from IPPs and can also deliver electricity services on a sustainable basis. In response to these challenges, focus on planning, procurement, and contracting practices for new generation investment must be renewed. Simultaneously, improvements need to be made to the performance of distribution utilities (Eberhard et al., 2016).

Africa's power sector reforms have not progressed as far as Latin America's. Most African countries are constrained by structural issues such as weak public sector capacity, vulnerable economies, weak governance systems, political crises and weak investment climates. Nonetheless, what is important about Brazil's experience is not the type or degree of reforms put in place, but rather the key principles underpinning reforms: openness and transparency in the planning of power expansion; transparency and predictability in the competitive procurement of generation capacity, and robust oversight by the ministry and the sector regulator. It is important to note that the reforms first commenced with efforts to improve the operational and financial sustainability of electricity distributors. These distributors then had to take responsibility for securing adequate power through a centrally managed, fully competitive procurement process.

The other lesson for sub-Saharan Africa from the Brazilian second wave of power sector reforms is to focus on planning and competition for long-term contracts that facilitate capital-intensive investments, backed by financially viable distribution utilities and appropriate risk mitigation, rather than relying on competitive wholesale spot markets. Also, all power purchased by distribution companies to meet their demand must be procured following competitive arrangements monitored by the sector regulator. For example, Kenya has an investment climate that is better than that of Tanzania and Uganda and has been able to attract private investment at a lower cost than its neighbours. Its electricity sector has been unbundled; it has an independent regulator, and it once had a clear power-planning process and a competent procurement capability in the Kenya Power and Lighting Company (KPLC), the transmission and distribution company. The regulator has helped move tariffs towards cost-reflective levels, and the KPLC has been reasonably creditworthy (Eberhard et al., 2016; Godinho & Eberhard, 2019b). However,

recent trends in political influence to halt and defer necessary tariff reviews, combined with the growing debt burden occasioned on the utility by the government, threaten the financial viability of the sector.

Tanzania. on the other hand, has a weaker investment climate, some ambivalence around private sector investment, a vertically integrated state-owned utility with technical and financial performance challenges, and poor planning and procurement practices—despite a regulator that seeks to encourage more transparent and competitive procurement. Tanzania has relied more on unsolicited bids and direct negotiations than on competitive tenders. As a result, some IPPs here stand out for their high prices and controversial contracts as explained in the next chapter (Eberhard et al., 2016; Godinho & Eberhard, 2018; Kapika & Eberhard, 2013). Uganda's recent success has relied less on its overall investment climate and more on a clear power sector structure and a recent competitive tendering programme for small renewable energy power plants like the GETFiT programme (Kruger & Swartz, 2018). With its power sector unbundled, IPPs contract directly with the transmission company, free of conflicts with state-owned generation, and the privately concessioned distribution company is increasingly more effective in reducing losses and improving its financial viability (Eberhard et al., 2016, pp. 38–44.)

Looking forward, the widespread challenges and weaknesses that trouble African power sectors continue to experience a chronic energy security challenge for the continent. Operational, technical, financial, equity, and political quagmires continue to hamper utilities' performances, affecting their ability to deliver quality electricity services and to invest in developing and maintaining infrastructure. As a result, most utilities struggle with underdeveloped and poorly maintained infrastructure, eventually resulting in power outages, low access rates, low availability of electricity, and high levels of system losses. Utilities often manage their energy shortfalls with strategic load-shedding or "planned outages", causing unpredictable blackouts to homes and businesses. Transmission infrastructure, a critical link for power delivery, has also suffered from underinvestment, unable to transport the needed energy from its generation sites to the millions of consumers who rely on it. These weaknesses increase overall system costs and also contribute to rampant poor quality and reliability of electricity supply on the continent except in some countries in SSA, and most countries in North Africa, that stand out with reliable systems (Eberhard & Dyson, 2019). Eberhard and Dyson, (2019) further argue that utilities facing a lot of technical and financial challenges struggle to gain the confidence of customers and investors (largest potential source of funds); yet, accessing finance from the private sector is essential for developing new projects as they are easily deterred by the high risk of investing in a dysfunctional system. Meanwhile, the close to 650 million people who lack access to electricity represent most of the continent's poor and rural populations, raising the

problem of equity among urban-rural and class divides. Equity problems are compounded by the high cost of power, commonplace corruption, and often opaque and unsustainable subsidies (Eberhard & Dyson, 2019).

Nonetheless, second and third waves of reforms have been initiated to address issues overlooked in the initial standard-model reform programmes, including policies to ensure social and environmental sustainability as well as more significant competition. The new phase of reforms takes cognizance of the increasing role of innovation in more efficient technologies, new and cheaper energy sources, flexible corporate management regimes, growing regulatory certainty and changes in customer preferences for more convenient retail services.

2.5 Powering Ahead: The Third Wave of Reforms

Disruptive technologies are prompting a new wave of power sector reforms across the globe. The world of energy is changing profoundly and rapidly. Accelerated innovation in power technologies, services and markets is shifting and upending relative prices and market shares, as well as the location and patterns of energy production and use. Electricity consumers are gradually becoming producers, too, as digitalization, information and communication technologies are used in more complex and decentralized ways since low cost, renewable and distributed energy, and storage resources have become competitive (Eberhard, 2006; Eberhard & Dyson, 2019; Kruger et al., 2018). Globally, we are seeing a dynamic energy sector in transition. Eberhard & Dyson,(2019) identify major elements of the third wave of reforms as follows:

Table 2.2: Elements of The Third Wave of Power Sector Reforms in Africa

Reform Driver or Impact Area	Likely Impacts, Experience and Implications
Renewable Energy Sources	Solar and wind energy are breaking through in Africa, facilitated by successful auctions which are delivering cheap unsubsidized grid-connected power. This breakthrough is coupled with continued innovation in storage technologies, and growing experiences with new business models for mini-grids and off-grid solutions (Kruger et al., 2018).
Generation Mix and Investments	Capacity additions in Africa until 2030 will be dominated by hydropower resources, natural gas, solar, wind, geothermal, and biomass. IPPs and auctions continue to permeate in Africa (Kruger & Eberhard, 2018). This aligns with a sea of change in the global energy mix. Demand in Africa is forecast to increase with a compound annual growth rate of 5.7% (Multiconsult, 2018). Both increasing electricity access and GDP growth contribute to this increased demand, with some regions—notably West and East Africa—projected to increase demand by 10% and 11% yearly.
Distributed Energy Generation, Technological Innovations, ICT, Net	A new generation of consumer-producers—or prosumers—electricity will flow in both directions. With real-time control over their electricity consumption and output, individuals will gain insight into their energy requirements and consumption, gain the ability to control the energy sources they use and the end-user they sell on to. Smart devices and controls will

Metering and Customer Preferences	complement smart meters, armed with machine learning and artificial intelligence to maximize comfort and economy.
Transmission Systems	There will be a new impetus to unbundle transmission systems to create independent system and market operators. These will be responsible for managing variability, flexibility, reliability and system strength as well as quality.
Distribution and Retail Services – Blockchain Technology	Electricity distribution and payment systems could use distributed ledgers or blockchain technology for accounting purposes, even at a household level (Chitchyan & Murkin, 2018). Blockchain, an online communication protocol that eliminates intermediaries, allows companies or individuals to create an auditable encrypted ledger that can record energy consumption and credit histories. These secure ledgers can facilitate energy trading between households
Integrated Distribution Framework (IDF)	Grids and power systems will transition to more radial structures with meshed patterns to drive electricity access (Pérez-Arriaga et al., 2019). Smart grids with new geometries will begin to emerge from a new landscape of traditional electricity networks interspersed with mini-grids, community grids, and distributed individual generation systems. Modular RE technologies offer to bring generation closer to consumers, even as large low-cost sources of generation remain centralized and distant. Mini-grids and off-grid systems are increasingly attractive and cost-competitive for remote communities and help to create incubation of anchor loads to stimulate demand (in rural areas with low loads) from complementary businesses not related to energy. Harnessing cold chain supply systems & appliance financing will boost incubation of loads.
Markets and Regulation	Regulatory reforms will be essential to respond to these transformations. These reforms will be designed to free up markets for willing buyer/seller arrangements, wheeling across the grid, and for smart metering.
Technology and Automation	Digitalization of the electricity system will be transformational for every aspect of system operations, planning, and maintenance. An explosion of new data sources will change how system operators work, and how customers engage with, consume, and manage their consumption. In addition to smart meters and Geographic Information Systems (GISs) – for example, '5G' data networks, social media, mobile apps, cloud apps and storage, sensor data, Global Positioning Systems (GPS), drones, critical infrastructure data, Enterprise Resource Planning (ERP), and blockchain data transfer – all of the aforementioned will be harnessed for decision support through virtual and augmented reality, artificial intelligence or machine learning, and cognitive intelligence. These have vast consequences for control and automation in power trading, remote switching, and automated operations.

Source: Author's creation based on Eberhard & Dyson, (2019)

While the third wave of reforms offers a promising outlook with diverse opportunities, the coming years herald major new challenges for power sectors worldwide if not properly prepared for and addressed in time. New actors and technologies bursting onto the scene will catalyze rapid changes in the landscape and needs of the sector. For example, cost reductions in renewables and advances in digital technologies are opening huge opportunities for energy transitions, while creating some new energy security dilemmas (International Energy Agency, 2019c; Metayer, Breyer, & Fell, 2015). Therefore, the explosion in new capacity additions from variable renewable energy – thanks to drastic price drops, succeeded by a similar cheapening in energy storage costs and technology proliferation – will trigger a need for new grid

management approaches and rules, including needs for utility business models. Likewise, traditional regulatory and business models face new challenges as well as opportunities in the rise of mini-grids and off-grid electricity providers in under-electrified areas (including energy communities that wish to gain independence from national systems). These transformations are being swept along with increasing digitalization, the arrival of proactive, self-generating consumers (prosumers), and the electrification of transport and electric vehicles (Eberhard et al., 2016; Foster & Anshul, 2019). In addition, Eberhard & Dyson, (2019) recognize that some actors in the power sector are foreseeing shifts in their roles, or even losing status, in response to these new trends, and that fuel suppliers for private gensets may have an option to diversify into the domestic solar panels business, or explore other interesting avenues for small-scale energy providers. In the context of greater regional integration, power trade, distributed energy and consumer-owned systems, transmission system operators and distribution utilities could all have entirely new job descriptions and responsibilities. Two likely scenarios of caution from the new reforms advanced by Eberhard & Dyson, (2019) are first, that as consumers gradually take greater control of their energy usage and production, including through solar home systems, smart meters and smart homes, storage solutions and electric vehicles, some technologies will become ubiquitous as they become economical for all, while others will rapidly lose economic value and could become stranded assets. This could accompany another push to unbundle state-owned generation system from the transmission and system operator. Secondly, system designers will realize the need to assign more responsibilities, skills, and capacity to Independent System Operators (ISO) to respond to these changes, manage increasingly complex energy demand and production patterns, and engage in real-time power trade (Eberhard & Dyson, 2019). This will promote grid stability and reliance for all consumers.

In general, African power sectors require a creative approach to respond to rapid global innovation in energy technologies and markets, identifying what types of reforms and implementation strategies will be useful and necessary to unlock the desired transformation. The electricity sector has a central role in underpinning and catalyzing green growth strategies (Eberhard & Dyson, 2019). Countries need to define context-specific models for future reforms, ensuring local ownership to embrace solutions that will work to meet countries' needs. This will provide an antidote to negative ideas or apprehension about reforms, often centered around losing sovereignty or control. More than ever, energy decision-makers need to take a hard, evidence-based look at where they stand and the implications of the choices they make. The following section explores one such creative approach: principal–agency theory that seeks to combine with power sector reform literature to provide a more powerful analytical framework for understanding governance and structural incentives for improved utility performance in the three case studies.

2.6 The Principal–Agent Theory and Its Origins

From a governance perspective, power sector reforms have encompassed new approaches to the organization, oversight and management of the sector, including changes to utility structure, ownership and governance systems, as well as changes in the utilities' monopoly status and the introduction of new market arrangements. However, the power sector reform literature does not help us fully to understand the consequent variations in utility performance and we shall have to turn to other bodies of theory to more fully understand the empirical evidence that is emerging.

This dissertation seeks to combine the literature and theory of power sector reform with principal–agent theory to provide a more powerful analytical framework that more adequately explains the variation in performance of utilities, in this instance power utilities in East Africa.

The principal-agent theory has its origins in the works of economists in 1960s and 1970s – for example Arrow (1971) and Drèze (1971) – who investigated the problem of risk-sharing among individuals as one that arises when cooperating parties have different attitudes toward risk. Risks should be allocated to the party best able to bear them – either through their wealth portfolio or their ability to pool risks. Principal–agency theory extended this risk-sharing literature to include the agency problem that occurs when co-operating parties or individuals have different goals (Jensen & Meckling, 1976) and division of labour (Laffont & Martimort, 2002; Smith, 2002). Specifically, agency theory is focused on the simplest and most common relationship in which one party (the principal) delegates work to another (the agent), who performs that work at agreed-upon terms. Agency theory describes this relationship using a metaphor of a contract (Jensen & Meckling, 1976; Laffont & Martimort, 2002).

According to Eisenhardt (1989a), agency theory is concerned with resolving two problems that can occur in agency relationships. The first is the agency problem that arises when (a) the desires or goals of the principal and agent conflict, and (b) it is difficult or expensive for the principal to verify what the agent is actually doing. The problem here is that the principal cannot verify that the agent has behaved appropriately. This has subsequently been empirically modelled and demonstrated by various economist scholars such as Laffont & Martimort (2002) and by Sappington (1991a).The second is the problem of risk sharing that arises when the principal and agent have different attitudes towards risk: the principal and the agent may prefer different actions because of their different risk preferences.

Since the unit of analysis is the contract governing the relationship between the principal and the agent, the main focus of the theory is on determining the most efficient contract governing this relationship. The contract has to take into consideration a number of assumptions about people (for example, self-interest,

bounded rationality, risk aversion) or assumptions about organizations (for example, goal conflict among staff) or assumptions about information – for example, information may be asymmetrically available and is a purchasable commodity (Greenwald & Stiglitz, 1990; Stiglitz, 2000, 2012).

Table 2.3: Agency Theory Overview

Key Idea	Principal–agent relationships should reflect efficient processes and practices in the treatment of information, including performance efficiencies and risk-bearing costs
Unit of Analysis	Contract between principal and agent
Human Assumptions	Self-interest
	Bounded rationality
	Risk aversion
Organizational Assumptions	Partial goal-conflict among participants
	Efficiency as the criterion of effectiveness
	Information asymmetry between principal and agent
Information Assumption	Information as a purchasable commodity
Contracting Problems	Agency – moral hazard and adverse selection: (i) Perquisite consumption (ii) entrenchment
	Risk sharing and allocation
Problem Domain	Relationships in which the principal and agent have partly differing goals and risk preferences (e.g., regulation, compensation, leadership, impression management, vertical integration, unbundling, transfer pricing, etc.)
Principal–Creditor Conflict (Unique agency problems)	Risky investments threaten investor returns

Source: Modified by the author from Eisenhardt (1989)

The above table summarizes the key constructs of agency theory as the relationships that reflect the basic agency structure of a principal and an agent who are engaged in cooperative behaviour but have different goals, interests and attitudes towards risk. In the literature search undertaken for this study, emphasis and attention had been paid to studies on developed and emerging economies but very few were on low-income developing countries in sub-Saharan Africa. The research, however, introduced a new phenomenon of unique agency problems that are faced in private as well as in public corporate entities with mixed capital and ownership structures, manifesting as principal-creditor conflicts that present greater complexities of the agency problem, particularly in low-income economy settings. The literature was extended to consider earlier works of Berle & Means, (1932) which emphasized the problems of delegation and role separation, that arise from the separation of ownership and control in a modern corporation, such that managers have powers to pursue their own interests at the expense of interests of their shareholders –for example, role separation and delegation increase risk for the agent.

Considering principals and agents have different attitudes towards risk (Eisenhardt, 1989a), each will try to maximize their benefit given their selfish nature. In a simple model of a principal and an agent, three basic families of principal–agent conflicts are likely to arise (Hviid, 2000) that explain this behaviour. In *adverse selection*, the agent has hidden information about his characteristics and the principal moves first to compel the agent to reveal the information. The principal's problem is to offer a contract that induces the agent to reveal his true type. In *signalling*, "the agent has hidden information regarding his type and moves first. The agent's problem is to take some visible action that the principal will correctly interpret as revealing the agent's type. In *moral hazard*, the agent moves first and takes some action that the principal cannot observe. The principal's problem is to establish a contract that induces the agent to take actions that the agent does not want to take, but that the principal values"(Steyn, 2001). An example of a moral hazard problem is a regulator (as the principal) offering incentives to a utility (the agent) to increase power sales or reduce losses.

Principals base their choice of mechanisms for solving adverse selection and moral hazard problems on the costs and benefits of the alternative approaches. There are two basic types of mechanisms – behaviour-based contracts (command and control) and incentive contracts (Jamison, 1998) that give rise to agency costs as that principals must bear. To this extent, Eisenhardt, (1989a); Sappington (1991b) and Shirley et al., (2017) argue that greater principal risk aversion is highly correlated with high costs of measuring behaviour, and goal conflicts are negatively related with behaviour-based contracts and positively related with incentive contracts. Likewise, Tosi (1984) argues "that the principal and the agent must each receive utility/satisfaction that exceeds their individual reservation utilities in order to be willing to increase production. Therefore, incentive compatibility, or truth telling, requires that the agent be better off expending effort rather than shirking, or truthfully revealing her type rather than lying". This works "by making the agent at least a partial residual claimant of the benefits of the relationship" (Sappington, 1991b; Tosi & Slocum, 1984). Incentive compatibility implies that the performance measure must be something the agent can affect (Schmidt, 1994). It also implies that, because incentive contracts shift risk to agents, agents need to be either risk averse or compensated for their risk (Eisenhardt, 1989a; Sappington, 1991a). Sappington (1991b) further explains that credible commitment by the principal is important, especially if circumstances change. It is therefore in the principal's best interest to keep his commitment especially in reform contracts (Shirley & Xu, 2017). In consideration of these elements of agency problems, the thesis reviews below the key lines of arguments in support of agency theory.

Agency theory has been developed along two schools of thought: the positivist theory of agency and principal–agent (Jensen, 1983). Both literatures address the same contracting problem between self-interested maximizing parties (with the contract as unit of analysis) and both use the same agency cost minimizing tautology. They however differ in their mathematical rigor, dependent variables and style.

2.6.1 The Positivist Agency Theory

The positivist school of thought is based on identifying situations in which the principal and the agent have conflicting goals and then describing the governance mechanisms that limit the agent's selfish behaviour. This makes the positivist research less mathematical than its counterpart, the principal–agent research (Eisenhardt, 1989a). In addition, positivist researchers have focused more exclusively on the special case of principal–agent relationship between owners and managers of large, modern, public corporations (Berle & Means, 1932). For example, Fama (1980) discussed the role of efficient capital and labour markets as information markets that are used to control the selfish behaviour of top executives. This dissertation includes an assessment of the role of capital market authorities as regulators (principals) of the case study utilities - Kenya Power and Umeme Ltd (agents), listed on the stock exchanges in Kenya and Uganda respectively, and how listing requirements act as information markets in controlling the selfish behaviour of top executives and majority shareholders. Likewise, Fama & Jensen (1983) explored the role of the board of directors as an information system that the stockholders within large corporations could use to monitor the opportunism of top executives. Jensen & Meckling (1976) explored managerial ownership, agency costs and ownership structure of a modern corporation, identifying options through which equity ownership by managers aligns their interests with those of the owners. The theory is based on recognition of the distinction between the role of principals and agents. Jensen & Meckling further point out the generality of the agency problem as one "of inducing an agent to behave as if he were maximizing the principal's welfare" and that this paradigm exists in all organizations and in all cooperative efforts – at every level of management in firms" (Jensen & Meckling, 1976, p. 309). Agency costs then arise from the agency relationship between the principals and agents in which agents have incentives to behave in a way that is contrary to the interests of the principals. Agency costs are defined to include (i) monitoring costs – the costs to the principal of monitoring agent activities in an imperfect information system, (ii) bonding costs – costs incurred to set up and demonstrate commitment by managers to pursue the principals' objectives using contracts that limit their activity, and (iii) residual loss – the cost of agent behaviour that is not in the interest of the principal, or misaligned objectives, despite monitoring and bonding costs – for example, inefficient managerial decisions lead to a residual loss. According to Jensen & Meckling

(1976) these costs can be incurred in two types of agency conflicts; (a) conflicts between equity holders and managers (resulting in the agency costs of equity) and (b) conflicts between equity holders and debt holders (resulting in the agency costs of debt). Interestingly, in addition to these types of agency conflicts, a third agency conflict is identified by Lin & Chuang (2011). In their study of agency theory, corporate ownership and IPO underpricing in Taiwan – demonstrating that the major governance problem in corporate organizations in emerging economies is (c) principal–principal conflicts (resulting in resource tunneling and expropriation of minority shareholders). Little is known about the principal–principal conflicts in SSA, let alone in the case study countries: this research aims to extend the frontiers of knowledge on the subject.

2.6.2 Agency Costs of Equity

Managers acting as agents of equity owners often face incentives that result in behaviour that is contrary to the interest of owners. This behaviour is generally defined as incentives to appropriate corporate resources in the form of perquisites (Jensen & Meckling, 1976, pp. 212–213). They note that "as the owner–manager's fraction of the equity falls, his fractional claim on the outcomes falls and this will tend to encourage him to appropriate larger amounts of the corporate resources in the form of perquisites. This also makes it desirable for the minority shareholders to expend more resources in monitoring his behaviour. Thus, the wealth costs to the owner of obtaining additional cash in the equity.'' In addition, Jensen & Meckling highlight that the most important conflict relates to the effectiveness of managerial incentives to ensure pursuit of profitable business strategies and investments on behalf of equity holders' as it declines. They postulated: "…however, we do not mean to leave the impression that this is the only or even the most important source of conflict. Indeed, it is likely that the most important conflict arises from the fact that as the manager's ownership claim falls, his incentive to devote significant effort to creative activities such as searching out new profitable ventures falls. He may in fact avoid such ventures (shirking) simply because it requires too much trouble or effort on his part to manage or to learn about new technologies. Avoidance of these personal costs and the anxieties that go with them also represents a source of on the job utility to him and it can result in the value of the firm being substantially lower than it otherwise could be" (Jensen & Meckling, 1976, p. 313).

In consideration of the above agency cost of equity, we note how agency theory helps to explain important incentives that govern managers' and top executives' behaviour in executing key strategic and investment decisions on behalf of the firm and equity holders.

One example of such incentives is the problem posed by free-cashflows[6] as an important instance of the strategy and investment related to the equity agency problem (Jensen, 1986). The theory suggests that free cashflows or payout of cash to shareholders creates major conflicts with managers as agents. Managers and top executives of these firms are not driven by maximization of the value of the firm, but rather by the maximization of corporate wealth, defined as "the aggregate purchasing power available to management for strategic purposes during any given planning period". Jensen continues: "In practical terms it is cash, credit, and other corporate purchasing power by which management commands goods and services" (Jensen, 1986). Payouts to shareholders, therefore, reduce the resources under managers' control, thereby reducing managers' power, and making it more likely they will incur the monitoring of the capital markets which occurs when the firm must obtain new capital.

Jensen (1986, p. 323) further argues that where managers have small or no ownership stakes, they have incentives “to grow the firm beyond its optimal size”. This is partly because growth increases managers’ power by increasing resources under their control. Growth is also associated with increases in their compensation packages, because changes in compensation are positively related to the growth in sales while their exposure to penalties as a result of inefficiencies is not commensurate. Managers face a conflict of interest in choosing to return the free cashflows to shareholders or to plough them back – to fund further investment or to reduce debt (Jensen, 1986, p. 112). By contextualizing this in the electricity sector that is highly capital intensive, similarities can be seen as free cashflows are usually large in low growth capital intensive industries where debt levels have been reduced.

Many of the examples used in agency theory are to do with private firms and, at first reading, may not appear to be directly relevant to the study of the performance of power utilities. However, the extent to which shareholder and ownership control is exercised in Tanzania, Kenya and Uganda is likely to have an impact on management behaviour. Umeme operates effectively as a private company and there have been periods when the shareholders/owners have had a strong influence over management’s behaviour. In Kenya Power’s case, the shareholder influence – via multiple investors on the Nairobi Securities Exchange – is slightly weaker, but nevertheless present. In TANESCO’s case, the shareholder/owner is effectively the government, and different – sometimes conflicting – pressures are exerted on management.

[6] Jensen (1986, p. 323) defines free cashflows as cashflow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital. Alternatively, it is ‘remaining cash after operating, tax and debt financing and tax cost deductions’.)

2.6.3 Agency Costs of Debt

Agency costs of debt arise when, in a highly leveraged financial structure, equity holders have incentives to undertake projects that promise high payoffs if successful, even if they have a low probability of success (Jensen & Meckling, 1976). They argue that if the projects succeed, equity holders obtain most of the gains. However, if the project fails, limited liability means that debt holders bear a disproportionate portion of the costs. This gives rise to an asymmetric incentive structure for equity holders. They further argue that it is likely that potential debt holders would be aware of this possibility. In this case, equity holders will bear the cost of the risk that they could behave contrary to the interests of debt holders, because debt holders are likely to charge a premium for lending to the firm. In addition to the residual loss – in this case, arising from the opportunity cost caused by the adverse impact of debt on investment behaviour (Steyn, 2001) or from monitoring and bonding costs – incurred to minimise detrimental behaviour – agency costs of debt also include bankruptcy and subsequent reorganization costs (Jensen & Meckling, 1976). These reorganization costs may include paying higher salaries to induce executives to accept the higher risk of unemployment, the firing of management in the event of bankruptcy or even instigating mergers. Steyn (2001) argues that each of the agency conflicts identified by Jensen & Meckling (1976) revolve around the premise that adverse incentives lead to strategic and investment behaviour that is detrimental to the firm from the perspective of the principal.

Having explored the focus of the positivist agency theory and some of its examples, this literature search turns to two propositions by Eisenhardt (1989a, p. 60). First, outcome-based contracts are effective in curbing agent opportunism: "… when the contract between the principal and agent is outcome-based, the agent is more likely to behave in the interests of the principal". The argument is that such contracts align the preferences of agents with those of the principal because rewards for both depend on the same actions and, therefore, the conflicts of self-interest between them are reduced. For example, Jensen & Meckling (1976) describe how, first, increasing managerial ownership of the firm decreases managerial opportunism. Second, information systems help to curb agent opportunism: "… when the principal has information to verify agent behaviour, the agent is more likely to behave in the interests of the principal". The argument here is that since information systems inform the principal about what the manager is doing, they are likely to curb agent opportunism because the agent will realize that he/she cannot deceive the principal (Eisenhardt, 1989a). An example of such information systems relates to the electricity utilities listed on the stock market – for example, Umeme Ltd and Kenya Power, which operate with regulatory requirements for compliance on a set of key performance indicators.

2.6.4 Principal–Agent Theory

Compared to the positivist agency researchers, principal–agent researchers, on the other hand, are concerned with a general theory that can be applied to employer–employee, lawyer–client, insurer–insured, buyer–supplier, owner–manager and any other agency relationships (Harris & Raviv, 2016, p. 20; Sappington, 1991b). This principal–agent paradigm seeks to characterize optimal contracts and explain observed arrangements. It involves careful specification of assumptions, which are followed by logical deduction and mathematical proof (Eisenhardt, 1989a, p. 60) and, in comparison with the positivist stream, the principal agent theory is abstract and mathematical. Another distinction observed by Eisenhardt (1989a) is that the principal–agent stream has a broader focus and a greater interest in general theoretical implications, while the positivist stream almost exclusively focuses on the special case of owner/CEO relationships in a large corporation. In addition, the principal–agent research includes more testable implications. Nonetheless, the two schools of thought are complementary in nature. For example, positivist theory identifies various contract alternatives and principal–agent theory indicates which contract is more efficient under varying levels of outcome uncertainty, risk aversion, information asymmetry and other variables (Eisenhardt, 1989a; Harris & Raviv, 2016).

The principal–agent literature further focuses on determining the optimal contract – that is, behaviour versus outcome – between the principal and agent. In analyzing a simple model of goal conflict between the principal and agent, with assumptions on an easily measured outcome and a risk averse agent, Eisenhardt (1989a) identified eight propositions that describe various observed arrangements. For example, in a simple case of complete information, the principal knows what the agent is doing or has done. Considering that the principal is buying the agent's behaviour, then a contract that is based on behaviour is most efficient. It follows then that an outcome-based contract would transfer the risk to the agent, who is assumed to be more risk averse than the principal (Holmstrom & Milgrom, 2009). In the scenario where the principal does not know exactly what the agent is doing or has done, the agent, given their self-interest, may or may not behave or have behaved as agreed. The agency problem arises because (a) the principal and the agent have different goals or (b) the principal cannot determine if the agent has behaved appropriately. In the formal literature, two aspects of the agency problem are revealed: (i) moral hazard and (ii) adverse selection. Moral hazard refers to the lack of effort on the part of the agent – that is, the agent is shirking. Adverse selection on the other hand refers to the misrepresentation of ability by the agent – that is, the agent may claim to have done certain tasks and the principal cannot completely verify these tasks' being done while the agent is working.

Eisenhardt (1989a) and Laffont et al., (2002) observe that in instances of unobservable behaviour due to moral hazard and adverse selection, the principal has two options to discover the agent's behaviour. First, the principal may invest in information systems (budgeting systems, reporting procedures, a board of directors and additional layers of management) for they reveal the agent's behaviour to the principal and the situation returns to that of complete information. The second option is a contract based on the outcomes of the agent's behaviour so that the contract motivates by coalignment of the agent's preferences with those of the principal, but at the price of transferring the risk to the agent.

Relating these contracting options to the focus of this thesis, the researcher aims to build on both the positivist and principal–agent lines of research to explore scenarios through which principal–agent problems arise in electricity distribution utilities in Uganda, Kenya and Tanzania – so as to provide, a) a deeper understanding of governance frameworks and regulatory incentives that drive performance, and b) how power sector reforms alter the principal–agent relationships and incentives for improved utility performance. Linking the two bodies of literature provides a powerful analytical framework that enables us to get a deeper understanding of the variations in performance of the utilities in question.

2.7 Connecting Power Sector Reform and Principal–Agent Theory

This thesis seeks a deeper understanding of why some power utilities perform better than others and how the structural, governance and regulatory reforms alter performance incentives.

The performance of power utilities varies within different power sector reform environments. In general, it has been observed that many unreformed, vertically integrated utilities still experience enduring challenges relating to financial viability and technical efficiency (Eberhard & Dyson, 2019; Eberhard & Godinho, 2017; Eberhard, Gratwick, et al., 2017b; Kapika & Eberhard, 2013; Trimble et al., 2016). Some utilities which have been unbundled and subject to competition, private capital markets and independent regulation – for example, KenGen – have seen improved performance, as have some utilities that are governed and managed via private management contracts or concessions – for example, TANESCO during the early phase of its private management contracts, or Umeme during the latter stage of its private concession (Eberhard & Godinho, 2017; Eberhard et al., 2016; Kapika & Eberhard, 2013).

This literature review has identified two bodies of literature that, together, could provide deeper insights - the power sector reforms theory provide a typology into how governance and regulatory incentives are altered through structural reforms: unbundling, establishing independent regulators, competition and private sector participation, while the Principal–Agent theory helps us delve deeper into how each of

these structural, governance and regulatory reforms impacts the relationship between principals (government institutions or investors) and agents (utility boards or management). Bringing these two bodies together provides a potentially powerful analytical framework for a comparison and understanding of utility performance in our three case study countries. In the sections below we explore linkages of Principal Agent Theory in the standard model elements.

2.7.1 Corporatization and Commercialization

The pre-reform rationale for a centralized power structure that is dominated by a state-owned national power utility with an endowed parastatal monopoly and vertically integrated supply system covering generation, transmission, distribution and customer services was to minimize costs of coordination between these functions as well as to access public finance for the development of power systems. Typically, the governance arrangements in this context placed the vertical utility (agent) under full ownership of the government (principal) and direct supervision by the line ministry of energy – or a department within the ministry – and, unfortunately, in the bullseye of rent-seeking politicians and public technocrats who transferred utility resources to politically influential groups. Considering parastatal utilities often had non-commercial objectives and operated on soft budgets, they could easily be given instructions (state patronage) on how to fulfill certain social obligations using public resources, without adequate economic analysis and without proper accountability mechanisms. This led to systemic abuse – moral hazard – and rundown of service delivery. As a result, sector problems in the electricity sector began to emerge, reflecting the poor performance of the state-run utility shown in high operational costs, inadequate expansion of access to electricity to serve the population, and non-delivery of a reliable supply. Power blackouts and brownouts are the most dramatic instance of this with their exceptionally high costs of alternative supply (emergency power plants and backup generators) as was the case with Tanzania's Independent Power Tanzania Limited (IPTL) diesel plant contract negotiated in 1994–95 (Ghanadan & Eberhard, 2007; Godinho & Eberhard, 2018) and Uganda's Aggreko emergency thermal plants (Jamasb & Llorca, 2018; Kapika & Eberhard, 2013). The failure of supply may be partly associated with very low operating efficiency caused by lack of maintenance, power theft and so on – pervasive in the pre-reform period – and partly associated with lack of investment caused by financial weaknesses of the SOE (Bacon & Besant-Jones, 2002).

The inability of the state-owned enterprise (agent) and the government (principal) to finance new and needed investments is often compounded by poor public sector tariff-setting which does not allow the SOE to fully recover its costs, as well as by inefficiency in collecting all the revenue due to it. Hence, the

standard model's power sector reform element of *Corporatization* was conceived as a way to put the power sector on a more commercial footing (Foster & Anshul, 2019; World Bank, 2004). Corporatization was aimed at transforming the utility into a separate SOE legal entity (separate from the ministry/government), operating as a company with associated rights and obligations under the governance regulatory structure of the Company's Act (Eberhard, 2007; Foster & Anshul, 2019; Gratwick & Eberhard, 2008b). Its shareholding is defined; is able to transact independently of the government; assumes an independent identity, liabilities, and with provisions for diversity in ownership (Gratwick & Eberhard, 2008b). The corporation could be governed by a board that includes independent and non-executive members (Eberhard, 2007) and has a formal reporting structure – unlike the day-to-day management instructions and decisions in a parastatal. The Company's Act further enables the corporatized utility to independently undertake choices in managing budgets, borrowing or accessing capital markets, earning commercially competitive returns on equity capital and having the autonomy to manage procurement, labour employment, payment of taxes and dividends. The corporatized utility as an agent is then obliged to operate according to commercial principles; hence, *Commercialization* represents a move towards cost recovery in pricing, improvements in maintenance, metering, billing and revenue collections, adopting internationally recognized accounting practices as well as accounting for all subsidies.

Using the lens of principal–agent theory, the governance framework is captured in the form of a reporting relationship or contract between the government (principal) and the corporatized utility (agent), operating under company law. A change in governance is also reflected in the delegation and separation of roles of the principal and the agent, who is empowered to act independently. The contract may take the form of a shareholder agreement, a performance contract, a management contract or a concession (Eberhard, 2007), all of which are common in corporate entities. However, attempts to improve the governance and regulation of state-owned utilities are not without problems. Eberhard (2007, p. 12) argues that one of the challenges is to ensure that the shareholder compact or performance agreement – negotiated between the utility and the government ministry – is also consistent with regulatory objectives. Unfortunately, regulators do not always have access to the shareholder compact or to agreements. There are typically significant information asymmetries and the state-owned utility can seek to influence key provisions of the performance contract in a way that limits regulatory discretion. On the other hand, the state may insert additional social or developmental obligations that are not directly related to the provision of electricity services. Ideally, these should be funded from profits, taxes,

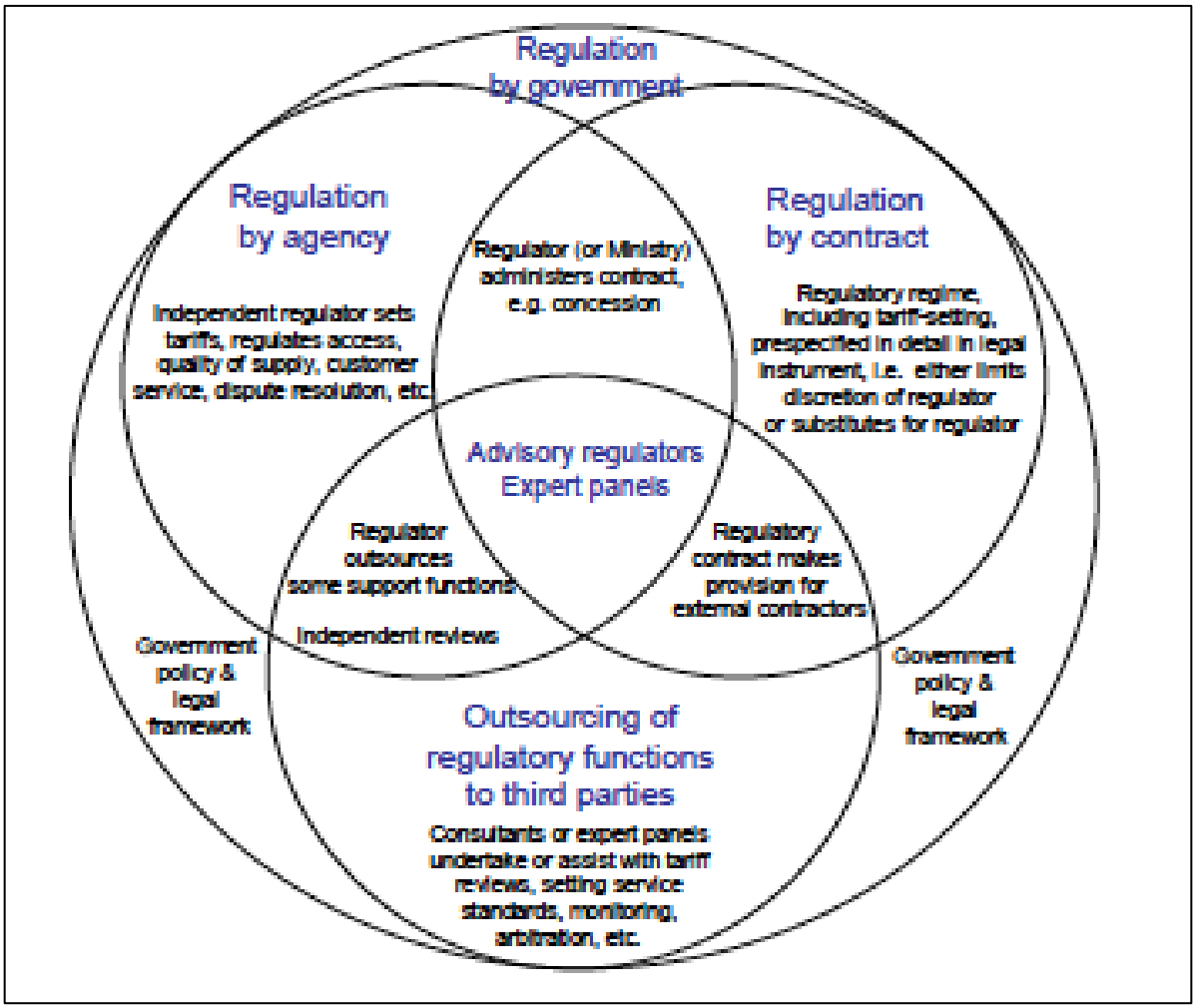
dividends, or special programmes, and not from core costs (Eberhard, 2006). These limitations impact on the overall performance of the corporatized utility.

Nevertheless, extant literature shows that good corporate practices, particularly with respect to human resources and financial discipline, were associated with better utility performance and were more prevalent among privatized corporate utilities (Eberhard & Dyson, 2019; Eberhard et al., 2016). By and large, governance scores tend to be systematically higher for private utilities, falling in the 60–90%range, compared to 50% for public utilities because of improved managerial focus, increased transparency and accountability in the former (Eberhard & Godinho, 2017; Eberhard et al., 2016; Foster & Anshul, 2019; Foster et al., 2017). Corporatization further allows for better alignment of regulatory incentives corresponding to the level of investment, cost of service and efficiency levels, as well as to managerial incentives within utilities.

2.7.2 Independent Regulation

Regulatory reform refers to the establishment of an autonomous entity with the responsibility for regulatory oversight and some role in decision making. Regulation involves overseeing the sector to ensure that policy-making and the strategic direction designed by the line principals is followed and enforced. Traditionally, policy making, regulation and service provision have been combined within the line ministry. However, with widespread corporatization of the service provider – to form an enterprise distinct from the line ministry as well as for growing delegation of these activities to the private sector – the need for a clearer regulatory function has been felt (Alexander & Estache, 2000; Foster et al., 2017). In addition, the changes in energy market structures, together with changes in the role of the state and regulation of the sector, were aimed at improving utility efficiency and productivity levels through the introduction of market competition (Wolfram, 1999). This has necessitated the creation of a regulatory entity dedicated to this purpose. The creation of an independent regulatory entity well defines the principal–agent relationship in the sense of government (principal) delegating its former oversight and supervisory role to the regulator (agent). This primary relationship is governed by a 'contract' that may take various forms. Eberhard (2007) identifies the different institutional options for regulation manifesting in Africa which includes (a) regulation by independent agency (b) regulation by contract (c) outsourcing of regulatory functions to third parties, and (c) an intersection of advisory regulators or expert panels.

Figure 2.1: Institutional Options for Regulation



Source: Eberhard (2007)

Considering the case of regulation by agency, the agency in question is a distinct independent entity with full financial and decision-making autonomy that takes binding decisions on regulatory questions and requests, including setting tariffs to recover efficient costs, oversees market entry and monitors and enforces quality of service standards (Eberhard, 2006; Pardina & Schiro, 2019). Independence is considered important to isolate the regulator and, ultimately, the service-provider (agent) from short-term opportunistic political interference that might jeopardize the achievement of the strategic direction for the sector in the long run. Independence, though always relative, has been defined in terms of an institutional existence, a governance structure, and a budget line that are separate from the line ministry itself. However, in practice, genuine independence has proven difficult to achieve in many political systems and cultures, because governments often find it difficult to relinquish their discretionary powers

to control important sources of political patronage, such as electricity tariffs, power sector investment plans, and utility employment (Foster et al., 2017).

Pardina & Schiro (2019) further argue that, while the creation of an independent regulatory agency addresses the conflict of interest and the information asymmetry problem associated with principal-agency relationship, it can prove difficult in practice for the political system to relinquish control of the sector and to fully respect regulatory independence. This is because, in most instances, the leadership of the independent regulatory entity is appointed by the line minister of energy with consent and approval of the president, as is the case in Uganda, Kenya or directly by the president, as with Tanzania. In the case of Tanzania for example, regulatory tariff adjustments were largely implemented between 2008–2012, though the escalation of costs associated with the drought meant that subsequent tariff adjustments were kept far below levels mandated by the regulator. Not only were regulatory decisions overturned, but also the senior management of the regulatory agency were sacked. In Senegal, tariffs have been frozen flat by government irrespective of regulatory advice since 2009. In Kenya, the electricity Regulatory Commission (ERC/EPRA), which is by law mandated to conduct a tariff review every three years, has, over a period of about 20 years, managed to conduct only three reviews that were permitted – in 1999, 2008 and 2013. Political sensitivities have led to successive governments' preventing full tariff reviews during electoral periods (Foster & Anshul, 2019; Godinho & Eberhard, 2019b). In Uganda, growing political pressure has compelled the regulator to review the tariff structure and to provide for more cross-subsidies across different customer categories. These political actions undermine the regulator's mandate as an agent.

The quality of regulation, then, is critical. If regulatory governance is transparent, fair, and accountable, and if regulatory decisions are credible and predictable, there is greater certainty around market access, and tariffs and revenues—with potentially positive outcomes for the host country and investors alike. The corollary is that inexperienced regulators with insufficient capacity may make arbitrary decisions that might serve to increase regulatory risk and deter investment. For example, an independent regulator brings with it oversight capacity and could potentially enforce the competitive procurement of IPPs (Eberhard et al., 2016). Equally so, an independent regulator can exercise guaranteed investments, provide sufficient revenue requirements and their recovery for private concessions, with a caveat that service delivery is good.

An alternative to the challenges of regulation by agency of from political influence and control by government is to confine regulation to the legal enforcement of contracts, in cases where the private sector is operating or investing in the power industry, for example through a concession or BOT contract:

this is known as regulation by contract. Another option is "to create regulatory entities with technical competence but without decision-making autonomy and to treat them as advisory bodies, the so-called 'advisory regulator'. In countries where technical capacity may be limited, regulation can be outsourced to consultants or to an expert panel" (Eberhard, 2006, p. 23; Pardina & Schiro, 2019, p. 6).

Proceeding from this is the governance and secondary contractual relationship between the regulatory entity (as a principal) and the utility – public or private (as the agent) – in form of licences and performance contracts that spell out the roles and obligations of each party. Both contracts specify the rules of the 'game' and are geared towards improving utility performance plus generating economic returns to the public. The existence of an independent regulatory body with tougher regulation is necessary in developing countries to transfer the efficiency gains to the customers and to ensure that it is not only producers and the government which benefits from privatization or other forms of private sector participation (Jamasb et al., 2015). In the case of independent power producers, Eberhard et al (2016) further emphasize that regulations at the sector level, although they do not directly influence the details of the investment transaction contracts, are important in defining the rules of the game and ultimately in shaping the enabling environment for IPPs (Eberhard et al., 2016). Unfortunately, regulatory institutions in developing countries are often found not to be independent agents, thus implying that political interference prevents energy prices from being cost-reflective. Country-level corruption on contracts granted to the IPPs also prevents the reforms from producing their intended effects in developing countries such as Tanzania. Generally, in SSA, the presence of a regulator is not necessarily associated with more competitive procurement practices, and regulators have not always ensured that captive electricity consumers benefit from the pass-through of competitive generation prices. The independence of regulators may be compromised by overreaching and competing government agencies.

Nevertheless, extant literature shows that the establishment of independent regulatory entities as the first step of reform has been the most widespread power sector reform in SSA, more than any single other reform – 33 of 42 countries have established an electricity regulator (that is, 79%). In the past two years alone, Botswana, Liberia, Morocco and Mozambique have established electricity regulatory agencies or have passed laws providing for their establishment (Eberhard & Dyson, 2019). In some cases, establishment of the independent regulatory entity is the only reform measure adopted in African power sectors which have favored regulatory reform as a straightforward solution to improve oversight regulatory procedures and for transparency in decision-making. A more recent survey conducted by Eberhard & Dyson (2019) ascertained that only a few power sectors still lack a regulator – notably

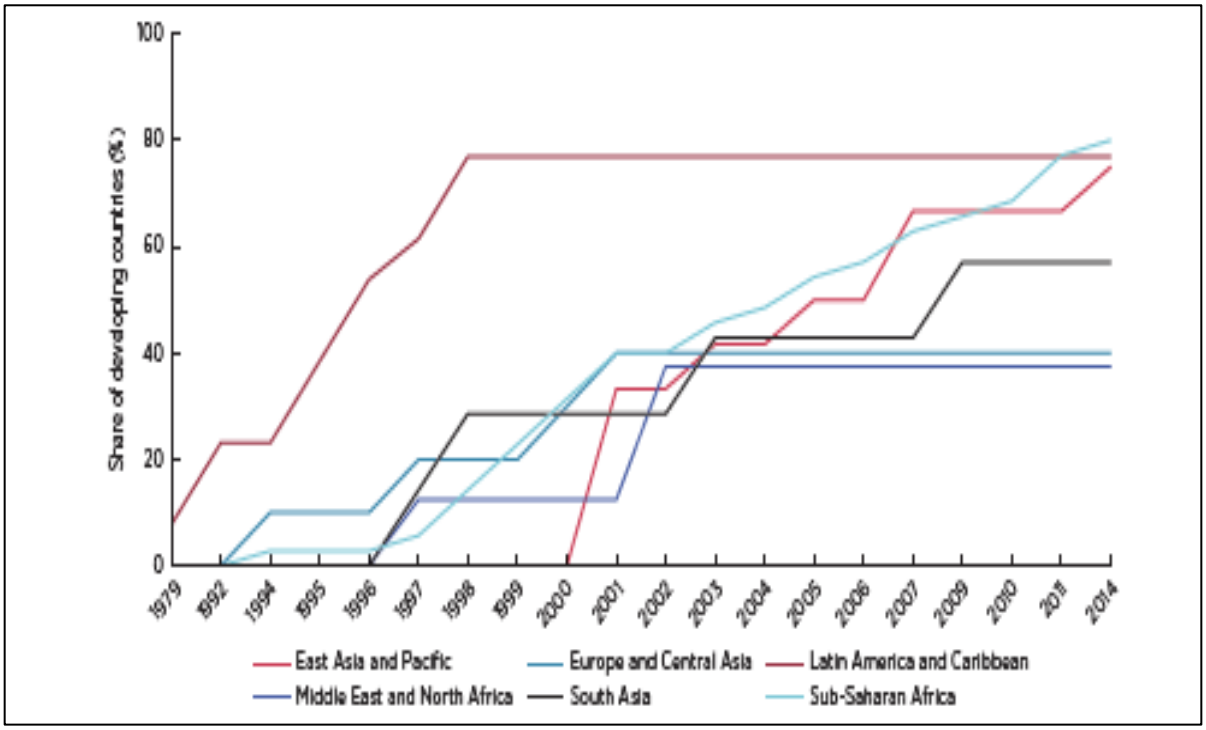
Swaziland, Sierra Leone and Equatorial Guinea. Establishing independent regulation tends to create an equitable, rules-based playing field for electricity providers, consumers, and private operators through the establishment of clear rules and mechanisms to oversee the sector and for spelling out cost-reflective tariffs for utilities.

Regulators as agents of government also have the responsibility to ensure incentives and risks that are fairly balanced between utility companies, end users, and private operators in the sector. This responsibility includes setting tariff regimes that allow adequate cost-recovery for the electricity utility, while ensuring affordable electricity and creating the conditions for reliable, safe, and secure service for consumers (Eberhard & Dyson, 2019). To achieve this aim, an independent regulator must avoid goal-conflict problems, while critically monitoring and providing incentives for the utility (agent) to improve its technical and commercial performance through contracts that mitigate unobservable behaviour of the agent/utility. Such incentives help to ensure that the utility's cost of service reflects appropriate commercial practices and to avoid having to account for inefficient or misaligned use of finances by utilities due to adverse selection and moral hazard tendencies. Since regulators have a responsibility to manage the selfish interest of regulated entities and while operating with limited (incomplete) information, they are prone to high levels of information asymmetry and are unlikely to get a complete picture of costs and potential efficiency gains (Vagliasindi, 2012; Vagliasindi & Besant-Jones, 2013). To mitigate this agency problem, regulators can invest in information systems such as budgeting systems (Uniform System of Accounts) or reporting systems to reveal the agent's behaviour to the principal, and the situation reverts to the complete information case. Considering that monitoring is a critical part of the principal–agent relationship, all or even the slight use of imperfect monitoring, improves outcomes, with the caveat that some types of organizations do not respond well to monitoring (Vagliasindi, 2008b). Regulators "also administer licensing regimes, requiring certain types of operator in the power sector to apply for a licence to generate, sell, transport, or distribute electricity, depending on specific conditions. They often play an important role in interpreting government policy and legislation to translate them into concrete rules, such as in instituting Feed-in-Tariffs (FiTs) or net metering regimes for distributed renewable energy" (Eberhard & Dyson, 2019, p. 31).

The figure below shows how regulatory entities have diffused rapidly across the developing world. While the Latin America and Caribbean region pioneered regulatory entities, sub-Saharan Africa and East Asia Pacific have subsequently caught up with the adoption of this reform. A review of regulatory reforms by Foster et al (2017) across developing regions shows that the "Latin America and Caribbean region was

the pioneer in the adoption of regulatory entities. As early as 1998, 77% of Latin America and Caribbean countries had established a regulator: in fact, there have been no further regulators established within the region since that date. The uptake of regulation started a little later in all other developing regions and regulatory entities were introduced at a much slower pace. By 2015, sub-Saharan Africa and East Asia Pacific had caught-up with Latin America and the Caribbean, with penetration of regulators climbing to the 70–80% range". However, in the three other developing regions – South Asia, the Middle East and North Africa, and Eastern Europe and Central Asia – the momentum around regulatory reform stalled noticeably in the early 2000s, and there has been no further diffusion since that date, leaving regulation confined to a minority of 30–40% of countries in each of these regions.

Figure 2.2: Percentage of Developing Countries Establishing Regulatory Entities by Geographical Region



Source: Foster et al (2017)

2.7.3 Structural Reforms: Unbundling (especially separating Gx from Tx)

Restructuring refers to "the movement along a spectrum towards full vertical and horizontal unbundling of the electricity sector. The starting point is typically a vertically integrated national monopoly utility, and the theoretical endpoint a fully restructured sector entailing vertical and horizontal unbundling of the generation and distribution tiers to create multiple companies operating in parallel" (Foster et al., 2017).

Table 2.4: Definitions of Stages of Restructuring Reform

Model Classification	Defining Characteristics
1. Vertically Integrated	Generation, transmission and distribution are undertaken by a single vertically integrated entity.
2. Partial Vertical Unbundling	Either generation has been separated while transmission and distribution remain combined, or distribution has been separated while generation and transmission remain combined
3. Full Vertical Unbundling	Generation, transmission and distribution have each been separated from each other
4. Full Vertical and Horizontal Unbundling	Generation, transmission and distribution have each been separated from each other, and further generation and/or distribution tiers have been restructured into multiple entities

Source: Foster et al (2017)

Vertical unbundling refers to separation of generation, transmission and distribution: to separate the competitive elements of the industry from the natural monopoly (transmission and distribution) components in preparation for privatization of profitable assets, and the introduction of competition. Horizontal unbundling involves the separation of the generation utility into a number of competing companies. New players are allowed into the market in the form of independent power producers (Bacon, 1995a; Eberhard et al., 2016, 2011; Williams & Ghanadan, 2006). Vertical separation of these distinct activities of the energy supply industry (ESI) was believed to guard against cross–subsidization between the competitive businesses and the regulated businesses of energy supply and discriminatory practices such as denial of access to networks (Gratwick & Eberhard, 2008b; Joskow, 2008; Kessides, 2012a). Hence, vertical unbundling aims to eliminate any conflict of interest – which, from a principal-agent perspective – is one of the prominent markers of agency problems that may arise when a single utility has more than one function along the electricity supply chain (Eberhard & Dyson, 2019; Foster et al., 2017). Foster et al (2017) cite a scenario under which conflict of interest is likely to arise: for example, a transmission company that also engages in generation may have the incentive to prioritize grid access for its own generation capacity as opposed to that of its competitors. Horizontal unbundling of generation was meant to create competition through facilitating power trade from a power exchange, a spot market, or from bilateral contracts (Eberhard et al., 2016; Joskow, 2008). This competition was aimed at reducing the concentration of market power, particularly for generation. For example, a country that has a high number of generation companies of the same size is likely to experience stronger competitive pressure in generation than a country that has one large and one small generation company. To encourage competition, private investment has been encouraged, in the form of IPPs with long-term contracts, and through full divestiture and the privatization of assets (Eberhard et al., 2016).

In addition, unbundling of the sector "allows the possibility of introducing more competition in the market, both between generators and between distributors. This would provide a further push to improve efficiency, since lower costs can be used to increase market share as prices are lowered relative to rivals"(Foster & Anshul, 2019). By this process, consumers can benefit from the change in market structure. Larger consumer gains are expected to accrue from the presence of several competitors with no one firm dominating. Other considerations for vertical unbundling relate to the desire to achieve greater transparency and accountability of management along the electricity supply chain. Where there is still market power on the supply side, regulation can again be used to improve the welfare of consumers (Bacon, 2018). Foster et al (2017) caution about the complexity of the unbundling process as one whose costs need to be carefully weighed against expected benefits, especially in countries where systems are small and where there is a serious risk of losing economies of scale and/or where managerial capacity to lead multiple corporatized entities is inadequate.

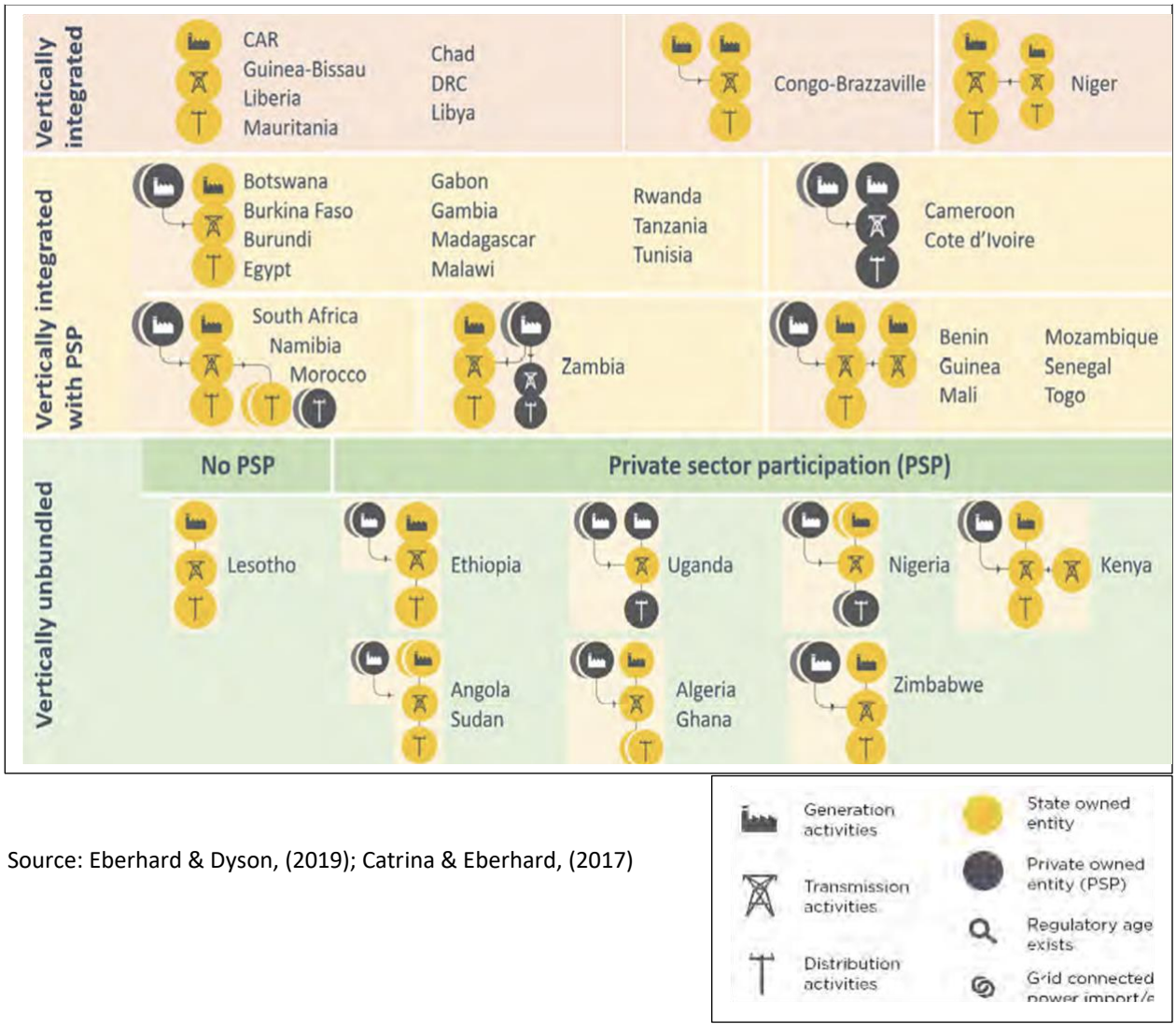
From a principal–agent perspective, vertical and horizontal unbundling the SOE into separate corporatized SOEs would create smaller but state-owned companies (Vagliasindi & Besant-Jones, 2013)[7]. that would be monolithically owned and managed by the state government before reforms. These separate SOEs become agents of the principal (government) with a governance structure and reporting relationship defined in form of contracts or agreements. Specifically, the competing generators enter into power purchase agreements (PPAs) with the state-owned transmission company (principal) functioning as the single buyer and the system operator. Similarly, unbundling of the distribution segment would also call for a power sales agreement (PSA) with the single buyer. The traditional agency problems of conflict of interest become a reality if no competition is introduced, especially via IPPs, while information asymmetry and adverse selection potentially increase the complexity of monitoring if regulatory reporting and compliance requirements come into play (Sappington & Stiglitz, 1987). Structural reforms, like vertical and horizontal unbundling, then provide the correct incentives and solutions to reduce agency problems associated with weak governance of SOEs that were pervasive during the pre-reform period and provide adequate incentives for positive and innovative managerial risk-taking geared towards performance improvement.

Taking cognizance of the experience of restructuring reforms in Africa, the extant literature reveals that most power systems in Africa still largely retain the traditional vertically integrated monopoly utility

[7] The categories of unbundling drawn by Besant-Jones (2006) are: vertically integrated monopolist, single buyer, IPPs, third party access and power market.

structure (predating restructuring reforms) and only 10 of the 42 countries have partially or completely unbundled the electricity sector (Eberhard & Dyson, 2019). In these cases, the monopoly utility has been separated into distinct generation, transmission and distribution companies – in some cases, only separating generation or distribution from the other segments. The remaining countries have maintained integrated utility companies with various forms of additional state-owned and private sector participation in the sector. For example, South Africa and Tanzania are caught between the state and the market where the state still plays a dominant role in electricity sector operation and in management (Eberhard & Godinho, 2017). In some cases, generation, transmission and distribution have been separated for operations but remain commonly owned under an umbrella state-owned company, such as in Egypt and Morocco (Eberhard & Dyson, 2019, p. 29; Eberhard & Godinho, 2017).

Figure 2.3: Structure of Power Sector in African Countries



Source: Eberhard & Dyson, (2019); Catrina & Eberhard, (2017)

2.7.4 Competition for the Market

Competition reform refers to the introduction of wholesale and retail markets with the objective of increasing benefits to consumers – including lower electricity prices and access through a wider array of retail services – and attracting private investment (Bacon & Besant-Jones, 2002; Eberhard & Shkaratan, 2012; Gratwick & Eberhard, 2008b). In pursuing implementation of market-oriented reforms, governments were encouraged (especially by the World Bank and the IMF as a precondition for lending) to open their markets either through liberalization or de-regulation of their economies, thereby creating independent system operators and developing retail competition. Through liberalization, private sector participation was encouraged in the electricity sector (Gratwick & Eberhard, 2008b; Williams & Ghanadan, 2006; World Bank, 2004). The purpose of competition is to promote efficiency and innovation by creating competitive pressures among service providers. When multiple companies compete simultaneously among themselves for consumers, a market discipline is created, resulting in the pressure to keep costs low to efficient or optimal levels as well as to improve and innovate with regard to service quality (Foster et al., 2017, p. 18). The competing service providers, in this case, are the agents – the corporatized SOE – and are subject to regulation by the independent regulatory entity - as the principal. This relationship is also governed by various contracts, licences and reporting obligations. Because of "large economies of scale, many power sector activities have been considered natural monopolies – that is, it would be inefficient to have more than one supplier, although this perception is beginning to shift with the arrival of smaller-scale renewable technologies. Even there, it is still possible to get different companies to compete for the right to supply the market on a monopoly basis for a period of time. In larger power systems that support a considerable number of generation plants, it is feasible to have direct head-to-head competition through the adoption of a wholesale power market" (Foster et al., 2017). Foster et al. (2017) identified five stages/models of competition forms that have been exercised globally since the advent of the power sector reforms – as shown in the table below:

Table 2.5: Definition of Stages/Models of Competition Reform

Model classification	Sector Structure Characteristics
1. Monopoly	A single company has responsibility for generation, transmission, distribution and retail sales
2. Independent Power Producers	As above but, in addition, private independent power producers (IPPs) are allowed to compete for the right to generate power
3. Single Buyer Model	A single wholesale power trader, which may be: (i) a transmission entity, (ii) a distribution entity, or (iii) a combined transmission and distribution/retail entity, as long as it has no direct interest in generation. The single wholesale power trader purchases

	power from all generators and sells to all distributors as well as to any large wholesale customers.
4. Bilateral Contracting with Third-Party Access	A transmission operator/some other entity by wheeling power through the grid on a non-discriminatory basis, acts as a single buyer of power for the majority of retail customers, while allowing large customers to purchase power directly from various generators
5. Wholesale Competition	Power market of multiple generation companies selling directly to multiple distribution companies and other large customers, supported by an independent system operator or market operator. Small customers can buy only from their local distributor
6. Retail Market Competition	As above, but allowing all customers – large and small – to purchase power directly from retail companies, which entails prior vertical unbundling of distribution and retail companies, with distribution companies providing open access wheeling services to numerous power retailers

Source: Foster et al. (2017)

From the above model, we note that competition is a movement along a spectrum, from complete monopoly to full retail competition, that takes place in different stages. In the presence of a single state-owned utility (stage one), it is impossible to introduce competition into the market. Hence, the first reform involves opening competition for the right to build and operate new generation plants supported by long-term power purchase agreements with the monopoly utility. These agreements express the contractual relationship between the monopoly utility (principal) and the new entrants – usually IPPs as agents.

The second stage involves the creation of a single buyer entity (principal) that has a monopoly on the sale of power to end-users, but for which a number of generation companies compete to supply. Globally, competition for the procurement of additional capacity for power generation is mostly done through IPP auctions: for example, South Africa's REIPPP programme and GETFiT programmes in Uganda and Zambia (Eberhard et al., 2016; Eberhard, Kruger, & Volk, 2017; Kruger et al., 2018). The only real difference between this and the earlier stage is that the single-buyer model typically involves a prior restructuring exercise to separate generation from transmission and distribution, so that the single buyer avoids the conflict of interest (an agency problem) embedded in its holding its own generation assets (Foster et al., 2017) and denial of access when there is a need for system expansion and dispatch. In the second stage there is also reduction in state ownership as the SOE is vertically unbundled.

The third stage, which should be preceded by full vertical unbundling of the power sector, allows direct bilateral contracting of power between generators and large customers (such as distribution companies or major industries), and is made possible by the principle of non-discriminatory third-party access to the national grid (Eberhard et al., 2016; Foster et al., 2017). The bilateral contracting expresses a governance relationship and framework between generators as principals, and large consumers as agents, also implemented through long term PPAs. The retail services to large electricity users (third-party access) is

an intrinsically competitive segment because the cost of competing for their business is small relative to the potential profits (Bacon & Besant-Jones, 2002). The fifth and sixth stages entail further unbundling of distribution and retail functions, so that distribution utilities act rather like transmission utilities, primarily as providers of wheeling services, and all commercial activities are conducted by retail companies that do not own network infrastructure (Foster & Anshul, 2019; Foster et al., 2017). Hence, both domestic private firms and multinational corporations could participate as market actors. As a result, there has been a strong push for privatization and models of private sector participation, such as the use of Public–Private Partnerships (PPPs) in the electricity sector (Vagliasindi, 2013; Vagliasindi & Besant-Jones, 2013).

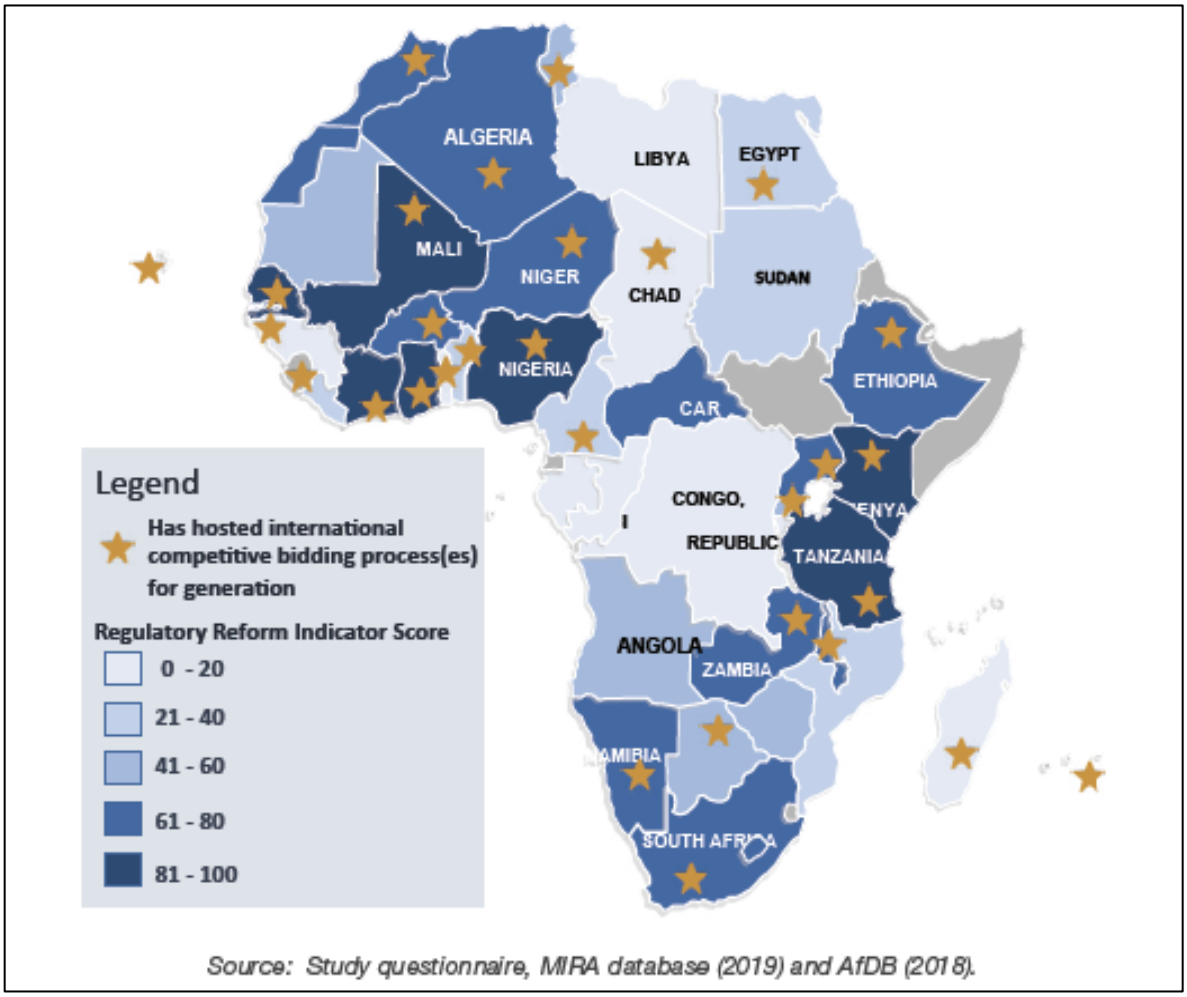
Broadly speaking, power sector reforms have been aimed at expanding the scope of competition in the electricity sector either through "competition in the market" or competition for the market" (Ljung, 2007). Competition *in* the market requires unbundling and privatization, permitting the presence of several firms, each with an incentive to increase its profits at the expense of the others. Competition *for* the market, on the other hand, would be possible even without unbundling: such competition corresponds to the privatization of the entire SOE as a single entity from some form of auction. Competition can also be between generators (wholesale) and between distributors (retail) (Bacon, 2018). A further consideration is that consumers must be able to switch between suppliers at low cost: any arrangement in which consumers have to remain with their original suppliers gives market power back to the sellers even when the sellers have only modest market shares (Bacon & Besant-Jones, 2002).

A recent study by Foster et al. (2017) shows the competition reform in over 30% of developing countries had doubled to 70% in 2015. According to Besant-Jones (2006) "the proportion of countries applying a Single Buyer Model remained fairly constant at about 20–25% throughout this period. However, the share of countries allowing Independent Power Producers grew steeply, as did the prevalence of various forms of competition in the market. By 2015, countries introducing competition were quite evenly divided between Independent Power Producers, the Single Buyer Model and various forms of competition in the market". Of these, wholesale power markets have been the most prevalent (especially in developed countries) and can be found in more than 10% of countries, followed by Latin America. Nonetheless, power sector competition has spread far wider and gone much deeper in the developed world than in the developing world. Whereas about 70% of developing countries have implemented some degree of competition, this falls well short of the developed world, where competition is almost universal and affects 96% of countries. Sub-Saharan Africa began reforms in 2005 with a monopolistic power sector in around 75% of countries. In the following 10 years, the prevalence of monopolistic sectors has dropped

markedly towards 50%. Among African countries adopting competition, the vast majority have only moved as far as introducing Independent Power Producers, with much more limited adoption of the Single Buyer Model (Foster & Anshul, 2019; Foster et al., 2017, pp. 20–22) owing to small system sizes in various countries, reform reversals, monopolistic behaviour of incumbent SOEs and the poor financial status of utilities that discourages competition.

If well managed, competition and private sector participation in the form of IPPs can result in greater investment choices and attraction of efficient technologies (Vagliasindi & Besant-Jones, 2013) such as auctions for renewable energy, including hydro, solar PV and wind (Kruger & Eberhard, 2018; Kruger et al., 2018). Indeed, competition reforms have helped to open capital investment flows in the African power sector in the form of IPPs. The fastest-growing sources of private sector investment in the sector are IPPs, alongside Chinese-funded projects (Eberhard et al., 2016, pp. 21–27). Moreover, many of these IPPs have exhibited superior technical performance relative to the state-owned utilities (Kessides, 2012b; World Bank, 2017). IPPs are now present in over 30 countries, with 270 operating or in construction totaling over 27 GW of capacity (MIRA database 2019). These represent about US$51.7 billion in investments (Eberhard & Dyson, 2019). Transmission investments have not benefited from the same influx of private investment as generation because only a handful of countries have some form of private participation in transmission. The map below shows countries in Africa that have hosted international competitive bidding processes for power generation (represented by the star symbol) highlighted against each country's regulatory reform score (Eberhard & Dyson, 2019).

Figure 2.4: International Competitive Tenders for Power Generation in Africa



Source: Study questionnaire, MIRA database (2019) and AfDB (2018).

Despite the prevalence of IPPs in Africa and globally, governance challenges emerge when power generation capacity is not procured in a competitive fashion. While competitive procurement of IPPs helps to ensure that projects are implemented at the lowest cost, the two decades of experience in power procurement in sub-Saharan Africa have amply demonstrated that a lack of competition for new generation capacity has extensive drawbacks, ranging from immediate effects on project outcomes (higher prices, unraveling contracts, and so on) as well as general effects on the overall governance of the sector, performance and on utilities and the investment climate in the country (Eberhard et al., 2016). IPPs have not always been procured by competitive means, raising concerns about transparency and value for money, especially when procured during power shortages and/or emergency situations. This scenario signals significant conflict of interest between principals and sometimes lack of capacity. For example; in Tanzania, the controversy surrounding the direct negotiation of an expensive private Independent Power Tanzania Ltd (IPTL) diesel plant, with long-term power purchase agreement (PPA) during the 1994–95

drought, resulted in excessive tariffs of US$0.31 per kilowatt hour (Eberhard et al., 2016, pp. 202–211). Worse, it became embroiled in corruption charges. Lengthy court battles ensued, along with arbitration proceedings between the government and IPTL. During yet another drought-related crisis not long afterward in 2006, a contract for a further diesel plant was directly awarded to Richmond Development Company, an enterprise lacking any relevant power sector experience. "Resulting delays meant the plant was not completed until the power shortage was over. Meanwhile, the investigation into corruption by a select committee appointed by the parliament caused the prime minister and the minister of energy and mines to resign. Tanzania adopted a new policy that allowed the public utility to play a leading role in the development of generation projects through a public–private partnership model" (Foster & Anshul, 2019).

From a principal–agent perspective, the creation of competitive wholesale and retail electricity markets by undertaking vertical separation inevitably means a reduction in state ownership, as the private sector could freely participate in the generation wholesale markets and take market share from incumbents. This drastically changes the governance framework, and alters the risk allocation to more experienced private owners (agents) or managers with a higher-risk appetite, and subsequently generates benefits for the sector and the overall economy (Sappington, 1991a). Competition also allows for better corporate governance practices to be exercised in accordance with private commercial practices, creating greater transparency, and allows audits to curb corruption tendencies and conflict of interest, unlike state-owned enterprises. This is supported by evidence from studies, such as Cubbin and Stern (2006, 2008), Erdogdu (2014) and Zhang et al. (2008), which find that, in some developing countries, market competition and increased regulatory governance, as result of power sector reforms, has brought enhanced service penetration, generation capacity expansion, utilization of generation capacity and a reserve margin.

2.7.5 Private Sector Participation: IPPs, Management Contracts and Concessions

The pre-reform inefficiencies and poor performance, associated with the state's natural monopoly in the power sector, supported the case for private sector participation. Since public utilities are not always managed with sufficient decision-making, the implementation of hard budgets and financial autonomy to allow for efficient operation, the desire to introduce alternative market structures gained credence. Private sector participation is one such option that has been put forward as a way to change managerial incentives towards profits, cost control and customer orientation. "Without unbundling, privatization could entail the creation of a private monopoly electricity company. In many developing countries, the performance of the SOE is so poor that it would be hard to attract bids for the entire utility" (Eberhard & Dyson, 2019). Although there are efficient, fully integrated, private sector electricity companies, there is

limited experience with this model in developing countries. Privatization would be expected to increase efficiency as the firm seeks to reduce costs and increase profits (as well as to increase tariffs when these have previously been held below the profit maximizing value). In the absence of regulation, tariffs could be set too high and consumers would lose out (Bacon, 2018). Often, such privatization involves transfer of ownership from the state (principal) to the private sector (agent). Concessions and management contracts, on the other hand, transfer rights to operate the network and its assets to the private sector for a specified period of time, often 20–25 years. This transfer gives pseudo-ownership rights and alters the governance relationship between the principal and the concessionaire as agent.

Transferring a publicly owned and controlled company or assets to private ownership or management is a classic solution to a state-owned utility's inefficient technical and commercial performance. Such a transfer can occur under different arrangements and to different degrees across the power sub-sectors. This transfer of ownership, through function delegation, alters the governance framework of the utility and introduces agency relationships between the state or asset owner (principal) and the new owners and management (agents) of the privatized company. Often this delegation and relationship is in form of a contract. In some cases, PSP contracts, especially for IPPs, have fixed terms of up to 30 years, but they can also take the form of complete indefinite privatization (Eberhard et al., 2016; Vagliasindi & Besant-Jones, 2013). A power sector will typically introduce PSP in one sub-sector to begin with —often in generation, with BOO or Build-Own-Operate-Transfer (BOOT) IPP arrangements – and sometimes in distribution services with franchising contracts (Eberhard et al., 2016). In addition, long-term concession arrangements, affermage or lease contracts, private management contracts, and full privatization programmes have been deployed across all segments of the power sector, including in transmission. Countries with on-going long-term affermage or concession agreements include Cote d'Ivoire, Mali, Cameroon, and Uganda; the Ghanaian utility, ECG, also entered a concession agreement in 2019 (Eberhard & Dyson, 2019). However, the concession was terminated soon after due to allegations of substantial violation of the supply of demand guarantees by the concessionaire Power Distribution Services Ghana Ltd (PDS)(AfDB, 2019).

Since the principles of regulation rely on the regulated company following a profit motive that makes them responsive to regulatory incentives, likewise, the establishment of private sector participation is responsive to regulatory profits and strongly linked to other components of reform – for example, competition. Considering that the interests and the motivations of the principal and agent are not always aligned, a conflict-of-interest problem is likely to arise at all levels of private sector participation.

According to Foster et al. (2017), "private sector participation can be implemented to varying degrees along a number of dimensions. First, the *scope* of private sector participation varies according to the extent of the electricity supply chain affected. Private sector participation may initially be undertaken only in one segment of the electricity supply chain, often generation, but not necessarily in another, such as in distribution. Eventually, the private sector may be brought in along the entire electricity supply chain".

Second, "private sector participation may affect some companies in a particular supply *segment*, but not all. For example, a country may privatize two of its generation plants, but leave the other three under public ownership. Third, the *coverage* of private sector participation may be gauged for generation according to the percentage of generation capacity that is under private control, and for distribution by the percentage of distribution companies that are under private control". There are three scenarios that define the extent of private sector participation shown in the model classifications below

Table 2.6: Definitions of Scope of Private Sector Participation

Model Classification	**Sector Structure Characteristics**
1. Public Ownership	All generation and distribution companies are under public ownership and management
2A. Some Degree of Private Sector Participation in Generation Only	At least one generation company has been privatized, or there is at least one public-private partnership for power generation, typically as an *Independent Power Producer*. The precise extent of private sector participation in generation can be gauged by calculating the share of installed generation capacity that is under private control. But, there is no private sector participation in distribution
2B. Some Degree of Private Sector Participation in Distribution Only	At least one distribution company has been privatized, or there is at least one public-private partnership for power distribution, typically a management contract or concession. The precise extent of private sector participation in distribution can be gauged by calculating the percentage of distribution companies in the country that is under private control. But, there is no private sector participation in generation
3. Some Degree of Private Sector Participation in Both Generation and Distribution	At least one generation company and at least one distribution company has been privatized or has some form of private sector participation.

Source: Foster et al. (2017)

Modalities have been applied differently and vary significantly across the electricity supply chain, depending on the host country's degree of preference. For example, management contracts, concessions, greenfield contracts and divestitures have been applied to all segments of the supply chain; however, their relative prevalence differs significantly. According to Kruger et al.,(2018) and Eberhard et al.,(2016) the use of greenfield contracts for generation by Independent Power Producers is extensively applied globally and especially for procuring renewable energy capacity. Similar greenfield contracts have been used in Uganda and in Kenya's IPP projects (Eberhard, Gratwick, & Kariuki, 2018b; Meyer, Eberhard, &

Gratwick, 2018b). For distribution, divestures and concessions are significantly more prevalent than management or greenfield contracts. In the transmission segment, divestitures, concessions and greenfield contracts have been used in a similar manner, while management contracts are rarely used (Foster et al., 2017). A global view of the prevalence of forms of private sector participation is shown in the table below.

Table 2.7: Prevalence of Forms of Private Sector Participation Worldwide

Percentage of Countries with:	Generation	Transmission	Distribution	Any of These
Management Contracts	2	0	8	10
Concessions	18	5	16	39
Greenfield Contracts (BOT/BOO)	57	9	3	
Divestiture	29	7	25	69
Any of These	63	14	40	70

Source: Foster et al. (2017)

Overall, the percentage of countries that have implemented some degree of private sector participation in either generation or distribution hovers around 70% for both developed and developing countries, with developed countries being only a few percentage points ahead. In the generation segment, PSP comprised a mixture of divestiture of existing assets and independent power producers (IPPs) for development of new capacity. The majority of developing countries opened their markets to IPPs, making this among the most popular power sector reforms and often the first to be undertaken. IPPs for the construction of new generation plants were often, though not always, combined with divestiture of existing generation plants, although minority government stakes were often retained. (Foster & Anshul, 2019). In sub-Saharan Africa, electricity divestitures were relatively rare, and PSP was skewed toward contract-based modalities. Although the overall percentage of countries adopting any form of PSP in sub-Saharan Africa was similar to other developing regions, the modalities adopted were different. Divestitures were comparatively rare, with PSP in generation primarily taking the form of IPPs and, in distribution, focusing on concessions and management contracts (Foster & Anshul, 2019); the private sector is encouraged to invest in new power generation capacity through tenders or auctions. As a result, private capital is widely introduced in the generation segment, which can easily accommodate Independent Power Producers (IPPs) to build new power plants and connect to a national grid (Eberhard & Dyson, 2019).

Despite the prevalence of private sector participation arrangements across the globe, they have been subject to controversies, cancellations and reversals, especially in cases of non transparent procurement processes. Cancellatons affected 40 transactions in 20 of the developing countries (Foster et al., 2017).

The quality of governance— including corruption levels, rule of law, and regulatory environment—is a key factor to support transparency and stability for private investment in the sector (Foster & Anshul, 2019). Eberhard & Dyson (2019) argue that concessions sometimes provoke suspicion of profiteering by the private investor, or of outright privatization, with the associated fears of losing public control of essential assets. This leads to reversal or non-renewal of concession and private management contracts, as in the case of Senegal, which terminated the concession for Senelec after only two years in 2001, or the recent case of SEEG in Gabon. In Tanzania's case, the management contract with NETGroup was cancelled on allegations of non-performance, lack of support from staff and high management fees (Ghanadan & Eberhard, 2007; Godinho & Eberhard, 2018; Gore et al., 2019; Kapika & Eberhard, 2013).

From a principal–agency perspective, delegation of ownership through privatization and divestiture, BOTs and BOOTs typical in IPPs, or of functions through management contracts, concessions, performance contracts is advantageous because operational and management decisions are transferred to individuals who are better informed – and thus better able to carry out these roles – with proper incentive alignment (Marques & Berg, 2011). A series of delegation contracts, therefore, arises to formalize this relationship between the government (principal) and the private sector participants (agents). The contracts will typically aim to ensure optimal achievement of outcomes as well as to mitigate information asymmetry and adverse selection possibilities. On the other hand, risk premiums must be paid to compensate the private sector/producers for the risk they bear (Eberhard et al., 2016; Eberhard, Kruger, et al., 2017; Kruger, Stritzke, & Trotter, 2019). To the extent that the government absorbs risk for private-sector participants, more rents can be captured for the government. However, risk absorption by the government reduces the incentives for efficient performance by the private sector. To the extent that the government forces private-sector participants to absorb the risk, the private sector may not undertake generation and supply with the least expected costs, but with the least aversion to risk. Sappington (1991a) observes that the costs of risk absorption are no less real than other costs and argue that if the government is more tolerant of risk than the private sector, then the public SOE may be desirable. This is consistent with the caution against extensive use of restructuring and private-sector participation in countries with small power systems that may defeat the large economies of scale (Bacon, 1995a; Bacon & Besant-Jones, 2002). Considerations of risks are clearly important in determining the choice of public versus private provision and in designing the auction in the event of privatization. For example, the cost-sharing and conversion of debt into equity of legacy debts held by UEB, the state-owned utility, by the Ugandan government at commencement of the concession helped to clean up its balance sheet and make it more attractive to external private funding (Kapika & Eberhard, 2013; Meyer et al., 2018b). What is

particularly relevant for organizational performance is whether decision-makers bear the full brunt of the consequences of their decisions. To the extent that they do, they are likely to act in risk-averse ways; to the extent that they do not, incentives will be blunted (Sappington & Stiglitz, 1987). Principals may also invest in risk mitigation activities. In general, private- sector participation alters the governance structure through delegation and reduction of ownership of the utility, enabled through concise contracts that allow the private sector to operate as commercial corporate entities and which aim to improve the performance of the utility. Incentives are critical to attract private sector investment and to provide expert skills, and must be commensurate to the prevailing risk exposure.

2.8 Power Sector Reform and Performance

This section reviews the empirical literature on electricity sector reform and performance. There is an extensive body of literature on reforms but, in order to be useful for this thesis, the researcher has focused on studies examining the evidence on performance that are based primarily on data analysis, or on a logical framework, or on models. The literature reviewed here briefly highlights different methodologies and consists of cross-country econometric analyses of electricity reform; efficiency and productivity analyses of electricity companies and reform; general economic growth studies which have some relevance to electricity reform, and country case studies of electricity sector reform. The primary aim here is to review and examine the extent and impact of empirical evidence on electricity reform in developing countries, and performance outcomes. In this section the researcher aims to assess and give an overview of the state of knowledge on the impact of reforms on performance rather than to conduct a detailed review of the methodologies and technical merits of all the individual studies discussed here.

2.8.1 Theoretical Basis and Framework for Reforms and Their Expected Impacts

To better demonstrate understanding, and to track the impacts of reforms on performance, the researcher highlights the theoretical basis for reforms as being the desire to improve performance and promote efficiency, and, when properly implemented, the assumption is that reform will have positive welfare economic impacts. Broadly, reforms are expected to lead to cost-reflective energy pricing and the curtailment of energy subsidies, while reducing the margins between price and cost – that is to say, reducing the scope for market power abuse and exercise (Jamasb et al., 2015). Reforms should also enhance the technical, operational (including improved access to energy) and economic efficiency of the sector (Jamasb et al., 2015). Because power sector reforms are multi-dimensional activities with interacting factors and a variety of impacts, they influence performance variables differently. The process

generally involves a set of concrete steps or measures based on a standard model of reform. At one level, these measures involve structural and organizational changes to the industry, and at another level, there is a requirement for appropriate institutional arrangements such as legislation and new agencies that facilitate change in performance (Jamasb et al., 2005). These measures further change the market structure, and this has a direct impact on the behaviour of the market actors and, consequently, on the performance of the sector.

The starting point for the design of the reform policy is the state-owned enterprise (SOE) with its monopoly on all aspects of electricity production and supply. Privatizing the SOE can lead to improved performance as the profit motive provides an incentive to lower costs, but private monopolies, in the absence of regulation, tend to use their monopoly power to maximize profits by restricting output through excess pricing, and hence absorb much of the gain from improvements in efficiency: this results in little benefit to consumers despite production costs having been reduced. Regulation attempts to redistribute the gains between consumers and the producer (Bacon, 2018). Conversely, regulators can create gains to consumers to the extent that the SOE monopolist is inefficient and regulatory penalties are imposed. The complementary reform steps largely involve unbundling, regulation, private sector participation and competition which all have theoretical and practical influence on performance.

Bacon (Bacon, 2018) argues that vertical and horizontal unbundling (U) on its own of the SOE into separate SOEs would create smaller but state-owned companies. The logic is that it allows the possibility of introducing competition *in*-the market, both between generators and between distributors (Bacon, 2018). This would provide a further push to improve efficiency and lower costs in a bid to gain more market share relative to rivals. From this policy intervention, consumers can benefit from the change in market structure through lower costs and the resultant lower tariffs. Larger consumer gains are expected to accrue from the presence of several competitors. Where there is still market power on the supply side, regulation can again be used to improve the welfare of consumers (Bacon & Besant-Jones, 2002; Kessides, 2012b). The potential costs and benefits from such a move have been analyzed by Pollitt (2007) and Vagliasindi (2012). Both authors warn that there are costs as well as benefits to unbundling, and that by itself this policy cannot be counted on to improve performance of the system overall. Some authors have emphasized that there are different degrees of unbundling with different consequences for performance (Vagliasindi & Besant-Jones, 2013).

Private-sector participation (PSP) on its own (P) without unbundling could entail the creation of a private monopoly electricity company, through privatization. In many developing countries the performance of

the SOE is so poor that it would be hard to attract bids for the entire utility. Privatization would be expected to bring in new capital owners, to increase efficiency (as the firm seeks to reduce costs) and profits (as well as to to increase tariffs when these have previously been held below the profit maximizing value). In the absence of regulation, tariffs could be set too high, and consumers would lose out. The introduction of Independent Power Producers' (IPPs) selling power to the vertically integrated SOE through power purchase agreements (PPAs) introduces a limited form of private-sector participation without unbundling the existing SOE. In this case, the SOE remains unchanged and purchases power from this new form of supply. Without direct pressure on the management of the SOE, the incentive to improve performance will be low (Bacon, 2018). IPPs, however, have the advantage of increasing generation capacity – a critical element to the sustainability of utilities (Eberhard, Gratwick, et al., 2017b).

Regulation on its own (R), in the absence of other policy changes, would be expected to have a negligible effect on the performance of an SOE. The regulator would essentially be duplicating the control of whichever government department was responsible for the actions of the SOE. Regulation makes sense when there has been unbundling and some private sector entry into the sector. The greater the market power of the private participants in the market, the greater the need for an independent regulator who can control excess profit-making and ensure some efficiency gains are passed on to consumers (Bacon, 2018; Eberhard, 2006). Regulation also makes possible the enforcement of performance targets embedded within other forms of PSPs – such as concessions and management contracts – by setting reporting and compliance obligations of competing utilities and enabling a trickle-down effect in some social benefits like access.

In the presence of a single state-owned utility, it is impossible to introduce competition (C) in the market, which requires unbundling and privatization as well as permitting the presence of several firms, each with an incentive to increase its profits. Competition *for* the market would be possible even without unbundling since it corresponds to the privatization of the entire SOE as a single entity from some form of auction. Bacon (2018) maintains that competition can be between generators (wholesale) and between distributors (retail) for the same market-share, by engaging in innovation and cost reductions to deliver cheaper and better service expectations to consumers. Bacon (2017) further emphasizes the importance of interaction terms in assessing policy impact on sector performance. He argues that certain policies, if applied on their own, would be expected to have little or no effect on sector performance – instead, policies need to be combined. He notes that most econometric studies do not recognize this aspect of reform and test whether each policy component contributes separately to improved performance –

whether or not other policies are in place. He therefore suggests that the policy combinations that could improve performance substantially are (U+P), (U+R+P), and (U+R+P+C). The last interaction term corresponds to the full policy-reform implementation, while the former two do not attempt to create a competitive environment in the sector.

2.8.2 Empirical Evidence of Reforms on Performance

Reform processes include many distinct policies. There has been no testing of the impacts of a reform programme carrying out all the steps regarded as defining the complete standard model policy. Econometric studies have always tended to concentrate on a small number of steps and to assess their impact on a limited number of variables. Nonetheless, this thesis reviewed these studies as follows:

Gassner et al. (2009) in a World Bank study, using a regression and propensity score-matching model, related the impact of private-sector participation on certain performance indicators (connections, bill collections, energy sales and distribution losses) in 1,227 distribution utilities in developing countries. They found that performance in terms of connections per employee and sales per employee improved substantially. Specifically, they found that privatization is associated with increase in sales per worker by 32%, bill collection rates by 45% and reduction in distribution losses by 11%. The study further disaggregated private-sector participation (PSP) into sub-categories by type of private sector contract: full divestiture; partial divestiture; concession; and lease or management contract and analyzed their impact on nine performance indicators over the period 1992–2004. The table below shows results with significant coefficients.

Table 2.8: Significance of PSP and Utility Indicators

Performance Indicator	Any Type of PSP	Full Divestiture	Partial Divestiture	Concession	Lease or Management Contract
Residential Connections	N	N	N	Y: ↑	N
Electricity Sales per Connection	N	Y: ↑	N	N	N
Employment	Y: ↓	Y: ↓	Y: ↓	N	N
Electricity Sales per Worker	Y: ↑	Y: ↑	Y: ↑	N	N
Residential Connections per Porker	Y: ↑	Y: ↑	Y: ↑	N	N
Residential Access	N	N	N	N	N
Collection Rate	Y: ↑	Y: ↑	Y: ↑	Y: ↑	N
Distribution Losses	Y: ↓	N	Y: ↓	N	N
Supply Disruptions	N	N	N	N	N

Source: Gassner et al.(2009), Bacon (Bacon, 2018)

Notes:

N: indicates a policy variable was not significant at 5% level

Y: ↑ indicates coefficient of dummy variable that has a positive sign and is significant at 5% level

Y: ↓indicates a coefficient of dummy variable that has a negative sign and is significant at 5% level

From the study, the authors show that lease or management contracts were not associated with performance improvements of any of the indicators, suggesting that the short-term nature of this private-sector participation did not make it worthwhile spending time or money on improving the performance of the utility (Gassner et al., 2009). Concessions were found to provide a limited incentive to improve billing and collection rates, because this is likely to be the simplest to achieve (Bacon, 2018). The significant increase in residential connections associated with concessions reflects the fact that concession contracts often included this as an explicit target. Partial and full divestiture forms of PSP are associated with significant increases in electricity sales per worker, residential connections per worker and collection rates mainly owing to transfer of ownership and risk to new owners. None of the forms of PSP is associated with an improvement in supply disruptions and residential access, because improvement in these indicators is likely to require substantial investments and time before a response becomes visible – especially for supply disruptions.

An econometric assessment of the effects of privatization, competition and regulation on the performance of the electricity generation industry by Zhang et al. (2008), using panel data for 36 developing and transitional countries over the period 1985–2003, identified the impact of these reforms on generating capacity, the volume of electricity generated, labour productivity in the generating sector and capacity utilization. Their study found that when the proportion of generation capacity owned by private investors increases by one percentage point, there will be a 0.1% increase in electricity generation per employee. Hence, a one percentage increase in the share of private sector participation leads to a 0.1% increase in energy generation per employee (Zhang et al., 2008). They further concluded that, on their own, privatization and regulation do not lead to obvious gains in economic performance, though there are some positive interaction effects. By contrast, introducing competition does seem to be effective in stimulating performance improvements. For example, they found that private investment and independent regulation on their own have little obvious effects on performance and that competition is the most important variable. In these results the interaction effect between privatization and regulation (PR) is also once again statistically significant, confirming that, in the absence of competition, performance improvements by the private sector may be heavily dependent upon having in place effective regulation.

Indeed, for this set of results, competition and the interaction of privatization and regulation dominate as an explanation for improved capacity utilization (Zhang et al., 2008).

In another study by Andres, Foster, & Guasch (2006) where 116 privatized distribution utilities in 10 Latin American countries were analyzed, the impact of privatization on six indicators – including number of employees, labour productivity, efficiency, quality of service, coverage and price before and after privatization were tested, the authors found, for example, that connections per employee rose by 56% relative to pre-reform values in the transition period, and by 125% in the post-reform period. Energy sales per employee (MWh) increased by 61% relative to pre-reform values in the transition period and by 127% in the post-reform period. Coverage in terms of residential connections per 100 households showed an increase of 14% in the post-reform period. Distribution losses reduced by 2.9% from 15.3% pre-reform values, to about 12.4% in the post-reform period, equivalent to a 19-percentage point change. In addition, both the duration and frequency of interruptions declined to about half of the pre-reform values from 20 hours per year to 10 hours per year (Andres et al., 2006). They observe that PSP is associated with an increase in bill-collection rates and, for partial divestitures, improvements in electricity distribution losses. Further, their results for the full sample showed that the collection rate increases substantially in the transition and post-PSP periods as a result of PSP. Moreover, it is not just divestiture (full or partial) that creates effective incentives to improve bill collection. There is evidence that concessions also do so – perhaps through contractual obligations to meet connection targets – confirming case-specific evidence. While the collection rate increases by an impressive 68% for partial divestitures and by 43% for full ones, over and above the change for equivalent SOEs, it increases by 40% for concessions. The strong positive effect of PSP in general on the bill-collection rate is confirmed by the matching procedure (Andres et al., 2006, p. 41). Andres et al. concluded that changes in ownership lead to significant improvements in labour productivity, efficiency and quality of supply, and average prices in the short term are modest after the reform period – for example, a rise in prices prior to the change in ownership but thereafter prices continued to grow at lower rates. Prices in real local currency were 11.1% higher per year during the transition compared to during the first period. After the first period, an additional 8.3% annual increase was observed. They also found evidence that the effect of change in ownership differs across firms, possibly because of other policy variables.

Vagliasindi (2012) in a study using panel data on power-market structure and performance in 22 countries examines the links and impacts of private-sector participation, regulation and unbundling on residential access, energy sold per employee, average tariff levels, and CO2 emissions. For the distribution sector,

privatization was measured by retail sales of the private sector utilities relative to total retail sales. The regression analysis of energy sold per worker on the privatization share gave a value of 9.6, with an overall mean value of energy sold per worker of approximately 25 megawatt hours (MWh). This means that a one percentage point increase in the share of private sales is then estimated to increase sales per employee by 0.1 megawatt hours. Access was estimated to mean entry through private-sector participation or privatization in the generation sub-sector, with a coefficient of 3.46, while the overall access rate was of the order of 60%, yielding an increase in excess of around 6%. This means that generation access is significantly related to unbundling, private sector participation and regulation. The study also found that labour efficiency is reduced by unbundling, but enhanced by the degree disaggregation of distribution, the introduction of the private sector and by regulation. Vagliasindi also found that tariffs increase with full unbundling and regulation but are negatively related to disaggregation in distribution.

In assessing the impact of power sector reforms on transmission and distribution losses, Nagayama (2010) introduced an interaction term for the entry of IPPs and regulation which reveals a coefficient of -1.4, and he concluded that transmission and distribution losses declined by 1.4 percentage points when both private-sector participation and regulation are present in the sector. The introduction of foreign IPPs decreased T&D losses in Asian developing countries with the establishment of an independent sector regulator.

Balza et al. (2013) explored the relationship between private-sector participation, institutional reform, and performance of the electricity sector in 18 Latin American countries using a long-run static model. Their results suggest that privatization is robustly associated with improvements in electricity generation capacity by 49%, quality and efficiency (reduction in transmission and distribution losses by 13%), but not with access to the service. In addition, regulatory quality was found to be strongly associated with better performance in terms of quality and access. That is, regardless of the level of private participation, well-designed and stable sectoral institutions are essential for improving the performance of the electricity sector.

Urpelainen et al. (2017), using instrumental variables, show that power-sector reforms increase generation capacity and reduce T&D losses in countries across the world. Their findings suggest that the number of power sector reforms is a robust and strong predictor of transmission and distribution losses. They conclude that each additional reform adopted reduces T&D losses by between 1.0 and 1.4 percentage points. The study yields a mean value of 13.5% for loss reduction across the 184 OECD and

non-OECD countries under study. Further, the study finds that by implementing all eight reforms specified in the model, a country could reduce T&D losses by about 11 percentage points. In addition, the effect of reforms on generation capacity was found to be positive and ranges between 1% and 5%. The effects are generally larger in developing countries.

In sub-Saharan Africa, the results obtained from the efficiency analysis of the Côte d'Ivoire electricity companies could not reject the hypothesis of a significant performance improvement in the post-privatization period, while the technical efficiency measures have behaved irregularly since privatization (Plane, 1999). Meanwhile, Estache et al. (2007) attempted documenting efficiency levels in Africa's electricity firms based on a sample of 12 operators' providing services in the 12 country members of the Southern Africa Power Pool. The study relied on the DEA decomposition technique to estimate the changes in total factor productivity (TFP). The results showed comparable levels of efficiency and performance levels in the region, while finding no clear correlation of efficiency improvements with the adoption of reforms (Jamasb et al., 2015).

Reforms have indirect effects on the performance of the power sector. Studies by Eberhard & Dyson (2019) of 48 SSA countries – using a Reform-Governance Index and a Performance Index to compare the levels of reforms adopted in a country followed by the ranking of the respective performance of its power sector – suggest that aligning the levels of reforms, governance and performance points to a relationship between a country's adoption of reforms, its quality of governance, and the performance of its power sector. Specifically, they argue, political, economic and financial measures to reform and improve a power sector can only enjoy full success in stable, transparent, rule-based environments. However, these factors do not paint the whole picture. In addition to governance, the success of any reform relies heavily on the local ownership and support for each measure. Improving performance measures such as electricity access and affordability depends on solid planning processes for rural electrification, as well as targeted policy interventions, regulatory initiatives, and funding allocation. Operational and financial performance improvements similarly require effective planning environments, adequate institutional and investment capacity, and targeted interventions to improve management and technical capabilities.

One of the main expectations from power market reform has been a reduction in price-cost margins and cross-subsidy levels between industrial and residential consumers. Reforms such as unbundling the sector, both vertically and horizontally, allows the possibility of introducing competition in the market, both between generators and between distributors. This would provide a further push to improve efficiency, since lower costs can be used to increase market share as prices are lowered relative to that of

rivals. By this process, consumers can benefit from the change in market structure. Larger consumer gains are expected to accrue from the presence of several competitors. In his study on the impact of the electricity industry reforms – on residential and industrial electricity price-cost margins and their effect on cross-subsidy levels between consumer groups in developing and developing countries covering a period 1982–2009 – Erdogdu (2011) found that there is no uniform pattern for the impact of reform process as a whole on price-cost margins and cross-subsidy levels. Rather, the findings suggest that the existence of IPPs and electricity price-cost margins are negatively correlated for industrial users, implying that the participation of IPPs into the generation market decreases price-cost margins for industrial prices only. This is largely because IPPs usually sell electricity to large industrial customers or utilities. At the time of study, there was no significant impact of IPPs on price-cost margin for households (Erdogdu, 2011).

Having reviewed the performance literature in detail for this thesis, the author identified a major gap in the literature - that most studies have been undertaken on macro-level or sector level components but very few on micro-level and institutional conditions. There is relatively limited testing of the effects of policy introduction on performance indicators at utility level. Specifically, there is a significant gap in assessing the reform impact of key performance indicators in the sub-Saharan region utilities, unlike in Latin America. For example, the review of the literature revealed a tendency to overlook transmission and distribution activities in SSA. In effect, the network parts of the sector are treated as black boxes, although there are considerable cross-country differences.

In SSA, in particular, many underlying problems, such as system losses, non-payment, network access, and electrification, are related to networks (especially distribution) and, in the light of unresolved problems and declining international investor interest, it is useful to test whether guaranteed revenues have facilitated distribution privatization. Secondly, the impact of private investment in the sector is partially addressed in the studies reviewed apart from case studies by (Eberhard & Gratwick, 2011, 2013; Eberhard et al., 2016, 2011; Gratwick & Eberhard, 2008a) on Independent Power Producers (IPPs).

The review of the literature on power sector reform and performance has revealed that all the studies have focused on rather narrow aspects of reform: a largely econometric or statistical approach has been adopted and this does not capture all the relevant variables that influence performance. This thesis, therefore, adopts a qualitative, multiple-country case study approach and design to try to obtain rich context information in order to understand the drivers of utility performance in Tanzania, Kenya and Uganda. The multi-faceted nature of reforms, and the varied characteristics of the sector across countries, means that case studies can address issues that do not easily lend themselves to rigorous quantitative

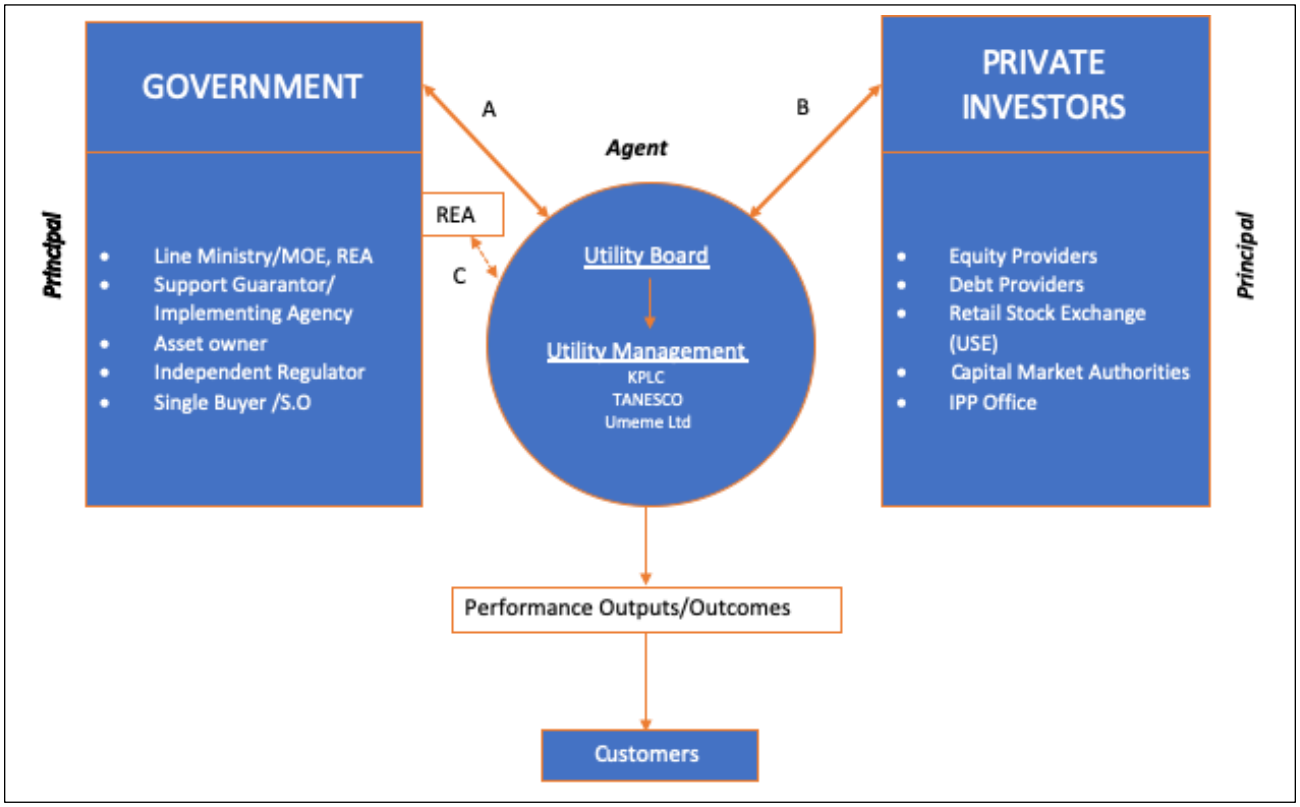
analysis, or could not be easily addressed due to lack of data. In addition, in electricity reform, dynamics, such as the implementation processes at utility level, and qualitative governance aspects, such as incentives, regulation and contract design, are crucial and, at the same time, inherently difficult to capture through statistical methods. Case studies can play a complementary role in contributing understanding to complex questions and multi-dimensional activities such as electricity reform. Combining case study reform experience with principal–agent theory, can generate a more powerful analytical tool – with comparable results that can be generalized and replicated for similar countries.

The performance of reforms has largely remained a work in progress or has stagnated at an intermediate stage without yielding the expected performance benefits. There is need to learn from the experience of countries and to address the enduring challenge of poor performance of utilities. Furthermore, policy and managerial solutions generating better benefits need to be devised. This thesis provides one such knowledge avenue. The next section gives a summary of the theoretical and analytical framework of principal–agency relationships in Tanzania, Kenya and Uganda.

2.9 Summary – The Broad Theoretical and Analytical Framework

The positivist theory of agency has been more focused on describing the governance mechanisms that solve the agency problem, simply described as "why certain contractual relations arise" rather than on the *how* (Jensen, 1983, p. 326) . This research aims to extend the positivist agency theory by describing in detail the nature of the contracts, their design and implementation effects on performance of electricity utilities in East Africa. The study will also borrow key concepts from principal–agent research but will not attempt to conduct mathematical and regression proof of the theory in the case studies, since the positivist line of research can adequately provide generalizable results that can be tested for validity and reliability.

Figure 2.5: The Analytical Framework



Using the positivist principal–agency theoretical lens, the analytical framework in the figure above presents a governance structure that will be used to explain the inter-relationships of various actors in the electricity sector, specifically the utility, drawing on the case studies of TANESCO, Kenya Power (KPLC) and Umeme Ltd. The aim is to understand how the principal–agent theory, combined with power sector reform theories, provides a more powerful analytical framework to better explain the varied performances of utilities. The primary principals are the government (public) and private investors who enter a cooperative relationship premised on the implementation of power sector reforms and each with different sets of interest. The relationship is further premised on a common goal – improving the performance of the traditional failed state-owned enterprise (SOE). The government's objectives in choosing among alternative forms of private sector participation are (a) economic efficiency – ensuring that those who have a comparative advantage in managing the utility undertake it and that appropriate and innovative techniques of management and levels of effort are supplied in running the sector; (b) equity – the government desires to fulfill certain social objectives like access, efficient tariffs, reliable supply of electricity as distributional benefits to the citizens (Sappington & Stiglitz, 1987), and (c) attract alternative capital for financing adequate investments into the sector, which eases the financial strain on its fiscus. In this way, the government expects to make a profit (rent) from its energy businesses. The

government is represented and operates through the following entities (i) line ministry of energy, (ii) support guarantor or implementing agency – usually the ministry of finance, (iii) the asset owner, (iv) the independent regulator and (v) state-owned single buyer or system operator. Government expects the best outcome and will enter a delegation of ownership or services contract with the private sector for the management of the utility. A contract is the key defining feature in this relationship (point A in the figure) and may take various forms.

The other primary principals in this framework are the private investors, consisting of (i) equity providers; (ii) debt providers, (iii) retail stock exchanges, (iv) the IPP office and (v) capital markets authorities. Their role is to provide capital and technical and managerial expertise in running the utility. Their primary objective is profit maximization, but the investors also have a desire to improve performance of the utility. Private investors also seek ownership or lease rights of the utility. Under the private sector participation arrangements, investors are represented in the utility by a board of directors, in a relationship either as majority owners or have significant ownership in the utility (point B). The utility's board of directors are, hence, primary agents of private investors.

The relationship between the government and private investors (at point A) is defined in a contractual framework that takes the model of a performance contract, concession or management contract – which is the primary contract. At the operational level, a series of contracts arise that define the working relationships. The independent regulatory entity has contracts in the forms of licences with the utility's board of directors, while the single buyer/system operator utilizes power sales agreements (PSA) or power purchase agreements (PPAs) for transactions relating to investments in generation capacity expansion. The asset owner will have a lease and assignment agreement with the private investors, while the support guarantor – ministry of finance, will have a support agreement with the private investors. The relationship between equity and debt holders, on the one hand, and the board of directors on the other is defined in financing agreements as equity and debt covenants. For vertically integrated utilities with full state-ownership (TANESCO), or partially unbundled utilities with partial private sector participation (KPLC) the contractual arrangements may take the form of a management or performance contract between the line ministry and the board of directors. Retail stock exchanges and capital market authorities exercise capital market authority statutes for reporting and compliance requirements that promote transparency and competition in capital markets. The IPP office relationship with the utility functions in terms of power purchase agreements for energy generated from various IPPs. Recent developments in the push for universal electricity access have also given rise to contractual relationships between entities charged with

rural electrification (REA) and the utility, in the form of project implementation agreements/contracts (point C).

Within the utility, the main contract is between the board of directors and the managing director and the latter's top executives-by way of a service agreement. This contracting framework can then be cascaded downwards to staff, depending on the level of institutional development, functions and staff capacity. The utility management has an obligation to deliver services (outcomes) to consumers who, in return, pay for the services, thus creating revenue.

This overarching governance framework will broadly be analyzed in in terms of the tenets of key principal–agency theory and the main drivers of delegation including; (a) complexity of task under consideration, (b) risk aversion, (c) conflict of interest, (d) limited competition, (e) control, (f) transaction costs and how these relate to agency problems of information asymmetry, moral hazard, and adverse selection.

The following Chapters, 3-5 are organized according to this structure: Introduction; an overview of the electricity sector in each case study, a typology of power sector reforms in each case study; governance framework; the contracting framework is presented next, followed by an analysis of operational and financial performance; and a summary of findings and analysis. Chapter 6 presents a comparative analysis of the three case studies, a contribution to knowledge and limitations of the study.

CHAPTER 3

TANZANIA CASE STUDY

3.1 Introduction

Tanzania's power sector has for long been singled out as a major obstacle to the country's development (Godinho & Eberhard, 2018). Despite abundant conventional and renewable energy resources, sustained donor support through funding, and building of technical capacity, the sector continues to underperform (Eberhard et al., 2016). One of the reasons advanced has been the poor performance of the state-owned utility, TANESCO, and lack of progress in reforming the power market.

TANESCO remains a state-owned, vertically integrated utility and private investment in the sector remains constrained (Godinho & Eberhard, 2018). While there are a few IPPs, these were mostly directly negotiated rather than competitively procured, and they ended up being expensive. The IPPs generated controversies around corruption, leading to the resignation of energy ministers and even the prime minister. Only a few elements of the advocated standard model reforms have been adopted: for example, passing of energy legislation (The Electricity Act, 2008); the establishment of a regulator – Energy and Water Utilities Regulatory Authority (EWURA), and Rural Energy Agency (REA). Even here there have been disruptions: a once admired electricity regulator has been eviscerated through removal of leadership after decisions that displeased government, and rural access to electricity remains low.

Central to the power sector challenges in Tanzania is a broken governance system and obsolete market structure – a vertically integrated state-owned utility operating largely as a de facto monopoly. Despite a period under a private management contract during 2002–2006, and repeated commitments to unbundling and some privatization, TANESCO continues to operate sub-optimally (Eberhard, Gratwick, & Kariuki, 2018a). Tariffs remain below cost-recovery; power generation costs have been exorbitantly high, and planning has not translated into timely initiation of procurement of new generation capacity. Indeed, power sector master plans have mostly been ignored (Eberhard et al., 2016). The quality and reliability of supply remains poor, and the financial standing of the state utility has persistently been very weak.

The Tanzania case is distinctly different from that of Kenya and Uganda in the sense that it offers the opportunity to discover how the absence of structural and governance reforms of the power market, coupled with erratic, inconsistent regulatory practices and cancellation of private management contracts,

have translated into ongoing poor utility performance in TANESCO. The application of theory and analytical frameworks derived from the power sector reform and principal–agency literature will enable deeper insights into how weak governance and inadequate reforms have provided only weak incentives for improved performance.

3.2 Overview of the Tanzania Electricity Sector

Tanzania has abundant energy resources, including recently discovered offshore gas in the south of the country, but struggles to generate adequate power for economic growth. Installed generation capacity in 2018 was 1,566[8] MW (hydropower 574.7MW, natural-gas-fired plants 893 MW, imported liquid fuels 89MW, biomass 10.5 MW). TANESCO also owns 16 isolated diesel plants with total installed capacity of 35.3 MW, serving regions and districts that are not connected to the national grid system. Electricity is also imported from Uganda[9] (17MW), Zambia (5MW) and Kenya (1MW). The current generation mix is much different from that of the recent past when expensive emergency power producers (EPPs) contributed about 16%. These have since been phased out, improving TANESCO's financial position. It is important to note that nearly 1,354 MW, or 86% of the grid-connected generation capacity installed is currently owned by TANESCO. IPPs currently contribute 189 MW, mainly from Songas.[10] This is a significant shift from the early 2000s where about 643 MW was privately owned; of which 331MW was private emergency power (Eberhard et al., 2018a, 2016). Despite recent efforts to diversify energy sources, TANESCO continues to be burdened by power supply challenges.

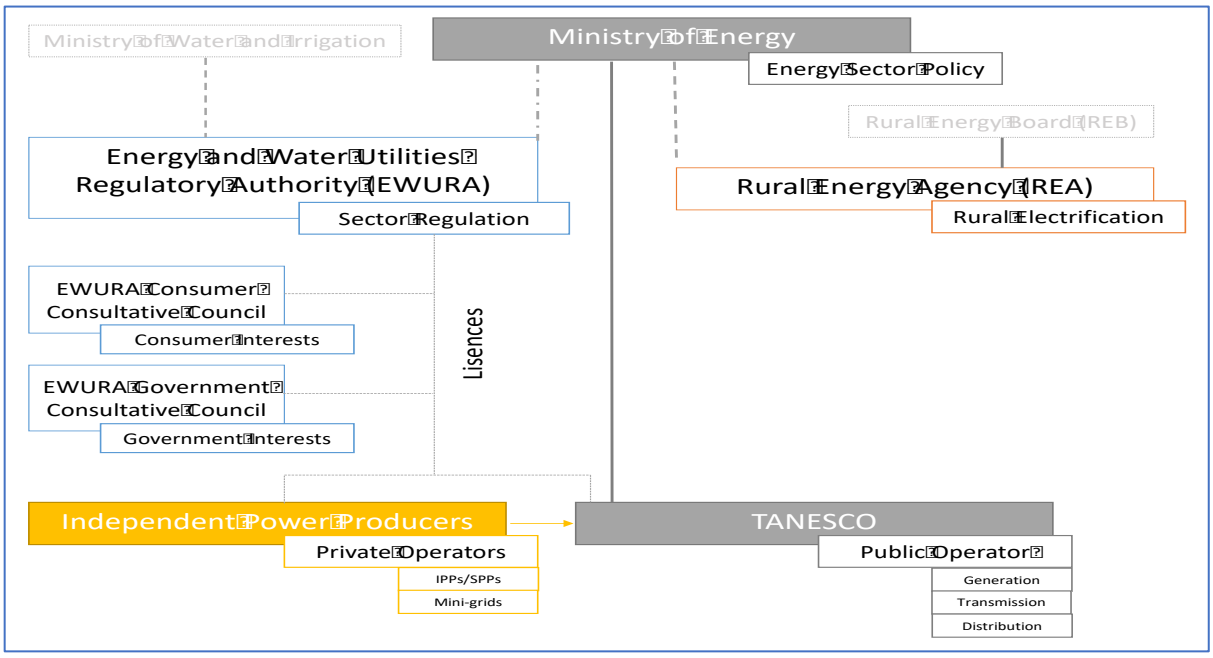
3.2.1 Institutional Set-up of the Electricity Sector

Government, through the Ministry of Energy[11] (MoE), is responsible for formulating policy and planning. It also oversees specific utility issues requiring parliamentary approval (including budgets). This financial oversight role, however, creates rent-seeking opportunities and political influence in the running of the utility (agent). Interview respondents in the case study confirmed that MoE technocrats and politicians have been known to request bribes for financial facilitation and to issue directives for construction of power lines to their constituencies. Since June 2006, regulation of the sector has been under the aegis of EWURA, which is responsible for licensing, tariff-setting, and setting technical and service standards.

[8] Off-grid and grid connected power together total to 1,601 MW.
[9] In 2017, EWURA approved a 14 MW PPA between Kikagati Power Company Limited (KPCL) and TANESCO
[10] Although IPTL infrastructure remains, it is not dispatched, but on standby for emergency situations
[11] In October 2017, Tanzania President John Pombe Magufuli separated the former Ministry of Energy and Minerals (MEM) into two ministries and appointed ministers to each.

EWURA's line reporting ministry is the Ministry of Water and Irrigation (MWI), which gives the regulator a degree of (but still far from full) independence from political interests in the energy sector (Eberhard et al., 2018a). TANESCO is responsible for generation, transmission/system operator and the distribution of power to over two million customers. The utility is a single buyer and enters into power purchase agreements (PPAs) with IPPs, including Songas, Independent Power Tanzania Ltd (IPTL), small power producers (SPPs), emergency power producers (EPPs), and the Mtwara Energy Project (formerly an off-grid generation and distribution concession). The Rural Energy Agency (REA), set up in 2007, is responsible for rural electrification.

Figure 3.1: Tanzania Power Sector Institutional Structure



Source: Eberhard et al., (2018)

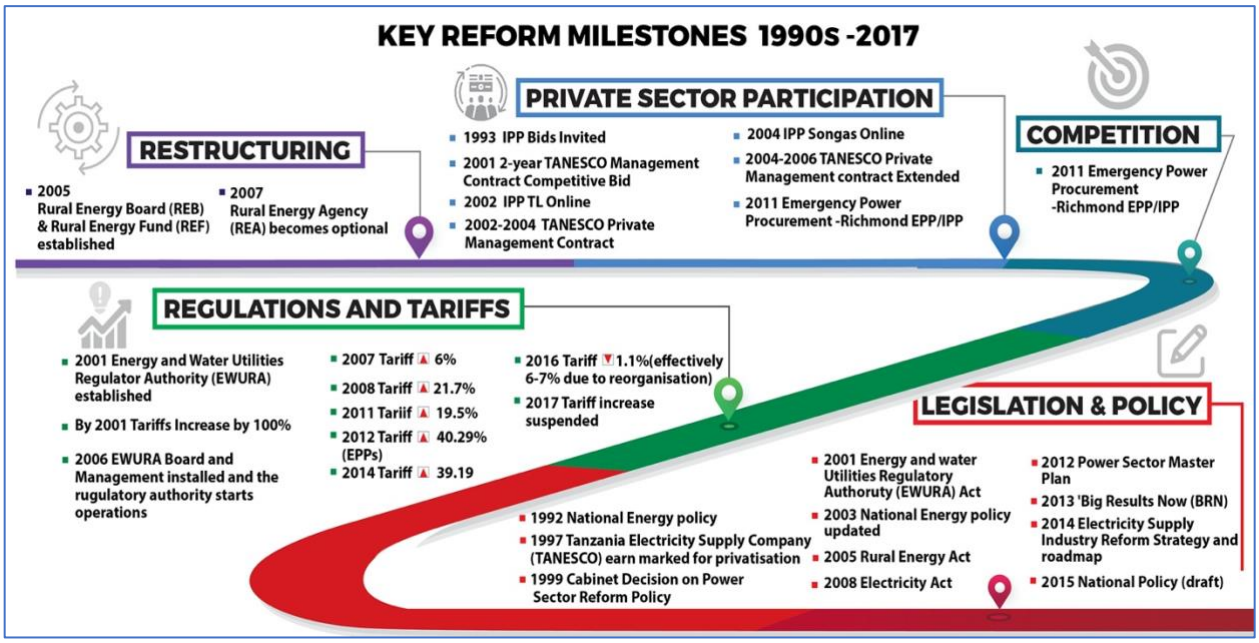
3.3 Power Sector Reforms in Tanzania

This section presents key reform milestones that have occurred in Tanzania's electricity and power sector during 1993–2017 that were potential facilitators of change towards performance improvements. The timeline is presented along the core standard power sector reform model components – legislation/ corporatization, regulation, restructuring, private sector participation and competition.

3.3.1 Early Attempts to Apply the Standard Reform Model

Tanzania's early attempts to apply the standard model are reflected in the timeline shown in the figure below:

Figure 3.2: Tanzania's Reform Timeline



Source: Author's creation

In the 1980s, electricity supply and distribution in Tanzania began to deteriorate, exacerbated by a wave of external shocks. These included the aftermath of the 1979 oil price shocks, decline in official development aid (ODA), and an expensive war with Uganda in 1979. Public spending declined, affecting investment in power generation and distribution infrastructure. Hydrological disruptions in this period put further strain on the power system as generation capacity and sales declined. The operational performance of TANESCO, which at the time lacked proper accountability systems, worsened and rent-seeking behaviour was the norm. Non-payment of electricity bills, influenced by an ideological perception of electricity as a social good rather than as a commercial service, also contributed to a deterioration of the financial position of TANESCO (Ghanadan & Eberhard, 2007).

As part of a package of the World Bank/IMF loans, structural adjustment programmes (SAPs) were imposed, including utility reforms aimed at, among others, attracting private sector investments

(Eberhard et al., 2016). Repeated attempts at reform in the early 1990s culminated in the formulation of the National Energy Policy in 1992, opening the door for private sector participation, commercialization and restructuring of the electricity sector (United Republic of Tanzania, 1992a). Specifically, the policy encouraged private electricity-generation and distribution in areas where TANESCO had not established a public power supply system. The policy also provided for the establishment of a rural electrification fund. In the same year, the Public Corporations Act was passed, setting the basis for the corporatization and commercialization of SOEs. The Act also provided powers to the line minister to 'specify' public corporations for private sector participation by allotment of shares or by privatization (United Republic of Tanzania, 1992b). In the same year, with a severe drought and supply shortages, the government lifted the state utility's monopoly on generation, with the goal of attracting new private generation.

In 1993, the World Bank – which, at the time, was providing financing for the construction of the 180MW Kihansi hydro project – imposed further reform requirements aimed at improving the sector's performance. These included preparing for, and initiating, restructuring and privatization, and the development and operation of private gas-to-power generation at Songo Songo island. The requirements further included obligations to meet financial covenants and abide by the principles of international, competitive procurement practices; the corporatization and commercialization of TANESCO's operations; enforcement of a plan of action for recovery of electricity arrears from government agencies and parastatals; an asset valuation study as well as a tariff study (to be updated regularly), and the implementation of the recommendations of a privatization study. In a bid to avert a power crisis, government committed to implementing the recommendations of a privatization study as well as to developing a gas-to-power IPP in Ubungo, to be fed with gas from Songo Songo island. Subsequently, bids were invited for the country's first IPP (Songas-106MW) in the same year (Eberhard et al., 2016; Godinho & Eberhard, 2018).

Changes in donor policies also impacted these initial reform steps. The Swedish International Development Agency (SIDA), Tanzania's largest bilateral energy donor, shifted from its historical role in hydroelectric development to support enactment of reforms by 1996–98. Norway and Finland pulled back from energy lending, reflecting a view that the private sector would increasingly take care of energy investment needs (Ghanadan & Eberhard, 2007). However, SIDA provided TANESCO with funds to procure two 18 MW OCGT turbines which ran on jet fuel[12] and government procured an additional two

[12] SIDA also committed to covering fuel costs for two years at about US$ 35 million

35 MW OCGT turbines through a World Bank facility. Pressure from the World Bank and IMF also resulted in a 100% increase in nominal tariffs aimed at achieving near-cost reflectivity for the utility.

Following these developments,and catalyzed by the 1993 Amendment to the Corporation's Act, a Parastatal Sector Reform Commission (PSRC) was established to oversee the restructuring and privatization of specified public corporations. TANESCO was subsequently designated for privatization and unbundling in 1997 (Ghanadan & Eberhard, 2007). This commitment was contained in a government letter to the IMF in order to access funding under the Enhanced Structural Adjustment Facility Programme (ESAF, 1989–1992 and extended to 1999). In 1999, a policy White Paper on Restructuring and Divestiture of the Electricity Sector was approved by cabinet. It spelt out the following strategies: vertical unbundling of the utility; the division of distribution activities between north and south; division of generation into hydro and thermal plants; separation of the transmission entity as an independent system operator and a market operator; creation of a single buyer/purchasing agency; new power sector legislation, and the establishment of an independent regulator. Other than the establishment of the regulator, none of these proposals were implemented

In 2001, the EWURA Act was passed to establish an independent regulator for the sector. Government failed to honor its commitments to support TANESCO's recovery of electricity bill arrears from non-paying customers, including government agencies. The utility itself was poorly managed, lacked a commercial culture and autonomy, and was consistently operating at a loss. In the same year, government, on the recommendation of the World Bank, reconstituted TANESCO's board and initiated a management contract with NETGroup Solutions (Pty) Ltd for two years (2002–2004 - Phase 1). The aim was to achieve commercial turnaround with a view to privatizing the utility at the end of the two years (Ghanadan & Eberhard, 2007). This introduced another level of governance arrangements and challenges previously unseen in the sector. For example, as the private management contract was being implemented, the PSRC acted as the formal owner and shareholder of TANESCO, committed to restructuring the utility, while the MoE and elements within TANESCO had strong reservations against restructuring and privatization. In addition, the commitments to restructuring TANESCO had still not been institutionalized by legislation.

In 2003, the National Energy Policy was revised (from the previous 1992 policy), emphasizing competition in the sector, encouraging private sector participation, ensuring open access to the grid, prioritizing regional cooperation and integration, and developing indigenous resources and renewables. The policy laid a further foundation for private involvement. Phase 1 of the Management Contract, focusing on improving collections, loss reduction, quality of supply and staff rationalization, was successful and

improved TANESCO's revenue collections from US$10–12 million to US$16 million per month, and restored the utility's balance sheet. The contract was extended to 2006 (Phase 2) to include improvements in technical performance. Monthly revenues increased further to US$22–24 million. Losses decreased from 28% in 2001 to 21 percent in 2002 but increased again in 2003-2005 to 26 percent. In 2006, losses were reduced to 22%, but still above levels of the first year of the contract. However, the contract failed to improve the reliability of supply, largely owing to disputes over the rationale for NETgroup implementing the Turn-Around Activities (TAAs). The conflicts subsequently made it difficult for the contractors to achieve the set technical targets. The contract specified technical consulting projects to be carried out in addition to management activities. Five of these (called relief projects) were completed in Phase 1. However, in Phase 2, six of the eight were accepted by the Board, but due to the deterioration of utility revenue surpluses, funds for turn-around activities (TAAs) were never disbursed (Ghanadan & Eberhard, 2007). Making matters worse, a significant portion of the increased revenue was absorbed by IPPs coming online – IPTL was commissioned in 2002, and Songas in 2004. In the end, the management contract failed to address customer service issues as well as the rate of new electricity connections.

In 2005, the incoming government administration of President Kikwete reversed power sector reform plans and delisted TANESCO from privatization. In 2006, government decided not to extend the management contract with NETGroup, without giving reasons why. In the same year, EWURA became operational, albeit years after its founding legislation, owing to a dispute between development partners and government about where it should be anchored. In 2007 a new local management team was appointed to lead TANESCO, headed by Dr Rashidi Idris, who introduced performance-based incentives within the human resource system that encouraged staff development, performance rewards (bonuses), customer relations with large power users and improved the billing and metering systems. Hydrological conditions were in TANESCO's favour and the utility registered an operating profit for the first time in years, although technical performance was still poor.

Nevertheless, despite faltering reform progress, in 2008 the Electricity Act was passed, updating the 1957 Electricity Ordinance Amendment that had, until then, governed the sector. The Act gave powers to the Minister of Energy to restructure the electricity sector with a view to attracting private sector participation and required that a policy for the reorganization of the electricity market be published. The policy was issued only later in 2014/15. It also separated policy and regulatory roles between the Ministry of Energy and EWURA. The Act appeared to signal a renewal of government's commitment to reforming the sector.

However, this was insufficient to prevent non-transparent and non-competitive procurement of 317 MW of emergency power plants (privately owned) between 2011–2012, provoked by a prolonged drought and shortages in hydropower.

The power crisis stimulated a new initiative, code-named 'Big Results Now' (BRN), to translate policy planning into implementation activities across all major sectors, including energy and gas. The BRN initiative of 2013 re-affirmed the earlier goal of unbundling TANESCO and privatizing the sector. It also established targets to have installed 10,000 MW generating capacity by 2025. However, the sector continued to suffer from TANESCO's poor financial performance which was severely aggravated by the expensive Emergency Power Producers (EPPs); the utility-incurred losses of TShs 1.45 billion (US$276 million) in 2013. Despite EWURA approving a 40% tariff increase in 2012 and a further 39% in 2014, TANESCO was unable to shoulder the extra cost of expensive thermal generation – revenue collected from tariffs were inadequate to cover the cost of sales and government contributions could not cover other operating expenses and financing costs as before.

Strategic interventions by the World Bank's Development Policy Operations Credits I & II (DPO I-II) aimed to address TANESCO's financial predicament. However, stakeholders were concerned as arrears continued to increase and TANESCO remained far from being financially viable. Nonetheless, the DPO loans also offered technical assistance to prepare TANESCO for unbundling, including establishing an independent system operator by 2017 (Eberhard et al., 2016). However, owing to the previous controversy and huge costs[13] arising from the non-transparent procurement of IPPs and EPPs (IPTL[14] & Symbion/Richmond), the government once again reversed policy commitments by covertly opting to procure, build and own all new long-term projects through TANESCO (despite its precarious financial position) rather than through the private sector. This unwritten policy has been formalized through letters to the Ministry of Energy and the Regulator (EWURA) that, going forward, all private projects will be undertaken as public–private partnerships (PPPs), although it is far from clear how the state's equity would be funded (Eberhard et al., 2018a). Further, noncompetitive procurement arrangements continue to persist, despite regulatory statutes that encourage competitive procurement.

[13] The result of unsolicited IPTL and impact were huge costs amounting to US$150 million (with an additional US$13 million budgeted for fuel conversion to natural gas, for a total of $163 million)

[14] The IPTL project company was formed between the Malaysian firm Mechmar (70%) and a Tanzanian firm VIP Engineering Limited (30%). The IPTL deal grew out of south-south collaboration which was being heralded at the time as an alternative to the north-south donor-recipient model of the previous decades.

Under the presidency of John Magufuli (voted into office in October 2015), the Big Results Now (BRN) targets were abandoned and scaled back to 5,000 MW by 2020 and 7000 MW by 2025. To date, little progress on unbundling and privatization has materialized, and privatization plans have been formally revised. The Electricity Supply Industry Reform Strategy and Roadmap (ESIRSR), which had been set for 2014–15, has been extended to 2025 in line with the Tanzania Development Vision (TDV) 2025.

The revised ESIRSR 2014–2025 set out timelines of reform interventions for the short, medium, and long-term, including the unbundling of TANESCO's generation segment and allowing IPPs to sell directly to bulk off-takers (though paying wheeling costs), by December 2017; the vertical unbundling of transmission and distribution by June 2021, and the horizontal unbundling of both distribution and generation, by June 2025. It envisaged government retaining 51% majority shareholding in generation. It also set TANESCO performance targets. However, the ESIRSR is stuck and no more progress has been made towards unbundling or more IPP involvement to-date. The interview respondents in the case study argued this is because policymakers are seeing neither the financial benefits of reforms nor of unbundling and called for initiatives to demonstrate benefits to policymakers, if the reform roadmap is to be fast tracked. Policymakers have largely not provided the right support and conducive environment for reforms to yield benefits. The high turnover at MoE and TANESCO, combined with a lack of a reform champion, leaves very few technocrats that have an appreciation of reform and its benefits. In sum, Tanzania's reforms have delivered little. A once-admired regulator has been compromised – decisions on tariff determination have been rescinded, as well as job terminations of Director-General and the board of directors. Songas stands as the only competitively procured IPP, and others such as IPTL, Richmond/Dowans/Symbion (126MW), have been mired in controversy[15] and now are no longer in operation. Reforms are yet to yield the desired improvements in basic infrastructure, customer service, and access on the ground that was originally hoped for after more than a decade of reforms.

3.4 Governance Framework and Structure in TANESCO

At a utility level, the board of directors (one tier) plays a dual role as agents of government overseeing the utility, and as principals to management. As principals, the board provides strategic leadership, oversight guidance and policy direction to the company. With prior consent of the line minister, it appoints and delegates the day-to-day management of the company to a chief executive or managing director (MD) as

[15] Procured in drought period to plug power shortage crisis in September 2006, the project got embroiled in corruption allegations leading to the resignation of then–prime minister Edward Lowassa and two other ministers in 2008.

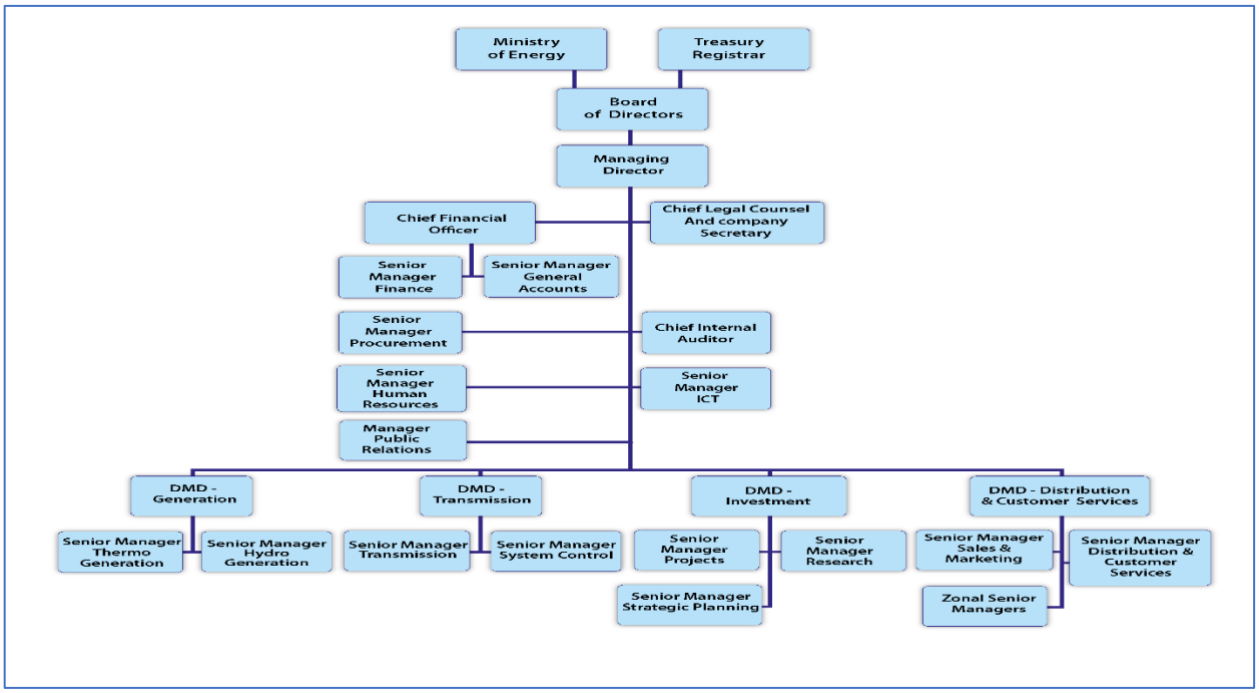
their agent – transferring responsibility to a more professionally qualified and experienced team. A performance contract establishes a reporting relationship between the board and the MD for the fulfillment of company goals. The operations of the company are delegated along 10 main divisional structures as shown in the figure below, with the respective heads reporting to the MD. There is also an 'independent' internal audit unit which administratively reports to the MD and the Audit and Risk Committee (ARC) of the board. Performance contracts establish functional and role reporting obligations between the division heads and the MD. The cascade of responsibility and task execution occurs through individual performance contracts and One Minute Goals[16]. Operational activities are further delegated according to geographical and zonal areas for faster service delivery. The managing director and his team assume the risks and obligations associated with delivery of electricity services to consumers, while ensuring sound technical and commercial performance of the utility.

To achieve the desired targets, the MD is supposed to ensure that all departments at head office, and business units (BU) at regional and zonal levels, are prudently managed. However, in executing their tasks, staff often have personal interests and goals that conflict with those of the corporation. For example, some of the staff interviewed acknowledged that managers receive revenues from large power users in their personal accounts or do not declare the existence of certain installation connections which pay them.

It is also worth noting that some of the performance failures in TANESCO are partly attributed to the politically fraught environment in which it operates. On assuming office in 2015, President John Magufuli fired the previous management team and appointed a new MD and new heads of departments. The high turnover of managerial staff as a result of political influence has created job uncertainty, with serious ramifications for its performance. It also stifles continuity of planning, financial management and internal business growth. The utility also has an inadequate information management and dissemination system that is fractured at various structural levels, uncoordinated and difficult to access. Staff supervision is weak and internal performance improvement programmes are nonexistent.

[16] One Minute Goals is a concept adopted from publications: *One Minute Manager* by Blanchard & Johnson (1983) and *Leadership and the One Minute Manager* by Blanchard, Zigarmi et al., (1985) and refers to a basic task assignment approach to improve staff confidence and productivity by ensuring that every employee has specific deliverables and makes a contribution to the overall performance of the company. It is an initiative that partly aims at boosting creativity, assessing, incentivizing individual staff performance and doing away with 'free-riders'- unproductive staff.

Figure 3.3: TANESCO's Governance Structure



Source: Author's modification based on Annual Reports

3.4.1 The Tanzania Companies Act (Cap 212 R.E 2002)

The Companies' Act is a general national law that provides a framework for the establishment of public and private companies in Tanzania. Under the law, TANESCO was registered as a limited company, fully owned by the government with 120 billion in ordinary shares. It is specified as a public corporation under the supervision of the Ministry of Energy and registered under the Companies Act Cap 12 (R.E. 2002) as amended. The articles and memorandum of understanding present TANESCO's identity as a corporate legal entity operating under commercial principles. However, there is no specific law that grants TANESCO autonomy from public service. Being publicly owned continues to erode the utility's efforts to gain autonomy and independence in decision-making, since socio-political interests of the government (principal) persistently conflict with commercial principles in utility operations, otherwise required by management (agents).

3.4.2 The Public Corporations Act, 1992

Parallel to the Companies Act, the Public Corporations Act – 1992 establishes TANESCO and specifies it as a state-owned enterprise under the power of the president. The Act provides the legal basis for the administration, specification, financial provisions and transitional provisions of all public corporations in

Tanzania (United Republic of Tanzania, 1992b). Of specific interest to this thesis is that it defines mechanisms for the establishment and appointment of boards of directors of public corporations in which the government is the sole shareholder, and outlines qualifications and limitations for appointment to board membership, and the appointment of the chief executive. These however don't reflect what is done in practice. The Act also defines commercial principles of operation, borrowing the powers of public corporations and the absolute power of the president to gazette institutions as public corporations. Ironically in practice, the tenets of sound commercial operation have not been protected under the same act – TANESCO continues to pursue non-commercial objectives; operates on soft budgets; is influenced by directives from the ministry of energy or the president and is not moving towards cost recovery.

3.4.3 Appointment, Board Structure, Functionality and Board Charter

The TANESCO Board Charter, as approved in 2016, provides for nine board members. However, the Companies Act only sets a minimum requirement of three. Ironically, the Public Corporations Act does not specify the number of board members for a public corporation. This ambiguity has left the line minister leeway to appoint varying numbers at different times. The chairman of the board is appointed by the president while the other eight directors are appointed by the line minister pursuant to the Public Corporation Act, Section 9 (sub-section 1 and 2). In practice, TANESCO in 2016 and 2017 had only six directors – all non-executives. Of the six members, one had resigned while two others had been fired in 2018 for supporting a tariff increase. Board members are required to serve a tenure of three years, renewable only once. However, owing to governance conflicts, some have had their agreements terminated before their term of office expires.

The board, to enable it to operate effectively and give full consideration to key matters, is structured into four standing committees: audit and risk management; corporate and governance; planning and operations, and human resource and remuneration. In the interest of business continuity, exchange of expertise and understanding of the organization, committee members are rotated from time to time to improve committee performance. However, the absence of a fully constituted board and committees poses serious risks to the utility, creating room for management to expropriate resources. There is a high turnover of board members at the institution as well as job uncertainty, especially for senior managers. In 2018, for example, the Minister of Energy instigated the demotion of various staff: two deputy managing directors responsible for generation and transmission, the chief internal auditor and the key senior managers responsible for human resources, legal affairs and technical operations. At the time of writing this thesis, the utility had no board of directors presenting serious governance challenges to the

utility's decision-making and supervision process. The lack of job stability and predictability among executives and staff is a huge risk to the utility's performance and underscores an immediate need to strengthen the governance structure in the electricity sector. Further, the high frequency of terminations of board members by politicians violates the independence of management espoused in corporatization and commercialization reforms, and ultimately the performance of the utility.

3.4.4 Selection and Role of the Board of Directors

The TANESCO board charter outlines desirable characteristics in the selection of board members across four broad categories: personal characteristics, core competencies, commitment, and team and company considerations. While these de jure characteristics exist, they are necessary but not sufficient requirements compared to those of the more robust utilities that operate commercially and by international standards. Interviewees confirmed to the author that there is no transparent and competitive selection process of board members. Instead, the line minister personally identifies individuals and asks them to submit their CVs and application letters for formalization and appointment. This process reflects on governance failures of the ministry as a principal. Nonetheless, the board is responsible for strategic planning, identifying key risk areas, considering and monitoring investment decisions, considering and approving financial budgets, reviewing the performance of company business plans and ensuring that the board can function independently of management. The board is also responsible for ensuring that a comprehensive system of internal control policies and procedures is operationalized, and that the company complies with sound corporate governance principles. However, interviewees confirmed that the board is often ignored by the MoE when new generation capacity is being procured, often in violation of master plans, and resulting in corruption scandals.

3.4.5 Transparency and Disclosure, Accountability and Risk Management

The company has mechanisms to disclose its financial statements in accordance with International Financial Reporting Standards (IFRS) and is audited by the Controller and Auditor General in the National Audit Office (NAO) of Tanzania. The board assents to the financial statements before publication. TANESCO is subject to and is required to comply with the provisions of the Auditor General and the Public Procurement Act of 2004. The financial statements contain disclosures regarding the company's compliance with the above statutory regulatory frameworks. It should be noted that between 2004 and 2011, TANESCO struggled to comply with the above statutory requirements and there were transactions not approved by the Tender Board. Unlawful and erroneous single sourcing and expenditure outside of

the annual procurement plan were observed – largely associated with emergency power plants and projects in transmission and distribution, signalling pervasive corruption and non-competitive practices.

However, by 2014, the company was issued with a 'clean bill of health by the office of the Controller and the Auditor General. Nevertheless, this clean slate did not last long. In 2015, TANESCO was involved in an arbitration case filed against it by Standard Chartered Bank Hong Kong (SCBHK) at the International Centre for Settlement of Investment Disputes (ICSID). SCBHK stepped into the shoes of IPTL as lender by assignment, seeking to recover shareholder loans arising out of the failure by TANESCO to pay IPTL for outstanding invoices and damages. The ICSID ruling awarded SCBHK a claim amount of US$148.4 million in September 2016. To date, the utility and government (guarantor) have not honored the award. TANESCO is currently also involved in a legal suit filed by Jacobsen Elektro (EPP) claiming US$12.56 million as default payment for works executed to develop the 100MW gas-to-power plant at Ubungo. By end of 2018, the company was a defendant in several other lawsuits, including Symbion, which points to a track record of defaults and poor financial performance (TANESCO, 2018a).

The accountability of the board is managed mainly through the performance contract with the Treasury Registrar, who is the formal asset owner and oversees all national investments in public corporations. It should be noted, however, that the current performance contract is a simple, weak and generic contract for all public corporations and does not incentivize the utility to improve performance compared to other utilities in the region and does not adequately address typical core utility challenges.

3.5 The Performance Contracting Framework

The governance framework between the government of Tanzania and TANESCO is defined in a Performance Contract (PC). Eberhard (2019) defines performance contracts as "negotiated, written agreements that clarify objectives of governments (principals) and motivate managers (agents) to achieve improved performance and are also used to reveal information". Performance contracts typically include approval of business plans and specify a number of key performance measures and indicators as well as governance structures. Shirley & Xu (2001) define performance contracts as "…written agreements between managers of state-owned enterprises (SOEs) — who promise to achieve specified targets in a given time frame—and government, which can reward achievement with bonuses or other incentives". Performance contracts embedded with incentive schemes are increasingly and positively changing the pace of utility performance in developing economies. According to Janssens et al (2018), governments, regulators and utilities are fundamentally rethinking the way they contract out services.

Previously, contracts were predominantly method-based and tended to emphasize inputs, including procedures, processes, wages to be paid, amount or type of equipment, or time and labour used. By contrast, performance-based contracting is an output- and outcome-based approach to contracting. Performance contracts clearly spell out the desired end result expected of the agent/contractor, but the manner in which the work is performed is left to the agent/contractor's discretion. Contractors are given as much freedom as possible to figure out how to best to meet the principal/government's performance objective. A key design requirement is the clarity of roles, responsibilities and accountabilities (J. G. Janssens et al., 2018). The whole idea of performance contracts is to make them more efficient by optimizing incentives and allocating risks to the party more able to bear or mitigate them. Properly designed, performance contracts can achieve better results than are normally achieved using traditional public sector input-based contracting methods. The advantage comes from a better alignment of incentives with output objectives, coupled with more agent flexibility in design and implementation to facilitate innovation and encourage efficiency.

3.5.1 Performance Contract between Ministry of Energy and TANESCO

Whereas the board charter provides for an annual PC framework between the government through the MoE (principal) and the Board of TANESCO (as agents), this has not been implemented and, in any case, has no legal basis (as would have been ideal). Instead, the appointed board signs a contract with the Treasury Registrar (TR). At the time of undertaking research for this thesis, the PC with the TR was the only contract known to management and staff, and hence is analyzed below. Since board members are appointed by the line minister, they are under immense pressure to execute directives issued by the MoE. The board often gets caught up in day-to-day operational activities, which creates conflicts with utility staff. It is ironic that the line ministry is absent and not party to an existing formal PC, yet the MoE often influences the day-to-day management of the utility. Respondents cited scenarios when the minister of energy has, in public meetings, issued directives to TANESCO's board and MD to undertake unviable projects. The ministry has relegated its core performance contracting role to TR but is operating informally outside established contractual parameters, a measure of the broken governance structure in the sector.

3.5.2 Design of the Performance Contract between GoTZ/ Treasury Registrar and TANESCO

The Public Corporations Act 1992, (No.2) Section 26, and Treasury Registrar Act, Cap 370 R.E 2002, Section 10, require every public corporation which holds a monopoly position in its business to enter an agreement (in this case a PC) with the Treasury Registrar with a view to setting quantifiable performance targets and to determine the proper distribution of dividends. The Treasury Registrar (TR) is the de jure

'principal' to the contract on behalf of government and is vested with responsibilities including holding "all capital investments in public corporations as well as in private investments where the government owns shares or interests in trust for the President and for the purposes of the Government of the United Republic of Tanzania" (Government of Tanzania, 2002). The board chairperson is the designated signatory on behalf of TANESCO. The board is an agent, in relation to the TR PC, but also the principal in its supervision of the utility's activities. The PC delineates the working relationship between the two regarding TANESCO's contribution in the achievement of national development goals enshrined in the Tanzania Vision 2025 and the national medium-term and long-term strategies (the Five-Year Development Plan), and the agreed key performance indicators (KPIs). The contract is signed and renewed annually. However, there is lost time between the de jure commencement date and the effective (de facto) date. For example, the most recent contract commenced on 1 July 2018 yet was signed for effectiveness on 28 September 2018. Yet there is no reconciliation and compensation framework for expensed resources (through government subsidies) during the three-month period, which further erodes the financial position of the company in unregulated expenses. In addition, there is neither a monitoring framework nor a compliance requirement provided by the TR to conduct technical diligence or authentication of information reported by the utility. This is because the Treasury Registrar lacks technical capacity and experience to validate the information. In the absence of independent monitoring and compliance, reporting is only done to fulfill a statutory requirement, without feedback mechanisms (critiques) to improve performance.

3.5.2.1 Objectives of the Performance Contract

The PC aims to define objectives and targets to be performed by the board of directors as well as to monitor and measure performance. The PC is also used for assessing the suitability of the board in terms of performance expectations. While the contract refers to "agreed upon KPIs and freely negotiated performance objectives and targets" between the TR and the board – a de jure provision – in practice, such a process of negotiation and agreement is not exercised. Instead, KPIs and targets are handed down to the board for implementation, without due regard to availability of resources or capacity of the institution to execute them. This demonstrates a de facto variation in a critical governance process that fails to draw a clear reassuring roadmap and systematic way for task delegation. Yet this procedure and resultant targets have a profound bearing on the performance of the utility to the lowest level of staff effort. In the absence of a reassuring contracting and incentive framework, moral hazard and adverse selection set in, creating a culture of staff indifference and low morale that affects performance. Further, while the contract refers to an agreement by both parties to review the performance of the Board on a

quarterly basis, well-placed interviewees confirmed through in-depth interviews that such an agreement and reviews do not exist, referencing termination of two sets of previous board of directors by the president, on non-performance grounds and because the directors had sought to raise tariffs to near cost-reflective levels.

3.5.2.2 Key Performance Measures

The PC provides nine strategic objectives derived from the Strategic Plan 2017–2021 which are used to guide performance. Many indicators and targets are provided. Table 3.5.1 shows the author's paraphrased and summarized representation of the PC targets.

Table 3.1: Performance Contract KPIs and Targets, 2018-19

Strategic Objectives	***Measurement KPI***	***Target 2018/19***
HIV and AIDS infections reduced and support services to employees improved	*No of Staff trained on HIV/Aids prevention*	*3,000*
	Number of infected staff who receive care and support	*70*
Human Resources Capability enhanced	*Conduct Employee Motivation Index*	*Enhanced staff motivation*
	% Implementation of CMS (Corporate Management System)	*20%*
Accessibility and Connectivity to Electricity increased	*Number of km of MV&LV constructed*	*30,000*
	Number of new customers connected	*250,000*
Sustainable Development of Support Services Infrastructures enhanced	*Number of buildings constructed*	*10*
Sustainable Development of Energy Resources enhanced.	*New installed capacity (MW)*	*35*
	Additional transmission line (km)	*250*
	Number analytical research projects	*>10*
	Awareness meetings of large power users	*100*
Implementation of the National Anti-Corruption Strategy effected, enhanced and sustained	*No of staff to receive training on NACSAP III*	*3,000*
	"Ensure 100% compliance with existing Public Procurement Act (PPA)"	*100%*
Corporate Image, Quality and Efficiency of Services	*Number of O&M contracts to engage in available plant capacity*	*6*
	Total number of interruptions to each T/L connection point/Number of all T/L (times)	*Ensure reliable service delivery*
	% of availability of ICT network	*To improve internal & external communication*
	% of responses to TANESCO-related story to the daily released magazine	*80%*
	% of implemented tender in the procurement plan	*Compliance with public procurement act*
Risk Management and Corporate Governance enhanced	*Risk management policy availability*	*Formulation of RMP*
	% of completion of ISMS systems	*Enhance security*
	% of implementation of Audit Recommendation	*compliance*
	Number intrusion in ICT system and network	*Ensure system security*
	Number of ordinary Board Meetings	*4*
	Number of Workers Meetings	*4*
	% of compliance to Treasury Registrar or Government directives.	*100%*

Strategic Objectives	*Measurement KPI*	*Target 2018/19*
Electricity Sales, Revenue Collection and Financial Sustainability improved	*Number of customer campaigns to increase revenue, deployed technology for revenue collection*	*>125*
	% of inspected meters	*>50%*
	% of distribution system loss	*10%*
	% of transmission system loss	*<6%*
	% of EBITDA growth	*>10%*
	% of Revenue growth	*>5%*

Source: Author's creation based on 2018/19 Performance Contract

With respect to the focus areas of this thesis, the PC targets an increase in electricity access by installing 250,000 new connections enabled through construction of 30,000 kms of MV and LV distribution lines. However, this is a low number in a country where about 67% of the population has no access to grid electricity. The adequacy of supply target is very low at 35 MW and, assuming a uniform capacity addition for the three-year strategic plan, would only add 105 MW by 2021. This would still be inadequate to meet peak demand growth of average 9% per annum. The contract also targets the construction of 250 km of transmission lines to increase evacuation capacity. No definitive targets are provided for reliability of supply apart from an indicative aim to ensure a reliable supply. However, a target to procure six O&M contractors to maintain existing generation plants is included. There is no mention of how their performance will be assessed. The contract sets no affordability indicators since this is the obligation of the regulator, EWURA. However, evidence shows the government dictating standard connection charges.

The target to improve financial viability and sustainability is reflected in targets to increase revenue collection to 125% (including arrears), reducing Transmission and Distribution losses to 6% and 10% respectively, improving EBITDA to more than 10% as well as capital growth by more than 5%. These targets are expected to translate into overall revenue growth. Despite the ambiguous presentation of the contract and lack of a baseline, the targets remain too many and appear not prioritized for emphasis, including basic administration activities. For example, some KPIs have no direct value to the utility's performance but are probably policy facilitators and activities derived from the MTEF that are better addressed at a policy level. Other targets reflect linkages to government directives which create risks for political patronage in their implementation. Apart from the quantitative targets, the KPIs also contain a wide range of qualitative internal initiatives which are subjective and difficult to measure.

3.5.2.3 Obligations of the Treasury Registrar

The Treasury Registrar's obligations are critical to the performance of the board. As per the contract, these include advising on the review and amendment of laws in order to empower the board to achieve its

mandate; promotion and creation of an enabling environment for the board to meet their agreed objectives; proposing to the appointing authority the termination of the board in the event of failure to meet the agreed objectives; ensuring that the appointed members have the relevant skills; carrying out quarterly monitoring and evaluation, and ensuring the timely appointments of the board of directors and the CEO upon expiry of their respective tenures.

Yet most of these obligations have been violated in one way or another. For example, while the TR is responsible for ensuring timely appointments of the Board of Directors, at the time of data collection and the writing of this thesis, the utility did not have a fully constituted board. Only the chairperson was in place and the other eight statutory positions were vacant. The TR has also not created an enabling environment: for example, autonomy for the utility to operate on a commercial basis. This breakdown is due to the misaligned authority structures and conflicting provisions – two government agencies with powers to appoint directors drawn from two separate legal instruments (the Public Corporations Act empowers the line minister of energy, and the Treasurer Registrar Act allows the TR). This signals a critical failure on the government's governance mandate. In addition, the government provides weak delegated powers to the board of directors (agents) to improve performance. The absence of a negotiation framework, and the TR's lack of technical capacity to monitor or evaluate performance of TANESCO, creates a double-edged sword for the board in executing their mandate. First, they assume a high risk of executing targets they do not own, think are feasible or are well prioritized and, secondly, the TR (principal) does not provide for necessary support resources. Yet, he retains powers to unfairly recommend their termination for reasons outside the control of management: for example, prolonged droughts that affect hydro-generation capacity, increasing generation costs linked to non-competitive EPPs, all of which create a difficult context for improving technical performance.

Further, and explicitly stated, the contract does not provide for any funding modality. While some funding (for large CapEx) is assumed to arise from state coffers through the MoE, and tariffs approved by EWURA, the fact that the MoE is not party to this contract creates challenges for the utility: it lacks a promoter when crucial public finance decisions are made. Evidence from interviews of top management established that the budgets proposed by the utility for state funding are not fully approved, leaving the utility (agent) inadequately resourced.

3.5.2.4 Rewards and Penalties

The PC does not provide for any incentives to the utility apart from annual board members' fees, only paid to TANESCO's board of directors when the utility achieves its targets. This PC provision is very weak and

does not incentivize either the board or staff who are the primary drivers of utility performance. It is no surprise that through in-depth interviews with top management members, the author ascertained that there is neither an incentive framework nor incentives for management and staff, of any form, to achieve the set targets. Staff rely only on salaries, which are very low, that are set through the mainstream public sector service regime with a mild adjustment. Demoralization is reflected in one respondent's rhetorical question: "If our efforts to improve performance closer to the set targets is not rewarded, then why the effort?". The question is a symptom of the deep-seated disillusionment among staff as agents of the board of directors. Yet if there was a framework for negotiating targets probably such staff incentive issues would be catered for.

3.5.3 Tariff Incentives for Utility

There are minimal efficiency incentives provided to TANESCO by the regulator EWURA (principal) through their cost-of-service and rate-of-return regulatory regime except for an OpEx allowance for loss reduction within the tariff. However, there are no explicit performance incentives accorded to the utility. Based on the PC, achievement of associated targets relating to collection efficiency, reliability and quality of service, and new customer connections, is implicitly assumed to benefit the utility. The management at TANESCO considers these to be residual benefits of their innovative efforts rather than incentives in a strict sense. For example, in 2016 EWURA directed the utility (Tariff Order No. 2016-010) to submit an implementation plan for metering system improvement in the distribution network to enable accurate measurement of energy and determination of system losses. They also requested EWURA to design strategies for fighting illegal connections, and to submit reports on efforts to collect outstanding debtors and payments made to creditors. These orders were understood to yield implicit benefits to the utility. There is also no reconciliation mechanism for cost recovery or monetary compensation for variations in power purchases and sales. The current state of incentives is clearly very weak, almost nonexistent and does not send a strong signal to motivate improvement in performance or the financial viability and sustainability of TANESCO either in the short- or long-term.

3.6 Operational Performance of TANESCO

How has this inadequate governance and incentives environment impacted TANESCO performance? This section provides an empirical and analytical description of the operational performance of TANESCO, guided by five key performance measures: three are the delivery metrics which matter most for consumers: that is, access to electricity, affordability of tariffs and an adequate and reliable supply. The remaining two capture the ability of the utility to deliver: its technical and cost efficiencies and its financial

sustainability. Trends in performance, computation of values and ratios for key performance indicators are analyzed and presented to show variations and are interpreted to explain the context.

3.6.1 Access to Electricity

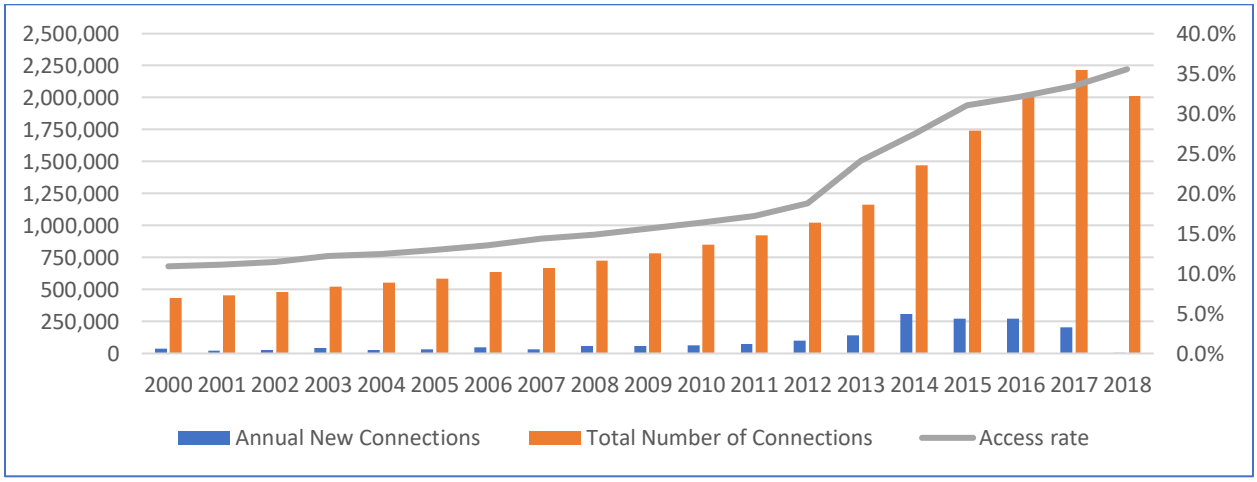
Tanzania is one of 20 countries with the largest electricity access deficits in the world (International Energy Agency, 2019b; International Energy Agency & IRENA, 2020). For this thesis the author uses the number of household connections to grid electricity divided by the number of households as a basic key performance indicator to measure access. With a total customer base slightly above 2 million connections to the grid, TANESCO still has a large unserved population in a country of 59 million people. Connections grew at an average rate of 6.6% per annum in the early and mid-2000s. The Millennium Challenge Corporation funded a large electrification project in Tanzania during 2008–2013 at a cost of US$200 million aimed at promoting economic inclusion and reducing poverty. It involved extending the electricity grid and offering low-cost connections to households. The project was less successful than planned: the number of new connections was less than a third of what was initially projected – it targeted 35,000 new connections but only 10,494 were connected. One of the reasons for the low connection numbers was the connection charges that TANESCO imposed for households living outside the 30-metre range of existing distribution lines.

Since 2013 there has been an increase in the rate of new connection. By 2018 annual new connections had reached 240,000 per annum from increased donor and government funding, which was mainly for the REA for last-mile-electrification projects. There was also a reduction in connection fees to TShs 272,000 for urban connections and TShs 150,000 for rural connections[17]. These are still relatively low connection numbers by developing country standards. However, in a country where GNI per capita is US$1,020, affordability of connection charges for the most rural citizens is still a huge challenge to electrification efforts. Making matters worse is the poor financial health of the utility which constrains its ability to invest in expanding access at a faster pace. In fact, almost 35% of the new connections has been executed by REA rather than by TANESCO. Electricity consumption per capita remains extremely low: it was 114kWh in 2017, declining from 147 kWh in 2016, owing to reduced electricity sales and an expanding population.

[17] In 2018, the Minister of Energy ordered the cancellation of EWURA approved rural connection fees (Tshs 150,000) and directed TANESCO to charge only TShs 27,000 of which 15,000 is recouped from the Rural Energy Fund, implying rural customers only pay TShs 12,000. The utility faces the financial brunt of the difference. Yet, the actual true cost of a rural connection is estimated at TShs 421,000.

Tanzania has, however, made progress with private initiatives in off-grid electrification, which has accelerated over the past five years owing to support by government for decentralized systems expressed through exemption from import duties and value-added taxes for solar products. There has also been the development of a mature mobile payment infrastructure that enabled innovative business models and payment mechanisms to emerge. Until 2007, access and rural electrification remained very low. Institutional reforms establishing REA/REF (which became operational in 2007) helped to create a stronger institutional mandate and devolved responsibility for electrification. Together with EWURA, which created a favorable regulatory environment for entry of private players (off-grid players), these institutions have helped to raise access rates in Tanzania, without which performance would have remained lackluster.

Figure 3.4: TANESCO New and Total Connections



Source: Author's own creation based on TANESCO annual reports

3.6.2 Adequate and Reliable Electricity Supply

Assessment of this indicator is presented in two sub-categories: namely, the level of installed generation capacity, which is a proxy for security of supply, and reliability of supply.

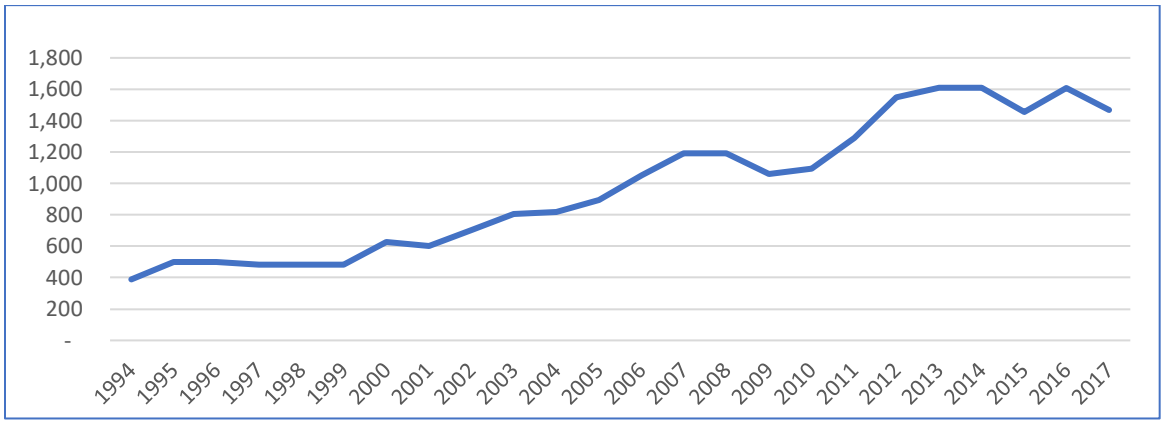
3.6.2.1 Installed Generation Capacity

Prior to 2001, most of the supply was state-owned hydropower and investment in new generation capacity was minimal, owing, in part, to the poor investment climate in Tanzania that persists to-date. Following a prolonged drought and power shortages, the procurement of two pioneer IPPs – Songas (106 MW) and IPTL (103 MW) – was initiated in 2002. IPTL was not competitively procured and resulted in one

of the most expensive IPPs in the region, also delaying the finalization of the Songas project. The utility also began to diversify its energy sources through gas-power generators, a shift away from the drought-vulnerable hydro. However, these investments were insufficient, and Tanzania continued to experience periods of power shortages, which prompted the contracting of emergency power projects (EPPs) – such as Richmond, Dowans and Symbion. Unfortunately, through non-competitive, non-transparent processes, this resulted in corruption allegations and disputes. None of these EPPs, totalling about 300MW, are still operational, and electricity supply and security has remained unstable and inadequate.

The politically sanctioned construction of the 2.1GW Rufiji Stigler's Gorge (recently renamed as Nyerere) hydro-dam, commencing in mid-2019, is expected to boost generation capacity over the next five to seven years and, hopefully, reduce the perceived high power prices as the government's informal policy shifts away from use of IPPs to PPPs. It remains to be seen whether previous corruption and non-transparent behaviour will filter through to the procurement of new long-term generation projects and whether resultant costs will be competitive. With a fast-growing population and an average GDP growth rate between 6–7%, peak demand (currently 1,116.5MW) is expected to catch up with current installed capacity (1,566MW). Combined with transmission and distribution system failures, Tanzania is still a long way from assuring security of supply. While private sector participation reform initially resulted in an increase in generation capacity through IPPs like Songas, IPTL and Symbion, there are still very few IPPs compared to countries like Kenya and Uganda. Private investment has since been constrained, leaving the sector exposed to further supply shortages. Songas was the only competitively procured IPP and is cheaper than the directly negotiated EPPs and IPPs which have also been riddled with corruption (Africa Research Institute, 2017; VOA, 2009).

Figure 3.5: Tanzania Installed Generation Capacity (MW)

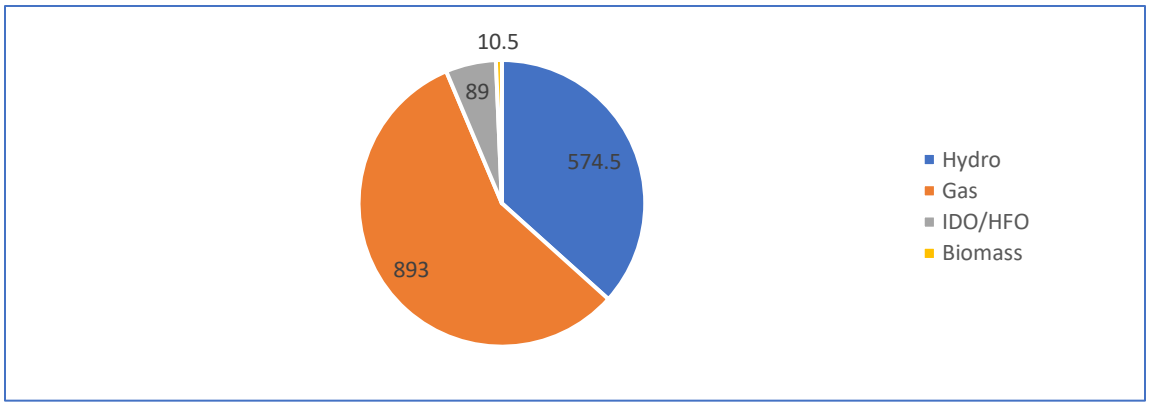


Source: Author's own creation based on TANESCO & EWURA annual reports

3.6.2.2 Energy Mix at End-2018

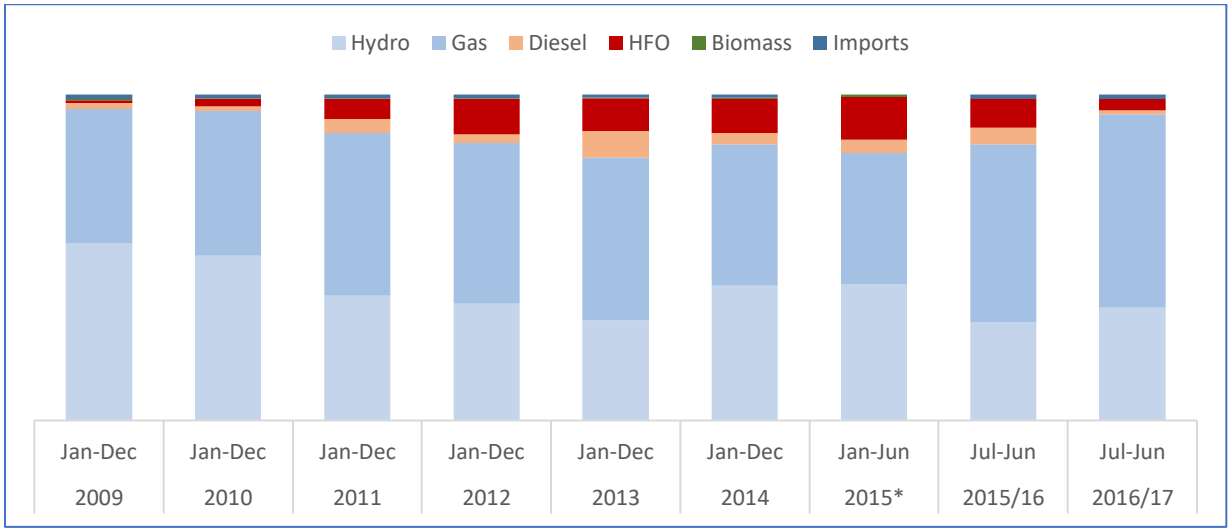
The energy mix currently comprises natural gas (57%) and hydropower (37%) with much of the remainder being HFO or diesel. Prior to 2018, the utility was burdened with about 495 MW of liquid-fuel power plants, which included the EPPs during times of supply crisis. Expensive PPA contracts ranged between US$0.31/kWh to US$0.40/kWh. Hydropower, at about US$0.10/kWh, is cheaper than thermal generation. However, within the context of climate change, hydro is increasingly unreliable and natural gas has emerged as the major power source. In addition to the Stigler Gorge hydro, TANESCO is in the process of planning or procuring an additional 950 MW power (Coal 600MW, Wind 200MW, Solar 150MW) which could diversify the mix further (USAID, 2020). Without a change in governance system to allow for competition, the procurement of these projects is likely to be embroiled in corruption once again.

Figure 3.6: TANESCO Generation Mix at End-2018 in MW



Source: Author's creation based on TANESCO data

Figure 3.7: Power Generation by Source



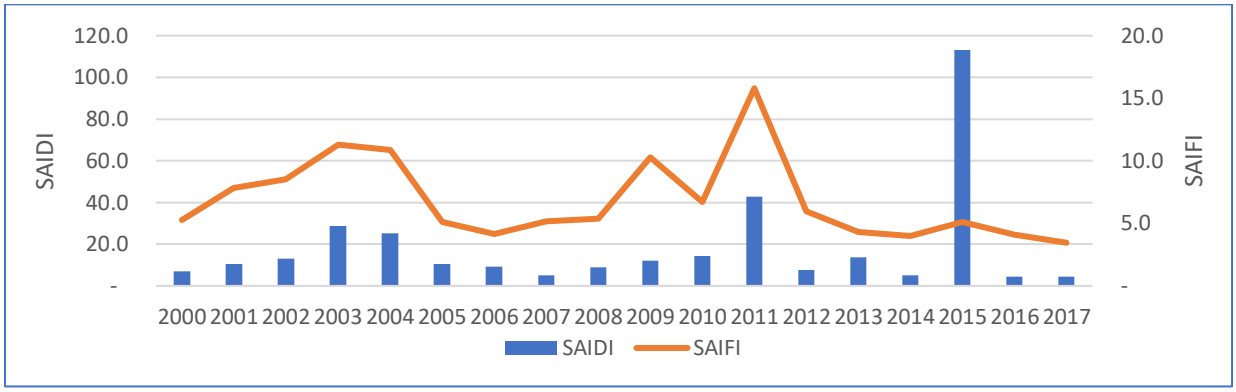
3.6.2.3 Reliability of Supply

Between 1992–2014, Tanzania experienced five serious, prolonged droughts, resulting in power shortages. Enduring weaknesses in generation-expansion planning processes have impeded timely initiation of tendering, procurement and contracting new generation capacity, resulting in repetitive power crises. Uniquely to Tanzania, Clause 5 (d) of the Electricity Act grants EWURA powers to approve initiation of the procurement of new electricity supply installations, making Tanzania one of the few countries in SSA where this authority is explicitly stated in law. While this is commendable and represents a new way in which regulators could become involved in approving investments, these powers have not been exercised for utility scale generation: instead, only for small power projects (SPPs) and mini-grids. The entity responsible for the initiation and management of the procurement process was not specified, creating an institutional lacuna for the acquisition of new generation capacity or IPPs, and hence supply security and reliability challenges persist.

Investments in the aged transmission and distribution network, too, have been inadequate, resulting in load-shedding and frequent outages. The 2020 World Bank's Ease of Doing Business survey reveals nine outages per month on average, lasting 6.5 hours and sometimes increasing to 12 hours at a time during severe drought situations (World Bank, 2020a). Although EWURA, as the regulatory principal, has set quality of service reporting requirements for TANESCO, there are high levels of non-compliance and there are no corresponding financial penalties or incentives attached. At a distribution level, TANESCO does not have an information management system to track and measure reliability accurately, especially at low

and medium voltage levels. The provided information should be considered with caution since it is indicative only of a few substations' reliability levels, at non-continuous times. Nonetheless, the figure below shows relatively high frequencies of interruption in supply, averaging 6.8 interruptions per 24 hours. Interview respondents attributed the poor reliability to inadequate investments in the T&D network to resolve network breakdowns, tripping and faults.

Figure 3.8: Reliability Indices SAIDI and SAIFI Trends



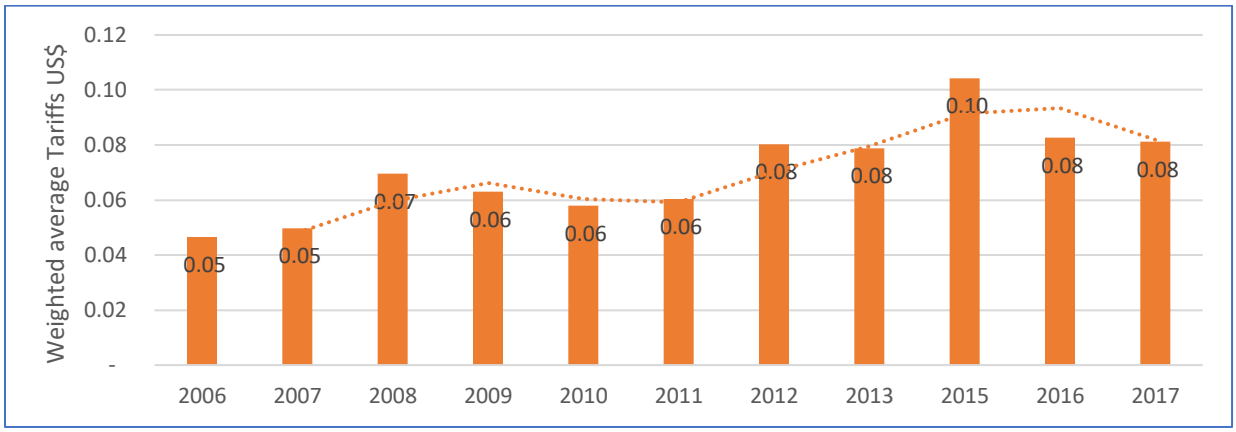
Source: Author's own creation based on TANESCO data

3.6.3 Affordability, Tariffs and Cost Recovery

EWURA has put in place a standardized economic regulatory framework to support multiyear tariff-setting albeit with few incentives to improve the performance of the utility. For the period 2001–2015, the regulator implemented a series of phased tariff increases, including 40.29% in 2012 and 39.19% in 2014, aimed at covering generation costs and improving the utility's financial position. It also allowed full operating cost recovery only in 2015. However, the tariff-setting process has been seriously undermined by politicians at the highest levels in government. Notably the most recent tariffs increase in 2017 was rejected by the prime minister at the direction of the president and this subsequently resulted in the termination of those in the positions of EWURA's director-general and the TANESCO MD (ESI Africa, 2017b), citing concerns that the tariff increase would stunt the president's plans to industrialize Tanzania

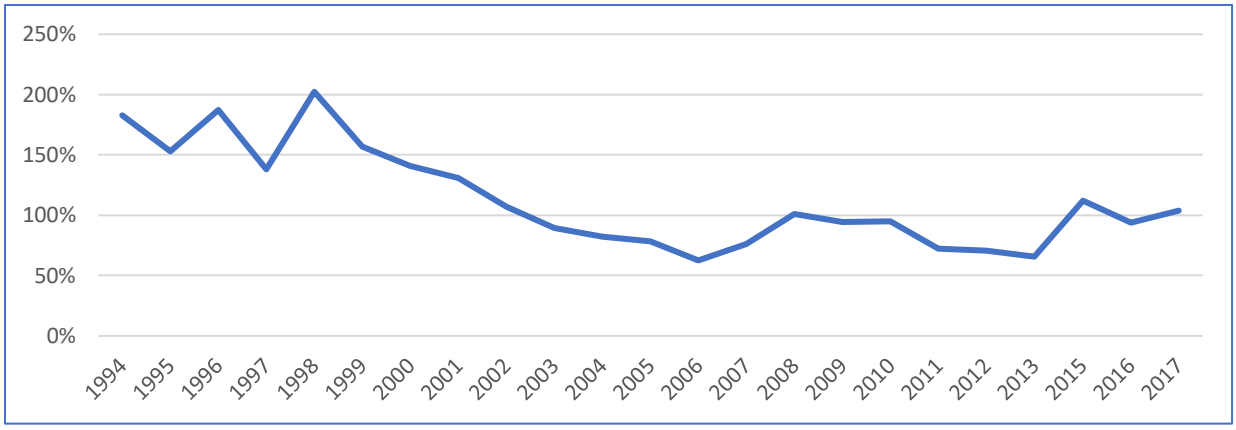
and increase electricity access. Consequently, tariffs have not been able to reach full cost-recovery levels and revenues are inadequate to cover the cost of sales.

Figure 3.9: Weighted Average Tariffs 2006–2017



Source: Author's creation based on TANESCO and World Bank Data

Figure 3.10: Cost Recovery (cost of sales) %: Trend 1994–2017



Source: Author's creation based on World Bank Data

The electricity tariff-setting methodology, as enshrined in the EWURA 'Tariff Application and Rate Setting' Rules 2017, GN 452, is not adequate to ensure full cost-recovery and financial viability of the utility. In particular, the methodology does not provide for a reconciliation mechanism for variations between the utility's revenue requirement, based on full cost-recovery calculations, and tariff charges determined by the regulator. One example is power purchase costs from IPPs, which have varied and have not been fully

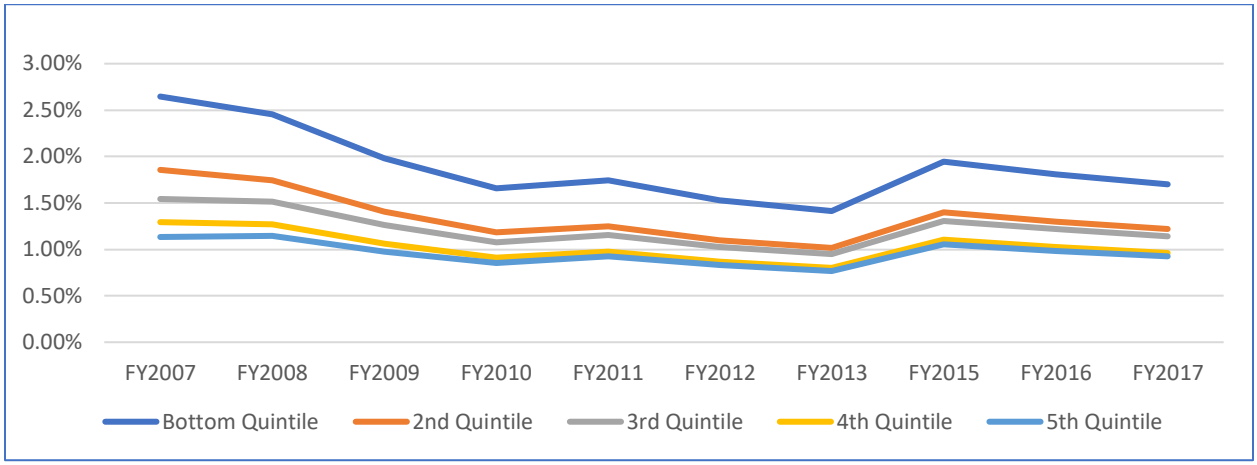
recovered in the electricity tariff. Likewise, O&M costs are not fully recovered[18] (especially those relating to some CapEx projects in generation and transmission), including railway transportation costs of fuel; port charges, and wayleaves corridor compensations. Prior to 2015, these costs were subsidized through direct transfers to the utility by government, but this has since stopped with no recovery mechanism in sight. These unrecovered costs exacerbate the financial strain of the utility. While the tariff methodology provides for monthly cost adjustments or passthroughs (gas, diesel, inflation, foreign exchange), there is no corresponding adjustment of end-user electricity tariffs. As noted earlier, EWURA's attempt to increase tariffs in 2017 was rescinded by politicians, leaving the utility in a financial state of despair.

Since the board of directors and director general (top executive) of EWURA are political appointees, the fear of losing their jobs reigns high when directives are issued. Making matters worse is the fact that the Electricity Act, 2008, in its current form, requires EWURA to seek consent from the line minister before tariff determinations are finalised. This loophole has been exploited by politicians and limits the power of the regulator in implementing techno-economic decisions. In other jurisdictions the wording in the Act would typically be "notify" the minister rather than "seek consent". In addition, one of the respondents highlighted the absence of formal provisions in the law under which a ministry of government office can overturn decisions of the regulator. Together, these two issues have granted unchecked power to politicians to reverse decisions of the regulator.

We have seen that the tariffs are not cost-reflective, but how affordable are they for consumers? We can assess affordability as the ratio of electricity expenditure to total household expenditure. Assuming a subsistence level consumption of 30 kWh per month, the author calculates the percentage electricity expenditure for different income quintiles. From the figure below, it can be seen that the poorest two quintiles (that is, the bottom 40% of households) spend below 3% of the GNI on electricity, indicating that electricity remains relatively affordable.

[18] A top informant at the utility decried the assumptions used in previous and current tariff determinations as 'heavily flawed' and maintained they ought to be revised to take into consideration the ever-changing cost elements of the sector to provide for full cost reflectivity if financial sustainability is to be achieved.

Figure 3.11: Affordability of 30kWh by Quintile



Source: Author's creation based on World Bank Data

Tanzania's major institutional reform in the electricity sector has been establishing the electricity regulator, thereby ceding tariff-setting and determination powers to EWURA (the agent) from government (the principal). While this helped initially to improve transparency in electricity pricing, with provisions for lifeline tariffs for low-income earners, recent interference from government has undermined regulatory independence in setting cost-reflective tariffs, which threatens the financial viability and sustainability of the sector.

3.6.4 Efficiency

Efficiency refers to a utility's ability to transmit and distribute electricity in the best way, while minimizing waste and inefficiency. While efficiency (productive and allocative) can be measured in various ways using several parameters, in this thesis, analysis is limited to loss reductions and collections rates. TANESCO's reform efforts to achieve technical and commercial efficiencies began in earnest in the early 1990s with the World Bank's support of the Power VI project (1993–1998) which emphasized utility commercialization as a foremost sector goal. The project increased tariffs and installed pre-payment meters to increase revenue collections and curb commercial losses. Additional progress was made during the NETGroup's management contract period (2002–2006) – however, only after the contract collection rates dropped to as low as 56%. A change in senior management[19] in 2010 brought more managerial focus on improving technical and commercial performance. Since then, there have been some significant investment initiatives, including deployment of new technologies such as prepayment meters and

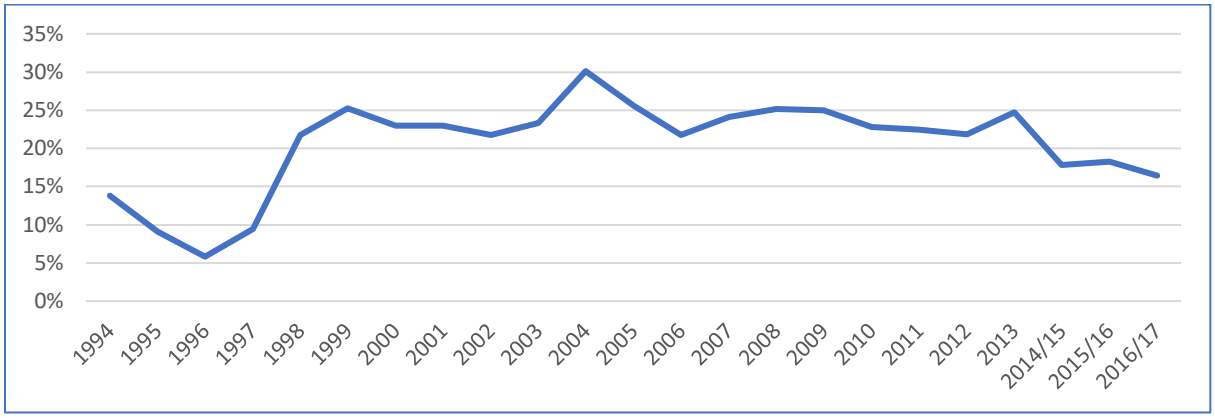
[19] Previous management team was fired by the minister of energy, and a new managing director appointed along with new heads of departments.

automated meter reading (AMR) technology; investments in network refurbishments and upgrade of substations, transmission lines; network reticulation, the targeting of high-loss feeders by introducing shorter distance transformer zones; meter audits to identify non-vending meters as well as to limit power theft, and enforced debt collection from government agencies. These initiatives have helped to improve collection rates to above the 96% mark. The improvements may be attributed to regulatory pressure on performance reporting; performance development plans (PDPs) with payroll performance incentives[20] adopted between 2011 and 2015; adoption of prepayment metering; and collection of government energy arrears through the government electronic payment gateway (GePG) system. The improved collections in 2013 and 2016 were due to direct transfers from the treasury and government-forced payment of ZECO arrears of TShs10 billion (US$4 million) respectively. TANESCO has also made agreements with various banks and telecom companies for revenue collection and mobile money bill payments. Government entities, however, continue to be delinquent customers, with outstanding total energy arrears of over TShs300 million (US$130 million) despite President Magufuli's orders to disconnect government institutions and Zanzibar Electricity Corporation (ZECO). In 2016, total government arrears were TShs125 billion (US$57 million) of which TShs85 billion (US$38 million) was attributable to ZECO alone, accumulated overtime, and the balance attributed to other government agencies, prompting the Parliamentary Public Accounts Committee to issue a notice to government to clear its arrears. The huge ZESCO arrears result from a tariff imbalance or difference between the bulk supply tariff (BST) charged by TANESCO and the retail tariff charged by ZECO, which is lower (ESI Africa, 2016b). It does not make sense to increase tariffs for ordinary consumers while government institutions are accumulating huge arrears. Despite President Magufuli ordering the disconnection of ZECO and government institutions to clear their bills in 2017 – which saw ZECO make part payment, a large portion of energy arrears (over US$9 m) remains unpaid (ESI Africa, 2017a). There is also a large unmetered customer base spread across the country. While total energy losses reduced from a high of 30% losses in 2004 to 17% currently

[20] In 2010/11, TANESCO engaged the services of National Water & Sewerage Corporation (Uganda) to design and implement hands-on performance improvement programmes (PIPs). These short-term (3 months rolling) PIPs were first piloted in Dar-es-Salaam and the coastal zones, and subsequently to all regions on the mainland and Zanzibar. The PDPs focused on financial turnaround; customer care; business planning and management; reliability of supply; autonomy and performance accountability in business units; attitude change and staff orientation towards continuous performance improvement, and monitoring and evaluation among others. The key tenet of the programme was payment of staff incentives to achieve set targets on an incremental basis. The programmes and incentives continued until 2015 when the minister of energy discontinued the consultants owing to the power crisis occasioned by a long drought. Although the PIPs stopped, a performance culture had been built to some extent that helps to drive revenue collections, albeit with the support of prepayment and other smart meters like AMR.

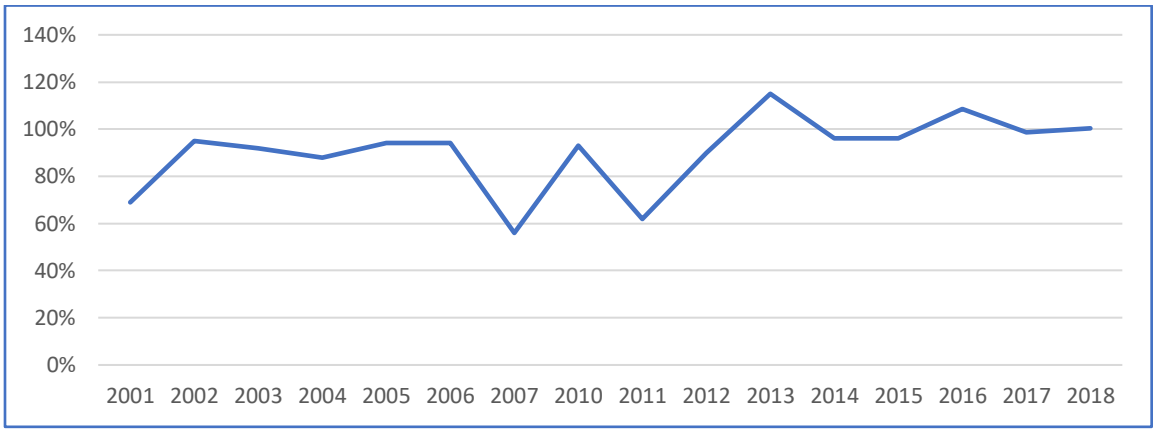
(transmission 7% and distribution losses[21] 10%, excluding power thefts and non-payment), they remain high compared to the benchmark of 10% for developing countries (TANESCO, 2018b; Trimble et al., 2016).

Figure 3.12: Trend of Total Energy Losses 1994–2017



Source: Author's creation based on World Bank data

Figure 3.13: Collection Rate 2010–2017



Source: Author's creation based on TANESCO Annual Reports

3.6.5 Financial Sustainability

Financial sustainability in this thesis refers to the utility's ability to generate sufficient income covering OpEx and full CapEx, including a return on the new and replacement value of existing assets, to allow for growth while maintaining efficient service levels. The analysis utilizes the profitability, solvency and liquidity ratios that help to gauge the financial performance and condition of TANESCO in the long and

[21] TANESCO has not carried out a study to establish the split between technical and commercial losses.

short term, and through examination of relationships among the ratios. The chosen ratios explain TANESCO's efficiency in putting its assets to work and addresses financial risks resulting from the company's choice about how to finance the business using either debt or equity for its sustainability into the future. The liquidity, solvency and profitability ratios also enable us to make comparisons with other companies in the same line of business. Overall, we trace trends of performance linked to changes in power reforms and the principal–agent arrangements underpinning them to better understand this performance.

3.6.5.1 TANESCO's Financial Performance

Figure 3.14: Revenues and Cost of Sales per kWh

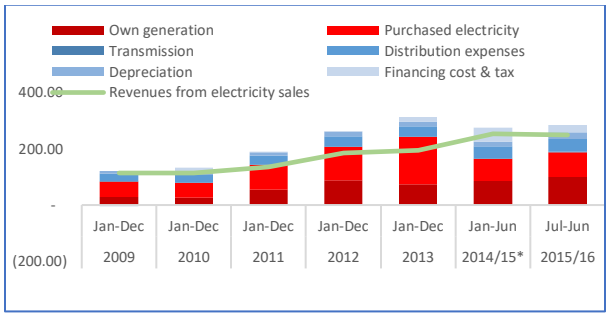


Figure 3.15: Gross vs Net Profit Margin (%) 1994–2017

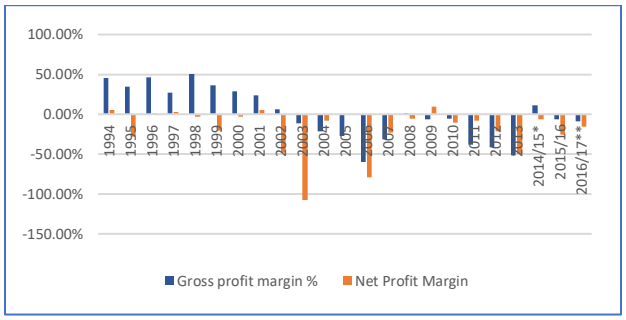


Figure 3.16: TANESCO's Debt-service coverage Ratios

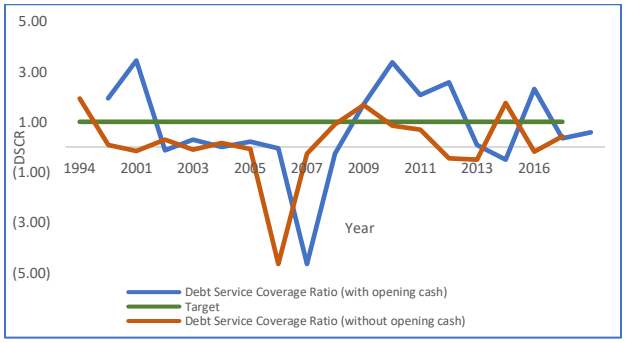


Figure 3.17: TANESCO's Debt to Equity Ratio

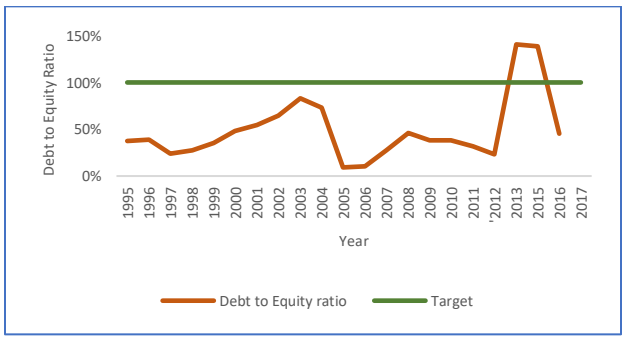


Figure 3.18: TANESCO's Cash (Self-financing) Ratios

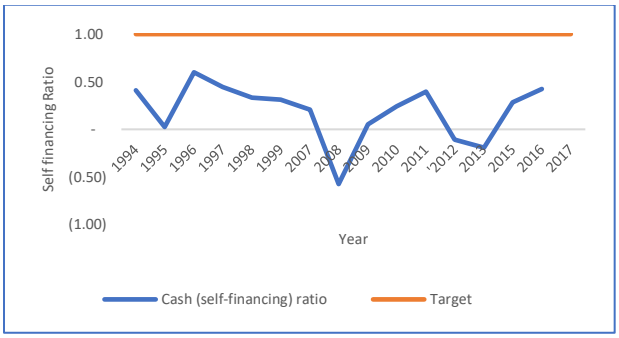


Figure 3.19: Debt-to-Asset vs Debt-to-Equity Ratio

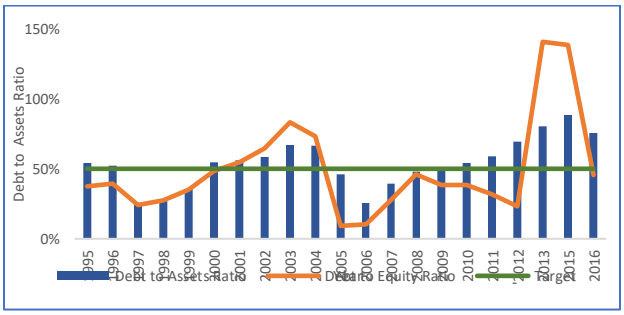


Figure 3.20: TANESCO's Interest Coverage Ratio

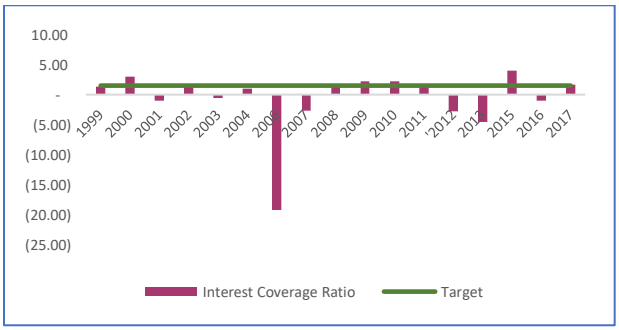
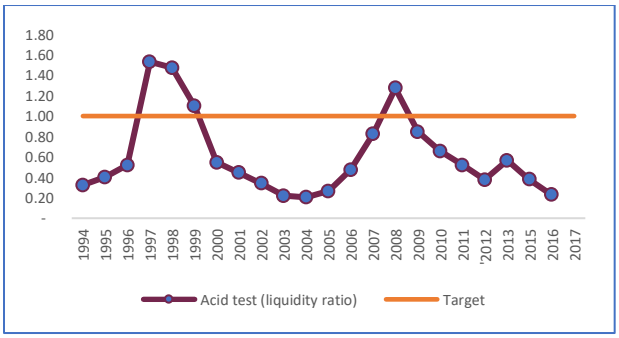


Figure 3.21: TANESCO's Quick Ratio (Acid Test)



Source: Author's creation based on TANESCO annual reports

TANESCO's revenues from electricity sales remained relatively flat in the 1990s and early 2000s and then started increasing after 2002, largely due to a series of tariff increases in the 2007–2014 period, buoyed by customer growth, increased consumption and efficient management practices introduced by NETGroup. Revenue growth in this period averaged 17% year on year, peaking in 2015 at TShs1.9 trillion (TShs 253/kWh) but then declined to TShs 1.4 trillion (TShs 238/kWh) in 2017 due to tariffs being stagnant and non-payment by some government institutions. Utility revenues have been inadequate to cover operational costs. Gross and net profit margins[22] (profitability ratios) have generally been poor, fluctuating from year to year, influenced by the source of energy generated. Favourable hydrology contributes to lower costs and higher margins and vice versa. From 2002 to 2017, both gross and net profit margins were mostly negative: losses were highest in 2006 and during the period 2011–2013, largely due to the purchase of electricity from expensive EPPs. Gross margins then improved in 2015 as a result of favourable hydrology and a reduction in the use of expensive thermal sources, but declined in 2016 as another drought was experienced. Gross margins have remained negative to date. The impact of government reversing the proposed tariff increase in 2017 can be immediately seen in the losses experienced by TANESCO.

Ultimately the profitability trend has been persistently negative (that is, losses) which underlines the fact that TANESCO's financial position is unsustainable. The solvency ratios – debt service coverage ratio, debt-to-equity ratio, debt-to-assets ratio and interest coverage ratio – also give a picture of financial unsustainability. For example, the debt service coverage ratio (DSCR), which measures an entity's ability to produce enough cash to cover its debt payments, was consistently below 1, yet the minimum desirable value of the ratio is above 1, and lenders usually prefer metrics above 1.2 or 1.3. Tariff increases in 2001, 2011, 2012 and 2014 can partly explain the periods when DSCR was above 1. The period 1995–2006 shows particularly poor financial results, exacerbated by drought affecting sales and huge expenditures relating to expensive EPPs. Many of TANESCO's debt obligations were falling due, yet the net operating income could not cover the debt repayments. The situation improved slightly after 2008, as the government of Tanzania agreed to convert debt and accrued interest owed by the company into equity share capital. However, despite this relief, the DSCR performance only exceeded 1 in two years.

[22] A margin refers to a portion of revenue that is a profit and is usually expressed as a percentage of sales. Gross profit margin refers to the portion of revenue left over after deduction of cost of sales. It reflects how successful a company's executive management team is in generating revenue, considering the costs involved in producing their products and services while net profit margin is the ratio of net profits to revenues.

In contrast, the debt-to-equity ratio (D/E), also referred to as leverage or capital gearing and a measure of the degree to which a company is financing its operations through debt versus wholly owned funds, has been relatively healthy owing to the fact that TANESCO is state-owned with significant subsidies and direct transfers from government. Against an optimum benchmark D/E ratio of 100% and below, TANESCO had healthy levels of gearing from 1995 through to 2012, with exceptions in 2013 to 2015. The low D/E ratio in 2005–6 is attributed to the government's conversion of TShs 693 billion of debt and accrued interest owed by the company into share capital in the year ended 31 December 2005, helping to relieve the financial distress of the company. This made up over 90% of the entity's debt at the time. The conversion of debt to equity underscores the inability of the utility to repay its debt, without which commercial loan terms would have been violated. However, despite this significant debt relief, the D/E ratio continued to rise in subsequent years, showing that the company is still not able to generate enough equity revenue internally and is highly dependent on debt financing for continuing operations.

The above notwithstanding, TANESCO's performance in terms of cash (self-financing) ratio has consistently been below 1 for the entire period 1994–2017. The ratio indicates the entity's ability to finance planned investments from its internally generated cashflows. TANESCO has had to rely on external finance for its capital investments, reflected in the company's balance sheet as grants, development funds and long-term borrowings. Considering that TANESCO's business is highly capital intensive, with regular upgrades and asset additions to the distribution network needed to keep up with increasing customer demand, it is clear that its financial situation is increasingly perilous.

With regard to TANESCO's debt-to-asset ratio (D/A) – an indicator of the utility's financial leverage or the percentage of a company's total assets that were financed by creditors, or how much debt the business is carrying to finance its assets – TANESCO maintained an unhealthy ratio above 50% from 1995–2016, except for periods 1997–1999 and 2005–2008. The reduction of the D/A ratio is associated with Phase 2 of the NETGroup management contract which helped to reduce the company's debt levels to as low as 26% in 2006. However, with the termination of the contract, debt levels once again rose to exceed the 50% threshold and more than doubled between 2013 and 2016.

Another solvency ratio explaining TANESCO's poor financial performance is the interest coverage ratio, also known as income gearing. It is used to determine how easily a company can pay its interest expenses on outstanding debt and the preferred ratio is 1.5 or greater. TANESCO's interest cover was consistently below 1.5, except in the period 2009–2011, and again in 2015 and 2017. The performance during these periods is largely associated with the impact of tariff increases by the regulator EWURA and the conversion

of debt to equity once again in 2015 by the government. Overall, the trend shows the utility is consistently unable to generate sufficient internal cash to make interest payments on its existing debt.

The quick ratio is used to show the utility's ability to satisfy current (short-term) liabilities using the most liquid current assets (including cash balances). Conducting a quick ratio (acid test) – which compares TANESCO's liabilities that fall due within the year with cash balances and assets that should turn into cash within the year (current assets excluding inventory) and is used to assess an entity's ability to meet short term liabilities –shows that the utility's financial standing is very poor and the ratio had been consistently below the desirable minimum level of 1 for the period 2000–2017 –except for one year, 2008. The poor performance implies that the company's liquid assets were insufficient to meet its short-term obligations for the 17-year period. At the end of 2017, the utility had payables amounting to over TShs 1.3 trillion (US$560 million) and trade payable days in excess of 550, which places it in a financial crisis mode. In 2017, TANESCO's accumulated debt's rose to US$365 million (Reuters, 2017) mainly consisting of energy and fuel arrears to IPPs, including to Songas of US$90 million, compelling the IPP to suspend its operations (ESI Africa, 2016a). The company, therefore, is constantly in need of external liquid funds to meet its short-term obligations, a reflection of deep governance failures.

This financial analysis demonstrates extremely poor performance by TANESCO, with temporary relief only in periods when generation costs were lower because of abundant hydro resources, or when substantial tariff increases were approved by the regulator, or when government provided bailouts. Overall, the structure and ownership of TANESCO provides insufficient incentives for improved performance. This changed somewhat in the brief period of the private management contract, although these reforms and incentives for performance improvements were not sustained once the NETGroup contract was terminated. Without immediate reform of the Tanzania power market and utility to introduce best practice governance and commercial principles, TANESCO is bound to remain a failed utility for the foreseeable future.

3.7 Summary of Findings and Analysis

This section summarizes the empirical findings of the analysis of Tanzania's reform experience and its impact on utility performance by examining, further, the relationship and impact of governance and incentive frameworks on key drivers of performance. The author then combines insights from the power sector reform literature with a principal–agent theory lens to establish and apply a clear and systematic analytical framework that explains linkages and relationships with specific performance outcomes.

Tanzania continues to exhibit an ambivalence and a lack of purposefulness regarding the restructuring of TANESCO and its power market to allow for more private sector participation and competition. While some reform steps have been taken, including enacting an enabling law and setting up of an independent regulator, the other standard power sector reform components – unbundling and competition – have not been implemented, despite numerous policy commitments. Limited private sector participation has only permitted a management contract for a limited period and a small number of IPPs. TANESCO remains vertically integrated and owned by the state; IPPs have been stifled, and competition for and in the market is nowhere near realization. The recent informal policy, which requires new generation projects to be procured within a PPP framework, with government equity participation rather than as classic IPPs, limits scope for private sector participation and the potential efficiencies that the private sector brings.

Tanzania's numerous on-and-off reform initiatives and the uncertainty created through not fully implementing the Electricity Supply Industry Reform Strategy and Roadmap has impacted negatively on the sector. There is a sense that the reforms have mostly been proposed by external DFIs rather than been driven by the country's political economy. In addition, Tanzania has lacked a reform champion and most policymakers have not yet appreciated the rationale and benefits of reforms. With the recent high staff turnover in the ministry and the utility, there is even less support for reforms. Although power sector reforms resulted in the institutional set-up of an independent regulator EWURA, its independence has been compromised and undermined. Imperfect legislation and poor governance practices allow political interests to undercut regulatory decision-making, reflecting the enduring agency problem of conflict of interest between government and the agent. Specifically, the government has been able to overturn tariff determinations because the Electricity Act requires EWURA to seek "consent" from the line minister rather than simply "notifying" the ministry. An amendment to the law would assist (but not, of course, guarantee) the tariff-setting independence of EWURA.

The few implemented reforms have been weak in addressing governance and performance challenges in the electricity sector. The lack of an enabling law establishing TANESCO as a corporation separate from conventional public service legislation has impeded independence in decision-making within the utility and opens the utility to the dangers of political patronage. Corporatization and commercialization allow the utility's management to be insulated more from politics because company laws limit the right of shareholders (government) to directly influence the enterprise. Political interference can be reduced through private equity and by independent directors representing shareholding interests. Subsequent case studies in Kenya and Uganda will highlight this option.

The overall governance system in the electricity sector in Tanzania appears broken and fails to provide sufficient incentives for performance improvements. This breakdown signals inefficient and ineffective risk allocation and division of labour between the parties and is exacerbated by goal incongruence between the government as principal and TANESCO the agent. Specifically, the ministry of energy as the line supervisor has relegated part of its core responsibility to the Treasury Registrar. As a result, conflicting mandates between the line MoE and the Treasury Registrar (TR), as parallel principals with conflicting authority mandates (principal–principal goal incongruence), creates mixed and imperfect signals for the utility. This is evidenced in the performance contracting (PC) framework with TANESCO. While the MoE is responsible for policy formulation and planning, it has neither a formalized framework for supervising or monitoring the utility, nor is it a signatory to TANESCO's performance contract. Yet the MoE continues to appoint board directors and issue regular directives on almost a daily basis that frequently compromise technoeconomic reasoning within the utility. More importantly, the TR is technically incapable of supervising TANESCO and has provided neither the conducive environment nor mandatory resources to enable improvements in its performance.

In other circumstances, the line minister and the president have usurped powers of the board. This environment has created shirking, poor work attitudes and moral hazard among staff and management. As a result of information asymmetry, the agent's behaviour is not fully observable by the principal. While the performance contract exists as a behaviour-based contract and an information system meant to curb agent opportunism by informing the principal about what the agent is actually doing – thereby co-aligning the preferences of the agent (TANESCO) and those of the principal – these information systems are ineffective, compromised, unenforced and almost non-existent. The board of directors has been politically undermined and is unable to exercise decision over control systems. In turn, the board is not able to use information from internal monitoring systems to properly monitor and supervise top management.

As if that is not bad enough, the performance contracting framework between government and TANESCO's board is structurally weak and poorly designed, with ambiguous, superfluous targets. It is generic and lacks focus regarding the core functions of TANESCO. The contract does not provide any incentives for management and staff, and hence is bound not to stimulate any improvements in performance. Some of the areas that clearly need attention are the poor human resource framework, poor incentives, poor planning tools, finance rationalization, inadequate training in procurement of complex projects, and contract negotiation.

Neither does the economic regulatory framework provide any incentives to drive performance, especially as it relates to full cost recovery and financial sustainability. Assumptions for the tariff-setting methodology are inadequate and do not capture exogenous impacts on O&M costs or power purchases, nor do they provide for adequate sales reconciliation mechanisms post tariff implementation. To achieve meaningful change in performance in TANESCO, the current tariff structure needs to incorporate performance-based incentives, matched with corresponding internal business planning and performance interventions (like PIPs) to shift the staff's public service ideology and attitude towards a commercial orientation.

Additionally, the weak governance system does not provide the board and management with incentives for managerial risk-taking and innovation – for example, through research and development. Board members are political appointees, and most have not been exposed to market-based competitive environments. As a result, they lack technical skills to compete in a market economy and they resist reforms including restructuring necessary for improving TANESCO's performance. This explains the organizations' inertia and their preference for the status quo. This has led to certain agency problems of entrenchment. While the board is potentially an internal information system that can assist the shareholder (government) in monitoring agent misbehaviour and conflicts of interest, thereby reducing agency problems, the board's authority has been undermined through repeated terminations, affecting monitoring and supervision of utility operations. This has resulted in continued misalignment of shareholder and agent interests and, thus, utility underperformance. Because TANESCO has a bureaucratic organizational structure founded in political favouritism, and a multitude of rules concerning seniority, pensions and salaries (thereby encouraging conformity), these practices have resulted in top managers being overly concerned with rules and directives from government. The result has been timidity and conservatism against reform; ineffective monitoring of managers' performance; limited change, and poor performance.

How have these inadequate structural reforms, lack of independence of the regulator and poor governance incentives impacted what customers want – that is, access to adequate, reliable and affordable electricity? And how have they impacted TANESCO's ability to deliver efficiently and on a financially sustainable basis?

At an operational level, electricity access rates have remained low owing to inadequate prioritization and limited funding incentives. However, institutional reforms introducing REA and EWURA have helped to

formalize institutional mandates for electrification by REA. The REA has been funded by government and donors (for better transparency and accountability) resulting in an increase, currently, to over 2.1 million connections. The EWURA has complemented electrification efforts by creating an enabling legal and economic framework for licensing and market entry of small power producers and mini-grid operators helping to ramp up access rates to about 35%. However, this is a slow pace relative to the unserved population of Tanzania and is low compared to Kenya's.

Furthermore, adequacy and security of supply is persistently poor. Despite being one of the early countries to allow private sector participation in generation through the first competitive procurement of IPPs, subsequent entry of new IPPs has been difficult, with mostly only expensive and temporary EPPs being contracted. This is attributed to the government's general antipathy towards the private sector partly exacerbated by the previous adverse selection experience with IPTL and the 100 MW Richmond/Dowans projects and associated corruption.

There is an enduring structural conflict of interest – the government-owned national utility is both a generator and the single buyer for IPPs. Despite a lack of funds, TANESCO has sought to build its own generation and to minimize the contracting of IPPs. The recent government policy shift from allowing private sector participation to more public ownership of new generation capacity (or PPPs) undermines previous reform commitments to private sector participation which would yield efficient and least cost projects. However, government, as a principal, has limited funds or capacity to assess value for money to bring these projects to fruition. Consequently, directly negotiated emergency deals persist as non-competitive procurement methods remain the preferred option – a governance failure that needs to be addressed through deeper structural reforms such as unbundling of TANESCO and linking generation expansion planning with the timeous initiation of competitive bids for new power. Indeed, the directly negotiated IPTL power costs six times more than the Songas power, with negative effects on consumers and TANESCO; yet, this could have been avoided if proper governance practices of tendering had been followed. In addition, there is a lack of adherence to least-cost power sector master planning as evidenced by the political sanctioning of the construction of the 2.1 GW Rufiji hydro dam that is likely to result in excess generation capacity compared to available demand, potentially resulting in huge deemed-nergy costs for IPPs.

Drawing from the above practices, it can be argued that vertically integrated, state-owned utilities are replete with systemic governance failures that cripple the agent's (TANESCO) efforts in technical planning and management, and prejudice energy security in the long run.

Inadequate generation capacity results in poor reliability of supply. As alluded to earlier, while the Electricity Act gives EWURA powers to approve initiation of procurement of power projects – powers further defined under the "electricity initiation of power procurement rules", with the overall objective of discouraging costly unsolicited proposals that fall outside the master plan, the entity responsible for the management of the procurement process was not specified, creating a gap that has allowed the ministry to influence new procurements, often very late, perpetuating supply shortages and unreliable supply. It is also not certain that EWURA is sufficiently equipped to carry out this task. Compounding the poor reliability problem is inadequate investment in transmission and distribution networks. TANESCO currently operates an old transmission and distribution network with few substations and long radial lines connecting far-flung areas. Poor reliability of supply is foreseen to persist into the future since the utility is cash-strapped, has a stressed balance sheet and is unable to finance needed upgrades, let alone attract private investments. Despite the regulator (as principal) setting reliability and quality-of-service reporting requirements, no corresponding incentives have been provided, which makes enforcement difficult. The regulator lacks adequate technical capacity to monitor and ensure the agent, TANESCO's, compliance with quality-of-service indices.

Despite previously ceding tariff-setting powers to EWURA, government has in recent times implemented reversals of tariff reviews and orchestrated the termination of top executives both at EWURA and TANESCO (allAfrica, 2017; The Citizen, 2017). This is foreseen to continue into the future, as the principal remains the appointing authority with a conflict of interest in desiring social tariffs rather than efficient prices. Even with the economic regulatory framework in place, EWURA has not provided strong incentives for performance to address TANESCO's enduring problems. For example, cost recovery, energy security and reliability remain a mirage. In the wake of regulatory reforms and occasional tariff increases, TANESCO, as the agent, was able to direct CapEx investments to improve technical efficiencies – specifically technical loss reduction; however, no incentives have been provided for revenue collection and commercial loss reduction (power theft) – the two huge leakages in the company's revenue requirement. Regulatory pressure is exerted only through quarterly reporting requirements to plug information asymmetry but with no penalties and consequences for under-performance. As a result, current system losses at 17% are persistently above the quasi-fiscal deficit (QFD) benchmark of 10%, while

government non-payment of bills endures – a principal's moral hazard. Collection rates only initially rose during the NETGroup management contract, other than the subsequent one-off-payments by government in 2013.

From a financial perspective, power sector reforms that improve overall sector governance help to strengthen the enabling policy environment; reduce perceived risks by prospective investors; allow for enhanced competition in accelerating investments, and improve financial sustainability of the utility. The financial health and sustainability of a utility (or off-taker) gives long-term certainty and predictability for payment of power generators contracted under long-term PPAs. In addition, financial sustainability enables the utility to invest in network expansion, electricity access and commercial services that improve the retail experience of consumers as well as incentives for staff. In order to finance generation and network expansion, utilities must have bankable balance sheets in order to access private capital. Regrettably, this is not the reality in Tanzania.

TANESCO's operations do not generate sufficient internal funds for continuing operations, capital investment and debt obligations. The utility is consistently operating at a loss, is heavily reliant on external financing for its operations, and needs debt relief from time to time to alleviate its recurrent financial challenges. TANESCO's revenues since early 2000s have persistently not recovered its cost of sales let alone full operating expenses and CapEx. Its gross and net profit margins have remained negative to date. However, improvement in revenue collection was registered in the 2002–2006 period when TANESCO was placed under a management contract by NETGroup signalling some benefits of agency contracting. TANESCO's debt-service coverage ratio, too, has largely remained below the minimum desirable level of 1 except for a few years like 2009 to 2012 and 2016, explained by tariff increases in those periods, enabled by reforms introducing the regulator - as the government's agent. While the debt to equity ratio was the only ratio with good performance, this was due to the fact that the company is funded through government equity, but even with this, the utility's debt levels exceeded the desirable level of 100% during2013–2015, requiring conversion to equity. As If that is not bad enough, its cash ratio was consistently below the minimum desirable level of 1 and unable to fund any CapEx from its internal sources. Additionally, TANESCO does not have sufficient liquid funds to meet its short-term obligations amounting to over US$560 million. The quick ratio largely shows persistent underperformance below the minimum value of 1. This precarious position does not guarantee its financial sustainability into the future.

Despite internal initiatives (sponsored by the World Bank and AfDB) being undertaken to advise on strategies to improve the utility's financial position – for example the Asset Valuation Study, Financial Turnaround Study and Corporate Financial Model, – it remains to be seen if the government of Tanzania will implement their recommendations for further commercialization reforms. One clear message, though, remains – that is, that the principal/ government's risk aversion and influence in the governance arrangements, regulatory and operational affairs of TANESCO has impeded its technical and financial performance.

All of this points to the need for deeper structural and governance reforms to alter the incentive framework for improved performance. These reforms – including unbundling, restructuring and allowing in more private sector participation – were taken further in Kenya and Uganda, the focus of our remaining case studies.

CHAPTER 4

KENYA CASE STUDY

4.1 Introduction

Kenya's history and experience with power sector reform is unique and different from Tanzania's and Uganda's , thus affording the potential for interesting and valuable insights. Kenya was one of the few African countries that decided early on to unbundle generation from transmission and distribution, with the creation of Kenya Electricity Generation Company Limited (KenGen) being responsible for generation and Kenya Power and Lighting Company Limited (KPLC[23]) responsible for the operation of electricity transmission and distribution. Uniquely, both KPLC and KenGen are listed on the Nairobi Securities Exchange (NSE). However, the Kenyan government retained majority stakes (50.1% in KPLC and 70% in KenGen). While KPLC and KenGen are subject to the reporting and corporate governance tenets prescribed by the NSE (the Capital Markets Act 2012), both are still legally parastatals, subject to the requirements of the State Corporations Act of 1987 (revised in 2012), which governs state-owned enterprises in Kenya, in addition to the Public Audit Act, 2015. One of the consequences of unbundling generation from transmission and distribution has been the removal of the potential for a conflict of interest[24] which arises (as in Tanzania) where a vertically integrated, national utility is both a generator and the single buyer for IPPs.

Supported by a national planning process for least-cost generation expansion, KPLC was able to translate plans into timely initiation of competitive bids for new power. Through building in-house capabilities, KPLC ran a series of successful tenders, mostly for thermal power, with subsequent tender rounds yielding even lower prices, and plants generally being built on time. Kenya ranks amongst the countries with the highest number of IPPs in sub-Saharan Africa and currently is in the fortunate position of having surplus capacity. However, these planning and procurement capabilities have eroded and dissipated somewhat in recent years, and there has been less success in procuring new geothermal power, a useful resource in Kenya. Regardless of that, Kenya has recently become a leader in passing legislation (the new Energy Act 2019, and regulations) explicitly allowing third party open access to the transmission and distribution grid,

[23] KPLC was rebranded as Kenya Power in 2011, but for uniformity in this thesis, we refer to it as KPLC
[24] Competing in procuring new generation capacity and power dispatch to the grid

creating an independent system operator (in transition) and thereby deepening competition reform in the sector by allowing large consumers to contract directly with generators. Kenya was also amongst the early countries to establish an independent electricity regulator, which later was converted into an energy sector regulator. In addition, the utility has built a strong institutional culture and technical capacity fostered through targeted capacity development and training, and supported by involved leadership. The utility was subject to a private management contract for a short period. These reforms, especially the partial listing of KPLC, create an interesting set of governance and regulatory incentives for improved performance. In general, KPLC has performed reasonably well, including recent increases in electricity access to more than 75% of the population in a span of five years, a much more impressive electrification performance than in other countries in the region.

Despite these advancements, the power sector in Kenya still faces enduring challenges, including weaknesses in the transmission and distribution segments of the system; the politicization of long-term planning; an emerging surplus of power generation capacity, and the need to integrate more variable sources of energy without affecting system stability. In addition to these challenges, recent gains in electricity access and generation capacity have come at a cost: threats to the financial sustainability of KPLC and KenGen have necessitated periodic debt restructuring. These factors have had a negative impact on system, technical and commercial performance. KPLC's profitability which, for decades, was steadfast has, in recent years, been in decline, unable to meet its debt covenants, and its solvency and creditworthiness are increasingly threatened. No dividend was paid to shareholders for two years in a row– in 2018 and 2019 (Business Daily, 2018; The Star, 2020). Technical and commercial losses have been persistently high – currently 20.5% from 18.9% in 2017 – and the utility has struggled to collect debts from government, impacting negatively on cashflow. Despite excess generation capacity, reliability of supply has been intermittent due to grid weaknesses. The World Bank's Doing Business Report (World Bank, 2020b) reveals a system average interruption frequency index (SAIFI) of 6.9 for large power users and 45 for low- and medium-voltage customers. The utility has not done enough to grow demand despite signing several take-or-pay PPAs with financial commitments to IPPs despite having enough power (KPLC, 2018). And although earlier deals with IPPs were mostly competitively bid, there have been some non-transparent, directly negotiated deals for some renewable projects, including the 310 MW Lake Turkana Wind Project. Recent governance challenges saw the termination of the entire senior management team in 2018.

This chapter examines the experience of Kenya through the lens of power sector reform and principal–agent theory, yielding new insights, explanations and knowledge on the relationship between power sector, regulatory and governance reforms and how they impact on performance – mainly increasing access and delivering adequate and reliable electricity at competitive prices through a utility which strives to be technically efficient, financially viable, creditworthy and able to attract investment into the sector.

4.2 Overview of the Kenya Power Sector

After decades of shortages, Kenya now has enough generation capacity to meet its demand, and supply is predominantly from renewable energy sources. The current installed generation capacity is 2,819 MW (August 2020) with peak demand of 1,912 MW, resulting in a peak reserve margin of about 47%. KenGen's installed capacity amounts to 1,775 MW or 63% of total generation, while IPPs contribute 1,013 MW or 36% (including Garrissa Solar 50 MW), and off-grid systems implemented by the Rural Electrification Agency (REA) ~30 MW. The country intermittently imports power from Uganda, Tanzania and Ethiopia for grid stabilization purposes. Recently, geothermal has emerged as the dominant source of power with installed generation capacity of 828 MW, displacing hydropower of installed generation capacity at 826 MW followed by diesel/HFO thermal power at 720 MW. Kenya also has the largest wind farm in sub-Saharan Africa, with the 2019 commissioning of 310 MW from the Late Turkana Wind Project. Renewable energy (predominantly geothermal, hydro, wind and solar) accounts for 72% of total installed capacity and 91% of total electricity generation (December 2019)[25]. Geothermal contributes more than 43% of total energy generated, making Kenya one of the global leaders in the use of this renewable resource. The increasing share of geothermal in power generation has displaced energy from diesel plants, resulting in significant reductions in fuel costs passed through to the end users. Emergency power projects (EPPs) with a capacity of between 30 MW to 290 MW (which used to be a key source of power in 2014–2015) have since been retired. The power utility operates more than 233,700 kms of Transmission and Distribution lines (of voltage level 11 kV to 400 kV) spread across the country and serving over 6.7 million customers through 4,866 transmission and 4,372 distribution substations.

Table 4.1: Kenya's Installed Generation Capacity – 2020

COMPANY	TECHNOLOGY	CAPACITY (MW) 2020	
		Installed Capacity (MW)	Effective/Contracted
KenGen			
Gitaru	Hydro	225.0	216.0

[25] Due to the drought situation experienced in 2017, hydro generation was less than usual. In 2017, hydro accounted for 33% of generation while geothermal remained at the usual 44%, requiring thermal generation to go up to 21% from 13% the previous year.

Kamburu	Hydro	94.2	90.0
Kiambere	Hydro	168.0	164.0
Kindaruma	Hydro	72.0	70.5
Masinga	Hydro	40.0	40.0
Tana	Hydro	20.0	20.0
Turkwel	Hydro	106.0	105.0
Sondu Miriu	Hydro	60.0	60.0
Sangóro	Hydro	21.0	20.0
Small Hydros	Hydro	11.7	11.2
Hydro Total		**818**	**797**
Kipevu I Diesel	Thermal	74	60
Kipevu III Diesel	Thermal	120	115
Muhoroni GT1	Thermal	30	28
Muhoroni GT2	Thermal	30	28
Garissa & Lamu	Thermal	0	0
Garissa Temporary Plant (Aggreko)	Thermal	0	0
Thermal Total		**254**	**231**
Olkaria I	Geothermal	45.0	44.0
Olkaria II	Geothermal	105.0	101.0
Eburru Hill	Geothermal	2.4	2.2
OW37, OW 37 kwg 12, OW 37 kwg 13 and OW 39 Olkaria	Geothermal	20.0	17.2
OW43 Olkaria Mobile Wellheads	Geothermal	12.8	12.8
OW905, OW914, OW915 and OW 919 Olkaria Mobile	Geothermal	47.8	47.8
Olkaria IV	Geothermal	140.0	140.0
Olkaria V	Geothermal	165	158
Olkaria I 4 & 5	Geothermal	140.0	140.0
Geothermal Total		**678**	**666**
Ngong	Wind	**25.5**	**25.5**
KenGen Total		**1,775**	**1,719**
Government of Kenya (Rural Electrification Programme)			
Thermal	Thermal	28.9	19.5
Wind	Wind	0.55	0.01
Solar	Solar	0.69	0.2
Total Off grid		**30.2**	**19.7**
Independent Power Producers (IPP) - Thermal & Geothermal			
Iberafrica I&II		52.5	52.5
Mumias - Cogeneration	Cogeneration	26.0	21.5
OrPower 4 -Geothermal I,II&III	Geothermal	121.0	121.0
OrPower 4 -Geothermal (the 4th plant)	Geothermal	29.0	29.0
Tsavo	Thermal	74.0	74.0
Rabai Power	Thermal	90.0	88.6
Imenti Tea Factory (Feed-in Plant)	Hydro	0.283	0.283
Thika Power	Thermal	87.0	87.0
Gikira small hydro	Hydro	0.514	0.514
Gulf Power	Thermal	80.32	80.32
Triumph Diesel	Thermal	83.0	83.0
Biojule Kenya Limited	Cogeneration	2.0	2.0
Regen-Teremi Falls (Genpro)	Hydro	5.00	5.00
Gura	Hydro	2.00	2.00
Chania	Hydro	0.50	0.50
Strathmore	Solar	0.25	0.25
Lake Turkana Wind Power	Wind	310.0	300.0
REA Garissa Solar Plant	Solar	50	50
IPPs Total		**1,013**	**997**
SYSTEM TOTAL		**2,819**	**2,736**

4.2.1 Institutional Set-up of the Electricity Sector

The structure of Kenya's electricity supply industry (ESI) was shaped by reforms that swept the industry in the mid-1990s, resulting in a transmission and distribution company, unbundled from generation, and

the introduction of private sector participation in the form of IPPs. The sector operates under a single-buyer model and key parastatals are required to operate on commercial principles. KPLC is the single off-taker having Power Purchase Agreements (PPAs) with all the generation companies, including KenGen and the Independent Power Producers (IPPs). The current institutional structure is summarized in the box below:

Figure 4.1: Kenya's Power Sector Institutions and Roles

Ministry of Energy and Petroleum (MoEP). The ministry is responsible for setting sector policies and overseeing utilities. Subsequent to reforms, it no longer has direct operational responsibilities.

Energy and Petroleum Regulatory Authority[26] **(EPRA, formerly ERC).** Established in 2007, EPRA is an independent authority operating under annual performance contracts with MoEP. It is responsible for regulating the energy sector, including renewable energy, and approving power purchase agreements (PPAs). Its mandate has recently been expanded to regulate downstream and upstream petroleum products, excluding crude oil and nuclear power. EPRA is also the data hub for the sector and responsible for national energy planning. EPRA develops Least- Cost Power Development Plans (LCPDP) with representation from all major stakeholders.

Energy and Petroleum Disputes Tribunal (EPTD). Established in 2006, the tribunal mediates disputes, and cases between sector agencies and electricity consumers, where necessary.

Rural Electrification and Renewable Energy Corporation[27] **(REREC, formerly REA**). A state-owned entity that was established in 2007 to take over implementation of rural electrification projects from KPLC. Its mandate has been widened to include renewable energy planning and implementation in rural areas, including off-grids.

Kenya Electricity Generating Company Limited (KenGen, formerly KPC). A partly privatized generation company (the government share is 70%), KenGen owns more than 63% of total installed capacity in Kenya. KPC assumed the generation function after the vertical unbundling of Kenya Power and Lighting Company Limited (KPLC) in 1997.

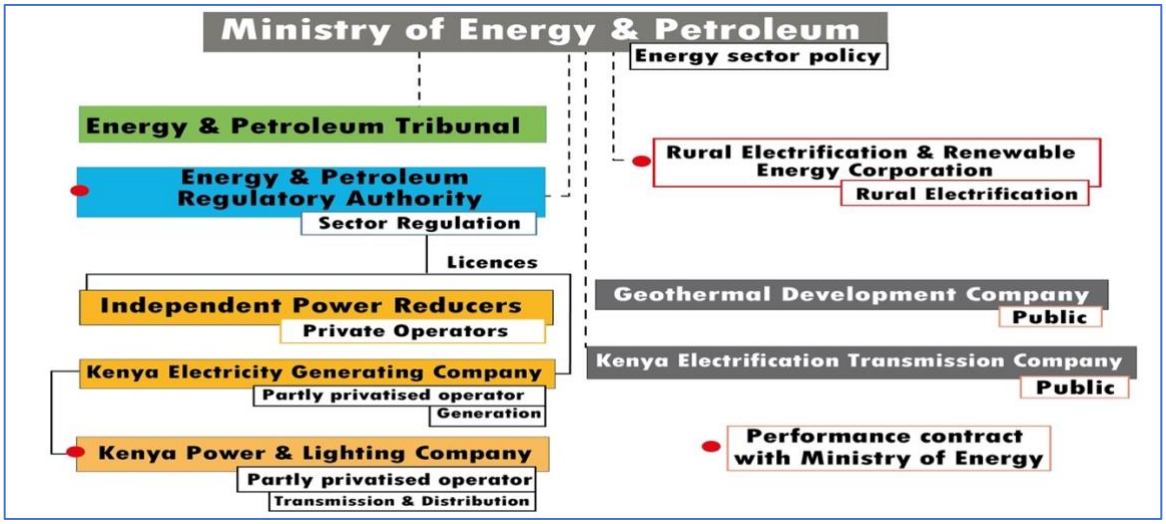
Geothermal Development Company (GDC). Fully government-owned company set up in 2008 to accelerate development of geothermal resources. Sells steam to KenGen for electricity generation.

Kenya Power & Lighting Company Limited (KPLC, re-branded Kenya Power). A partly privatized transmission and distribution company (the government share is 50.1%) and grid operator. Since the establishment of KETRACO in 2008, KPLC has focused on distribution, developing distribution lines/substations of 66kV and below.[28] However, it continues to operate the high-tension transmission lines that existed prior to 2008, since it retained all transmission assets that had been capitalized in its books when the new transmission company (KETRACO) was established. KPLC also operates the mini-grids owned by REA. KPLC acts as a single buyer in the electricity market: all generating companies must sign PPAs with it. Currently, KenGen and 12 independent power producers have long-term PPAs with KPLC. KPLC also provides Fiber optic broadband to customers through its subsidiary Kenya Power International.

Kenya Electricity Transmission Company Limited (KETRACO). This is a state-owned utility established in 2008 to plan, design, construct, own, operate and maintain new high-voltage electricity transmission lines (over 132kV), associated substations, and regional interconnectors that form the backbone of the national transmission grid.

[26] The new Electricity Act 2019 re-establishes EPRA as a successor to the Energy Regulatory Commission.
[27] REREC has been established as an autonomous state body corporation, replacing REA.
[28] KPLC operates some 132kV lines that were built using government funds. Ownership of the lines was transferred to KETRACO upon completion.

Figure 4.2: Institutional Structure of Kenya's Power Sector

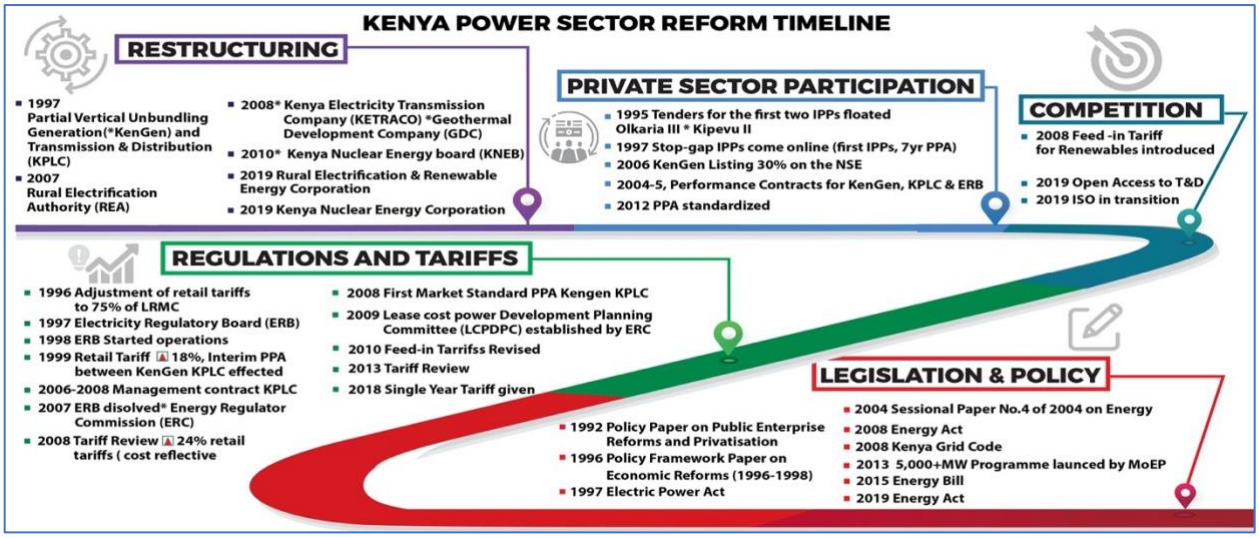


Source: Author's creation

4.3 Power Sector Reforms in Kenya

The figure below shows the key reform components and timeline of reforms in Kenya's power sector.

Figure 4.3: Kenya's Power Sector Reform Timeline



Source: Author's creation

During the period 1990–1994 Kenya experienced major macroeconomic challenges resulting from a confluence of factors, including drought and deterioration in its terms of trade. Donor funding to the

power sector was frozen between 1991 and 1996, mainly because of governance failures linked to allegations of corruption. The 1992 policy paper on Public Enterprise Reforms and Privatization was one of the responses during the aid embargo. It set the basis for later reforms in the power sector and deregulation of the Kenyan economy that began in 1993 (Godinho & Eberhard, 2019b). Over this period the IMF and the World Bank outlined terms for lending that were conditional on reforms, including tariff studies; reorganization of the power sector, and legal and regulatory reforms. Subsequently, a move towards cost-reflective tariffs[29] (a component of commercialization) was adopted.

As the country emerged from an aid embargo, one of the state's main objectives was to attract much-needed private sector investment to complement limited public sector investment. In a policy paper on economic reforms at the time (Government of Kenya, 1996), the government outlined its intention to separate the regulatory and commercial functions of the sector, to facilitate restructuring, and to promote private-sector investment, including via IPPs (following the recommendations of the World Bank and the IMF). Meanwhile, the power situation deteriorated further. In the agreement reached at the end of 1996, World Bank funding was made conditional on unbundling the generation segment from KPLC, restructuring, and enacting enabling legislation. Consequently, the Electric Power Act of 1997 was passed (Eberhard et al., 2018b).

The government's primary function, through the Ministry of Energy and Petroleum (MoEP), became policy formulation, and its regulatory authority was devolved to the newly established Electricity Regulatory Board (ERB) that became functional in 1998. At the industry level, rationalization and unbundling redefined the scope of KPLC, which had operated as an integrated utility since 1954. From 1997, KPLC began to focus exclusively on transmission and distribution, while a separate entity known as KenGen (formerly Kenya Power Company- KPC) took over all public power generation activities.

In addition to restructuring and reorganizing regulatory functions, KPLC, with support of the World Bank and external consultants, began the first competitive process for tendering and negotiating IPP contracts. In 2003, the government expressed dissatisfaction with the performance of the energy sector (Government of Kenya, 2003), noting that, despite the reforms, including the introduction of IPPs, electricity in Kenya was still unreliable and expensive. To remedy this, a deeper, second wave of reforms was recommended and subsequently detailed in the national energy policy of 2004, commonly known as

[29] In 1997, tariffs were increased to 75% of long-run marginal costs.

Sessional Paper No.4 of 2004 (Government of Kenya, 2004a), which set the basis for passage of the 2006 Energy Act and outlined the government's commitment to:

- establish a rural electrification authority;
- accelerate the increase in the rural electrification rate by 10 percent a year;
- facilitate the development of a competitive market structure for the generation, distribution, and supply of electricity;
- establish the Geothermal Development Company (GDC) to assess Kenya's geothermal resources, including steam-field appraisal and development;
- establish KETRACO to build new transmission lines using government funds and concessionary financing;
- provide an increase in the lifeline tariff for domestic consumers of up to 50 kWh per month from July 2008;
- enact new legislation to, among other things, dissolve the ERB and create a new independent energy sector regulator—the Energy Regulatory Commission (ERC), and
- partially privatize KenGen through an initial public offering of 30% of its equity through the Nairobi Stock Exchange.

Unlike the first wave of the reforms, which were mainly donor-driven, the second set of reforms was initiated and led locally. By 2007, most of these measures were implemented, including KenGen's listing on the Nairobi Securities Exchange in 2006. Exceptions were the development of a fully competitive market structure and the ambitious rural electrification target (Eberhard et al., 2018b; Kapika & Eberhard, 2013). The Energy Act of 2006 provided that the ERC would be funded through not only electricity levies but also fuel levies from downstream petroleum regulation, enhancing its financial independence. In 2008, the Kenya Electricity Transmission Company Limited (KETRACO) was established to focus on the construction of new transmission projects, facilitated by funding from the government and donors through concessionary financing, while KPLC retained responsibility for operating the grid. KETRACO currently owns over 42% of the total transmission network and is poised to become the dominant transmission company once the committed transmission projects are completed. The GDC was also established but has been less than successful in its mandate to lower the risks of geothermal development for private sector investment (Godinho & Eberhard, 2019b).

In 2008, Kenya's Vision 2030 (encompassing social and economic goals) set a new generation target of 23,000 MW by 2030 (up from 1,310 MW in 2008). Rural electrification efforts aimed to bring electricity to every home in Kenya with interim targets set for 2013 and 2022 (these have since been shifted) (Eberhard et al., 2018b). In 2010, the government began work on a nuclear power project through the Kenya Nuclear Electricity Board (KNEB), recently re-established as Nuclear Power and Energy Agency (NPEA) in 2019, an

autonomous institution within the MoEP (Government of Kenya, 2019, p. 52). The initial aim was to generate 1000 MW of nuclear energy by 2023, but by 2019 little progress had been made.

In September 2013, the MoEP launched the '5000 + MW' programme with the goal of bringing at least 5000 MW of power online within 40 months, and IPPs were prioritized to play a central role (Government of Kenya, 2013). The programme was heralded by the Kenyan government as the means to 'transform Kenya', by providing adequate generation capacity at a competitive rate (MoEP, 2013). However, this programme has proven difficult to implement and points to some weaknesses of coordination and planning in Kenya's power sector. In 2017, the government announced plans to halt the programme, citing concerns of depressed demand and expensive loans (Kenyan Wall Street, 2017). Meanwhile, at the generation level, the ERC in 2014 affirmed that 'electricity generation in Kenya is liberalized', with IPPs given an opportunity to enter the sector and compete alongside the state-run KenGen (Eberhard et al., 2018b). A competitive market structure has been set in motion with the passing of the Energy Act 2019, providing the legal basis and institutional frameworks to facilitate a competitive wholesale market structure in the country.

4.3.1 Private Sector Participation

Private sector participation in generation has been practiced for over two decades in Kenya and its share of installed generation capacity has risen to 36% of installed generation, contributing about 26% of production. With the increased IPP commitment and shift to renewables, IPPs are expected to play a significant role into the future. Of the near-term capacity envisioned in the 5,000+ MW program, the majority (70 percent) is expected to come from the private sector with KenGen and GDC developing the balance.

4.3.1.1 Progress in Setting up IPPs

The first wave of privately financed generation dates back to 1996 involving the procurement of two diesel IPPs: Westmont (46 MW) was sponsored by a Malaysian firm, and Iberafrica (44 MW) represented a partnership between Union Fenosa (Spain, 80%) and the KPLC Pension Fund (Kenya, 20%) (Eberhard et al., 2016). With a tenure of seven years – longer than that of most EPPs – these first two IPPs were considered stopgap measures for addressing drought-induced hydroelectric shortages and the delayed construction of projects envisioned in the LCPDP. Iberafrica renewed its contract in 2004 and increased its capacity progressively to reach 108 MW in 2015 (Eberhard et al., 2016, p. 110).

The second wave of IPPs – during 1997–99 – occurred amid a move to reform and liberalize the sector. In 1996, KPLC ran international competitive bids (ICBs) for two projects—Olkaria III and Kipevu II—which came to be known as OrPower4 (with varying MW/geothermal) and Tsavo (74 MW/diesel) respectively. OrPower4 was exclusively developed by Ormat (Israel/USA, 100%), while Tsavo represented a consortium of investors: Duke Energy and Industrial Promotion Services (IPS) (jointly 49.9%), Commonwealth Development Corporation (CDC)/Globeleq (United Kingdom, 30%), Wartsila (Finland, 15%), and the International Finance Corporation (IFC, 5%). Although both projects were procured via ICBs, it is noteworthy that only three bids were received for the Tsavo plant and two for what would become OrPower4 (Eberhard et al., 2016). KPLC subsequently also ran ICBs for the thermal IPPs – Rabai, Thika, Gulf and Triumph – obtaining progressively more competitive prices. Drought conditions and worsening hydrological conditions in the decade 2000–2010 led the MoEP to directly engage three international EPPs (Aggreko, Cummins, and Deutz) for a combined 105 MW rental capacity during 2000–2001. In 2006 Aggreko would be called upon again to provide 80 MW and further increases to 290 MW by 2009. In 2012, there were 120 MW of EPPs: to date all these have since been decommissioned. Recently, a number of projects have been procured through a renewable energy feed-in tariff scheme. By end of 2020, Kenya had 17 IPPs with installed capacity of 1,013 MW, thus increasing security of supply.

4.3.1.2 Private Management Contract – Manitoba Hydropower

Reforms also led to Kenya's first private management contract in the power sector. Following a review of tariffs and performance of KPLC that revealed inefficiencies, KPLC was put under a private management contract – which was seen as a means of severing political and bureaucratic influence over utility staff by government officials (Godinho & Eberhard, 2019b) and was also a condition to unblock US$152 m from the World Bank, which also set goals to increase connectivity by 200,000 customers and reduce system losses by 14.5% (Africa Business Insight, 2016). Other targets included obligations to improve billing and revenue collections and to improve reliability of supply and technical efficiencies (design and implement N-1 contingency for the transmission system operator).

A two-year contract was awarded to Manitoba Hydro in May 2006 after a competitive tender. The contractor provided a 3-member senior management team comprised of the CEO, finance, administration and technical experts and all other departments were re-aligned and merged to report to the three functional heads. Worth noting is that the new management did not terminate any of the existing staff but focused on training and coaching local staff to improve work culture. The contract continued the

positive trends of reducing system losses and improving collection rates, with the latter reaching close to 100%, while losses decreased further to 16.6% in 2008.

At the same time, profits increased, and a healthy debt-service coverage ratio was maintained. The utility also saw an increase in new customers (increasing by 258,134 in two years from the previous 40,000 per annum). The contractors also introduced preventive 'live-lines maintenance' without switching off power, which greatly improved reliability. In 2008, government decided not to renew the contract citing the realization of the set objectives for contractors. Other stakeholders interviewed, however, pointed to the tension and conflicts that arose in 2007 (at the onset of a drought) between the MoEP and contractors, regarding direct procurement of IPPs and EPPs desired by government, which the contractors rejected. Others cited the anomaly of government continuing to provide subsidies to KPLC while the contractors were promising financial viability, and the fear of possible staff retrenchments. Though the management team was not well-liked by local KPLC staff, the two-year period allowed them to build internal capacity and a greater degree of independence from political influence, as well as a sense of purpose and ownership over the new trajectory of power sector reform and development in Kenya. As part of its exit strategy, Manitoba Hydro partnered with KPLC to form Kenya Power International –an offshoot of KPLC that provides consulting services across Africa and the Middle East.

4.4 Governance Framework and Structure in Kenya Power (KPLC)

KPLC's governance is framed by key legislation and policies, including the Companies Act 2015 Cap. 486, the Capital Markets Act 2012 Cap. 485A, the State Corporation Act 2012 Cap. 446, the Code of Governance for State Corporations (Mwongozo), the Memorandum and Articles of Association, and the Board Charter, all of which outline the structure, composition, roles, responsibilities and functions of the company, the board and committees. KPLC is a listed company with 49.9% of its shares[30] publicly traded on the Nairobi Securities Exchange and the remaining 50.1% owned by the government of Kenya. This capital structure makes it a mixed capital enterprise, thereby creating new principal–agency relationships. For this reason, the company is also obligated to comply with the Code of Corporate Governance Practices for Issuers of Securities to the Public 2015, and the Capital Markets (Securities, Public Offers, Listing and Disclosure) Regulations, 2002. At a utility level, the governance structure of the company is headed by a board of directors (BODs) who provide strategic direction to the organization, exercise control and are accountable to shareholders. The board, in consultation with the cabinet secretary (CS) of MoEP, appoints and

[30] Most of these are owned by institutional investors (banks) and local individual investors.

delegates the day-to-day management of the company to a chief executive officer (CEO/MD) and approves the organizational management structure.

In line with Code of Governance of State Corporations, the board is composed of nine members in contrast to the 11 provided for under the State Corporations Act. Of these, six are independent non- executive directors including the chairman; two are non-independent directors representing the national treasury[31] and the ministry of energy[32]; and one executive director who is also the managing director and chief executive officer. The constitution of this board takes into consideration diversity in gender, age, ethnicity and culture. The board chair is appointed by the president, while board members are nominated, seconded and appointed by shareholders at annual general meetings (AGMs) in a transparent, competitive and formal process based on merit and in accordance with the provisions of section 132 of the Companies Act. This process also involves advertisement for available vacancies in public newspapers, a feature that is absent in most utilities in SSA. Pursuant to section 6 (e) of the State Corporations Act, the CS of MoEP can nominate and appoint not more than three board members. There is, however, a behind-the-scenes selection and vetting process for board members representing various regional, political and business interests. The composition of the board takes into consideration a mix of skills and competencies required to achieve the company's long-term goals. Hence, it is a requirement that at least one board member is a financial expert with the necessary qualifications and expertise in financial management. The code of governance requires that at least one-third of the board members be independent and maintain their independence in decision-making. Board members are eligible to serve three-year terms, renewable once. However, the CMA rules provide for a maximum term of nine years, giving independent directors more latitude to oversee the long-term strategies of the company and its performance. At every AGM, at most one-third of the board members retire by rotation and are eligible for re-election only on a first-in first-out basis. If, for any reason, a vacancy occurs on the board, the permanent directors (representing MoEP & national treasury) may appoint a person to fill the vacancy temporarily until the next AGM when he or she is expected to stand down, but is eligible for election. The appointment of board members is formalized through a gazette notice. The corporatization reform and streamlining of board composition to include independent directors is meant to check excesses of government-sanctioned political influence as well as to protect the interests of private shareholders (principals), without which the company risks permeation of rent-seeking moral hazards.

[31] As the owner and custodian of government owned assets and investments.
[32] Line ministry, superintending over the energy sector policy implementation and performance.

In addition, the BODs, as an internal control mechanism of agency problems, helps to monitor and evaluate the performance of top management. It helps shareholders to control possible information asymmetry, management perquisite consumption[33] and entrenchment[34] – traditional agency problems that affect performance by inhibiting monitoring – by adopting short-term (the incentive or reward systems) and long-term (changing corporate structures) solutions. Hence, when effective, these internal control mechanisms can resolve traditional agency problems, albeit with agency costs of monitoring actions of management, to ensure goal confluence between principals (shareholders) and agents (management).

However, since private shareholding is thinly and widely spread, with no large-block stockholders, in practice "there has been minimal-to-no representation of private sector interests on the board" as intimated in one of the interviews. "The government as majority shareholder, has a firm grip on the board."

Continued government influence adversely affects post-privatization company performance. Even after partial privatization, the government continues to appoint key top managers (CEOs and board members) in KPLC. This serves to dampen incentives for improved performance since board members and officers are actually insiders. In recent years the company's performance has declined partly because of this government influence and behaviour. According to a key interviewee: " … there has been political interference in the appointment of CEOs who have no understanding of the company's business". One of the conclusions that will be drawn later in this study is that privatized companies that continue to have significant government ownership and representation are likely to have lower performance than those with reduced government influence.

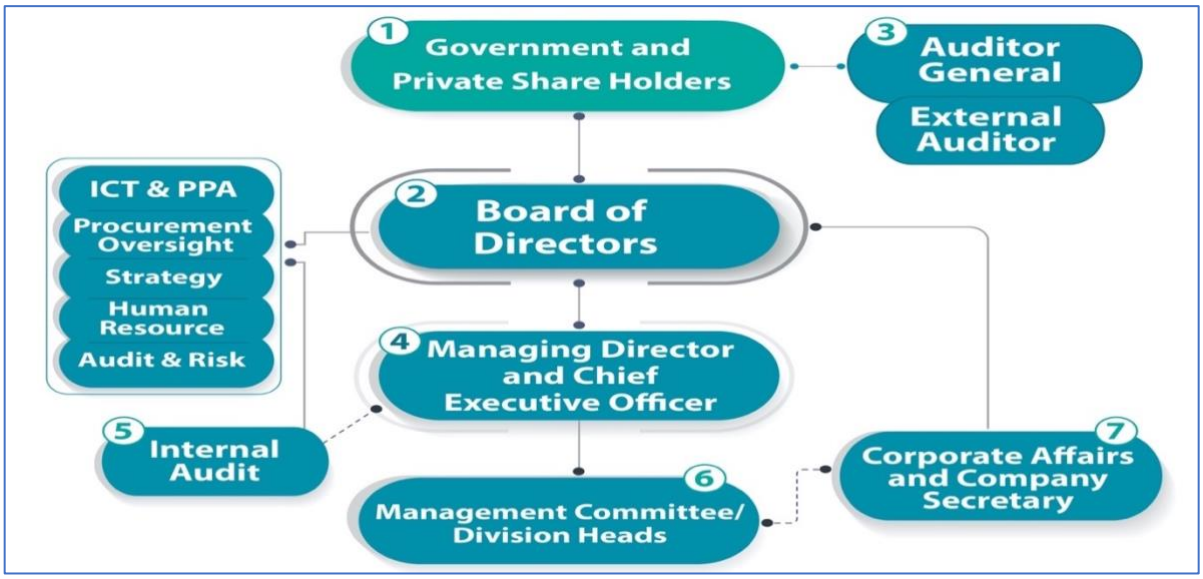
At an operational level, KPLC's management is structured into 13 functional divisions, each headed by a general manager (GM) who reports to the managing director. These GMs form a core management committee that considers policies and strategic measures for optimal business performance; monitors performance, and makes recommendations to the board. The divisions have various departments headed by managers who coordinate implementation of business functions. Operational activities are structured into 10 semi-autonomous regional administrative business units (BUs) headed by regional managers and these units are further devolved into 46 county BUs headed by county business managers. Following this

[33] Short-term cost-augmenting activities by managers designed to enhance non-salary income or provide other on-the-job consumption

[34] Refers to actions of management that reduce the effectiveness of control mechanisms designed to regulate management behaviours

structure, the finance, procurement and O&M activities have been devolved to regional levels, while planning and other corporate services are still centralized. This multidivisional structure (M-form) allows for more efficient monitoring of managerial discretionary behaviours, reduces agency costs and can substitute for weak corporate control mechanisms in certain scenarios. Essentially, the M-form structure helps to identify distinct business contributions to the company's performance because of the decentralization of operating responsibility and centralization of strategic controls at the head office.

Figure 4.4: KPLC's Governance Structure



Source: Author's creation

4.4.1 Board Structure and Functionality

While the roles and responsibilities of the KPLC board are clearly articulated in the Board Charter, of interest is the key responsibility for ensuring that the business is financially viable and properly managed. To achieve this and other strategic mandates, the board's efficacy is enhanced through delegation of authority along a structure of five functional committees: strategy; human resources; procurement oversight; information, communications and technology and Power Purchase Agreements, and audit and risk. The committees act as agents of the main board to address specific issues relating to its mandate within the company. Membership to these committees is based on the relevant skills, expertise and experience required to handle respective functions.

As a partially privatized company, the board is structured to have a diversity of skills which allows for exposure to a market-oriented competitive environment, thereby enhancing KPLC performance – unlike

traditional SOEs (for example, TANESCO) which may have good technical skills but lacks many other essential skills to compete in a free-market economy. The partial privatization also provides several structural solutions that reduce agency problems and provides incentives for managerial risk taking – for example, the creation of two board committees: strategy, and the ICT&PPA committee, which indicates the importance the board attaches to KPLC's performance and energy security as priorities. The strategy committee assists the board and management in setting targets and reviews the five-year corporate strategic plan. The committee also oversees the company's financial management and monitors implementation. Equally important is the board's focus on PPAs by providing oversight in the negotiation of PPAs with IPPs and ensuring that they safeguard the interests of the private sector and customers through cost-effective power purchase costs. These two committees as agents of the main board have helped to create a stable investment climate and commercial culture within KPLC that provides adequate certainty and incentives for investment in generation expansion over time.

To sustain a performance culture, the government has created a State Corporations Advisory Committee (SCAC) that monitors and evaluates the board and management's performance. The committee also develops and issues guidelines for governance audits, incentives and rewards for board members. Typically, KPLC board members are incentivized with; directors fees of Ksh600,000 annually or, on pro-rata basis for the period served; a sitting allowance of Ksh20,000; telephone allowance of Ksh20,000; a lunch allowance of Ksh2,000 per sitting; accommodation allowance for work-related trips; mileage allowance, and training fees. The board chairman receives an additional honoraria of Ksh80,000 per month. These incentives provide motivation for the board's supervision of management to improve KPLC's performance and are better than that which their colleagues in TANESCO receive.

Through quarterly reporting obligations and annual self-assessments, the SCAC aims to indirectly push and improve members' individual and collective performance. For the year 2018, board performance was scored at 93.6%. Government's delegation of the authority for monitoring and evaluating through such a formalized framework has helped to improve company performance.

4.4.2 Mwongozo (The Code of Governance for State-owned Corporations)

The Mwongozo[35] (Government of Kenya, 2015a) was born out of the realization that state-owned enterprises (SOEs) had, over the years, and with new challenges, not operated at expected levels owing

[35] Swahili for Guide or Regulations was developed in 2014 and is anchored in the Constitution of Kenya, 2010 Articles 10, 73 and 232 that espouse national values and principles of governance –integrity, efficiency, and effectiveness, and carries the same legislative importance.

to weak governance structures and poor leadership in the management of public resources. The code has been adopted as a state-motivated reform to create a transformational mindset in the way business is conducted to increase efficiency and accountability in the use and deployment of scarce resources. One of the governance challenges faced by SOEs is insufficient competence in boards of SOEs, as well as embedded political interests, arising from an opaque appointment process. A professional and independent board is more likely to safeguard an SOE from political interference, lead to more efficient operations through well-defined strategy and could ultimately result in increased value-for-money to the shareholders. The Code of Governance, in relation to Kenya and KPLC, provides a framework for improving corporate governance by allowing for the appointment of professional boards with well-defined skill sets; the undertaking of board inductions and evaluations, and requires regular performance reports. The Code has also provided for reform and reduction in the size of the boards and the increase in the number of independent board members to reduce conflicts of interest, which is a game-changer in boardroom affairs. It further provides a platform for addressing shareholder rights and obligations with the aim of ensuring that sustainable performance excellence become the hallmark of SOEs.

Drawing from its past aid embargo experience and the desire to exploit energy resources to spur growth in the economy, the government implemented the Mwongozo to streamline governance and to attract investments. Despite the previous caveats around ongoing political interference in KPLC's board, the Mwongozo code is a positive reform initiative to inculcate good governance principles in all SOEs. It promotes greater autonomy, transparency, accountability and leadership focused on performance, for the purpose of improving service delivery unlike in other countries in the region. In fact, Kenya is the only case study that has advanced to this level of governance robustness. This initiative has also created a better investment climate and gives greater regulatory certainty, which has catalyzed growth of IPPs as well as greater certainty of shareholder investments in KPLC.

4.4.3 Accountability, Transparency, Disclosure, Risk Management and Internal Control

In line with the Public Audit Act 2015 and Capital Markets (Securities, Public Offers, Listing and Disclosure) Regulations, 2002, KPLC is mandated to prepare and publish financial statements in accordance with International Financial Reporting Standards (IFRS) and International Accounting Standards (IAS). The KPLC has in place robust accounting systems and adheres to listing requirements for disclosure of the same to shareholders. The KPLC is subject to external audit by the Auditor-General of Kenya who provides a qualified opinion of the company's financial performance in accordance with International Standards of

Supreme Audit Institutions (ISSAIs). Of interest is that, while KPLC maintained a strong financial performance for many years, in recent times its solvency has declined and, as such, the Auditor General noted a breach of commercial borrowing covenants in 2018 by Ksh59.9 billion[36]. Although lenders waived their rights to demand payment owing to breach of debt covenants, it signals increasing financial stress[37]. This breach also means that the company violated the capital markets[38] listing obligations in regard to maximum debt capacity and solvency[39] (KPLC, 2018, pp. 112–117). Detailed analysis of these ratios is presented in section 4.6.5 below.

In addition, these incidents indicate that internal governance mechanisms (such as BODs), on their own, cannot reduce traditional agency problems since they have limited access to information and little influence over top management performance evaluations. In July 2020, the board of KPLC was forced to resign for failure to disclose to government the magnitude of financial distress resulting from an inadequate tariff review, excessive debt levels and high operating costs associated with the access and network expansion program, overcommitment in new IPPs (the 5,000+ MW program), and financial mismanagement in operations, threatening the financial sustainability of the company (Business Daily, 2020a; Kahawa Tungu, 2020). In sum, the intervention of the auditor-general and penalties by the CMA underscore the strength of the independent governance system in Kenya and in KPLC, occasioned by corporatization and privatization reforms. However, private debt has not been an effective enough mechanism for controlling agent (managers') behaviour associated with the problem of free cashflows because of continuous state subsidies and possible excessive risk-taking (preference).

4.4.4 The Capital Markets Governance, Listing Rules and Regulations

KPLC as a mixed capital enterprise (MCE) is subject to both internal and external governance rules and regulations of the CMA of Kenya (CMA-Kenya, 2016). Effective governance and regulation by capital markets helps to provide strategic guidance to the company and promotes effective monitoring of the company's management and its accountability not only to the board but also its to its shareholders and

[36] KPLC's total borrowing as at end of 2018 amounted to Ksh 113 billion.
[37] In July 2018, majority of KPLC senior management were arrested and charged at the High Court with alleged corruption relating to procurement violations and material misstatement of financials (information asymmetry) and subsequently terminated.
[38] Although CMA imposed penalties as confirmed from interviews, these were not publicly disclosed.
[39] At the end of 2018, the company's current assets of Ksh 54.6 billion were less than current liabilities of Ksh 106.3 billion, resulting in a negative working capital of Ksh 51.6 billion

wider stakeholders – such as customers, the public, the media, investors and other market participants, unlike in traditional company governance structures.

Capital markets are a form of external corporate governance mechanism used to control management through: board compositions; legal duties imposed on directors; governance regulations and internal control standards; reporting of financial performance; conflict of interest disclosures, and independent audit of financial statements. In addition, the institutionalization of a compliance and risk management function, with powers to report directly to the board on regulatory requirements prescribed, uniquely places emphasis on transparency of the governance system. In combination, these three facets or tenets alter the governance and incentive framework of KPLC as a listed company. In Kenya, the capital markets corporate governance regulations: set standards and rules for the composition of board of directors; define the main responsibilities of the board and the requirement for a board charter, and make key provisions for compliance with the prescribed code of conduct. For example, one such standard is for listed companies avoiding appointing a person as director unless that person is fit and proper to hold such a position and is a certified director from an institution recognized by the CMA. This standard has the potential to eliminate would-be incompetent political appointees by governments in SOEs and reduces conflict of interest by government, since qualification requirements are pre-defined by an independent institution.

In addition, the capital markets regulations introduce an element of penalty, liability and sanctions to the company, or any company director, or management staff (jointly or severally) who contravenes the set regulations. This regulatory control mechanism helps to indemnify the company/ utility against any loss arising from contravention of the CMA regulations. The CMA also provides for potential suspension and delisting of the company. This accountability mechanism compels directors and management to strive for improved performance to achieve the set regulatory standards and disclosure of necessary information. The mechanism further places full responsibility for the operations of KPLC and its compliance adherence obligations on its directors and employees with calls for a clear separation of duties and functions deemed to pose conflict of interest. For example, separation of CEO and board chairperson roles, the compliance and audit functions are to be segregated and independent from operational functions and reporting to the board. This also applies to the separation of internal policy, supervisory roles, sales, dealing and corporate finance functions.

Related to this are requirements to improve financial performance, pursuant to the listing and disclosures regulations (CMA-Kenya, 2002). The First Schedule of the Capital Markets (Securities) (Public Offers,

Listing and Disclosure) Regulations, 2002 (Amended 2016) sets out minimum requirements for listing as well as the continuing obligations of the listed entity. Among these are mandatory obligations to have a clear future dividend policy and a track record of profitability and future prospects – KPLC must have declared profits after tax. The code of corporate governance practices for issuers of securities to the public (Government of Kenya, 2015b) reiterates the rights for every shareholder's entitlement to distributed profit, in the form of dividends and other bonus shares (script dividend or rights issue) as applicable. The listing and disclosure regulations further outline a requirement for solvency and adequacy of working capital, with the requirement that KPLC not be insolvent. It also sets as a mandatory requirement for the company not to be in breach of any of its loan covenants, particularly in regard to the maximum debt capacity.

Accordingly, KPLC, which is listed on the main investment market, complied with most of these requirements until 2018 when the company breached the debt-service coverage ratio and current ratio covenants, resulting in a negative working capital of Ksh51.6 billion (KPLC, 2018). This prompted CMA to issue warning letters of suspension and to set up a company's recovery board to help faulting companies get back on track. The rationale for the recovery board is the fact that companies that have been profitable in the past do not guarantee that they will remain profitable in the future. Hence, the recovery board is meant to play a risk-mitigation role where the internal board and financial control mechanisms have been weak and, also, to cushion financial markets from adverse effects from failing market participants. Nevertheless, the listing on the securities market has helped to introduce independent non-executive directors to the board of KPLC, helping to minimize agent opportunism, agent induced market risks and government influence, as well as creating an opportunity for the company to raise funds from private shareholders when there have been shortages from government. Listing has also helped to give credibility to the company and, therefore, interest from various stakeholders. The addition of the CMA as another primary regulator increases transparency and compliance obligations for improved financial performance, thereby altering the traditional governance framework. Overall, this governance framework has been instrumental in helping KPLC improve its financial performance.

4.5 The Performance Contracting Framework

Performance contracting in Kenya can be traced back to the economic liberalization reforms of the early 2000s and as a condition for donor funding. A policy paper on an Economic Recovery Strategy for Wealth and Employment Creation (2003–2007) (Government of Kenya, 2003) highlighted governance failures

within SOEs. The underlying concern was that poor public governance had led to wastage and misuse of public resources. SOEs were dogged by political interference, and issues of tribal, ethnic and political patronage were pervasive in ensuing management appointments at state corporations. As a result, performance deteriorated. The policy therefore recommended adoption of performance contracts (PCs) for CEOs and for boards to improve performance. Legal Notice No. 93 of August 2004, a subsidiary legislation to the State Corporations Act, Cap 446 provides the legal basis for the implementation of PCs in SOEs (Government of Kenya, 2004b). The legislation also provides for the autonomy of boards of directors (BODs) and target-setting frameworks, and specifies the roles of the parent ministry, the national treasury as well as the need for a contracting framework. The first PCs, including that of KPLC, became effective in July 2004. The contract defined relationships between the government and parastatals, and articulated targets against which performance is evaluated. Government developed performance incentives for BODs which meet the agreed targets and, as the majority shareholder, reserved the right of shareholders to remove non-performing directors.

The medium-term plan (2018–2022) of Kenya's Vision 2030[40] is centered on four pillars (code-named the 'Big Four Agenda'): namely, universal healthcare, affordable housing, food security and manufacturing, all of which are dependent on the provision of adequate, reliable and affordable electricity supply. For example, to increase the competitiveness of Kenya's manufacturing, a time of use (TOU) initiative was introduced in December 2017 for industrial and commercial customers granting a 50% reduction in electricity tariffs during off-peak hours, taking advantage of the surplus power generation capacity that the country currently enjoys. This was incorporated in KPLCs performance contract. In line with the Mwongozo provisions, performance management in KPLC is implemented through annual PCs between the government (principal) and the board of directors (agents) (Government of Kenya, 2018). The contract establishes a hybrid of 'behaviour and outcome-based contractual relationship between the two. In essence, the PC framework guides the board and top management of KPLC in translating strategic objectives into actions and reporting performance levels. This delegation mechanism creates an agency accountability obligation and relationship for management's performance and is cascaded to senior staff in individual PCs. Hence, the corporate KPIs and targets are assigned to the CEO's performance contract and balance scorecard and then cascaded to the relevant divisional and functional heads and drilled down

[40] Kenya Vision 2030 is the country's development programme for the period 2008–2030 and is based on three pillars –Economic, Social and Political. It is being implemented in successive five-year medium-term plans. The objective is to help transform Kenya into a newly industrialized middle-income country providing a high-quality life to all its citizens in a clean and secure environment.

to staff with reference to their specialized contributions. Performance contracts incorporating disaggregated operational KPIs are further cascaded to regional, county, and branch business units with targets customized to each level of the organization. Since the KPLC management system is aligned to a multidivisional organization structure (M-form, is less bureaucratic) which enhances monitoring effectiveness, the cascade of performance contracts allows for monitoring of managerial discretionary behaviours. Essentially, M-form structures help to identify distinct business unit contributions to corporate company performance because of the decentralization of operating responsibility and centralization of strategic and financial controls at the head office. The M-form structure is more efficient in promoting corporate entrepreneurship since it negates the disadvantages of organizational size and complexity while facilitating monitoring of an individual manager's entrepreneurial behaviour. This way, overall accountability is increased, agency costs are reduced, and the privatized company performance is improved.

4.5.1 Performance Contract between Ministry of Energy and KPLC

Broadly, the signatories of the PC are the cabinet secretary for MoEP as the principal on behalf of GoK and the chairman of board of directors as the agent on behalf of KPLC (along with one other independent director) (Government of Kenya, 2018). To facilitate achievement of Vision 2030, the PC outlines strategic objectives of the government as:

- To improve energy generation – a mix that is efficient, reliable, and competitively priced;
- To increase customer connectivity to a customer base of over 9 million customers;
- To improve electricity supply quality that exceeds customer expectations, reduces cost of doing business, and increases sales revenue. These will, overall, improve the delivery of customer services;
- To develop a modern, efficient, and responsive electricity system infrastructure that encompasses electricity demand growth;
- To develop a robust distribution system that facilitates achievement of the 5,000+ MW generation expansion plan;
- To promote good corporate governance and management for enhanced efficiency and service through internal capacity development and resource alignment;
- To diversify business revenue leveraging on the existing assets and innovation, and
- To give reasonable return to shareholders for their investment.

For the 2017/18 performance contract, the board's commitment to achieving these objectives is reflected in a strategic intent statement undertaking to improve energy generation in a mix that is efficient,

reliable, and competitively priced; increase customer connections in support of the universal access by the year 2020; improve electricity supply reliability and quality to enhance customer satisfaction and sales revenue growth; develop a modern, efficient, and responsive electricity system infrastructure, and to improve system efficiency by reducing both technical and commercial power losses.

In turn, government commits to acknowledging receipts of correspondences and approve requests from KPLC as well as ensuring timely release of budgetary allocations within seven days after exchequer release. To monitor performance, compliance and mitigate agency problems of information asymmetry, requirements are set for KPLC to submit quarterly and annual reports to the Inspectorate of State Corporations with copies to MoEP, The National Treasury, and the Performance Management and Co-ordination Office. Hence the cascaded PC also provides a mechanism for monitoring and observation of agent efforts, or outcomes, that are accomplished through supervision, accounting controls, and other initiatives. Effective monitoring is a key to resolving principal–agent conflicts since unsupervised managers can behave opportunistically. In the absence of such monitoring, agents make risk-averse choices. In sum, the PC reinforces the functions of a BODs.

4.5.1.1 Performance Indicators and Targets

Performance indicators and targets are derived from the company's five-year strategic plan and are operationalized through the annual PCs of the board, CEO/MD, and top management and staff. For the year ended 2018, KPLC had many KPIs, though well focused and measurable, and structured along seven key performance criteria categories shown in the table below. All the categories and KPIs are considered important to the company; however, the degree of their importance varies, hence the assigned weights. While the core mandate category relates to utility-specific activities, other categories are policy-related development goals and are considered essential – however, with repercussions on KPLC financials since not all of them are priced in the company's revenue requirement and often create cashflow shortages.

Table 4.2: KPLC's Key Performance Indicators and Targets for 2018

	Performance Criteria Category	Units	Weight %	Target 2017/18
1	**Financial Stewardship and Discipline**			
	Absorption of Allocated Funds	%	5	100
	Pending Bills	%	5	≤ 1
	WEIGHT SUB TOTAL		***10***	
2	**Service delivery**			
	Implementation of Citizens' Service Delivery Charter	%	4	100
	Application of Service Delivery Innovation	%	3	100
	Resolution of Public Complaints	%	3	100
	WEIGHT SUB TOTAL		***10***	
3	**Core Mandate (Vision 2030 Flagship Projects)**			

	Generation Capacity Procured	MW	4	22
	Universal Access: Number of New Customers Connected to Electricity	No.	4	1,200,000
	Expand and Upgrade Electricity Distribution Network	Kms	4	1,033
	Number of New and Upgraded Distribution Substations Completed	No.	4	14
	Street Lighting Project	No.	4	30,000
	Facilitation of Competitive Electricity Tariff	%	4	100
	Core (Other Priority Projects Linked to SDGs, etc.)			
	Release of funds to Regional and Branch Offices	Days	4	5
	System Efficiency	%	3	81.6
	Customer Average Interruption Duration Index (CAIDI)	Hours	4	5.5
	System Average Interruption Frequency Index (SAIFI)	No. per year	4	45
	Implement Phase 1 Last Mile Project.	No. of transformers	3	3,704
	Ease of Doing Business: Average Time to Connect New Business Customers	Days	2	30
	Return on Investment	%	5	4.4
	Profits Before Tax	Ksh millions	5	11,683
	Dividends to the National Treasury	Ksh millions	5	450
	Project Completion Rate	%	2	100
	WEIGHT SUB TOTAL	***%***	***60***	
4	**Implementation of Presidential Directives**	%	5	100
5	**Access to Government Procurement Opportunities**	Ksh millions	3	3,000
6	**Promotion of Local Content in Procurement**	Ksh millions	2	16,000
7	**Cross-cutting Issues**			
	Asset Management	%	1	100
	Youth Internships/Industrial Attachments/Apprenticeships	No.	1	1,795
	Competency Development	%	2	100
	Disability Mainstreaming		1	100
	Prevention of HIV/AIDS Infections	%	1	100
	Safety and Security Measures	%	1	100
	National Cohesion and Values	%	1	100
	Corruption Prevention	%	2	100
	WEIGHT SUB TOTAL		***10***	
	OVERALL TOTAL WEIGHT		100	

Source: Government of Kenya, (2018) (adapted)

Of importance to this thesis are indicators focusing on access, adequacy and reliability of supply, efficiency, affordability and financial sustainability – which the PC prioritizes under the Core Mandate category above, with the highest weight of 60%. Regarding achieving universal access, the government set a target of 1.2 million connections to the grid by the end of 2018, under the Last Mile programme, enabled by disbursement of government and donor funding worth Kshs12.6 billion. KPLC also targeted to build 1,033km of MV distribution lines (Kshs1.3 billion) and 14 primary substations to facilitate electrification expansion. This aimed to increase access rates from 70.6 to 80% by June 2018. Adequacy of supply is reflected in the targeted addition of 22 MW of new generation capacity, bearing in mind the current excess supply. (A further 25 IPPs are in the pipeline with approved PPAs with an aggregate capacity of about 4,000 MW, though not yet finalized). Monitoring reliability of supply commenced in

2016 with targets of CAIDI at 5.5 hours and SAIFI of 45 per year. Efficiency is assessed in terms of a reduction in technical and commercial losses from the current 21% to only 18.4%. Power loss reduction involves prioritized activities such as reconfiguring heavily loaded and lengthy 33kV and 11kV feeders; reconductoring circuits on LV networks, the addition of new circuits; injection of new transformers, and deployment of an energy-balancing module. Commercial losses are to be reduced by implementing outdoor metering for large power users and reductions in billing errors. While this contract does not specify revenue collection as a key target, the tariff provides for 1% bad debt (target 99%). There is also mention of initiatives to diversify non-regulated revenue sources including a fiber-optic cable project for internet services. In addition, as previously mentioned, the PC targets affordability through the implementation of Time of Use (TOU) tariffs for large power customers at a reduced energy charge of 50% and participation in a task force to review existing PPAs for possible cost reductions.

The PC prioritizes financial sustainability with targets for profit before tax (EBITDA). However, owing to recent liquidity challenges, the company has resorted to expensive short-term loans (Ksh 70 billion) and overdrafts (Ksh 12 billion) in addition to the previous syndicated long-term loan (~Ksh 50 billion) to bridge its cashflow shortages, which indicates the precarious financial position of KPLC.

The inclusion of presidential directives[41] (relating to the electrification programme) and other non-core activities in the PC indicates continued influence in decision-making by government (with its majority shareholding), which potentially compromises the commercial viability of partially privatized companies. Indeed, one of the reasons advanced for the poor financial position of KPLC has been the imposed electricity connectivity programme that was not well planned or budgeted. Other incidences have been cited through interviews with the utility managers, where the government overrules technical planning decisions; and does not involve the utility in negotiation of a few IPPs.

Until 2018, only the managing director (MD) was contracted on a 3-year contract, renewable once, and the remaining management and staff had long-term employment contracts. Subsequently, all senior managers have been engaged on 4-year (renewable) performance contract terms of employment with stringent targets. The previous long-term employee contracts were deemed to lack incentives/penalties for non-performance (with no consequences). The employment contracts are further reviewed on a bi-annual and annual basis. While this arrangement has sent strong signals to improve performance and

[41] In October 2014, President Uhuru directed that every school, hospital and dispensary in the country be connected to the grid. This was followed by another directive in May 2015 directing that 75% of Kenyan households be connected to the grid and domestic connection fees reduced from Ksh35,000 to Ksh15,000 as a standard.

enhances the agency roles, it is still nascent and requires a longer time to fully assess impacts on performance.

4.5.1.2 Electricity / Energy Regulation and Regulatory Regime (EPRA Successor to ERC)

Since its establishment as an electricity regulator in 1998, and then as an energy regulator in 2007, ERC/EPRA as a principal has played a crucial role in balancing decision-making in the sector, especially between privately owned IPPs and the publicly owned generation company KenGen. The ERC/EPRA has licenced new capacity, creating security of supply and approving near-cost-reflective tariffs for KPLC. However, recent involvements by government in sector regulation and planning is undermining regulatory independence and effectiveness in regulating market entry, tariff reviews and system planning.

Following an earlier pronouncement by President Uhuru in 2017 to reduce the cost of power, a task force team was formed, headed by the Ministry of Energy, to review all existing PPAs; to establish revenue requirements for each; to explore possibilities for mutual termination (or compensation payments for termination), and to compare PPA costs with similar plants regionally and globally. The interim recommendations (not yet official) are that PPAs should be left to run through to their termination date, while a freeze was put on renewing PPAs, especially for the more expensive IPPs. In addition, in a bid to implement government's recent policies geared towards industrialization and employment, the regulator has been directed to heed policy and not to increase tariffs. Government's emphatic argument as intimated in interviews has been that "the law/regulation follows policy and hence any inconsistencies in it are an area for law reform and not the reverse". Specifically, the EPRA has been pressured to set low tariffs that reflect policy objectives rather than economically efficient prices. While the regulator previously had exhibited authority in managing generation expansion planning processes, the new team has been described by some interviewees as "weak and indecisive" which has let the ministry take over planning decisions. The regulator has also been accused of an inability to stand firm in exercising its legal mandate to determine cost-reflective tariffs, owing to fear of job termination. Government has seized this weakness to push for a move away from cost-reflective tariffs towards more subsidies, in the hope of creating more employment. This signals a potential decline in the role of the regulator and the energy sector.

4.6 Findings and Analysis: Operational Performance of KPLC

This section provides an empirical and analytical analysis of the operational performance of KPLC, considering five key performance measures which are the enduring challenges facing utilities: access to electricity; adequate and reliable supply; efficiency; affordability, and financial sustainability. Trends in performance, computation of values and ratios for the KPIs are presented and analyzed below to show trends and to explain results.

4.6.1 Access and Electrification

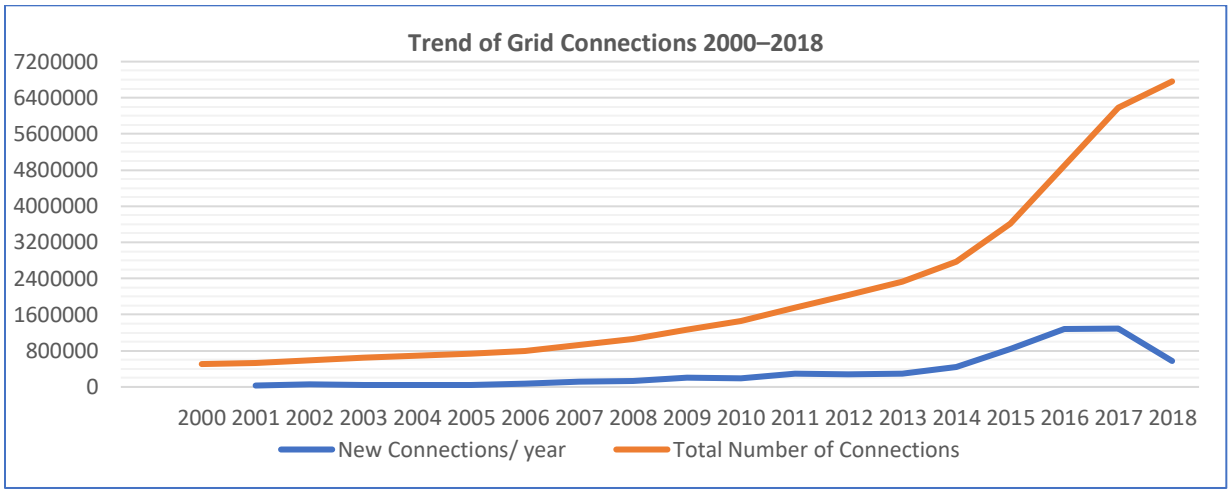
Kenya is implementing an aggressive electrification programme that has more than doubled the number of grid connections in a span of just five years with the aim of achieving universal access to electricity by 2022. KPLC has connected, on average, about a million new customers annually during the last four years (2014–2018) and had about 6.7 million customers as of June 2018.[42] About 65% of these new connections are in poor households which consume less than 15 kWh monthly (Fobi, Deshpande, Ondiek, Modi, & Taneja, 2018; K. Lee et al., 2016). With the existing grid already reaching a relatively better-off population, the subsequent grid extension and intensification will be reaching even poorer areas of the country. To achieve the social objective of universal access while ensuring financial sustainability of the sector, the government has developed well-designed programmes of subsidizing connection costs through budget transfers from the Kenyan government to KPLC. The average cost of connecting a household within 600 meters of medium (MV) to- low voltage (LV) transformers in high density urban and peri-urban areas is about Ksh 1,000,000 (US$1,000). Prior to the adoption of the Last Mile Connectivity Programme (LMCP) in 2015, this connection cost was being funded by KPLC and the beneficiaries on a ratio of 65:35%. However, under the LMCP, households pay a reduced connection cost of Ksh 15,000 (US$150), and the Government provides the rest of the funding from its own resources, donor grants and concessional loans. In addition, under the Slum Electrification Programme, the GoK has been able to further address the affordability barriers of people living in high-density informal settlements by providing targeted subsidies for connections through an innovative output-based mechanism (OBA). Considering the rate of urbanization in Kenya and the large number of people living in informal settlements (including half of those in the capital Nairobi), ambitious electrification targets may be met. National electrification rates are currently 75% – with 84% of urban households with electricity connections and 71%of rural households (World Bank, 2018). However, in a bid to meet the LMCP targets, KPLC has also had to divert

[42] This performance exceeds what South Africa achieved at the height of its electrification programme – less than 500,000 connections per annum – but still one of Africa's most successful efforts, raising access rates from about 50% in 1994 to close to 90% today.

resources to access-related infrastructure, and these amounts swelled over time as the utility tried to connect people living farther away from the grid. This has caused the utility's performance in billing (consumption and net revenue per customer) and loss reduction to deteriorate. The Last Mile programme obliged the government to reimburse KPLC for maintenance and connection costs, but the transfers have been insufficient to avoid significant adverse financial impact on the utility.

It is worth noting that the early structural reforms of the sector did not materially impact the pace of electrification and it was necessary for the government to adopt additional and more ambitious targets for universal access, backed by dedicated financing and donor support, without which access rates would have remained low. In addition, regulatory reforms in early the 2000s have created a strong enabling framework for growth of off-grid electrification efforts in Kenya as a leader in access in the region.

Figure 4.5: Number of Connections to the Grid



There is a broad lesson here. Progress in electrification requires national goals and targets, planning and subsidies for connections. However, as more and more low-income households are connected, especially in deep rural areas, the issue of affordability arises (which is examined later). Likewise, consumption remains low and is generally insufficient to either pay for grid strengthening and extensions, or the operating and maintenance costs of these services. It shall be shown, how this has impacted KPLC's financial performance. For high levels of electrification to be sustainable, some level of cross subsidies is generally also required for low-income households.

4.6.2 Adequate and Reliable Electricity Supply

Over the past two decades, Kenya has been one of the most successful countries, a leader in Africa, in taking bold steps towards enhancing security of supply. In particular, since 1990, net generation capacity

has more than tripled to reach a current level of just over 2.8 gigawatts (GW). Kenya has also diversified its power system from reliance on almost exclusively hydro-electricity to a more balanced mix of hydropower, geothermal and oil-fueled generation, and, in recent years, also wind and solar energy. Kenya's previous reliance on hydropower led to repetitive supply crises in the 1980s and 1990s. With the aid embargo, and unable to access funding for new generation capacity, the country faced severe supply constraints resulting in contracting of expensive emergency thermal power, which, in turn, increased the cost of supply as it waited for the commissioning of the state-owned and IPP plants. Given the need to grow its economy and to access donor loans, the country revised its approach to generation planning and adopted reforms to attract private-sector investments into the sector. Following the unbundling of generation from transmission and distribution, a new and better coordinated planning and procurement system ushered in a series of IPPs.

Kenya has since attracted over 16 IPPs for over 1000 MW of capacity, including geothermal projects worth US$3.0 billion in investment. In addition, a further 25 IPPs have approved PPAs: these have an aggregate capacity of about 4,000 MW. The increased capacity translates into improved reliability of supply. Kenya has become a destination for IPPs owing to its good governance reflected in good planning through least-cost power development plans (LCPDPs) and international competitive tendering practices linked to timely procurement. Furthermore, its good governance has been facilitated by the structural reforms which created a separate independent grid company to contract power without facing the conflict of also being a generator.

Figure 4.6: Trend of Growth in Installed Generation Capacity (MW)

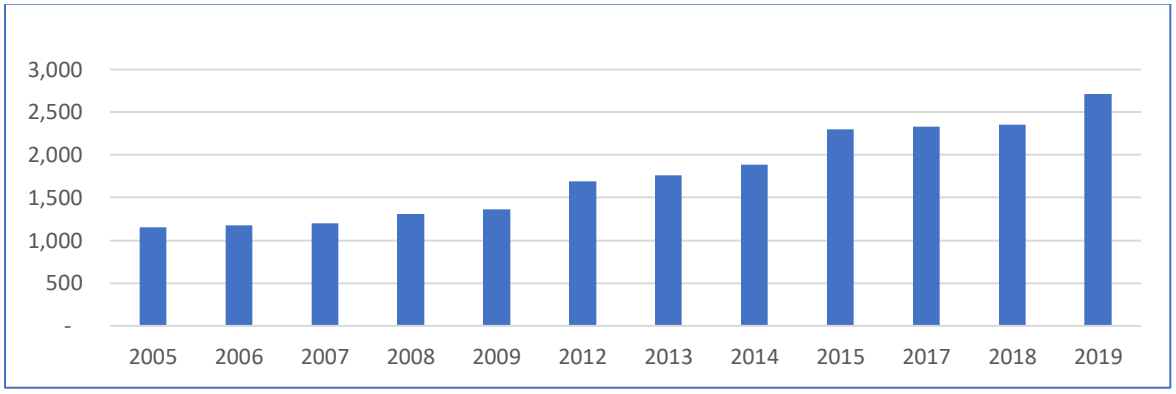
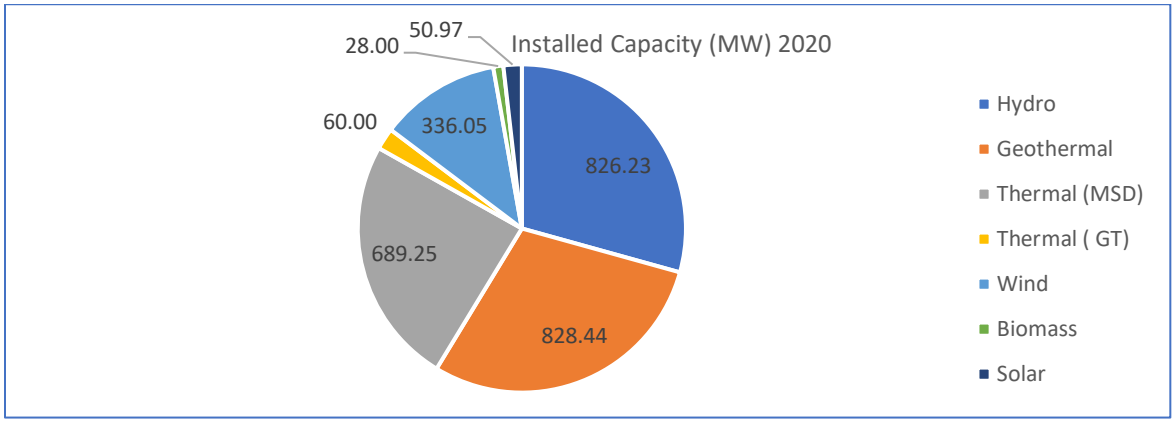


Figure 4.7: Installed Generation Capacity by Energy Source



Source: Author's creation based on primary data

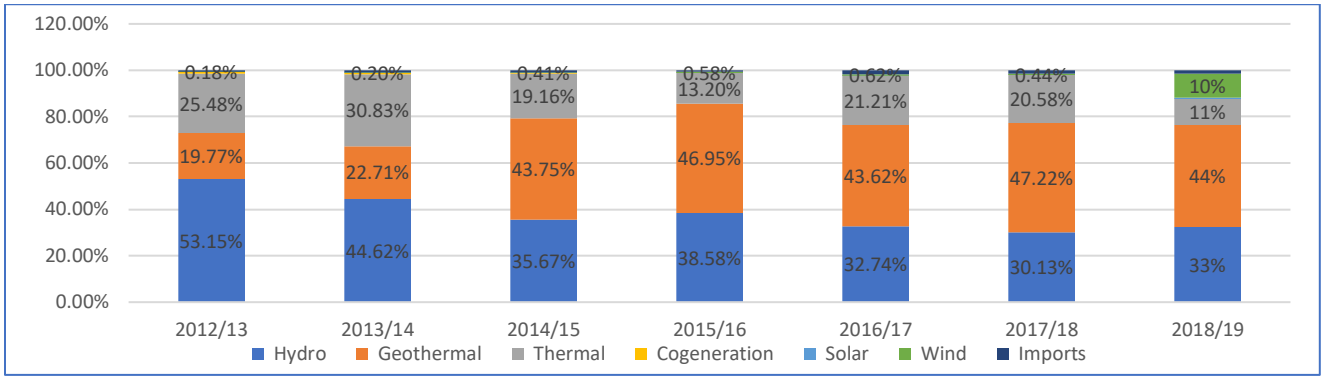
4.6.2.1 Generation Mix

Kenya's security of supply has improved through marked diversification of the energy mix. With restructuring, the country sought to de-risk geothermal resources managed by a corporatized GDC. Currently, geothermal capacity is 828 MW contributing 44%of electricity production, and this share has been growing since 2014, helping to displace the more expensive thermal generators whose contribution has gradually declined to 11%. Following the commissioning in 2015 of the latest large geothermal plant of 280 MW at Olkaria, consumers saw a reduction in fuel costs. The share of hydro has declined from above 50% in 2012 to about 33% today. The recent (2019) commissioning of the Lake Turkana Wind Project, with a capacity of 310 MW, has increased the contribution of wind to 10% and was projected to increase to about 12% by end of 2020.

Overall, there is a shift towards more renewables – which are expected to be commissioned by 2024 by the private sector – including wind, solar, biogas, small hydros, and so on under the Feed-in-Tariff (FiT) policy introduced in 2008[43]. The total share of renewable energy in Kenya's power mix is now amongst the highest in the world.

[43] The 2018 Least-Cost Power Development Plan 2017–2037

Figure 4.8: Trend of Kenya's Generation Mix (MWh)



Source: Author's creation based on KPLC primary data

4.6.2.2 Reliability of Supply

Despite having surplus generation capacity, it has not always translated into improved reliability of supply for customers, mainly because of deficiencies in the transmission and distribution segment. Industrial customers experience average system interruption durations (SAIDI) of up to 5–7 hours per month while low- and medium-voltage customers experience system average interruption frequency as high as 45 per year. The transmission and distribution network is currently overloaded, impacting the availability, quality and reliability of supply. This is largely due to significant under-investment and delays in the implementation of capital projects. The average capital investment in transmission and distribution has remained largely flat at about US$630 million annually during the last five years while new customer connections per annum have doubled. On the transmission side, dependence on government budget allocations for capital expenditure and for right-of way-compensation (wayleaves) in a tight fiscal environment means budgetary transfers are inadequate and frequently delayed, resulting in KETRACO being unable to complete projects on time, or for KPLC to properly maintain the grid for reliability. On the distribution side, while the low-voltage network has been expanded aggressively for Last Mile electrification, commensurate investments have not been made to strengthen the medium-voltage network. The resulting effects are that the transmission and distribution networks have become weak, with some very long lines, and backbone lines are overloaded. Bottlenecks have been created in key segments of the transmission network resulting in power dispatch constraints. And system breakdowns and supply interruptions have become common. Seriously low voltages are experienced, particularly in western Kenya, resulting in load-shedding in that part of the country for years.

Despite these challenges, there have been some improvements in network performance. Figure 4.9 below shows that the cumulative average time to restore power (CAIDI) was 6.5 hours in 2016/17 and has

reduced to 4.5 hours in 2019. Similarly, Figure 4.10 shows monthly system-average interruption frequency reduced from 4.6 (or cumulative of 45) in 2016/2017 to ~2.4 or (cumulative 23) in 2019 but is on a rising trend once again. While the regulator EPRA lacks capacity and an enforcement framework for quality-of-service standards, and does not provide incentives for reliability, since July 2016 the utility has been obligated to report on reliability indices. The improvement in performance indices has arisen following the construction of new substations; the upgrade and refurbishment of existing substations; automation of distribution networks, and the live-line power maintenance programme which minimizes duration of planned outages. KPLC has been able to finance these with short-term commercial loans, a benefit of its commercial strategy. Overall, KPLC performs better on this index than sister utilities in the region.

Figure 4.9: Performance of CAIDI (hrs.)

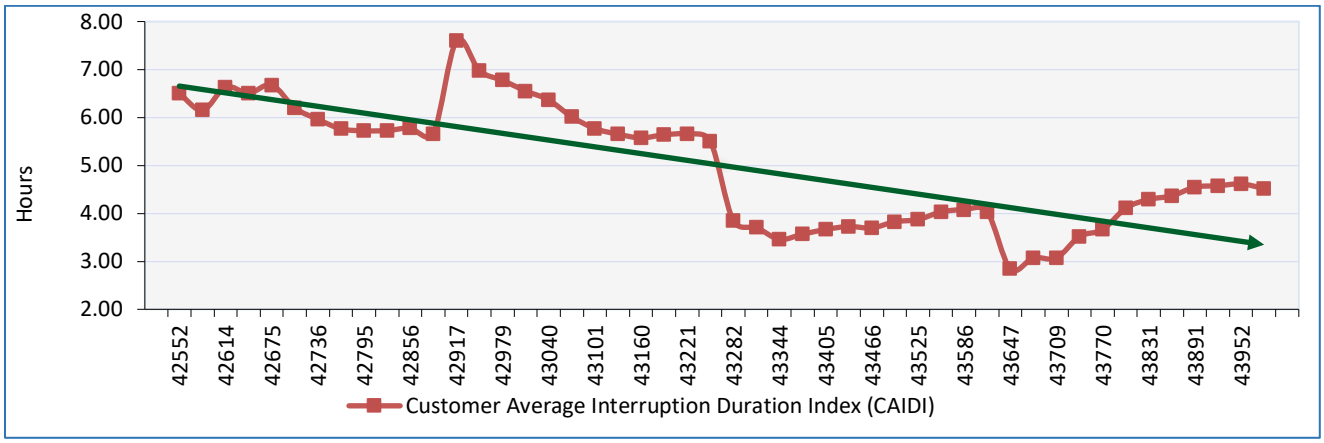
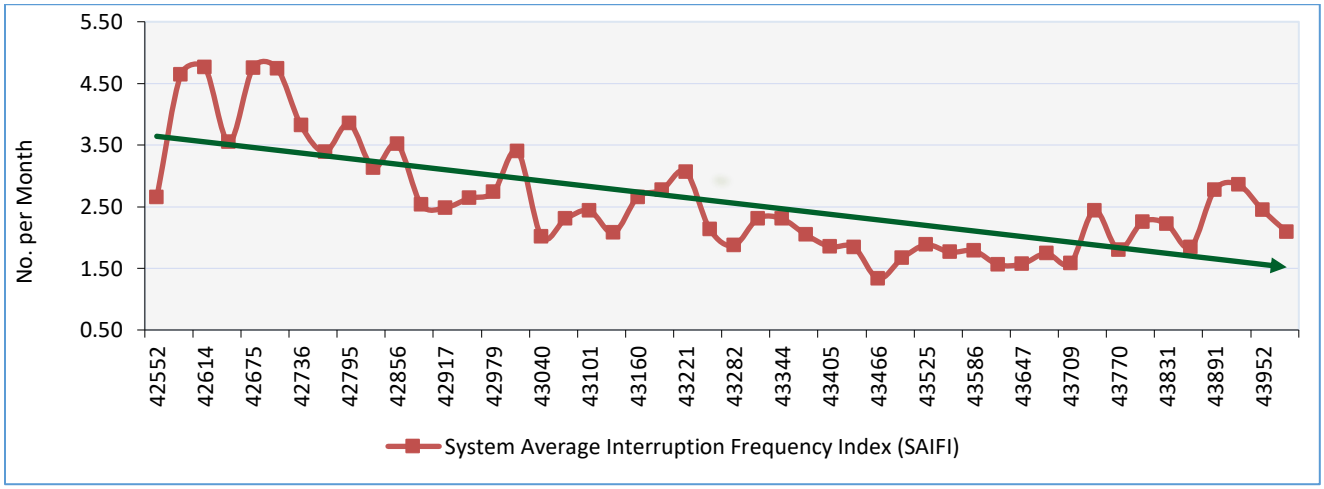


Figure 4.10: Performance of SAIFI (no. per month)

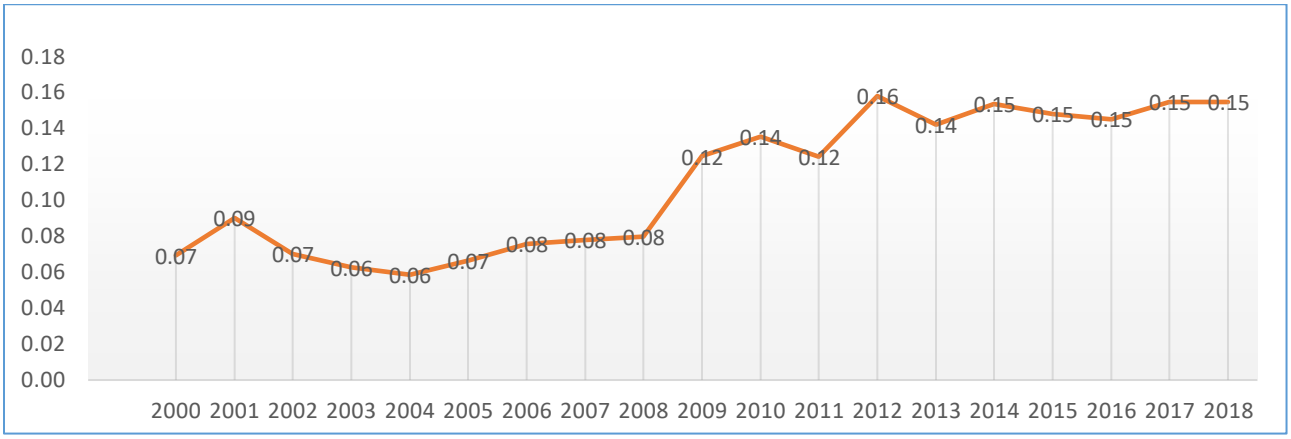


Source: Author's creation based on KPLC primary data

4.6.3 Affordability

Despite the relatively high cost of electricity in Kenya, the cost of a subsistence volume of 30 kilowatt-hours per month is well under 5% of the budget of the poorest 40% of households (ESMAP, 2018). Electricity appears to be affordable with lifeline tariffs (Ksh 10 for 100 kWh) and subsidized connection charges. However, electricity consumption has not risen as sharply as the number of connections. In addition, the uniform tariff applied in off-grid areas is unaffordable to most rural households – hence, subsidies are applied, and reconciliations carried out by KPLC to ascertain the viability gap and billed to government. Average tariffs remained low in the 1990s (owing to state subsidies). In 1999/2000 there was an 18% retail tariff increase. In 2008, tariffs were increased by 24% for cost reflectivity and covering EPP and IPP costs. Subsequent increases were effected in 2012/13 to further cover rising generation costs.

Figure 4.11: Average Tariff (¢/kWh) trend



Source: Author's creation based on KPLC and EPRA data

Under the automatic tariff-adjustment mechanism, retail tariffs are adjusted monthly for fuel costs, foreign exchange and a water resources management levy (Ksh 5/kWh) and passed through to customers. Inflation adjustments are done bi-annually. This pricing mechanism worked fairly well until 2017 when government, under pressure of elections, halted the tariff-review mechanism. The timing also coincided with a drought period, causing the administration to become sensitive to power price increases. After the election, the passthrough was implemented but reversed in 2018, leading to accumulation of utility debt. While the regulator is meant to conduct a tariff review every three years, only four reviews have been carried out – 1999, 2008, 2013 and 2018. In 2018, a single-year review was granted rather than the prescribed multi-year tariff and no further review has been conducted since.

Although reforms led to the establishment of an independent regulator, regulatory independence in tariff determination is increasingly eroded as government influences tariff decision-making to achieve political goals. A top manager in an interview decried this as: " …the regulator is heavily influenced by government – doesn't provide adequate revenue requirements which threatens the commercial viability of KPLC". Another respondent had this to say "ERC/EPRA as a principal is facilitating the financial collapse of KPLC". Hence, in a weakened institutional governance setting, governments are able to influence pricing decisions even under partial post-privatization conditions.

4.6.4 Efficiency

For this thesis, efficiency is assessed in a limited way using two KPIs – system losses and revenue collection rates. System losses refers to the difference between energy generated and energy consumed, including technical and commercial losses comprising the following: primary and secondary distribution network losses; substation losses; under-billing due to inaccurate meters due to lack of maintenance and poor calibration, and electricity wheeled to consumers but not paid for (theft). Following the resolution of the tariff imbalance between KPLC and KenGen, the KPLC was put on a performance contract in 2004 and KenGen in 2005. The PC, as a new governance-monitoring tool, had an immediate impact on collection rates, which increased to almost 99% in 2005 from 81%, and transmission and distribution losses reduced to 18%. The introduction of a private management contract in 2006 (Manitoba Hydro – discussed earlier) helped to push collection rates to 100% and technical losses declined to 17% by end of the contract in 2008. Since the management contract had set up strong governance systems focusing on improving efficiency, and had built adequate technical capacity, KPLC was able to continue the positive performance trajectory. The recent connectivity drive for universal access, however, has dented this stellar performance as collection rates have declined to 98% and losses have risen to highs of 21% largely due to non-payment of bills and power theft. While reforms such as the management contract enabled greater efficiency improvements, these benefits are being eroded by governance weaknesses associated with government influence and choices that are not economically efficient. It remains to be seen whether KPLC will recover from this recent decline.

Table 4.3: Trend of Revenue Collections and Losses

Year	Collection Rate: %	Distribution Losses: %
1997		21
1998		20
1999		22
2000		22
2001	85	21
2002	84	23
2003	83	21
2004	81	18
2005	99	18
2006	99	20
2007	100	18

Year	Collection Rate: %	Distribution Losses: %
2008	100	17
2009	101	16
2010	101	16
2011	101	16
2012	100	17
2013	100	19
2014	100	18
2015	98	18
2016	98	19
2017	98	19
2018	105	21

4.6.5 Financial Sustainability

One of the primary drivers of power sector reforms was the desire to improve the financial performance of utilities to achieve financial viability and sustainability, and to shift away from state-subsidies, thereby easing the financial burden imposed on the national treasury, while releasing scarce resources to other sectors of the economy. In analyzing the financial performance of KPLC, this thesis applies the approach of vertical and horizontal analysis of financial data and ratios to identify key trends and exceptions, and examines how the former explain the achievement of the reform goals.

4.6.5.1 KPLC's Financial Performance

Figure 4.12: Revenue Growth Trend (Ksh millions)

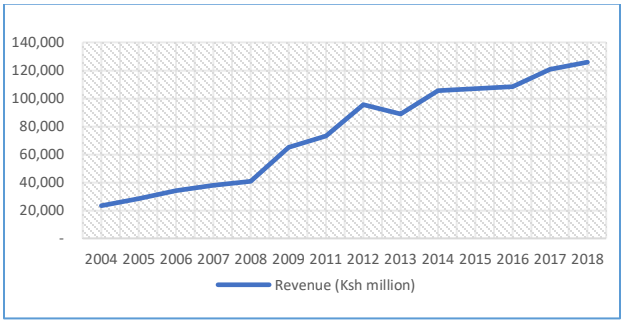


Figure 4.13: Gross and Net Profit Margins 2004–2008

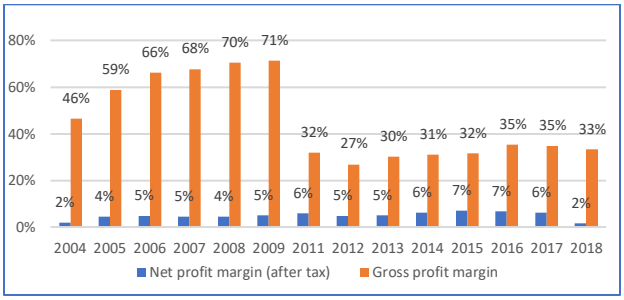


Figure 4.14: KPLCs Debt-Service Coverage Ratios

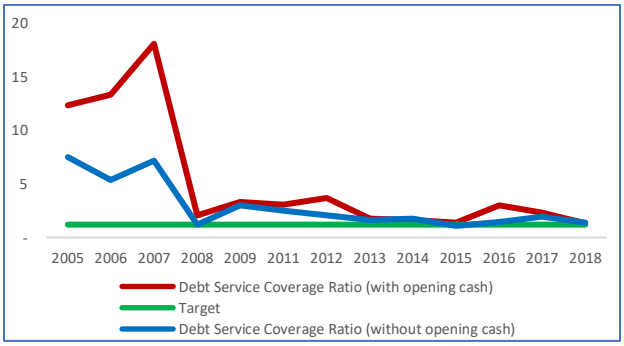


Figure 4.15: Debt to Equity Ratio

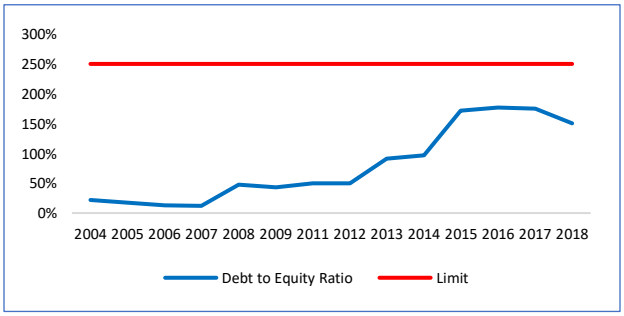


Figure 4.16: Cash (self-financing) Ratio

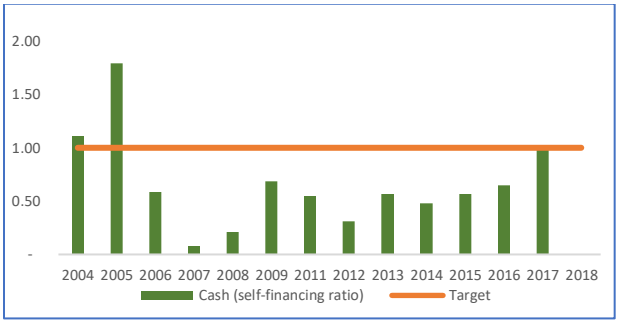


Figure 4.17: Current Ratio

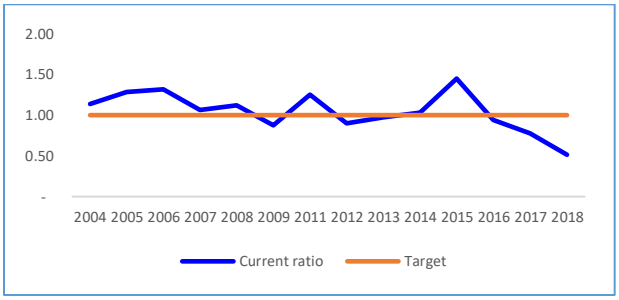


Figure 4.18: Interest Coverage Ratio

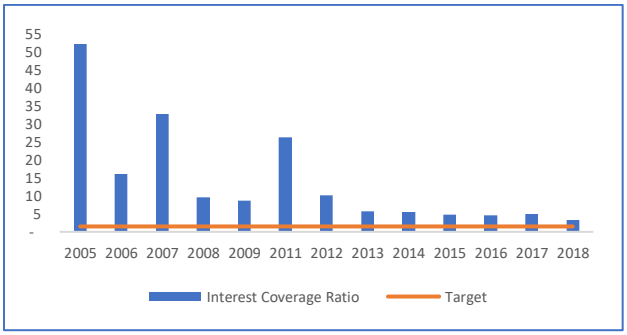
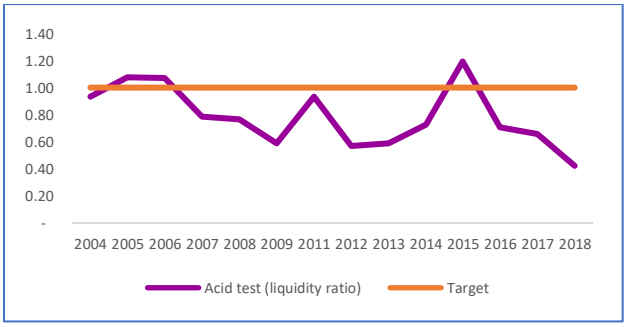


Figure 4.19: Acid Test (liquidity ratio)



Gross revenues grew from Ksh 23 trillion in 2004 to Ksh 126 trillion by 2018, representing an average growth rate of 10% per annum over the 14-year period. The revenues are largely from electricity sales to retail customers based on determined base-tariffs as well as on monthly adjustments to the tariffs for changes in the macroeconomic indices – foreign exchange and fuel prices. The revenues performance trend is also dependent on customer growth, tariff indexation, and customer consumption behaviour. KPLC's customer base grew by an average of 34% from 1.8 million in 2011 to 6.7 million by 2018. This increase has positively contributed to the revenue growth specifically from the commercial and industrial customers. However, with the implementation of the Last Mile Connectivity Programme and connection of more low-demand customers to the grid, the average consumption per customer reduced by an average of 15% per annum over the period.

A disaggregation of consumption profiles shows a decline in net consumer revenues from both industrial (anchors) and domestic customers owing to the rise in: cheaper captive and reliable renewables sources, such as solar PV, and power thefts respectively (Murefu, 2020). Nevertheless, regulatory reform that enabled tariff increases has contributed to revenue growth, with the most impactful tariff increases occurring in 2008 by 24%, as well as in 2011 and 2013. In 2011, the tariff increased by 46% translating into a revenue increase of 18% and, similarly, the tariff increases in 2013 of 40% led to a revenue growth of 40%. Overall, the impact of regulatory reform and the presence of an independent regulator (agent) has spurred considerable increases in KPLC's revenues.

Despite the recent sharp decline in revenues (KPLC, 2018), the analysis of KPLC's profitability over the period 2004–2018 shows that the utility maintained positive gross profit margins at an average of 45% and net profit margins after tax at an average of 5% as shown in Figure 4.13. KPLC's gross margin increased in the period to 2009 but declined significantly in 2010/11 as a result of increasing thermal generation costs. Periods of drought in the late 2000s necessitated the procurement of power from EPPs, raising KPLC's operating costs and depressing the company's financial indicators. Net profit margins after tax were relatively low at 5%t between 2006 and 2013, coinciding with a 64% increase in fuel purchase costs in 2012. KPLC saw recovery in 2014, with a net profit margin returning to 6%. However, the net profit margin then declined to 2% in 2018 owing to a delayed review of retail electricity tariffs[44], increased

[44] The 2013 schedule of tariffs was for a 3-year period with a new tariff expected from June 2016, but this did not happen. Considering that the average revenue requirement, which drives the tariff computation, takes into account the total transmission and distribution assets, failure to review and issue a cost reflective tariff meant that

operating costs associated with the access programs, delayed fuel cost recoveries, increasing financing costs and doubtful electricity receivables, which negatively impacted cashflows. In nominal terms, profits reduced by 92% from US$49 million in 2018 to US$3 million in 2019. Gross profit margins declined from 35% in 2016 and 2017 to 33% in 2018. Regardless, the company did not make a loss, as profitability remained positive for the period 2004–2018 albeit at a decreasing rate. The comparison between gross and net profit margin shows that the company has significant operating expenses that depress its revenues and profitability.

Recently, KPLC has issued three profit warnings (cautionary earnings statements) to its shareholders, citing depressed economic activity and demand, inadequate tariff reviews and increasing financing costs (Anywanza, 2020). The onset of COVID-19 is forecast to exacerbate KPLC's declining financial health. In order to reverse and stabilize its financial position, the company has sought external debt relief in the form of a 12-month moratorium on its foreign currency-denominated loans and is in talks with local banks to reschedule its multibillion shilling debt (Ksh 68 billion), which has seen its profitability dip to the lowest in 16 years (Business Daily, 2020b). While the company still achieves a positive average net profit margin (after tax), buoyed by non-regulated revenues, its financial sustainability is increasingly perilous, signalling the impact of inadequate regulatory tariff decisions in recent years and government demands around increasing access.

The solvency ratios – debt-service coverage ratio, debt-to-equity ratio and interest coverage ratio – have been positive but there is a declining trend. The minimum desirable value of the debt-service coverage ratio is usually one, indicating that the company's operating income and opening cash and cash equivalents are just sufficient to cover debt obligations that arise during the year. KPLC has debt covenants that require a minimum DSRC of 1.2. From Figure 4.14 above, KPLC's DSCR was mostly above 1.2 for the period 2004–2018, implying that its operations generate enough cash to sufficiently meet debt obligations. The sharp decline in 2008 was a result of repayment of a series of on-lent borrowings. The company obtained additional facilities[45] in 2015 that increased its debt by 87% year on year. This led to a 39% drop in the DSCR to 1.08, which was marginally below the target of 1.2 (1.08). In the same year, the company breached its loan covenants and was vulnerable. Further, recent declines in cash flows have

the revenue requirements for 2017–2019 was based on the size of the grid assets as at 2013 and did not take into account the significant expansion of the network in the preceding period, thereby creating a huge financial viability gap for KPLC.

[45] KPLC acquired a long-term syndicated loan of Ksh 50 billion from The World Bank, AFD, Standard Chartered Bank and Rand Merchant Bank

made it susceptible to default, unable to service its debt and seeking waivers from its lenders (Business Daily, 2020b). Because the ratio is close to 1, the company has limited ability to take on new major debt obligations, and its financial sustainability into the future is increasingly threatened. With regard to performance of the debt-to-equity ratio(D/E), also referred to as leverage or capital gearing and a measure of the degree to which a company is financing its operations through debt versus wholly owned funds, the trend shows that the utility had healthy levels of gearing from 2004–2014 where the D/E ratio was below 100% (Fig 4.15). In the period 2015–2018, the KPLC's D/E exceeded 100%. because the company obtained additional short- and long-term facilities in 2015 that increased its debt[46] by 87% year-on-year. To date, KPLC's total debt is estimated at US$1 billion. This increased its gearing ratio significantly. However, the D/E ratio was still within the 250% limit required by the debt covenants. In comparison to the DSCR ratio described above, the increase in gearing in 2015 led to a decrease in the DSCR ratio by 39%, which also exerted unprecedent pressure on cashflows.

KPLC's interest coverage ratio (income gearing) performance, which assesses how many times a company's operating profit exceeds its interest payable, was consistently above 1.5 (minimum target is 1) but declining significantly. Interest coverage ratio measures the margin of safety a company has for paying interest on its debt. Despite being positive over the entire period, this performance has declined from 52 in 2005 to 1.5 in 2018 (Fig 4.18). This indicates that the company's operations were healthy enough to meet its interest payment obligations but continue to deteriorate. This analysis is in line with that of the DSCR above, which shows a DSCR consistently above the target of 1 but declining. In summary, performance for the period 2015–2018 shows significant declines, which coincides with increased gearing in the company's financing structure to drive electricity expansion plans. Some of the reasons for ratios still being positive include payment holidays and low interest on government on-lent loans. However, cumulatively, the debt levels have led to significant increase in the interest payment obligations depleting KPLC's cashflows and are not sustainable in the future.

An analysis of the liquidity ratios – cash (self-financing ratio), current ratio and acid-test ratio – shows a declining trend in performance. The self-financing ratio (Fig 4.16), which indicates an entity's ability to finance planned investments from its own resources, has been consistently below 1. It is computed as a ratio of the utility's net cash flows from operating activities for the current year, and the planned capital expenditure for the subsequent year. The utility has been consistently below the target ratio of 1. However, KPLC has debt covenants that require a lower minimum self-financing ratio of 25% for one of

[46] Currently, commercial finance is used only for overdrafts and short-term financing

its long-term facilities and the analysis shows that the utility was able to achieve this ratio for the period 2004–2018, except for the years 2007 and 2008. This indicates that the utility's operations consistently generated sufficient cash flows to finance its capital investments. KPLC's low self-financing ratio is attributed to expensive EPPs, over-expenditure on electricity expansion programmes arising from government pressures to achieve universal access and industrialization objectives, and government's failure to timeously reimburse utilized funds, thereby creating a cashflow mismatch between investment expenditures and revenue recovery. As a result, KPLC relied on additional external funding to finance its capital investments, which further compromised its financial health. This can be seen on the company's balance sheet as long-term and short-term borrowings. In addition, KPLC's current ratio – a ratio of current assets to current liabilities – has declined below the minimum value of 1. The ratio shows that the entity's current assets are insufficient to meet the company's current liabilities. While KPLC has debt covenants that require a minimum current ratio of 1.0, its performance has been declining (Fig 4.17), signifying a decline in its liquidity and a breach of its loan covenants. Accordingly, in 2018, the company received letters from its lenders condemning the covenant breach until 30 June 2019, when negotiations with lenders resulted in the issue of debt waivers. This performance trend, however, points to the increasing financial risk of the company and is unsustainable. In addition, KPLC's acid-test ratio, which compares short term (current liabilities that fall due within a year) with cash balances and assets that should turn into cash within a year excluding inventory, in the period 2004 to 2018 was consistently below the desired threshold of 1, except for 2005, 2006 and 2015, indicating that the company's liquid assets were mostly insufficient to meet its short-term obligations. The decreasing trend in the acid-test ratio coincides with sharp increase in trade payables[47] (Ksh 71.2 billion) for the period 2015–2018 confirming that the utility is faced with liquidity shortages and is not financially sustainable in the long term unless remedial measures are taken.

This analysis demonstrates that while *partially* privatized utilities, such as KPLC, are able to perform better than state-owned utilities such as TANESCO, if they still have a majority government shareholding, financial governance systems may be vulnerable to being undermined by governments.

[47] KPLC is currently working with commercial lenders to restructure its debts and clear payables, as well as seeking waivers for violation of some of its liquidity covenants.

4.7 Summary of Findings and Analysis

The section below provides a summary of key findings and insights into how governance and regulatory incentives are altered through power sector reforms – unbundling, establishing independent regulators, competition and private sector participation. We combine power sector reform literature with principal–agent theory to obtain a deeper understanding of how these governance and regulatory reforms impact the relationship between principals (government institutions, private shareholders) and agents (the utility) to explain KPLC's performance.

At a policy level, Sessional Paper No. 4 of 2004, laid a firm foundation for legal and institutional reform of the power sector in Kenya. The policy and new legislation facilitated restructuring of the power market and unbundling of KenGen from the vertically integrated KPLC to: enable a competitive power market for generation, distribution and supply of electricity; the introduction of a lifeline tariff for domestic customers of 50 kWh per month; the partial privatization of KenGen through an IPO offering 30% stock to the public; and the creation of other corporatized institutions (namely, KETRACO, GDC and REA/REREC) as agents of government that have since also impacted the performance of KPLC in various ways. The corporatization and commercialization reforms allowed for the transfer of authority and risk allocation from the government (principal) to the more technically competent management teams of agents in these entities (with separate governance systems), enabling them to operate on a commercial basis including moving towards cost recovery pricing, the adoption of internationally recognized accounting practices, and raising their own debt for operational activities. This has facilitated investment and expansion of service delivery underpinned by good planning.

For a long time, Kenya has had a robust planning system buttressed by optimal LCPDPs designed by KPLC, and well linked to procurement of new generation capacity. Because of the greater management focus occasioned by structural reforms and corporatization, KPLC has developed expertise in system planning to accurately forecast power-supply needs. However, increasing government influence in planning activities in recent years has resulted in the proliferation of directly negotiated power procurements poorly aligned with LCPDPs. This has led to situations of excess supply and obligations to pay deemed energy costs, which unnecessarily increase the cost of power for consumers. In addition, the new Energy Act of 2019 has shifted the authority of planning decision-making back to the Ministry of Energy and Petroleum. There is growing concern that the ministry will interfere in technical and economic choices, threatening to unwind the reform benefits associated with KPLC's better planning in previous years. Ideally, the electricity planning function should be located close to the system operator as the competent

agent. However, in a partially privatized utility, where the power off-taker is government-owned, planning choices are likely to be unduly influenced by political considerations and these can undermine utility performance.

On the positive side, the new Energy Act has created room for deeper reforms – competition in the market, and open access to transmission and distribution infrastructure – which will increase efficiencies in lowering wholesale costs for eligible large consumers. The revised legislation also aims to share some electricity planning, development, access expansion and supply roles between the national government and county governments. It remains to be seen whether this new agency relationship will have tangible development impacts in the future.

From a governance perspective, commercialization reforms – which require the set-up of accountability systems including performance contracts (PC) between KPLC and the government – have since 2004 helped in monitoring the performance of managers of the company. The PCs, as behaviour-based contracts, provide for targets against which commercial and operational performance of management is assessed bi-annually by the principals (that is, the board and the government) and corrective action may be taken in time to improve performance. In addition, the PCs, as a monitoring and information system, help to reveal what the agent is doing and serve to limit information asymmetry, agent opportunism, entrenchment and perquisite consumption. Because the PCs have steep targets for the agents (KPLC board and management), there is constant pressure to improve performance.

In an interview, an informant emphasized that " … the drive for performance is beyond incentives and more to do with pressure from the top". Unfortunately, the PCs do not provide incentives for staff as prime drivers of performance – an issue that needs to be addressed. Nevertheless, PCs have set a path for continuous performance improvement with little room for agent-shirking since the majority of top management have time-bound performance-based contracts which co-align agent behaviour and preferences with those of the principal. Despite this initiative, several gaps relating to the absence or strength of incentives for staff, coupled with government directives incorporated in the PCs, have created moral hazard among middle management and low cadre staff, thus compromising productivity with the consequence of systemic power theft and corruption, especially with the Last Mile Connectivity Programme. Behaviour-based performance contracts without adequate incentives are insufficient to drive performance in utilities.

Interestingly, KPLC has a strong set of corporate governance arrangements, anchored in laws that govern SOEs and publicly listed companies. The governance structure encourages a diversified mix of skills among

board members, allowing for market-oriented business management practices to thrive. The company is directed by a qualified and experienced board of directors and has reasonable systems and controls to manage risks and conflict of interests, including monitoring agent opportunism amongst top executives. The requirement to include a finance expert on the board, and the set-up of two standing committees dedicated to Strategy and PPAs, has enabled management to focus more on financial performance and procurement of additional IPPs. The inclusion of a board majority of independent non-executive members for internal decision control – a requirement of the capital markets authority and obligations for listed companies – has boosted the independence and accountability of the board and helped to minimize conflicts of interest. This translates to improved performance. However, the independence of the board is increasingly threatened by growing government influence in strategic decision-making: for example, in the appointment of directors and muzzling of private sector interests. This has become possible because the private sector shareholding is thinly spread, with no major private stockholder, and there are challenges in coordinated action. As a result, the board has not been effective enough in balancing the conflicting policies and objectives of the government with the company's financial integrity and long-term sustainability. In this way, government actions, as the principal, pose a conflict of interest that can adversely affect the performance of a utility, even if partially privatized.

An examination of the different aspects of performance, and commencing with the imperative of access, reveals that the GoK has driven the access and electrification development goal, through an aggressive campaign, to levels higher than in any other country in the region. However, this ambitious programme is now threatening the financial sustainability of KPLC. Government's failure to reimburse KPLC fully for electrification costs underscores a failing principal–agent relationship. Similarly, the regulator has failed to fully provide for these costs and has been undermined by delays and postponements of tariff reviews by government. Consequently, the principal's continued interference has adversely affected KPLC's liquidity ratios to the extent that the utility has violated its debt covenants. Its cashflows have declined significantly and the financial sustainability of KPLC is increasingly compromised. Thus, again, even though KPLC has been partially privatized, its financial governance controls have been undermined, enabled by government's ongoing majority shareholding.

How have the reforms impacted Kenya delivering an adequate and reliable power supply? The unbundling of KenGen from KPLC created an autonomous agent (KenGen) – with delegated authority from government – which has the functions of procuring and contracting new publicly funded generation capacity as well as opening the market for IPPs. The rebalancing of tariffs in the early 2000s helped to

create bankable balance sheets for KenGen and KPLC, allowing them to attract private investment in generation on commercial terms. Subsequently, Kenya has contracted more than 17 IPPs (with at least 25 more in the pipeline), expanding generation capacity and ensuring security of supply. Kenya is currently one of only a handful of African countries in the fortunate position of having surplus capacity. The unbundling has also removed potential conflict of interest between the largely state-owned KPLC, KenGen and IPPs in the procurement and dispatch of new capacity, further enhancing the investment climate in Kenya. KPLC, as a separate independent grid company without generation, is in a fundamentally different situation to vertically integrated utilities such as TANESCO. In addition, KPLC's managerial focus has concentrated on system operation and commercial distribution services, and maintaining a good financial standing as an off-taker. Restructuring has also enabled the creation of other new corporatized entities (KETRACO, GDC, and REA/REREC) as agents of government, operating on a commercial basis.

Increased generation capacity has improved the reliability of power supply. Previously, Kenya experienced supply shortages during periods of drought that impacted negatively on hydro-electricity production and had to contract expensive emergency power. Today it has a more diversified mix, enhanced by more reliable geothermal sources and complimented by hydro, wind and solar.

The Manitoba hydro management contract (an outcome-based contract) helped to permanently transform and improve supply reliability in Kenya by allowing for investment in technologies that enabled live-line maintenance (to minimize outage durations) as well as for the design and implementation of the N-1 redundancy standard for the transmission system operator in case of a system failure. The management contractors further helped to build internal capacity for system planning in KPLC, which survives to-date. Nevertheless, challenges remain in the transmission and distribution infrastructure segments owing to the prevalence of old, long transmission lines and the need for more transformers to evacuate power to far-flung areas. Despite these challenges, Kenya has better power supply reliability than its peers in the region.

The Manitoba Hydro management contract also helped to improve commercial and technical efficiencies, reflected in increased number of connections, increased revenue collection rates (close to 100%), and the reduction of losses down to 17% within only two years. The contract minimized political interference during the contract period. Despite the challenges back then – including risk aversion by staff fearing for their job security, information asymmetry, and later goal incongruence between government and contractors (agents) relating to risk preferences in the procurement of IPPs – it is considered one of the most successful electricity management contracts in SSA. More recently, despite the regulator monitoring

reliability indices, there have been no corresponding regulatory incentives for improving the quality-of-supply performance. Nevertheless, because the government (principal) cannot easily verify that the agent has behaved appropriately, EPRA plays a dual function of monitoring compliance of KPLC to mitigate information asymmetry problems in addition to performance assessments.

Regarding tariff affordability and cost reflectivity, regulatory reforms established the regulator – ERC/EPRA – under the ambit of the Ministry of Energy and Petroleum, with an institutional mandate to regulate market entry through licencing, and tariff-setting. Since commencement in 2007, the regulator (as a principal) has played a crucial role in balancing decision-making in the sector, especially between privately owned IPPs and the publicly owned generation company KenGen. This has helped to remove potential conflicts of interest, especially in licensing new capacity, and has facilitated security of supply. The creation of EPRA, which aimed to separate regulatory and commercial functions in the sector, has subsequently facilitated approval and implementation of near cost-reflective tariffs, making the sector financially viable and attractive to investments in IPPs. Affordability has been promoted through incorporation of lifeline tariffs for electricity consumption up to 100 kWh, the subsidizing of connection costs, and the introduction of a time-of-use (TOU) initiative for industrial and commercial customers, granting a 50% reduction in electricity tariffs during off-peak hours. Despite these initiatives, as well as an initial period when regulatory independence in tariff-setting was respected by all stakeholders, recent involvements by the government/principal in issuing directives, including to halt or postpone tariff reviews, have caused a decline in profitability and financial performance of KPLC and have undermined regulatory independence.[48] This demonstrates the potential conflict of interest government has in influencing tariff-setting.

In order to finance generation and network expansion, utilities must have bankable balance sheets to access private capital. Until 2018, KPLC maintained a healthy financial performance record enhanced by the securities exchange, listing obligations and tariff increases, particularly in 2008, 2010 and 2013. However, in recent years, its financial state has declined significantly. Net customer revenues have declined owing to the proliferation of captive renewable energy sources for the profitable industrial customers and the addition of low-demand customers under the Last Mile programme. The reversal of the 2017 tariff review had a direct, negative impact on the company's revenues. As a result, gross and net profit margins have declined. Despite the period under the Manitoba Hydro management contract, which saw KPLC's profitability increase from 59% to 70% in 2008, it declined soon afterwards. While KPLC's debt-

[48] The regulator is directed to "consult and get political approval" from the line ministry in determining tariffs.

service coverage ratio is positive, it has declined towards minimum levels, indicating financial stress. Likewise, its liquidity ratios – cash ratio, current ratio and the acid-test ratio – have fluctuated with significant declines to below minimum thresholds, indicating the financial vulnerability of the company occasioned by the government's and the regulator's failure to implement cost-reflective tariffs. As a result, the company has violated its debt covenants and sought waivers from lenders and the capital markets authority as it seeks to restructure its debt obligations. As stated in one of the interviews with a top manager in the institution: "… KPLC can be financially sustainable in the long term if it is allowed to operate commercially". However, recent presidential and ministerial directives and policy pronouncements, combined with a weak regulator, do not guarantee its commercial viability and sustainability into the future.

From a capital structure perspective, the listing of KPLC on the Nairobi Securities Exchange has established contractual relationships and obligations, not only with the board and shareholders but has also allowed entry of other (principals) interested in improved performance – the public, media, private investors and other market participants. The CMA/NSE sets requirements for stronger compliance with financial controls and information disclosure obligations. These include providing dividends consistently and to ensure the company is kept on a sound financial footing. Because the CEO and some directors (agents) own equity stock in the company, their interests are aligned with those of the owner (government), helping to drive performance. While the listing on the securities exchange as an external governance mechanism incentivizes KPLC to remain profitable, solvent and with adequate working capital, a confluence of factors – such as non-cost reflective tariffs; overborrowing to finance the aggressive universal access programmes; the expensive cost of capital; delayed government subsidies, and internal mismanagement – have led to a decline in its financial performance. These failures also indicate that the discipline that comes with exposure to private capital and debt is, in itself, inadequate to solve agency problems where government subsidies might exist. In this way, the principals' enduring conflict of interest in the governance of KPLC has had detrimental financial repercussions not only on KPLC but also on the capital markets. This requires a review and rethinking.

In summary, the Kenyan case provides fascinating insights on how legislative, regulatory, structural and governance reforms can create incentives for improved utility performance. However, the role of the principal, including in a mixed capital enterprise such as KPLC, remains critical. When the relationship between principal and agent is well understood and the agent is properly incentivized, performance

improvements are possible. When the principal undermines or muddies those incentives through conflicting political interventions, performance improvements can be reversed.

CHAPTER 5

UGANDA CASE STUDY

5.1 Introduction

Uganda's history and experience with power sector reforms is considered exceptional in Africa, having gone further than most countries in implementing the standard reform model of the 1990s, affording us insights how this was achieved as well as the country's resulting power performance improvements. Uganda was the first country in sub-Saharan Africa to unbundle its generation, transmission and distribution utilities. It has also been the only country in anglophone Africa to offer private concessions for power generation and distribution. In the years that immediately followed the reforms, the private distribution operator struggled to reduce losses and improve reliability of supply, and there were delays in investments in large new hydropower capacity, resulting in costly dependence on thermal emergency power plants (EPPs) and high electricity tariffs (Eberhard et al., 2016). Despite concerns that the country's power system was too small to reap the benefits that might flow from unbundling generation, transmission and distribution, as well as privatization, the reforms initiated between 1999 and 2005 are beginning to bear fruit (Meyer et al., 2018a). Losses are down; revenue collections and connections have increased, and a large portion of the previously dilapidated infrastructure has been rehabilitated. Similarly, the independent regulator (ERA) has been effective; has sustained near cost-reflective tariffs since 2012 and effective tenders have been run for private IPPs, closing the generation gap.

The distribution concession operator – Umeme Ltd – is listed on the Uganda and Nairobi Securities Exchange and has been ranked by the World Bank as among only two African utilities that are financially viable. In addition, the concessionaire's shareholding has evolved from two majority private shareholders to a more diversified investor and shareholder base, facilitating access to capital markets.

Despite these achievements, this journey has not been a smooth one. In 2008, the government and the distribution concessionaire entered into a dispute over their contractual obligations. In 2009, a new energy minister, backed by several parliamentarians, tried to reverse a number of the 1999 power sector reforms, but was eventually convinced to back down. During the same period, anti-fraud investigations, allegedly targeting inflated power prices, led to raids of nearly all power sector institutions, but more

specially Umeme Ltd. Then, in 2011 and 2012, negotiations over performance targets for the 2013–2018 regulatory review period deadlocked, and the inputs of an independent advisor and the World Bank were required before a resolution was reached (Meyer et al., 2018a). In March 2018, amidst rising tariffs, power reliability challenges, and pressures from the public, business community and parliament, the president issued a directive to the minister of energy not to renew the Umeme concession (Mandu, 2018; The New Vision, 2018). To date, private investment in the power sector tends to be politically contested. The tedious coordination efforts and transaction costs occasioned by the multitude of financiers involved in the Bujagali Energy Limited hydroelectric IPP apparently left a lasting impression on Ugandan government officials – who tend to see private sector involvement as being more costly, complex, and time-consuming than directly negotiated power projects. In addition, the Umeme concession is widely viewed as being poorly negotiated by the government and as unfair to citizens.

One of the reasons advanced for these criticisms is that Umeme Ltd still has some performance challenges, chiefly a failure to increase electricity access - electrification rates remain low at about 22%, in a country of 42 million people, although this may be more a result of the design of the concession. Nevertheless, there are excessive bureaucratic procedures for getting electricity connections. Umeme has not done enough to grow electricity demand to absorb the current power supply surplus. Distribution losses remain high – 16.4% in 2019 – despite reductions from levels at the start of the concession. These losses may even be higher, if power thefts were accurately measured. Electricity supply reliability also remains poor, with inadequate investments in networks to counter long radial transmission and distribution lines. The World Banks's Ease of Doing Business Survey reports an annual system average interruption frequency (SAIFI) index as high as 42 and a system average interruption duration (SAIDI) index of 59 hours. Electricity tariffs are the highest in the east African region at about US$ 0.21 per kilowatt hour on average.

This Uganda case study provides further insights into the interaction between power sector reform, regulatory and governance frameworks and utility performance. Interestingly Uganda and Umeme's governance frameworks are much more market-oriented than the traditional governance approaches utilized by Kenya and Tanzania. The analytical frameworks derived from the power sector reform and the principal agency literature enables a deeper understanding of how strong governance and structural reforms have provided stronger incentives for improved performance.

5.2 Overview of the Uganda Power Sector

Uganda has abundant energy resources, including hydro, bagasse, solar, biomass and fossil fuels, such as petroleum oil- which may be in production in the near future. Geothermal energy (450 MW) is also being

explored and wind feasibility studies and pilot projects are planned through the Scaling-up Renewable Energy Programme (SREP) and the Sector investment plan (MEMD, 2015). While electricity is the primary focus of Uganda's energy policies, plans and projects, most of the population is still reliant on firewood and charcoal as a primary source of cooking. Fuel biomass contributes approximately 90% of the total consumed energy.

Installed power generation capacity in December 2019 was 1,254 MW comprising 1,004.2 MW of hydropower, 100 MW of thermal, 50.8 MW of solar photovoltaic (PV), 96.2 MW of bagasse/co-generation and 1.1 MW from other sources. Of the total installed capacity, 1,246.5 MW is grid-based while 7.5 MW is from off-grid sources. The largest hydropower plants are in the 380 MW Nalubaale-Kiira complex[49] that is government-owned, followed by the 250 MW Bujagali[50] Hydropower IPP and the recently completed 183 MW Isimba dam, funded by China, as well as the 42 MW Acwa II, also an IPP. In the pipeline and yet to be commissioned is the 600 MW Karuma dam – upstream –also funded by China and is expected to ramp up generation capacity to 1,854.4 MW by end-2021. As of 2019, Uganda had a total of 38 commissioned IPPs with a combined capacity of 638.6 MW or 51% of installed capacity, making it the second country in the number of IPPs in sub-Saharan Africa, after South Africa, and the second country to run competitive bids for grid-connected solar PV. Out of these, 22 are small hydro plants totaling about 150 MW.

Table 5.1: Uganda's Installed Generation Capacity

GENERATOR	OPERATOR	TECHNOLOGY	INSTALLED CAPACITY 2019 - MW	LICENSED CAPACITY (2019) - MW	Ownership
Large Hydros					
Bujagali Hydropower	Bujagali Energy Ltd (BEL)	Hydro	**250**	**250**	IPP
Nalubaale & Kiira	Eskom Uganda Ltd	Hydro	**380**	**380**	Public
Isimba Hydropower	UEGCL	Hydro	**183**	**183**	Public
Acwa II	Arpe Limited	Hydro	**42**	**42**	IPP
Mini Hydros					
Mpanga	Africa Energy Management System,	Hydro	**18.00**	**18.0**	IPP
Bugoye (Mobuku II)	Tronder/ Bugoye Hydro Ltd*****	Hydro	**13.00**	**13.0**	IPP
Kabalega (Buseruka)	Hydromax Limited	Hydro	**9.00**	**9.0**	IPP
Ishasha	Eco-Power Limited	Hydro	**6.6**	**6.6**	IPP
Mobuku I / Kilembe	Tibet Hima Mining Co Ltd****	Hydro	**5.00**	**5.0**	IPP
Mobuku III	Kasese Cobalt Company Limited (KCCL)	Hydro	**9.90**	**9.9**	IPP
Nyagak**	WENRECO	Hydro	**3.50**	**3.5**	IPP
Muvumbe	Vidullanka Sri Lanka	Hydro	**6.5**	**6.5**	IPP
Siti 1	Elgon Hydro Siti (PVT) Ltd formerly	Hydro	**5.0**	**5.0**	IPP
Nyamwamba (SA-	South Asia Energy management Systems	Hydro	**9.2**	**9.2**	IPP
Rwimi	Eco-Power Limited	Hydro	**5.5**	**5.5**	IPP

[49] Nalubaale and Kiira were previously known as Owen Falls and Owen Falls extension respectively and are now referred to collectively as the Jinja complex, since Jinja is the nearest town.

[50] Until 2018, Bujagali Energy Ltd (BEL) was owned by Sithe Global Power and Industrial Promotion Services Kenya. SN Power of Norway acquired a 60% stake in 2018 and refinancing of its shareholder loans to lower tariffs.

Lubilia	Frontier energy	Hydro	**5.4**	**5.4**	IPP
Mahoma	Mahoma Uganda (PVT) Ltd	Hydro	**2.7**	**2.7**	IPP
Nkusi	Hydromaxx Nkusi Ltd	Hydro	**9.6**	**9.6**	IPP
Waki HPP	Hydromaxx Nkusi Ltd (Waki)	Hydro	**4.8**	**4.8**	IPP
Kisiizi SHP**	Kisizi Hospital	Hydro	**0.4**	**0.4**	IPP
Bwindi SHP**	Bwindi Community Micro Hydropower	Hydro	**0.1**	**0.1**	IPP
Sindila (Butama) HP		Hydro	**5.25**	**5.25**	IPP
Swam**		Hydro	**0.04**	**0.04**	IPP
Ndugutu		Hydro	**5.9**	**5.9**	IPP
Siti 2		Hydro	**16.6**	**16.5**	IPP
Ziba / Kyambura		Hydro	**7.6**	**7.6**	IPP
Thermals (HFO)					
Namanve***	Jacobsen (U) Limited	Thermal	**50.0**	**50.0**	EPP
Tororo***	Electro-Max (U) Limited	Thermal	**86.0**	**50.0**	IPP
WENRECO Thermal**	Industrial Promotion Services (IPS/GOU)	Thermal	**1.6**	**1.6**	PPP
Diesel					
Bukuzindu Hybrid	Kalangala Infrastructure Services	Diesel	**1.0**	**1.0**	PPP
Co-generation/					
Kakira Sugar Limited	Kinyara Sugar Limited	Cogeneration	**51.1**	**51.1**	IPP
Kinyara Sugar Limited	Kinyara Sugar Works Limited	Cogeneration	**14.5**	**14.5**	IPP
Sugar & Allied	Kaliro Sugar & Allied Industries Ltd (SAIL)	Cogeneration	**11.9**	**11.9**	IPP
Sugar Corporation of Uganda Limited	Sugar Corporation of Uganda Limited (SCOUL)		**9.5**	**9.5**	IPP
Mayuge Sugar	Mayuge Sugar Limited		**9.2**	**9.2**	IPP
Biomass					
Pamoja- Tiribogo	Pamoja Energy Ltd	Biomass	**0.032**	**0.032**	IPP
Pamoja- Ssekanyonyi	Pamoja Energy Ltd	Biomass	**0.011**	**0.011**	IPP
Solar					
Tororo Solar North	Access (UAE)/TSK	Solar PV	**10.0**	**10.0**	IPP
Soroti Access Solart	Access (UAE)/TSK	Solar PV	**10.0**	**10.0**	IPP
Kabulasoke Solar -	Xsabo Group	Solar PV	**20.0**	**20.0**	IPP
Bukuzindu Hybrid	Kalangala Infrastructure Services	Solar PV	**0.6**	**0.6**	PPP
Kitobo Island-	Absolute Energy Ltd	Solar PV	**0.2**	**0.2**	IPP
Mayuge Solar PV	Emerging Power U Ltd	Solar PV	**10.0**	**10.0**	IPP
	TOTAL INSTALLED GENERATION		**1,290**	**1,254.2**	

Note: ** refers to offgrid-generation plants Source: Author's compilation based on ERA data

In the past, Uganda experienced shortages of power supply that were characterized by major blackouts and power rationing, especially in the years 2006–2008. This resulted in the installation (on a rental basis) of emergency power plants (EPP) of about 150 MW of diesel-based thermal power and the gradual addition of 50 MW of thermal based Heavy Fuel Oil (HFO) plants, that operated as IPPs to close the supply gap. Following the commissioning of the Bujagali hydro plant, the diesel-based thermal power plants were gradually shut down and, overall, thermal power plant capacity was reduced to the current level of 100 MW (HFO-based) operating on cold standby for emergency backup. Energy from the thermal power plants was so expensive that the government had to heavily subsidize the power sector. Despite a challenging start, Uganda concluded the largest private hydropower investment in Africa, the Bujagali plant, built by an IPP. Uganda also hosts the first indigenous African IPP (50 MW Tororo thermal plant, Electro-Maxx),

financed, built and operated solely by African companies. Simultaneously, it has attracted a raft of smaller IPP investments, including innovative competitive bids for small hydropower, biomass, and solar projects solicited under the global energy transfer feed-in tariff (GETFiT) programme, which was developed jointly by Uganda's Electricity Regulatory Authority (ERA) and the Kreditanstalt für Wiederaufbau (KfW, German Development Bank) (Eberhard et al., 2016).

5.2.1 Institutional Set Up of the Electricity Sector

The structure of Uganda's electricity sector is among the most advanced in SSA and reflects the ambitious reforms that began in the late 1990s and were completed in 2005. At a policy-making and regulatory level, Uganda's electricity sector has elements in common with all the three case study countries. These elements include the government, through the line Ministry of Energy and Minerals (MEMD), which is responsible for policy-making, while the independent Electricity Regulatory Authority (ERA) provides regulatory oversight and is the principal in relation to the Umeme concession plus other licensed companies in the sector.

Box. 1 Power Sector Institutions – Uganda

Ministry of Energy and Mineral Development (MEMD)

The MEMD is the focal point for energy policy matters within the Ugandan government. For public or emergency power generation projects, the MEMD continues to act as a procurement entity, either in its own right or through the sector's parastatals.

Electricity Regulatory Authority (ERA)

ERA's main responsibilities are licensing and setting cost-reflective electricity tariffs. ERA also defines and monitors technical standards within the sector and enforces adherence to the National Grid Code. It issues and monitors the licences required to generate, transmit, and distribute power. ERA also sets and reviews feed-in tariffs for renewable energy (REFiT) generation projects between 1 and 20MW.

Uganda Electricity Generation Company Ltd. (UEGCL)

UEGCL is the holding company for state-owned generation assets. Its main roles are to oversee the performance of Eskom Uganda (see below) and of the thermal plant at Namanve (50 MW); to negotiate and administer engineering, procurement, and construction contracts for government/ public projects as well as all Build-Own-Operate-Transfer (BOOT) projects, namely IPPs; and to supervise the operations and maintenance of mid-tier public projects.

Eskom Uganda Ltd.

Eskom Uganda is a subsidiary of South Africa's utility giant, Eskom Holdings. In 2003, Eskom Uganda was awarded a 20-year concession for the operation and maintenance of UEGCL's hydropower plants (Nalubaale, 180 MW, and Kiira, 200 MW). As at end of 2018, Eskom had invested US$25 million into the two dams.

Uganda Electricity Transmission Company Ltd. (UETCL)

The state-owned UETCL owns, operates, plans and procures Uganda's medium- and high-voltage transmission infrastructure (N33 kV). It also functions as the system operator, bulk single buyer (making it signatory to all PPAs), and dispatcher for almost all the

electricity generated in Uganda: this excludes electricity generated within separate grids, as the Electricity Act allows generators to sell directly to small energy co-operatives.

Uganda Electricity Distribution Company Ltd. (UEDCL)

UEDCL is Uganda's holding company for state-owned distribution assets, and it both administers and supervises the private distribution concession agreement (presently held by Umeme). UEDCL also operates a small number of rural grids in south-western Uganda, previously concessioned to Ferdsult Engineering Company Ltd.

Umeme Ltd.

In 2005, Umeme Ltd. became the major privately-owned electricity distributor in Uganda, after winning a 20-year concession to operate UEDCL's main distribution network. Umeme buys electricity at a bulk tariff from UETCL and, as of end-2019, it was selling it on to 1.5 million customers. Umeme operates under a hybrid regulatory regime that combines a Rate of Return, performance-based and price-cap regulation, with incentivised targets for losses, collections and operating-cost allowance through to 2025. The company is further incentivised with a contracted net US$ return of 20% p.a on investments. The company is listed on the Uganda and Nairobi Securities Exchange and operates a grid network capacity of up-to 33kV.

Rural Electrification Agency (REA)

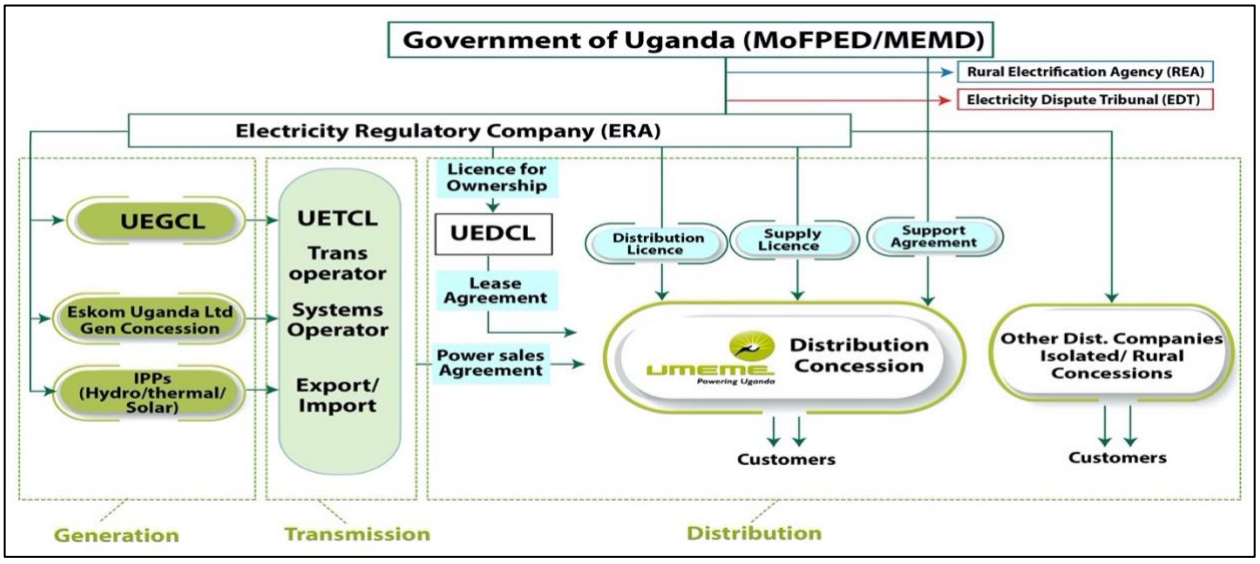
Rural Electrification Agency (REA) is a semi-autonomous body established by an act of parliament, to operationalize the government's rural electrification function. It functions as a secretariat of the Rural Electrification Board (REB) which carries out the rural electrification responsibilities, as defined in the Electricity Act of 1999. It was established under a statutory instrument in 2001 (no. 75) but started its functions in July 2003. The Rural Electrification Board (REB) gives policy guidance. REA activities are funded via the national fiscus, concessional loans and a 5% transmission levy. The entity, however, is highly under-resourced and lacks capacity to provide national electrification target expectations by itself.

Private Sector Off-grids

Various private sector companies are involved in design, build, own and operation of small-scale renewable energy off-grid and mini-grid projects below 500 kW throughout the country. These range from Solar, Biomass, Biogas, Geothermal and prospects for Wind.

Source: Meyer, Eberhard, & Gratwick,(2018b) *–modified by author*

Figure 5.1: Uganda's Power Sector Structure

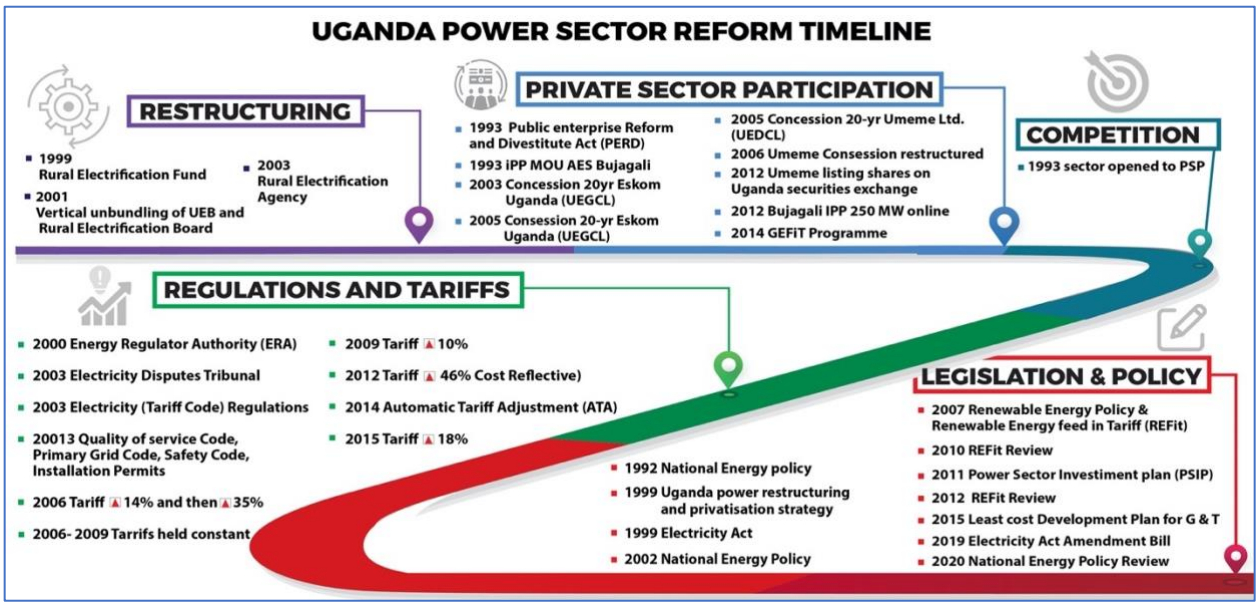


Source: Umeme Ltd, modified by author

5.3 Power Sector Reforms in Uganda

The figure below shows the key power-sector reform components and milestones realized.

Figure 5.2: Uganda's Reform Timeline



Source: Author's creation

Uganda's power sector reforms can partly be traced to the devastating civil war and the instability that plagued the country between 1962 and 1986, severely impacting the country's infrastructure and economy. Available generation capacity had fallen to 60 MW, losses were running to at least 40% of generation; power infrastructure had been vandalized; system reliability was significantly diminished, and the government-owned Uganda Electricity Board (UEB) was in an operational and financial crisis. The government of Uganda soon realized the centrality of the power sector to resuscitating the economy and advancing development, and it became a priority over the next decades (Godinho & Eberhard, 2019a). Successive droughts in the mid-1990s also diminished output from hydropower, including at Owen Falls. Government and donors began ploughing money into infrastructure rehabilitation and expansion but the UEB – plagued by internal inefficiencies and financial difficulties – was resistant to change and slow to implement interventions targeted at improving performance. The poor performance of UEB represented an important constraint on the economy and gradually eroded the legitimacy of the vertically integrated SOE model. A 1996 World Bank ESMAP report revealed the seriousness of the problem, observing that "while difficulties facing the sector can be traced to Uganda's civil war and disruption, the fact that sector

performance remains so weak after many years of physical recovery and much technical support makes a case for significant institutional change". (Energy Sector Management Assistance Programme, 1996, pp. 26–27; Godinho & Eberhard, 2019a)

Uganda was highly reliant on foreign aid – supporting more than 50% of the government budget – and multilateral and bilateral agencies like the World Bank, IMF, DIFID, NORAD and others began to make borrowing conditional on the implementation of reforms. The public's fatigue with previous civil wars and a dysfunctional economy made acceptance of reforms easier as they looked forward to improved services. However, there were pockets of opposition from within the utility and ministries that thought they might lose from such reforms. Building on economy-wide macro-economic reforms, including the 1993 Public Enterprise Reform and Divestiture (PERD) Act, the government of Uganda, under the personal direction of the president, and with support from the World Bank and the donor community, commissioned London Economics to produce the *Ugandan Power Sector Restructuring and Privatisation Strategy (PSRPS),* which was adopted in June 1999. The objectives of the strategy focused on four core goals: (i) to improve overall sectoral performance; (ii) to enhance both the economic and environmental sustainability of the sector; (iii) to foster energy security; and (iv) to open the sector to private investment, especially in generation and distribution (Eberhard et al., 2016). The PERD Act bestowed significant power on the Privatization Unit (which reported to the finance minister and the secretary of the treasury) to carry out the divestiture of public enterprises. The Act also bestowed responsibilities such as financial, legal, and operational analysis of the entity; the valuation of assets; determination of the means of divestiture, and holding discussions with the board, officers and employees (or their representatives) of public enterprises with a view to achieving a fair, reasonable and harmonious divestiture (Godinho & Eberhard, 2019a). In November 1999, the Electricity Act was passed. This Act, together with the earlier PERD Statute, provided the legal framework necessary to initiate and implement sector reforms. The Act also provided for the UEB and its successor companies to be incorporated under the Companies Act but falling under the jurisdiction of the Ministry of Finance, Planning and Economic Development (MOFPED).

In the period leading up to these reforms, there was persistently poor performance in the UEB; ongoing political interference in tariff-setting; investment decisions; personnel and deployment; poor reporting; rising energy arrears, and an absence of financial autonomy. In the period 1996–1998, two successive managing directors (MDs) were removed from office[51]. Subsequently, an expatriate (Paul Mare) from

[51] In the first instance, this was on the grounds of failing to implement changes in line with government's divestiture programmes while, in the second, it was connected to gross financial irregularities.

South Africa's Eskom, was hired as MD and tasked with implementing the restructuring of UEB[52]. He would go on to be the first MD of UEDCL and Umeme Ltd. In 2001, UEB was unbundled vertically, and three new companies were formed to own legacy UEB assets: the Uganda Electricity Generation Company Ltd. (UEGCL), the Uganda Electricity Transmission Company Ltd. (UETCL), and the Uganda Electricity Distribution Company Ltd. (UEDCL). The Rural Electrification Board (REB/REA) and Electricity Regulatory Authority (ERA) were also established in 2001. The National Energy Policy of 2002 reinforced these comprehensive sector reforms and reemphasized the importance of attracting private investment into the Ugandan energy sector. It proposed measures to attract more private capital and international developers.

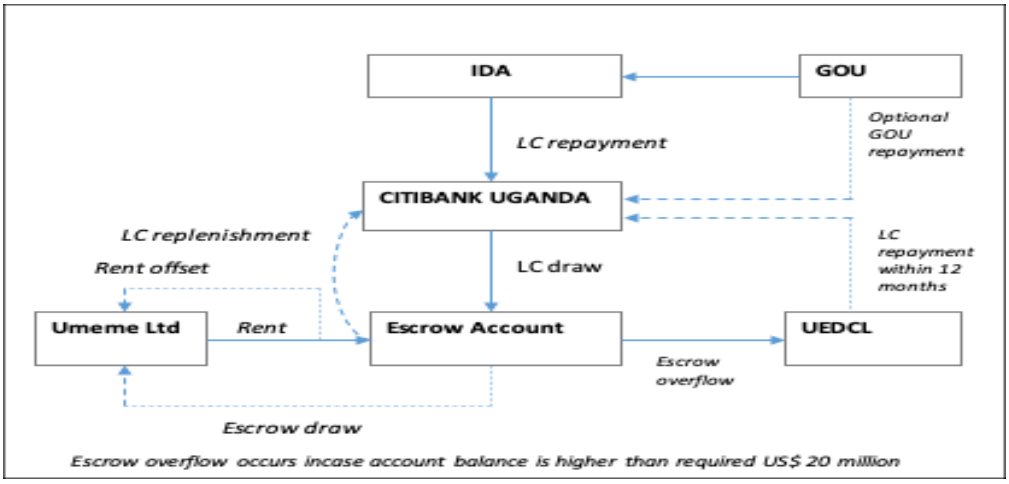
The Privatization Unit under MOFPED was charged with driving a process for concessioning the generation and distribution utilities for private operators. The Ugandan government conducted international competitive tenders for the operation and maintenance (O&M) of the Nalubaale-Kiira Hydropower complex plants, and for the concessioning of distribution assets. The tendering process resulted in the award of a 20-year concession to Eskom Uganda Ltd in 2003. The concessioning of the distribution utility followed in 2004. Following protracted negotiations, a joint-venture agreement was signed by the South African utility Eskom Holdings (44%) and Globeleq (a Commonwealth Development Corporation/CDC investee 56%) to establish Umeme Ltd (Eberhard et al., 2016; Godinho & Eberhard, 2019a). In early 2005, Umeme Ltd signed a 20-year concession agreement to operate UEDCL's distribution network (in a one-kilometre radius of the existing grid), with an effective commencement date of March 2005. Through these concessions, the government increased the financing base for rehabilitation and incentivized improved performance in accordance with private sector benchmarks (Eberhard et al., 2016). These new governance arrangements created new relationships with the government as the principal and further opened the sector to market-oriented management of the sector, resulting in greater efficiencies. The UETCL remained a publicly operated transmission utility and was reorganized with an operationally independent board and a corporate management structure. Despite plans to privatize the UETCL, the government has so far refrained from doing so. Uganda has, meanwhile, maintained the single-buyer model, and the UETCL is still the sole off-taker of all electricity entering the main national transmission

[52] These included restructuring the SOE into separate units (Generation, Transmission, Distribution, Projects, Finance and Services), each with a designated general manager, staff rationalization, divestiture of non-core activities, cost control, introduction of a new billing system and improving customer service.

grid. The core reform and restructuring process initiated by the 1999 legislation had been completed in six years (1999–2005) (Eberhard et al., 2016; Godinho & Eberhard, 2019a)

The reform process was supported by a credit from the World Bank's International Development Association (IDA) to promote divestiture, restructuring of SOEs, private sector participation and strengthening of regulatory frameworks. A supplementary contingent credit of US$5.5 million was provided by IDA to support a liquidity facility for Umeme. The Multilateral Investment Guarantee Agency (MIGA) of the World Bank further provided insurance coverage for up to US$45 million in equity and shareholder loans to cover transfer restrictions, expropriation, war and civil disturbances, and breach of contract. The IDA contingent credit-guaranteed Umeme the right to compensation for loss of revenue stemming from the following potential events: (1) failure by ERA to approve tariff adjustments according to the tariff methodology in the distribution and supply licence; (2) nonpayment of power bills by governmental entities; (3) early termination of the concession by Umeme resulting from a breach of the privatization agreements by the national government or its entities during the first 18 months of the concession; (4) early termination of the concession by Umeme for reasons related to the company during the first 18 months (entitling Umeme to a return of half its initial investment of US$5 million); (5) refunds by Umeme of the concession fees and security deposits paid by customers of UEDCL before the transfer date; and (6) termination of the concession in the event of default or force majeure (including for political reasons) by the UEDCL or the government of Uganda. The contingent credit was the first recorded instance of a development finance institution covering regulatory risk. The security package consisted of the following support measures: monthly lease rents; an escrow account; a letter of credit (LC) facility, and an IDA contingent credit to backstop the latter. The LC facility and the IDA contingent credit were accessible to Umeme only for the first three events listed above and only after other mitigation measures (from monthly lease rents and the escrow account) were exhausted. Under the distribution concession awarded to Umeme Ltd, the concessionaire/agent was contractually obligated to invest a minimum of US$65 million by the end of the fifth year. In return, the company was expected to provide up to 60,000 new connections, reduce total losses from 33% to 28%, and improve collection rates from 75% to 92.5% (Eberhard et al., 2016, pp. 230–231).

Figure 5.3: Distribution Concession Escrow and PRG-Backed LC Security Structure



Source: Author's creation

While these reforms were taking root, a set of new challenges emerged, threatening the viability and sustainability of reforms in the power sector. First, a long drought in 2005 and in 2008 drastically reduced Lake Victoria water levels, creating a generation supply deficit in the range of 90–210 megawatts (MW) (USAID 2013); load-shedding was extensive and economic growth was being constrained. It had been hoped that the 250 MW Bujagali hydropower plant (HPP) would be on-grid by this date. However, in 2004, allegations of corruption resulted in the collapse of the originally contracted consortium led by U.S.-based AES Corporation, and to the abandonment of the project, creating negative perceptions around the viability of the new model under the private sector (Eberhard et al., 2016; Meyer et al., 2018a). The project was relaunched in 2005 under the supervision of the WBG and the European Investment Bank (EIB) and the plant was completed in 2012 with new investors. Without doubt, this large investment was facilitated by the presence of a private distribution concession, which instilled confidence that, over time, collections and loss-reduction initiatives would be sustained (Eberhard et al., 2016). Meanwhile, owing to the delay in completion of Bujagali – seven years later – a serious supply–demand deficit arose, requiring expensive thermal power. At peak demand during 2011–12, Uganda was operating 200 MW of generation facilities using heavy fuel oil (HFO) and diesel. The dispatch of these facilities first drained the UETCL's capital savings and then affected the single buyer's liquidity. Worse still, the depreciation of the Uganda shilling, which fell 25% against the U.S. dollar in 2011 alone, and the depletion of the World Bank's partial financing of the thermal-based power production costs, led to a severe shortfall of funding in the power sector (Eberhard et al., 2016; Meyer et al., 2018a). Secondly, the Umeme concession in itself was experiencing

challenges and requiring compensation due to government's failure to supply the amount of energy specified in the concession agreements, an additional drain on the national budget. In addition, technical performance was increasingly difficult owing to power theft. While Umeme made progress in expanding connections and investment, losses remained stubbornly high, oscillating with no discernible pattern between 31% and 35%.

Owing to the severe drought of 2005–2006 and limited supply, Umeme's concession contract was renegotiated in 2006. Under the renegotiations, Umeme won a number of additional protections specified as the 'Special Provisions Period' (SPP), including a guaranteed volume of power to dispatch; an increase in the allowable ceiling of losses to 38% from 33% – certain interviewees in the sector allege that Umeme had wanted the losses target raised as high as 40%- (a decision that government rejected but some stakeholders still consider the 38% as inflated and cheated Ugandan consumers) to allow for emergency conditions – and an enhanced buy-out amount provision. Despite these challenges, government did not permit ERA to increase tariffs until 2012, as they had already been increased twice in 2006 – by 41% and 35%. However, the weighted-average tariff had effectively declined by 6.6% in Uganda shilling terms and by 23.2% in U.S. dollar terms, the latter being significant because most of Uganda's power sector revenue requirements were denominated in foreign currency. As a result, the weighted-average retail tariff in 2011 was US$0.126/kilowatt-hour (kWh), while a fully cost-reflective tariff would have been about twice that, at US$0.251/kWh (Eberhard et al., 2016, p. 232)

In 2012, the government finally took steps to fix an unsustainable sector and remedy the liquidity situation of the UETCL. It supported ERA's request to increase the end-user tariff by a weighted average of 46%, which, together with power produced by the Bujagali HPP after October 2012, reduced the pressure on the UETCL's balance sheet. In October 2015, tariffs were once gain increased by 19% despite the looming presidential elections in 2016, demonstrating the independence of ERA. While the automatic tariff adjustment (ATA) mechanism caps tariff increases to not more than 2.5% per quarter (cumulated to 10% per year), the depreciation of the shilling against the US dollar in 2015 saw ERA's role and independence put to the test. However, with government support and proper stakeholder sensitization, tariffs were increased to cost-reflective levels, mitigating a sector revenue shortfall of USh 36.9 billion that would have further strained the treasury. In addition, a previous quarter shortfall was mitigated by allowing UETCL to draw funds from the Tariff Stabilization Fund, although to its depletion.

Meanwhile, attempting to stimulate private investment in small-scale renewable energy projects and to bridge the looming supply gap until Karuma and Isimba hydro dams came online, ERA adopted the

Renewable Energy Feed-in Tariff (REFiT) scheme in 2012. Yet, it quickly became clear that investment challenges remained, linked mainly to constraints on introducing cost-reflective tariffs for new projects whose financing and project development costs were high. Much needed small-scale power projects proved unviable, even as the demand for power kept growing (Meyer et al., 2018a). In 2014, ERA and the German development bank, KfW, developed and implemented the Global Energy Transfer Feed-in Tariff (GET FiT) facility targeting projects under 20 MW. Through this, up to 16 IPPs, using various renewable energy sources and totaling 150 MW of generation capacity, were constructed. In addition, ERA, with the support of MEMD and Umeme, implemented a demand-side management project for distribution of free LED bulbs at a cost of US$4.1 million, as an energy-saving initiative at peak demand to avoid looming supply deficit.

On the distribution front, access rates have remained very low despite the initial assumptions of the 2002 Policy that private sector investment would flow once the sector was liberalized, and comprehensive reforms had been implemented. The Umeme concession limited its service responsibility to within a one-kilometre radius of the grid network. While Umeme and REA have made some inroads to advancing access, this is seen to be one of the oversights of the new power sector model. For example, between 2012 and 2019, the Umeme concession agreement did not have access targets while the earlier period had weak targets. However, the concession is heavily biased towards reducing losses, increasing collections, and stabilizing the service in the legacy networks inherited from UEB.

In the period 2006–2009 the new minister of energy established a commission of inquiry into increasing tariffs, subsidies and the basis for the 20% return on investments. The resultant report recommended the termination of the Umeme concession although this was rejected by the incumbent permanent secretary and the president. In 2011, a second inquiry was undertaken by the Ad Hoc Parliamentary Committee to investigate the sector, including the sub-optimal performance of Umeme, the basis for the 20% return on investment, and relaxation of targets under the Special Provisions Period (SPP). Once again, however, the 2012 recommendation of the Committee to terminate the Umeme (and Eskom) concessions was not followed by the executive arm of the government. Despite these challenges, Umeme's concession has persevered because of the strength of its contractual agreements with the government. The contract provides comprehensive protections, including against the failure of ERA to approve tariff adjustments in accordance with the tariff methodology as specified in the distribution and supply licence. The risk of government default on payments, and the premature termination of the concession contract, are both mitigated through escrow accounts, a World Bank Letter of Credit and Partial Risk Guarantee provided at

the time of signing the contract, and, ultimately, strict legal obligations that the agreement placed on the government. In addition, the 2006 concession amendments, were made possible due to the bargaining power afforded by an 18-month exit clause favouring Umeme in the original agreements. The second reason for Umeme's survival has been identified as the support it received from the highest levels. The president, backed by robust sector legislation and knowledgeable technical experts in the sector and MoFPED, was able to defend the new sector model, knowing that government would have to pay a hefty buy-out amount[53] or penalty in the event of terminating the Umeme concession. Thirdly, and importantly, Umeme was able to improve its performance and defend its approach from 2011 onwards, albeit six years after signing the concession contracts (Godinho & Eberhard, 2019a). Umeme's strategy, which included increasing revenue collections, reducing losses and re-investing in the sector, allowed it to meet and sometimes exceed the targets set by ERA. Umeme's success in attracting the much-needed investment meant that the national treasury was not burdened by having to fund network investments, and this led to further government support for the utility. Internally, a set of payroll incentives, and using retrenched staff as outsourced contractors, helped to get the buy-in and support of staff, unlike the scenario in KPLC described in the previous chapter.

Meanwhile, the regulator (ERA) has also matured over time, raising performance targets for Umeme, as well as issuing two amendments to the concession agreement (through the 7-year tariff review period 2012–2018). The first amendment called for equalization of the tax in the tariff (with the tariff which Umeme actually pays), and the second calls for the reconciliation of higher-than-predicted sales and Umeme's profits (growth factor revenues). Although these proposed amendments were taken to court, and a consent judgement entered – showing maturity of the regulator – the issues are yet to be comprehensively resolved. Subsequent amendments have been made to the concession relating to setting the minimum number of new connections per year as well as setting reliability targets. In addition, ERA has been supportive in redefining the power supply price revenue-reconciliation formula as the difference between the actual and the target tariff parameters in an effort to ensure a more balanced

[53] The buy-out amount is a financial asset that the company is entitled to receive from government calculated as a percent of gross accumulated capital invested by Umeme less cumulative capital recovery charges at the end of the concession for any unrecovered and un-depreciated assets or investments added onto the distribution network throughout the concession period. In the case of government default, the termination payment (TP) is set at between 106% and 120% of the undepreciated invested capital ('IN'), while in the case of a company default, the TP is set at between 80% and 94% of the IN amount. On natural termination on expiry of the Concession, the TP is set at 105percent of the IN amount.

revenue flow to the sector. Overall, the governance and performance of the Uganda electricity sector is stable, creating certainty around cost-reflective pricing, and instilling investor confidence.

5.3.1 Chinese-funded Flagship Power Projects

Karuma – 600 MW – and Isimba – 183 MW – are the first two hydropower projects to be financed and built by China in Uganda. The third, Ayago – 600 MW – 840 MW – was scheduled for launch in 2018, although this has been postponed to 2023 owing to lack of funding and limited demand. In 2015, the Ugandan parliament approved loan financing for Karuma dam at a cost of US$1.7 billion (initially US$1.4 billion) and Isimba (US$567 million) with government contributing 15% equity (US$253 million) for Karuma, which the contractors used to kick off preliminary works. The funds were obtained from the dedicated reserves that the government had accumulated since 2007 and had earmarked for generation capacity development. The bidding and award process for Karuma and Isimba were entangled in bureaucracy that saw feasibility designs for Karuma revised and increased to 600 MW from the 400 MW favored by donors (The East African, 2011). Environmental concerns, declining donor support, politicization and allegations of corruption in the evaluation and contracts committees of the Public Procurement and Disposal of Public Assets (PPDA) resulted in investigations and further delays denting the credibility of the procurement process. Confronted with this impasse, Uganda's President Yoweri Museveni used the 2013 Durban BRICS conference and a meeting with Chinese President Xi Jinping to award the Karuma plant to Sinohydro, and Isimba to CWE (Meyer et al., 2018b). The award to Sinohydro came as a surprise, as the company had never been a shortlisted bidder for Karuma, and it remains unclear on which assessments the award was given. Nevertheless, the Chinese Exim Bank committed the required debt financing for both projects. Isimba has since been commissioned while Karuma experienced technical delays and is due for commissioning in 2021 rather than as planned in 2019 (Businge, 2020; Daily Monitor, 2020). Despite this progress, key concerns have arisen. Firstly, the current and estimated future peak demand is below the lower base-case assumptions in Uganda's LCPDP. The capacity installed by 2020, after an initial anticipated commissioning of Karuma (about a total of 2000 MW $\pm$ 10%), is more than twice the domestic peak demand. Since nearly all recently added new generation capacity is based on 'availed capacity' or 'take-or-pay' arrangements, Ugandans will be forced to pay for much more electricity than it effectively is able to dispatch. Secondly, while the government has been quick to publicly communicate an expected tariff range of US$ 0.4 –0.6/kWh, capacity payments have not been made public. In addition, this tariff range is based on best case assumptions regarding cost and time overruns but not the significant out-of-pocket investment government shouldered for Karuma and Isimba and neither the looming

contingent liabilities through sovereign guarantees issued to back the loans (Meyer et al., 2018b). While these projects appear to secure Uganda's energy security, inadequate demand, cost-and-time overruns, as well as contingent liabilities, will increase the overall resultant cost of electricity for the foreseeable future – a challenge to consumer's needs.

5.4 Governance Framework and Structure of Umeme Ltd

Umeme's governance structure is founded in the Companies Act 2012 Cap 110, and in its memorandum and articles of association. Being cross-listed on the Uganda and Nairobi Securities Exchange also requires the company to comply with the Capital Markets Act, 2011 of Uganda and the Capital Markets Act, 2012 Cap 485 of Kenya, especially with regard to the constitution of board memberships, financial profitability and reporting obligations. There is also a board charter (currently in draft form) that spells out the structure, composition, roles and responsibilities of the board and functions of the company. Since the utility is regulated by ERA, any changes in its ownership structure and board membership are required to be brought to the regulator's (principal) attention.

The roles of the chairman of the board and the managing director (MD), who is the chief executive officer, are separate and distinct. The Chairman is an independent and non-executive director. The board of directors ('the board') is constituted of representatives of institutional and private equity investors, including the majority shareholders, who provide a solid and diverse skill set from the private sector, with rich experience and knowledge in market-oriented management styles and emerging power markets. The composition also assists the board to function effectively and with appropriate regard to relevant domestic and foreign developments and micro- and macro-economic factors. The diversity in skill sets, especially in power utilities, financing and equity investments, energy infrastructure management, commerce, engineering, economics and accounting among others, has been the cornerstone of Umeme's superior performance over the years. The composition of the board has evolved from the initial minimum six board directors in 2005 to the current ten. Of these, two are executive directors while the rest are non-executive directors. Until 2019, the majority of the directors were non-resident internationals, which has helped to mitigate undue influence from government (as the principal) and local politicians. The board provides oversight guidance to management, risk management and corporate governance. The appointment, resignation, retirement and removal of directors is governed by the Companies Act 2012 and Umeme's Articles of Association, which grant powers to the nominations committee of the board to select alternative directors depending on the changing needs and strategy of the company. Before selecting directors, the board through the nomination committee, considers the requirements of the

board and the company in terms of skills, experience, knowledge and other competencies, and selects those individuals whose skills, experience and knowledge complement those already on the board. Subsequently, directors are appointed by shareholders at annual general meetings (AGMs). There is no term limit on the number of times a non-executive director may stand for re-election, which gives institutional certainty and continuity in implementing strategies. In executing its mandate, the board appoints and delegates the day-to-day management of the company to the MD as the agent, premised on the board's delegation of authority for the performance and implementation of the strategic plan of the company. Through a management service agreement[54], the MD and senior management team (SMT) are assigned targets and report to the board on a quarterly basis, or more frequently whenever necessary. A specialist team of international external lawyers and consultants was put in place and is drawn upon for technical, legal and commercial advice to the board and MD/SMT, owing to the complexity and financial sensitivity of the concession agreements and the complex regulatory environment. This team of experts is instrumental in resolving major legal and regulatory challenges and augments the company's performance. A sister team of local external lawyers is also contracted to provide legal services for conflicts arising from local suits. At the operational level, the MD and SMT operationalize the management services agreement to implement the company's strategy and deliver services to customers. The company utilizes a unitary management structure (U-form) – where all function heads control their plans but report to the top at the centre that is centrally managed as a single unit and specialized along 11 departments. Functional operational roles are cascaded to four regional offices comprised of 25 operational districts and 21 service centres across the country. While the unitary form is cheaper, it introduces coordination challenges in implementing tasks, leading to delayed service delivery. In addition, the structure propagates imperfect information arising from the various non-self-sustaining units, creating information asymmetry that can impede appropriate decision-making at the top.

[54] In 2009, Actis Infrastructure Umeme Ltd (Mauritius – 100%) through its subsidiary Umeme Holdings Ltd (Mauritius - 99.9%) entered into a management services agreement with Umeme Ltd for the provision of management support and administrative services, secondment of employees and know-how in the management of the company in Uganda. The eight (8) seconded personnel came to be known as the senior management team (SMT) constituted mainly of international expatriates including the Managing Director, General Manager, Chief Finance Officer, Chief Technical Officer, Chief of Safety, Head of Customer Service, Chief Information Officer, Corporate Development Manager. With the divesture of Actis shareholding in 2016, the majority of the SMT's services ended except that of Managing Director.

5.4.1 Board Structure and Functionality

To ensure efficiency within the governance structure, and to focus on critical company issues, the board delegates its authority and functions to six committees (agents of the main board) with clear terms of reference and reporting requirements. These include the remunerations committee (REMCO); the audit committee; the environmental, social and governance committee (ESG); customer service and loss reduction committee (CSLR); the nomination committee, and the strategic review committee (SRC). The board sets targets[55] for the MD and senior management team (SMT): these generally exceed those in the concession and regulatory framework and are subsequently cascaded down to staff.

Uniquely, and of importance to the thesis, is the accountability of the board to shareholders. The board has to ensure, inter alia, that there is regulatory compliance; that adequate risk management processes exist and are complied with; that key policies are approved, including investment and strategy; that good corporate governance is ensured; that ethical standards of the company are monitored and influenced; that board composition, director selection and succession planning takes place; that performance of the MD, senior management and of the board itself is reviewed, and that corporate strategy is validated and approved. The board's internal monitoring and supervision mandate underscores the importance of the commercial performance objectives and the agency relationships.

Board members are incentivized with a sitting allowance (retainer) of US$16,000 each per quarter of a year, directors' insurance coverage, business costs – including domestic and international travel – accommodation, meals, training fees, medical insurance and entertainment fees. Committee chairs and the chairman receive an additional US$3,000 per quarter. In addition, directors are allocated or encouraged to buy shares in the company. These incentives are a motivation for robust monitoring and supervision of management (agency costs of monitoring) to achieve the set shareholder and regulatory targets.

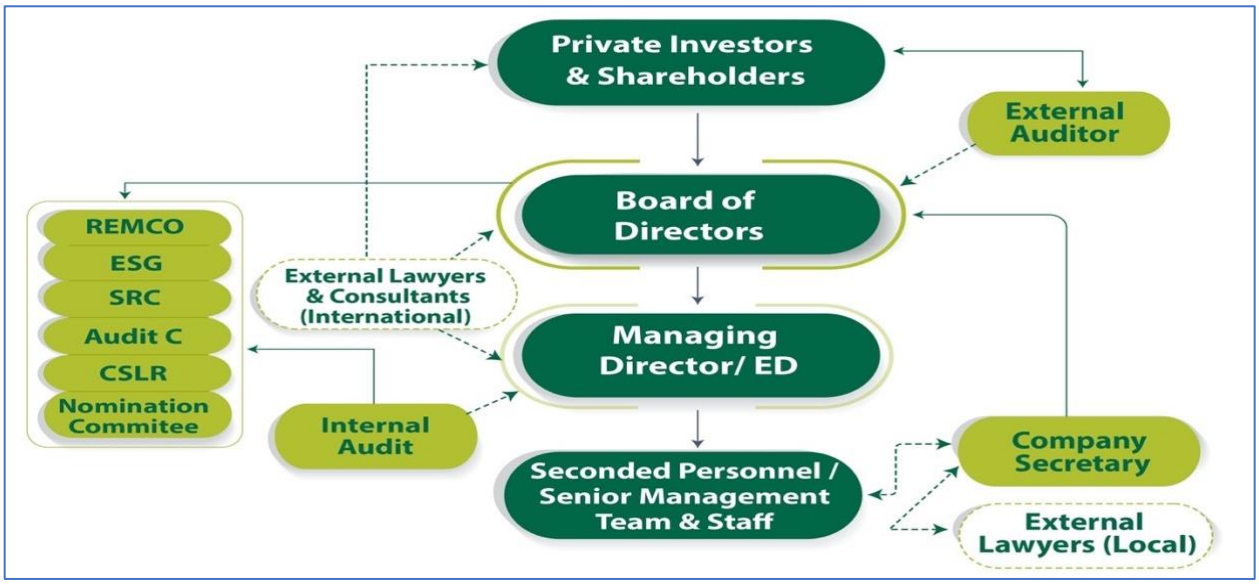
5.4.1.1 Accountability, Transparency, Disclosure, Risk Management & Internal Control

The company has financial accounting and audit systems for reporting both to shareholders and the public. Umeme makes statutory and quarterly reports to the board, the asset owner (UEDCL), the regulator and the capital markets authority (in line with listing requirements) including announcements

[55] Pursuant to the Lease and Assignment Agreement with UEDCL, and Umeme's investments strategy, there is no minimum investments required but continuous modifications of the network. Hence, the utility is encouraged to expand the distribution infrastructure in line with the Restoration and Reinforcement Plan. Subsequently the board sets Wildly Important Goals (WIGs) for the MD/SMT to achieve.

in major newspapers for transparency and disclosure purposes. The financial statements are prepared in line with International Financial Reporting Standards (IFRS) and are subject to both internal and external audit. Such disclosures have, at times, led to challenges: for example, contestations by ERA in August 2014 of changes in ownership and shareholding – citing "change in control and transfer of licence" violations and breach of Section 46 of the Electricity Act without approval of ERA (ERA, 2014). Subsequently, an amicable settlement was arrived at indicating the strength and maturity of ERA and Umeme in resolving sector issues. Nevertheless, external auditors and ERA continue to dispute a portion of gross investment amounts reported by Umeme as asset additions, for various reasons[56], as well as the accounting treatment of unpaid tax liabilities (currently at USh 16.6 billion). Overall, the availability of risk management controls and transparent disclosures enables the board and management to devise remedial action in time for better performance. Umeme has won a number of awards in relation to financial reporting and best compliance with the capital markets authority and the Uganda securities exchange.

Figure 5.4: Umeme's Governance Structure



Source: Author's own creation

[56] For the period 2012–2018, over US$107 million in executed CapEx projects has been rejected and un-recognized in the tariff by ERA for reasons including no justifications or prior ERA approval; insufficient supporting documentation; unreliable accounting estimates; emergency CapEx queries; missing installations; poor quality works; CapEex/OpEx classification ambiguity, and no value for money realized – 'used and useful' principle.

5.5 The Umeme Concession

Following the unbundling of the Uganda power sector, and the award of the distribution concession to Umeme Ltd, the company signed various contracts with government institutions and with the shareholders on 17 May 2004 to support the 20-year concession, taking effect on 1 March 2005. The concession signified a transfer of partial ownership, risks and authority from the principal to a more competent managerial team in Umeme[57], the agent. The concession was established to create a profitable venture, with growth prospects for investors, and to create incentives to improve and expand the distribution of power in Uganda. The Government hoped to achieve improved service delivery of electricity to Ugandan customers as well as to create a stronger, more attractive distribution function that would, in turn, attract new IPPs. A power sector is unattractive to IPPs when the distribution function cannot guarantee adequate collections to pay for generation. Improvement of the distribution function benefits the entire sector from generators to customers. The concession agreements have been amended a couple of times to reflect the changing business environment and, also, to facilitate improvements in performance. The agreements set out terms, conditions and obligations of the parties to the different contracts and are summarized below:

5.5.1 Lease and Assignment Agreement – LAA

This agreement, between Umeme and UEDCL grants Umeme (as agent) a leasehold interest in the distribution network and in land, property and equipment owned by UEDCL (principal) and to be used to distribute electricity to consumers in Uganda. The agreement has a term of 20 years from the transfer date of 1 March 2005. The agreement provides conditions under which:

(a) Umeme received "possession of the assets under the concession asset but not ownership" and thus has the exclusive right to use, maintain and retire the distribution network assets and related systems and has to retransfer the assets back to UEDCL after 20 years, unless the contract is terminated before that date. Umeme is required to make monthly rental payments into an escrow account for the assets under concession, the assigned interest and other rights equivalent to the debt service for loans of UEDCL; the actual depreciation and interest on expenses related to the portion of the assets under concession acquired on, or after, 1 January 2002; a maximum return on equity of 10% on the asset carrying value effective January 2009, and administration fees. Umeme has an unconditional right to receive cash from users of the distribution network for

[57] Umeme Ltd and Umeme are used interchangeably in this thesis but refer to the same company.

concession rental payments to UEDCL through the tariff methodology. The right to receive cash is accounted for by the company as a financial asset.

(b) Umeme has the rights and obligation to make necessary modifications to the distribution system as deemed desirable. However, UEDCL retains title to the modifications and additions from the effective date of the modification. For Umeme to recover its investments in the distribution network and earn a return through the tariff, investments need to be pre-approved by ERA (the regulatory principal).

(c) Umeme, at its sole cost and expense, is required to obtain and maintain insurance policies from insurers that are financially sound and commercially viable in Uganda. In the event of loss, which prevents the company from performing under the LAA, UEDCL is named as 'loss payee' under all insurance procured by Umeme to cover loss or damage to the distribution network.

(d) The agreement may be terminated either by UEDCL, where the company fails to meet its obligations, or by Umeme, where UEDCL, UETCL or the government fail to meet their respective obligations as specified under the original agreement, or under the fourth amendment to the LAA of 28 November 2006. A buy-out amount (as defined in the agreement) is payable to the company.

(e) Umeme and UEDCL are required to agree on an agent who will be a designated bank and enter into an escrow agreement. The parties are required to open up both USh and US dollar accounts. Umeme is then required to deposit into the escrow account all rent, net of the administration fee component that will be paid directly to UEDCL. GOU and UEDCL may deposit funds into the escrow accounts at any time.

5.5.2 Power Sales Agreement - PSA

The power sales agreement between Umeme and UETCL provides for the sale and the bulk supply by UETCL of electricity to Umeme for on-sale by Umeme to its customers through the distribution network over a period of 20 years from the transfer date of 1 March 2005. Of interest to the performance of Umeme is that the agreement obligates Umeme to purchase power from UETCL as the single buyer, while granting rights to Umeme and placing limits on bulk supply tariffs and payment obligations that protect Umeme's revenues – for example, rights to withhold payments or offset revenues due to UETCL relating to the bulk supply tariff (BST), as explained in section 5.5.5.1 below.

5.5.3 Support Agreement

The support agreement between Umeme and the government (represented by the Ministry of Finance, Planning and Economic Development as the principal) regulates the relationship of the parties regarding the management, operation and maintenance of the distribution system by Umeme. The key operational provisions in this 20-year agreement include: government support and obligation to pay Umeme for energy arrears not covered by government entities, so as to keep the company financially viable; and government commitment and obligation to pay a buy-out amount in the event of contract termination resulting from either political, regulatory or early termination by government or at the end of the concession. Specifically, the payment must be made in dollars not later than 270 days following the receipt or issuance of any termination notice or 90 days following the final resolution of any dispute. In case of natural termination of the concession, government is obligated to pay the buy-out amount not later than 30 days following the last day of the concession term. There have been public concerns that the buy-out amount condition is steep for a government that is persistently struggling to finance its growing budget and a perception that government is increasingly beholden to Umeme since it is not in position to pay (Kiwawulo & Kalyango, 2011).

5.5.4 Licences for Supply and Distribution

These refer to the Licence for Supply number 048 and Licence for Distribution number 047 from ERA, granting Umeme the right to supply and distribute electricity within a defined geographic area (1 km off the existing grid) in specific towns of Uganda subject to certain conditions. The licences will also endure for 20 years from the transfer date.

In all four of the above licences, Umeme is contracted as the agent by the respective institutions - principals on behalf of the government of Uganda, to raise funding and to deliver quality electricity services to customers. For example, during the first five years of the concession, Umeme had specific contractual obligations as follows: investing US$65 million to rehabilitate the network; connecting 60,000 new customers; reducing losses to 28%, as well as reducing uncollected debt from 25% to 7.5%. The investment, access and debt collection obligations were met, but not the reduction in losses. Achieving these targets was possible owing to the provisions of the contract that enabled mobilizing of private investment capital as well as being able to recover arrears from delinquent government agencies. However, these targets have been seen by some to be soft and less ambitious.

Other than the above, Umeme has other facilitating agreements that enable a smooth implementation of the concession, including: the Umeme Management Services Agreement between Umeme Ltd and

Umeme Holdings Ltd; the Escrow Agreement between UEDCL and Umeme to establish an Escrow Account; the Uganda Distribution Concession Project Agreement between Umeme and the World Bank's IDA in which the IDA, with the agreement of government, committed to the disbursement of loan facilities and the Letter of Credit; and the IDA Commitment Agreement between the IDA and Citibank Uganda Ltd. These agreements are generally geared towards transferring risks to the party most able to mitigate them, while creating a sound financial, legal and technical basis for focused management and improving the performance of Umeme. Some of the risks include: political risks; regulatory risks; market risk (foreign exchange and interest rate risks); credit risk; and liquidity risks, which most SOEs fail to manage especially in sub-Saharan Africa.

5.5.5 Incentive Structure and Framework

Pursuant to the Electricity Act, the power supply licence and tariff methodology, ERA regulates both the levels and structures of electricity tariffs, determines the revenue requirement of Umeme, and applies a hybrid rate of return (ROR) and performance-based regulation. Rate of return regulation determines the required revenue of a utility as equal to a rate of return (equal to the weighted average cost of capital) on the regulated asset bases plus depreciation plus operating and maintenance costs plus taxes. Tariffs are calculated by dividing the required revenue by projected volumes of electricity to be sold. The ROR or cost-of-service regulation is utilized so that revenue to be earned should be equal to the cost of supplying electricity plus a fair return on the rate base. The determination of the revenue requirement is enhanced by elements of performance-based ratemaking –such as benchmarked levels of losses, distribution, operating and maintenance costs[58] (DOMC) (previously based on planned and actual costs incurred, and more recently, with some Latin American countries for the 2019–2025 period), revenue collections (bad debts) and, more recently, a minimum number of connections target. This is further enhanced by capped allowances (pass-through) for changes in macroeconomic variables such as inflation, foreign exchange and fuel costs. Following from the tariff methodology, ERA sets 7-year rolling performance targets to be achieved by Umeme – which go through a detailed negotiation process – to provide accurate expectations for efficiency for the next period. Once agreed upon, the parameters are fixed for the entire period, embedded in the tariff computation, and only adjusted for macro factors. Umeme is then tasked with deploying its resources to equal or surpass the set parameters, thereby gaining any additional revenues (implicitly) to enhance its profitability. On the other hand, failure to meet the targets obviously reduces

[58] These include repairs and maintenance, transport, insurance, staff payroll, contractor costs, administrative costs, prepayment costs, AMR, debt collection costs, telephone costs, IT costs.

the profits available for shareholder distributions. Hence, by setting targets for costs, ERA passes on the risk of poor performance to Umeme, which is theoretically able to manage this risk by operating efficiently and through incentives to make a profit.

The concession is structured so that, if Umeme's operational performance matches the targets used in setting the tariff, and assuming no growth in sales volume during the retail tariff year, its annual returns from operating the electricity distribution concession will be equal to a contractually allowed return on its investment of 20%. This contractual return is set through the life of the concession and is not part of the tariff review. The return is on new investments in fixed assets as well as an allowed return on working capital. The return is annual, based on an approved level of capital investment in nominal USD and working capital in nominal USh. Hence, the company is incentivized to source funds that are priced lower than the rate of return so that the surplus economic value created is allocated to its equity holders. In addition, Umeme receives all the reward and bears all the risk of achieving its revenue targets, including distribution losses, uncollected debt and DOMC. In 2019, a new parameter, the minimum number of new connections, was added to the targets for the 2019–2025 tariff review period.

Umeme is thus incentivized to meet or exceed its sales volume and tariff/revenue targets as it receives the reward of earning additional profits of growth in sales volumes (minus, of course, the payment of its power supply and operating costs in accordance with the tariff methodology) and in circumstances where the tariff performance targets are met or exceeded. Conversely, it enjoys limited protection of downside risks in circumstances where targets are not met due to underperformance. The costs related to the four set tariff parameters of distribution losses, uncollected debt, DOMC and working capital days lag, are reflected in the calculation of the retail tariff, thereby providing Umeme with baseline revenues that should just cover expenses relating to these parameters. To the extent that actual operating performance is better or worse than envisaged in the tariff parameters, Umeme's revenues in respect of these operating parameters will or will not cover the related expenses leading to a positive or negative impact in the overall profitability of the company.

The retail tariff is set annually from January and, as previously mentioned, is adjusted quarterly using the automatic tariff adjustment mechanism. The quarterly adjustments are for changes in the bulk supply tariff (BST) from UETCL as well as changes in foreign exchange rates and inflation, such that Umeme is protected from such fluctuations. To the extent the adjustments are foregone, there is supposed to be a reconciliation in the next tariff period.

5.5.5.1 Bulk Supply Tariff Off-sets and Power Supply Price Off-sets

Other incentives and revenue risk mitigation measures are embedded within the Umeme's power sales agreement. Pursuant to section 5.3 (d) of the Power Sales Agreement (PSA) between Umeme and UETCL, Umeme has a right to recover or defer the portion of the overdue government entity bills relating to the bulk supply tariff (BST) from its payments to UETCL. Specifically, the section states:

"If a GOU Entity fails to pay a delivered electricity bill by the due date therefor, the Company may defer payment to UETCL of the Bulk Supply Tariff portion of any such unpaid bill until such time as the non-paying GOU Entity or GOU pays such electricity bill; *provided, however, that the Company's obligation to pay any such amounts to UETCL shall be cancelled to the extent that such amounts remain unpaid for 60 days following the due date therefor and the Company shall have first provided GOU (with a copy to the GOU Ministry of Finance, Planning and Economic Development) 14 days' notice of such non-payment including the amount owed and the identity of the non-paying party….."*

ERA also amended of the Supply Licence / tariff methodology to mitigate revenue shortfalls. Pursuant to section 5.3(a) of the Power Sales Agreement between Umeme and UETCL, in the event that the charged bulk supply tariff set by ERA, and invoiced by UETCL, exceeds the BST cap, and which would otherwise be used to fund or replenish the escrow account, Umeme is entitled to invoke the BST payment limitation provisions to hold back the invoiced amounts exceeding the BST cap. This revenue recovery mechanism has helped Umeme to maintain adequate funding for its operations and hence its financial performance. In addition, the power supply price (PSP) component of the retail tariff contains a quarterly adjustment factor, the PSP reconciliation amount, necessary to reconcile the cumulative amounts of power supply costs paid by Umeme to UETCL – in the event that Umeme fails to collect sufficient revenues owing to factors beyond its control: for example, power losses arising from the supply side. If the reconciled amounts are positive, Umeme is rewarded; if negative, they are deducted to benefit consumers. Umeme also has rights to invoke the BST cap payment limitation provisions to hold back the entire invoiced amount in the UETCL. These two provisions of the PSA have been exercised from time to time by Umeme to ensure it recovers its revenues fully and have helped to keep its financial viability strong. This has been possible because the provisions exclude the principal's direct constraining influence that is typical in many other utilities and SOEs.

5.5.5.2 Growth

Another incentive embedded within the tariff is revenue as a result of a growth in sales. The tariff uses prior period purchases in computing the sales base, thereby creating a possibility of experiencing excess revenues when sales increase. For example, if the tariff assumes that purchases will be 3000 GWh based

on the prior period. and yet Umeme purchases 4000 GWh in the current tariff year, it translates to excess revenues vis-a-vis the cost allowed in the tariff and the resultant tariff. This methodology was meant to provide sufficient internal funds to finance additional growth through new connections as well as investments in supply reliability. However, in 2012, ERA introduced Amendment Number 2 and Number 4, which effectively recognized the excess revenue and clawed it back from the subsequent tariff computations for the distribution component. The company contested this action through the Electricity Disputes Tribunal which resulted in a consent judgement in 2016. This prompted Amendment Number 5 where both ERA and Umeme recognize the excess revenue and requirement for Umeme to invest the 'windfall' revenues in the distribution network. However, a 4% management fee is allowable as a fee for the risk of execution of the requisite capital investments.

Together, these contract and license provisions are incentives and risk mitigants that cushion the company's revenue streams, enabling sustainable profitability. Overall, the contracts embody a change in conventional utility governance and regulatory arrangements that highlights the changed roles of government as principal and its relationships with Umeme (agent), facilitating a new model for improving utility performance in the power sector.

5.5.5.3 Non-Network Assets

In line with Amendment Number 4 of Umeme's Electricity Supply Licence, ERA also includes in the tariff a component for allocation and recovery of funds to finance non-network assets. Non-network assets are those which do not directly improve or expand the distribution network but are necessary for operation of the distribution network: for example, vehicles, IT infrastructure, equipment, systems and licences, tools, storage infrastructure, telecoms equipment, building/ office refurbishments, and so on. In addition, Umeme is provided allowances for capacity building (such as costs for technicians) and well as meter testing costs for compliance with Uganda Bureau of Standards (UBS) – the national quality assurance regulator. The amounts are billed to customers through the tariffs. The provision of non-network allowances enhances the company's ability to fund all costs and to achieve a relatively smooth revenue stream. Umeme has reporting responsibilities for compliance purposes. However, Umeme still encounters some challenges in its operations, albeit they are simpler to resolve. At an operational level, Umeme provides relatively better incentives to its staff than government entities, including purchase of company shares, long-term incentive bonuses pegged to performance, provident fund, health insurance schemes, allowances for operational activities, annual salary increases, telephone costs and other non-monetary performance awards and recognitions that motivate staff to perform better and, by implication, also Umeme.

5.6 Operational Performance of Umeme Ltd

This section provides an empirical and analytical analysis of the operational performance of Umeme Ltd, with three key performance measures taken into consideration: first, what consumers want – namely access to electricity, an adequate and reliable supply, and affordability; second – performance efficiency, and third – financial sustainability. The second and third measures give a sense of how well the utility is able to provide these services. Performance data, and the computation of values and ratios for the KPIs, are analyzed to show trends and results. These data and trends are linked to the context of structural, governance and regulatory reforms in the power sector and the principal–agent theory is used, where useful, to provide a deeper understanding and explanation of the drivers of performance, ultimately to contribute to new knowledge.

5.6.1 Access and Electrification

Uganda has one of the lowest electricity access rates in sub-Saharan Africa – 22%, up from 3–5% in the 1960s. Energy poverty is high among the population of 42 million people. Despite the power constraints at the onset of the Umeme concession, with modest connection targets in the first five years, the company helped to marginally increase connection numbers. The government and Umeme Ltd did not include ambitious electrification/connection targets in the concession agreement at its commencement in 2005, focusing instead on the commercial viability of the utility. It hoped that the private sector model would mature to yield growth in electrification numbers. Connection targets were dropped altogether in 2010 and were not a key regulatory performance parameter until 2019. In addition, Umeme's concession is limited to a 1 km footprint around the existing grid, and for the past decade the utility has not been incentivized to expand the grid to rural areas. Umeme, therefore, has neither the obligation nor the right to extend service beyond these defined areas; hence, minimal electrification rates for the past 15 years.

However, Umeme has, within the same period, made some progress in increasing connection numbers (mainly in urban and peri-urban areas) as part of its annual capital investment programme, funded through the tariff. Connections have grown from an average of 54,000 per year, prior to 2014, to 160,000 per annum post-2014. Umeme-funded connections earn a 20% return on investment. The advent of global development programmes aimed at achieving universal access, like the Sustainable Development Goals (SDG 7) agenda as well as Sustainable Energy for All (SE4ALL), have created opportunities to accelerate electrification with dedicated funding and incentives for Umeme (8% pre-financing fee and 4% management fee). Umeme is also partnering with Power4All to innovatively design and pilot a Utilities 2.0 project that seeks to increase access through construction of solar PV mini grids under the grid, leveraging

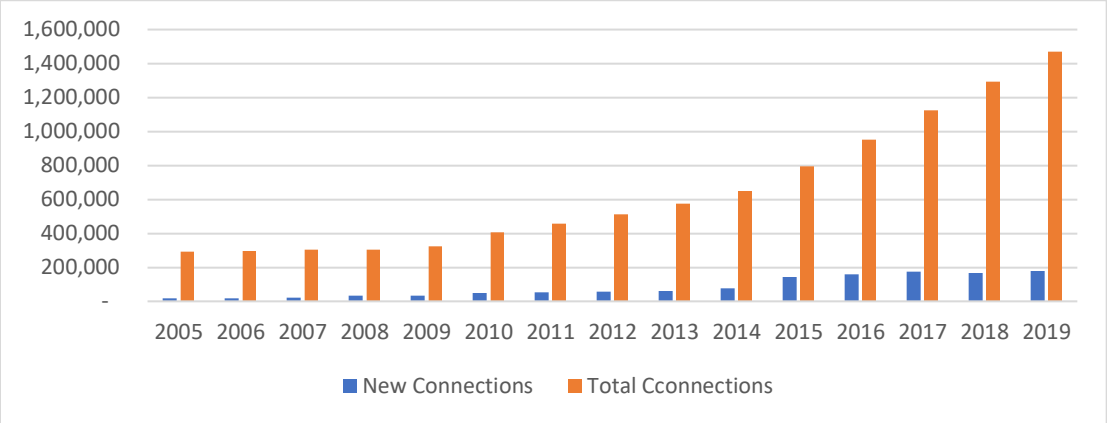
private financing and technology. The government, too, has set moderately ambitious targets to align with the access agenda. Accordingly, Umeme embraced various donor programmes such as the Global Partnership on Output-based Aid (OBA) programme (from 2015) – mainly funded by the Government of Uganda, the World Bank, Kreditanstalt für Wiederaufbau (KfW), and the European Union (through the REA) – as well as the peri-urban programme and the KfW-funded densification programme (from 2017) to increase access. In tandem, the government launched the electricity connections policy (ECP) which seeks to achieve a 60% connection rate by the year 2027, comprising of both on-grid and off-grid connections. The annual target has been set at 300,000 connections, although this is slightly lower than the necessary connection numbers to realize the policy goals. Combined, these development programmes had added a total of 178,152 subsidized connections to the grid by the end of 2019. This progress has been possible because of the joint cooperation between a private entity (Umeme Ltd), a public entity (REA) and the donor community, which unlocked and demonstrated to stakeholders the opportunities of institutional cooperation for increasing access rates – should the right incentives be provided. This change in governance arrangements and cooperative relationships has yielded better incentives for access.

Power sector reforms also enabled the establishment of the Rural Electrification Fund/Agency (REA) managed by a board with an institutional mandate for promoting rural electrification. REA builds distribution line extensions which are handed over to Umeme for operation and connection of customers. Despite the growth in network coverage, the actual number of rural connections has remained low.

The Electricity Regulatory Authority has tried to create a conducive regulatory environment that facilitates easier market entry, including light-handed regulation for over 18 mini grids that currently operate in the country. ERA has also revived and set minimum connection targets for Umeme for the remaining period of the concession 2019-2025.

Umeme's increasing connections trend is a step in the right direction. However, recent declines in donor funding – which led to a halt in the Last Mile connections programmes under the ECP – are concerning unless deliberate funding interventions are taken. The private sector-led model for electrification has yielded insufficient gains in electricity access on its own. One of the small distribution concessionaires – Ferdsult Engineering Ltd – has also collapsed. In sum, despite the fast pace and extensive power sector reforms in Uganda, electrification efforts have been lower than its peers, Kenya and Tanzania, which have larger, publicly funded programmes.

Figure 5.5: Trend of New and Total Connections



Source: Author's own compilation based on Annual Reports & primary data

5.6.2 Adequate and Reliable Electricity Supply

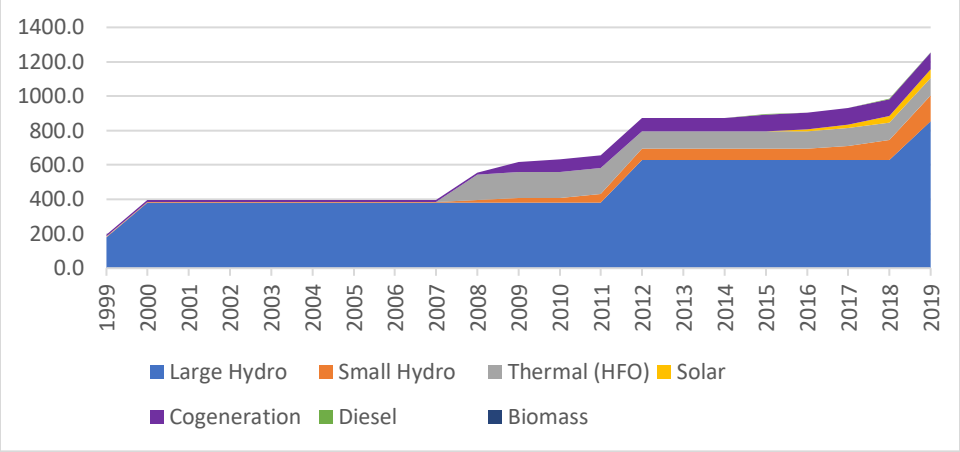
Adequacy of supply is reflected in a country's installed generation capacity to meet current and future demand. Uganda has moved from a period of historical power shortages, including in the 1990s and mid-2000s, and is now fortunate to enjoy a period of excess capacity that enables security in supply. Generation capacity in the 1990s was limited to just 150 MW – although, in reality, this was even lower, due to low availability factors. The state-owned utility (UEB) was performing poorly, with high technical and commercial losses and was unable to invest in new capacity to match the growing demand. Complicating these structural and institutional challenges, Uganda's meagre installed capacity was primarily hydro-based, making it vulnerable to droughts. Towards the end of the 1990s, the Owen Falls dam (Nalubaale) had been refurbished to raise its capacity to 180 MW. Construction of a second power plant, Kiira, began in 1993, comprising five 40 MW units with a combined total of 200 MW, and was commissioned in 2003. When drought struck in 2005, the government was compelled to procure expensive emergency power (EPPs) for the period of 2007–2011, along with associated imported fuel costs, which were subject to the volatility of international petroleum markets. In 2012, the Bujagali IPP project was commissioned, adding 250 MW to the grid, allowing the government to phase out emergency power. With growing electricity demand anticipated, the government, through its agent ERA, implemented the GETFiT programme to harness smaller renewable resources across the country. The programme yielded about 15 successful projects with a combined capacity of about 150 MW, that have been commissioned or are under construction. These projects, together with other small IPPs, have added a total of 340 MW. Altogether, Uganda has 38 IPPs, amongst the largest number of any in SSA and second only to South Africa. In 2019, the Chinese-funded Isimba dam was commissioned, adding a further 183 MW to the grid. Karuma (600 MW), another Chinese-funded dam, is expected to be commissioned in

2021, increasing total national installed capacity to over 1800 MW. There are also plans to develop other large hydropower plants[59] using public funds including Ayago (840 MW), Kiba (330 MW), Oriang (392 MW), Uhuru (600 MW) – all along the River Nile – Muzizi (45 MW) and Nyagak (5 MW).

With peak demand currently at 724 MW, including exports, Uganda has more than an adequate and secure electricity supply in the medium term. However, with a growing population, high suppressed demand that has not been empirically quantified, and should universal access programmes be accelerated, Uganda could soon be looking to expand its generation capacity. For now, the sector is burdened with deemed energy costs, associated with excess generation capacity, that are raising tariffs higher.

While Umeme is responsible for distribution and not for generation, it could be argued that its cost-reflective tariffs, financial sustainability and creditworthiness have created an environment favourable for investments in generation. Although it is difficult to argue the counterfactual with certainty, it is doubtful that the old UEB could have done the same. Power sector reforms, unbundling and private concesssions have ultimately created an investment climate that has enabled Uganda to meet its generation needs.

Figure 5.6: Installed Generation Capacity



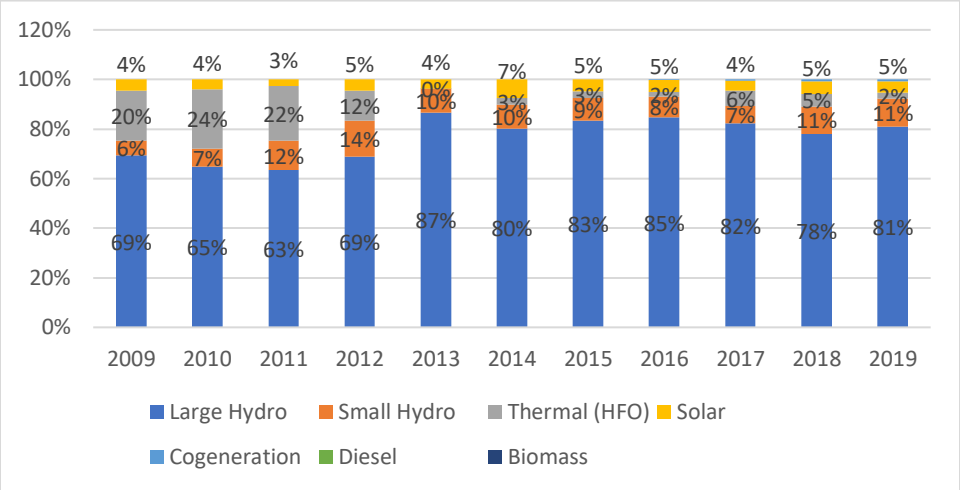
Source: Author's own compilation based on primary data

[59] Source: Power Sector Investment Plan (PSIP) 2019–2040 for Uganda

5.6.2.1 Generation Mix

Uganda's generation mix is more diversified today than during the 1990s. At the peak of the drought, thermals contributed as much as 24% of the energy generated; however, these have subsequently been phased out, with one thermal IPP being used as reserve back-up. The power system is dominated by hydro-electricity, contributing 92% (enabled by the abundance of lakes and rivers, especially the River Nile). New technologies, like solar PV and biomass, are entering the system and contribute 5% of energy generated.

Figure 5.7: Trend of Generation Mix



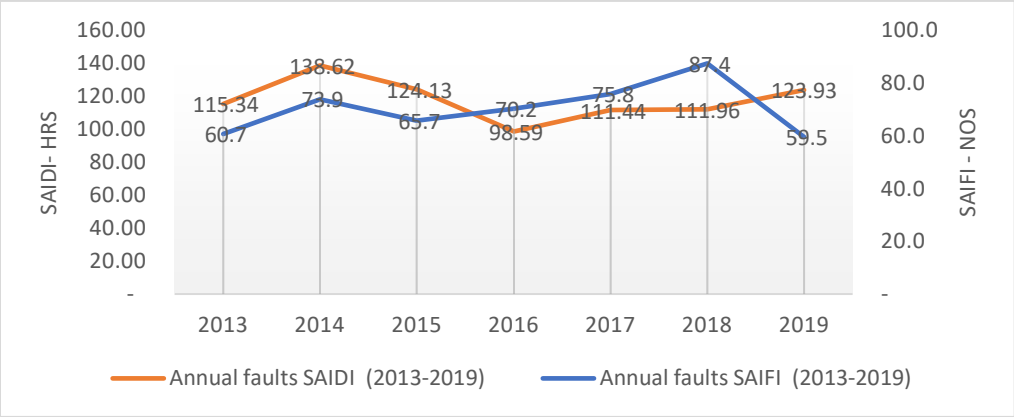
Source: Author's own compilation based on ERA Reports and primary data

6.2.2.2 Reliability of Supply

Despite adequate generation availability, the reliability of supply remains one of Umeme's bugbears, mostly because of the legacy of poorly designed and maintained networks it inherited. Despite the huge capital investments in distribution network since 2015, totaling US$656 million by end_2019, reliability of supply remains poor, as reflected in the high system-average-interruptions frequency of 59 per year and long system-average-interruption duration index of 124 hours. This is another area where not enough thought was given to appropriate incentives in the initial concession agreement. Owing to incessant outages, the regulator (ERA), as principal, in 2016 introduced quality-of-service regulations – an agency monitoring system requiring Umeme to report on supply reliability and customer service on a quarterly basis, in a bid to reduce information asymmetry and laxity (moral hazard). In 2019, further proposals were made by ERA to amend the supply licence to include an S-factor penalty/reward-incentive for reliability: this will take effect during the 2020–2025 period. Certain stakeholders interviewed expressed

dissatisfaction at Umeme's failure to improve reliability despite the huge return on investment accorded to the company on its capital expenditure. Others pointed to the lack of prioritization of investments in reliability as well as to weak operational management structures that require resourcing and skilling. Poor power supply reliability continues to affect the economy and businesses, while for domestic consumers it is more of a nuisance than a cost. Some progress was made in 2019 in reducing the frequency of network faults. However, as shown in Figure 8, Umeme has not been able to reduce the frequency and duration of supply interruptions sustainably over the past decade. Nevertheless, it should be noted, reliability is currently still much better than it was in the 1990s and early 2000s before the reforms.

Figure 5.8: Trend of SAIDI and SAIFI



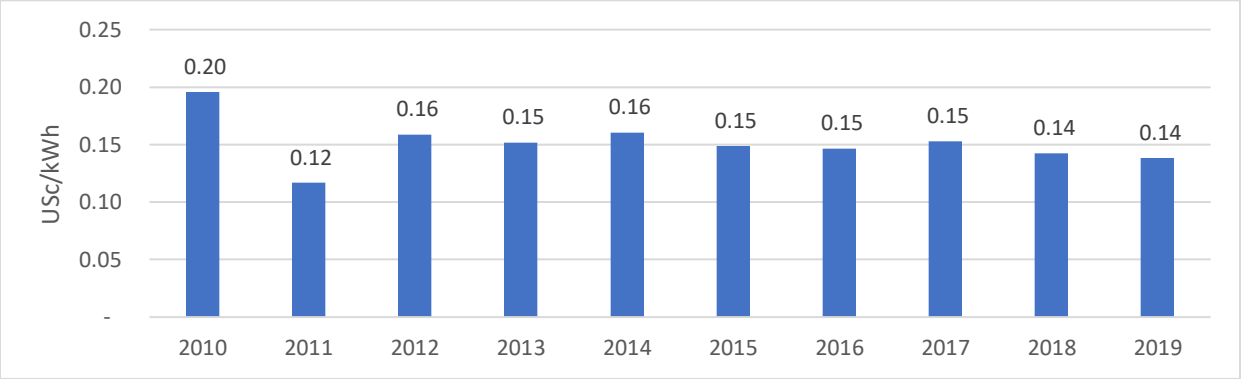
Source: Author's own compilation based on primary data

5.6.2 Affordability

Electricity tariffs are high in Uganda, dampening efforts to grow demand and improve electrification rates. For a subsistence consumption level of 30 kWh per month, the bottom 40% of the population needs to spend over 7% of their household income, making power expensive. Despite a lifeline of 15 kWh at a subsidized rate of US$0.06 per kWh, many domestic consumers cannot afford to pay for subsequent volumes, and power thefts are prevalent. This implies that the cost-reflective tariffs applied in Uganda are largely ringfenced for the high-income earners in quintiles 4 and 5 and not for the low-income earners. Equally so, for a long time, connection costs remained high – over US$180 for a domestic one-pole, single-phase connection. The New Connection Policy of 2018 reduced connection costs for a single pole to USh 20,000 (US$5) in order to subsidize the poor, and increase access for under-the-grid households. These subsidies were made possible by a combination of donor (concessional terms) and government funding. However, connection costs for customers in a 2–3kilometre radius are still very high ranging from

US$3,000–4,000 per km, which is still very expensive for low- and medium-income earners. In December 2020, at the suspension of the ECP subsidies by donors and government, connection costs for domestic consumers were increased to US$ 200 for a 'no-pole' service connection and US$ 750 for a 'one-pole insulated conductor' service pole, thereby undoing the access gains that the sector had started to harness. Despite the public outcry over the outrageous costs, the electricity connection policy has not been revised to lower costs (Kasemiire, 2021). Todate, Umeme has the highest connection costs in East Africa. Interestingly, the ERA has taken steps to reduce connection costs for commercial and industrial consumers requiring grid extensions by developing the energy rebate policy that became effective in 2017. Under the policy, the consumer is compensated for self-motivated (but ERA-approved) investments for power line extensions. The compensation is undertaken by a distribution utility over time through offsets of monthly energy billed to the customer. This initiative, however, can only benefit a few high-income earners in the manufacturing sector and does not stimulate access efforts. In addition, in January 2017, the ERA, at the prompting of government, in a bid to encourage manufacturing and industrialization, restructured the tariff to create a subsidized tariff category for extra-large industrial customers whose average tariff was lowered to US$0.06 per kWh. The two actions demonstrate the influence of the principal (government) in the tariff structures, although the concession and regulatory regime still ensure that the average tariff provides sufficient revenue for financial sustainability of the utility.

Figure 5.9: Average Retail Tariffs



Source: Author's own compilation based on primary data

5.6.4 Efficiency

Prior to unbundling, the governance and performance of the state-owned vertically integrated UEB was extremely poor. Even with significant investment contributions from donors to rehabilitate the dilapidated infrastructure, the utility's internal governance and management remained weak and was

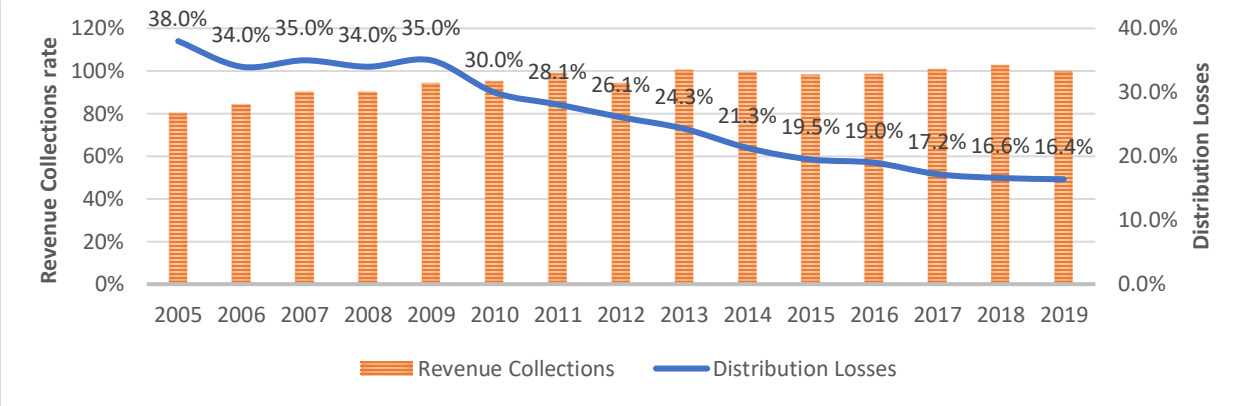
unable to translate this capital into improved service delivery. Losses were as high as 40%, and inaccurate billing, poor revenue collection, bloated staffing levels, and rampant corruption were the order of the day, denying the company the much-needed financial resources to improve performance.

A 1996 ESMAP study found that UEB was financially unviable. Governance arrangements also undermined the commercial operation of the utility, with the ministry of energy (principal) responsible for appointing an under-qualified board of directors. The MEMD's setting of low social tariffs further plunged the company into a deeper deficit. Revenues collected were too low to finance any meaningful infrastructure refurbishment and expansion, let alone cover operating costs. The UEB also failed to collect government bills for energy consumed. With the power sector reforms ushering in new governance arrangements – entailing unbundling of generation, transmission and distribution into separate legal companies, and the concessioning of distribution assets to Umeme – a more focused management team was introduced to turn around the fortunes of the utility. The impact of the concession was immediate, as seen in the figure below, with collection rates rising from 80% to 99% in 2011 and have been close to the efficient benchmark level (100%) since then. Losses, meanwhile, remained stubbornly high in the first six years, partly because of the dilapidated distribution infrastructure, and a supply deficit emanating from a drought, leading to increased load-shedding and power theft. This situation resulted in Umeme (agent) and government (principal) making amendments to the concession obligations and targets (risk sharing), in what came to be known as the special provisions period (SPP), until the 250 MW Bujagali dam was commissioned in 2012. Furthermore, tariffs were increased to cost-reflective levels in the same year. With proper incentives now provided under the SPP period, and tariffs raised, the regulator (ERA) as principal sought to drive performance through setting 7-year targets incorporating losses and revenue collections. Subsequently, Umeme has innovatively sustained revenue collection rates above the set targets and reduced losses from 38% to 16.4% in 2019 (Umeme, 2019).

Interventions used to increase collections include use of prepayment metering for all domestic and commercial customers; automated meter reading (AMR) technology for medium and extra-large customers; concessional offset rights to recover unpaid government arrears; meter audits, and investments in partnerships with banks and telecom companies to facilitate over-the-counter payments and mobile money transactions. Recently, Umeme has been a leader in developing a 3-phase prepayment metering technology for government installations to minimize non-payment or bills. Losses have been reduced through execution of dedicated investments in feeder refurbishments; reconductoring; injection and maximization of transformers; zoning and shortening feeder spans; use of aerial bundled conductor

(ABC); frequent campaigns to persuade illegal users to regularize connections under the connection amnesty, as well as disconnections. Despite these interventions, losses still fall short of the set regulatory targets. However, the targets have exerted a push that caused a significant reduction in losses in a short period. The concession governance model thus far has been effective in ensuring revenues are properly collected and protected, and losses reduced. The principal (government) has left Umeme to exercise its managerial expertise in improving efficiency without undue influence.

Figure 5.10: Revenue Collections and Loss-Reduction Trend



Source: Author's own compilation based on Annual Reports

5.6.5 Financial Sustainability

Financial sustainability in this thesis refers to the utility's ability to generate sufficient income covering OpEx and full CapEx, including a return on the new and replacement value of existing assets – to allow for growth while maintaining efficient service levels. The analysis utilizes the profitability, solvency and liquidity ratios that help us gauge the financial performance and condition of Umeme in the long- and short-term, and through examination of relationships among the ratios. The chosen ratios explain Umeme's efficiency in putting its assets to work and addresses financial risks resulting from the company's choice of how to finance the business using either debt or equity for its sustainability into the future. The liquidity, solvency and profitability ratios also enable us to make comparisons with other utilities. Overall, trends of performance linked to changes in power sector reforms are traced, as well as the principal–agent arrangements underpinning them to better understand this performance.

5.6.5.1 Umeme's Financial Performance

Figure 5.11: Revenue Trend (USh millions)

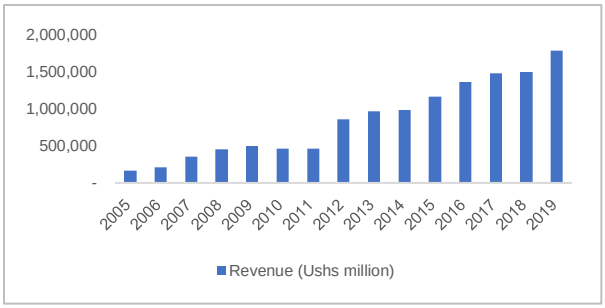


Figure 5.12: Debt Service Coverage Ratio

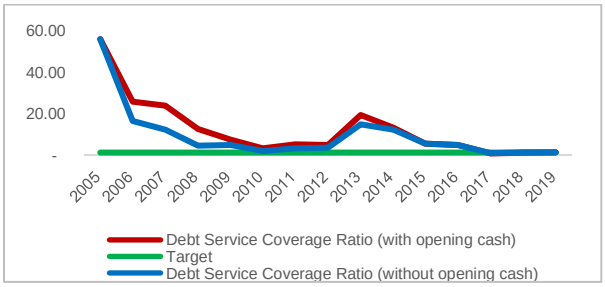


Figure 5.13: Gross Profit Margin and Net Profit Margin

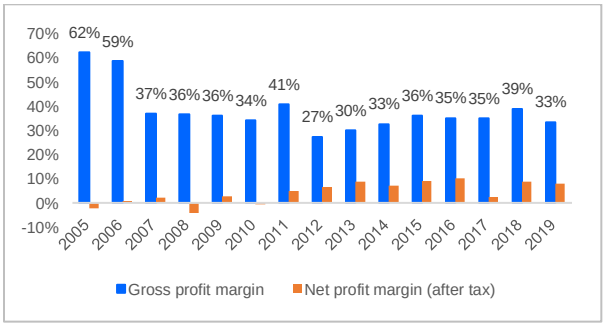
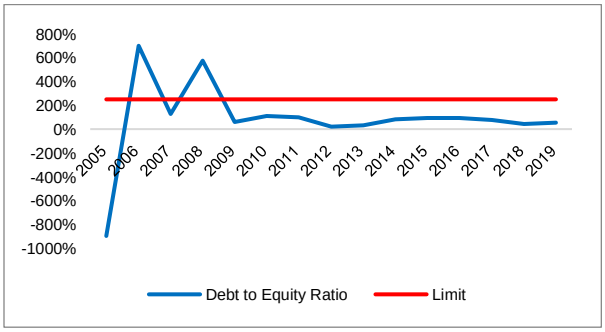


Figure 5.14: Debt to equity ratio



Source: Authors' compilation

Figure 5.15: Debt-to-Assets Ratio

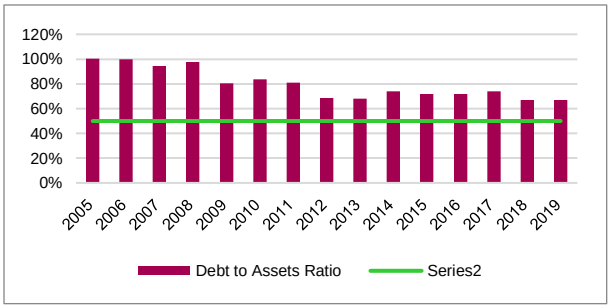


Figure 5.16: Interest Coverage Ratio

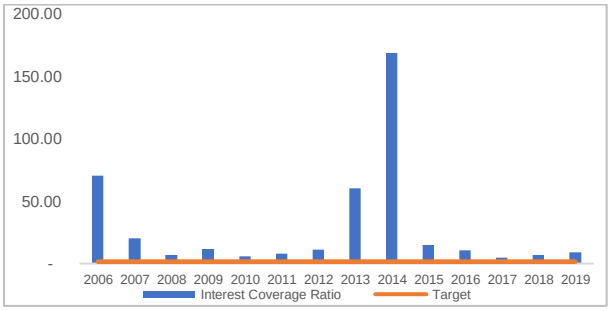


Figure 5.17: Cash (self-financing) Ratio

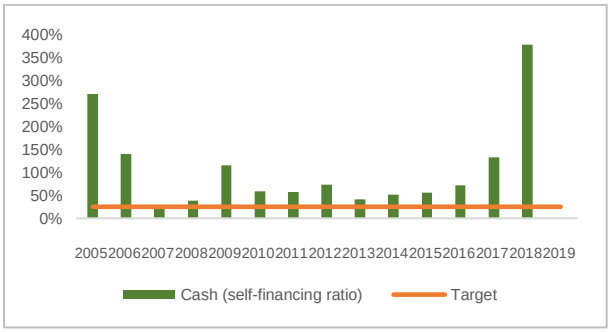
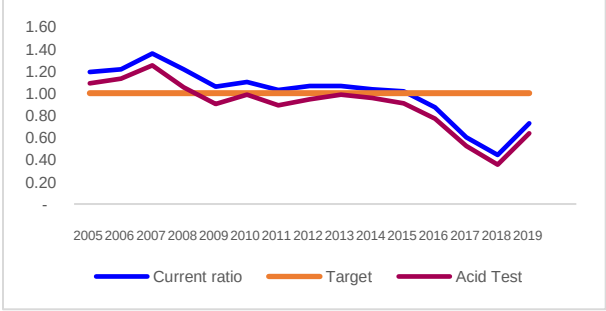


Figure 5.18: Acid Test (quick ratio)



Prior to power sector reforms, and the concessioning of the distribution assets to Umeme Ltd, the state-owned UEB was persistently posting losses. With a new and more focused concession management team in place, Umeme's revenues from energy sales started increasing in 2006 due, initially, to phased tariff increases of 76% (41% and then 35%) and then by 10% in 2009, sanctioned collaboratively with the independent regulator, ERA. A prolonged drought, and widespread load-shedding, saw revenues decline in 2010 and in 2011 and government provided huge subsidies (US$623 million cumulatively up to 2011/2012) to keep tariffs low. Tariffs were subsequently increased by 46% in 2012 to cover expensive EPPs during a period of supply shortage, as well as to cover the costs of the new Bujagali plant. Cumulatively, these increases enabled the sector to reach cost-reflective levels. A further increase in 2015 enabled the sector to cushion the effects of depreciation of the shilling against the US dollar, thereby sustaining cost reflectivity and sector revenues.

Umeme's revenues, which comprise energy and demand charges as well as service fees, buoyed by accounting adjustments provided for under the concession agreements, have since increased more than tenfold from USh 160 million in 2005 to USh 1,776,597 million (Fig 5.11). Some of the revenue drivers other than tariff increases include growth in Umeme's customer base by an average of 15% and consumption by 8% per annum, increasing sales, and reduced energy losses. The concessional offset mechanisms, and deployment of prepayment metering (commonly known as 'Yaka') and other smart meters, have also helped to boost revenue collections. As a result, Umeme's bottom line, reflected in gross profit and net profit margins, has constantly been positive (Fig 5.13) and the company never made a loss during the entire period. This is largely as a result of the annual 20% return on investment (dollar-denominated) incentive that Umeme is concessionally guaranteed through its rate base as well as the tax shield. To date Umeme has invested over US$656 m into the business.

The tariff recovery mechanism provides that investments, completed in the current year, earn a return in the following year. In addition, tariff increases have contributed to the profitability of the company. In 2017, the net profit margin declined to 2.4%, despite a high gross margin of 35%, due to a one-off shortfall by ERA of USh 103 billion in the tariff computation relating to surcharges for the lifeline tariff, and recovery by ERA of regulatory receivables, although it was recovered in the following year, owing to a robust tariff mechanism and enabling concessional laws. In the same year, clawbacks of investment in the rate base affected profitability but these are still under review. Nevertheless, the company still achieves an average net profit margin (after tax) of 6.5%.

Umeme's solvency ratios, including the debt-service coverage ratio, debt-to-equity ratio, debt-to-asset ratio and interest coverage ratio, affirm its financial sustainability in the long term. The debt-service coverage ratio (DSCR), which measures the company's ability to produce enough cashflows to cover its debt payments, was consistently above the desirable minimum level of 1, except in 2017 (Fig 5.12). Umeme has debt covenants with the International Finance Corporation (IFC) that require a DSCR of 1.15. In the early years, Umeme had a healthy DSCR above 20 as the company relied on a shareholder's loan (USh 110 billion) whose debt obligations were not due in the grace period. In addition, the accrued interest was capitalized every year as part of the loan to be repaid later. This capitalization of accrued interest is responsible for the gradual decline in the DSCR in the years 2006–2010 as the company's debt obligations gradually increased thereafter. The ratio increased again in 2013, as a result of the company's 2012 initial public offering (IPO) whose proceeds were used to settle the balance of the shareholder loan. This reduced Umeme's total debt service leading to higher levels of DSCR again. However, this rise was short-lived as the company acquired a syndicated term and revolving credit facilities worth US$235 million[60] from IFC, Standard Chartered Bank and Stanbic Bank Uganda Ltd in 2013, leading to a much lower ratio in 2017 – a year when the company (after the consent judgement Amendment No. 5) had to write off USh 115 billion regulatory receivables from its books – arising from the ERA contested growth factor revenues/excess sales and income tax. This occurrence coincided with the tariff miscalculation in the same year by ERA, creating revenue shortfalls in providing for lifeline tariff surcharges and ultimately affecting the EBITDA and DSCR. However, this was a one-off event. The low DSCR in 2018 is because the company paid out USh 259,809 million in principal and USh 92,516 million in interest, which was the highest cash-out in the period of the debt term facility. The low levels of DSCR in 2018 and in 2019 indicate a weakness in its financing structure as a single major event that could impact liquidity, or its EBITDA could result in Umeme breaching its debt covenants. Nevertheless, Umeme still retains a DSCR above the minimum.

In contrast, the debt-to-equity ratio (D/E) performance, also referred to as leverage or capital gearing, and a measure of the degree to which a company is financing its operations through debt versus wholly owned funds, has been very healthy and within optimum debt covenant limits of 2.5 – except for the early years of the concession 2005–2008 (Fig 5.14). The D/E ratio was due to the relatively low share capital that Umeme shareholders had invested in the company, and the accumulated losses incurred by the company during these early years that led to negative total equity. Starting 2007, the D/E ratio reduced

[60] US$90 million is designated as term Facility A lent by IFC and US$125 million as term Facility B lent by Stanbic Bank Uganda Ltd and Standard Chartered Bank. US$15 million and US$5 million were designated as revolving credit facilities with Stanbic and Standard Chartered Bank respectively.

when some of the shareholder loans were converted into equity, leading to increased share capital. Subsequently, from 2009 onwards, the company's operations started generating substantial profits, which were accumulated in retained earnings, thereby growing the shareholders' funds (equity) and bringing the D/E ratio to levels within the desired limit in subsequent years. This is attributed to the increased share capital arising out of the 2012 IPO as well as from increased profits that had accumulated in retained earnings. This also increased the shareholders' funds (equity) and offset the significant borrowings that were acquired during this same period.

Umeme's debt-to-asset ratio (D/A), an indicator of the utility's financial leverage, or the percentage of a company's total assets that are financed by creditors, or a measure of how much debt the business is carrying to finance its assets, shows that the company's D/A ratio never got to levels below the desired upper threshold of 50% during the period 2005–2019. This indicates that the company's operations are capital intensive, with internally generated funds not being sufficient to fund the company's capital investments. This is unique because unlike other SOEs such as KPLC or TANESCO that receive state subsidies, Umeme relies mostly on external debt financing for its capital investment needs (Fig 5.15). In 2019, the company's D/A ratio indicated that approximately 70% of the company's assets on its balance sheet are funded by debt[61]. The solvency performance is further assessed by the company's interest coverage ratio (ICR) also known as income gearing, which is used to determine how easily a company can pay its interest expenses on outstanding debt. The preferred ratio by lenders is 1.5 or greater. Umeme's interest cover was consistently above 1.5 (Fig 5.16) indicating that the company's operations were healthy enough to meet its interest payment obligations. The company's performance in the years 2013 and 2014 shows the ICR grew exponentially high, due to the retirement of the shareholder loans in 2012 and using the proceeds from the IPO to reduce the debt burden as well as interest expenses. Umeme also negotiated a grace period of 3 years on the term loan from 2013–2015. However, in the subsequent years up to 2019, the company increased its drawdowns from the facility A and B, which increased its debt burden beyond pre-2012 levels, thereby increasing its interest expense. This explains the significant decrease in the interest cover ratio in years subsequent to 2014. Umeme has, on average, been able to meet its interest coverage ratio of 2.5 consistently.

With reference to the liquidity ratios, Umeme's cash or self-financing ratio performance has, on average, been above the minimum desired level of 1 for the period 2005–2019 (Fig 5.17). The ratio indicates the

[61] Apart from the US$235 million term facility in 2013, Umeme has acquired other short-term facilities of US$20 million from both Standard Chartered Bank in 2017 and from DFCU Bank-Uganda in 2018.

company's ability to cover its finance costs from its internally generated cashflows. The high values in the early years relate to the low investments made then since the company had just been established, while in the later years it is due to deliberate efforts to reduce investments due to increased regulatory risks associated with recovery of previously invested funds as well as increased uncertainty as the concession nears its end in 2025. Lastly, we assess Umeme's liquidity using the acid test ratio (quick ratio), which compares liabilities that fall due within the year with cash balances, and assets that quickly turn into cash within the year (current assets). A minimum value of 1 is preferred as this shows that the entity's liquid assets are sufficient to meet its current liabilities. Umeme's performance in this ratio was poor and below 1 for the period 2009 to 2019 which points to the company's negative net cash flows in this period (Fig 5.18). This may partly be explained by growth of the current portion of the loan liabilities on account of increased borrowings on Facility A and B as well as on the increase in the short-term bridge facility for CapEx, which depleted its liquid assets and increased the company's reliance on external funding for its continued operations. This is true for Umeme since its inventory is largely made up of materials used in expansion of the network and corresponding repairs and maintenance, and does not have a ready buyer in the market should Umeme want to liquidate its inventory.

In summary, Umeme is financially sustainable, reflecting the benefits of private management and investors, operating within a robust concession agreement within a restructured and reformed power sector and an independent regulator.

5.7 Summary of Findings and Analysis

In concluding this chapter, the researcher offers a systematic analysis of how power sector reform and principal–agent theories provide an analytical framework, which gives a deeper explanation and understanding of drivers of performance in Uganda and Umeme Ltd. An analysis of these structural and governance reforms and practices reveals why certain reform interventions improve performance and others fail.

This Uganda case study provides a stark contrast between a traditional vertically integrated state-owned utility that was performing disastrously, and a restructured, unbundled sector, with private concessions which have performed a lot better. Unfortunately, little performance data has survived from the old UEB period, but by comparing current Umeme data with general reports from the previous epoch, there is no doubt that Uganda's power sector is in much better shape. The previous weak governance and poor performance of the state-owned utility (UEB), which had accentuated agency problems such as entrenchment of non-commercial habits and attitudes, has been transformed by structural and

governance reforms, providing space for market-oriented ownership, management, regulation and incentives that mitigate agency problems. This revitalization helps to improve the adequacy, efficiency and financial sustainability of supply, although with disappointing progress in access, reliability and affordability.

At a macro level, power sector reforms in Uganda have been deep, extensive and fast-paced, resulting in restructuring (vertical unbundling) of the power market to create separate corporatized entities (for generation, transmission and distribution), with a much wider private sector participation than in Kenya and Tanzania. The restructuring reforms have created new governance arrangements that have sent strong signals to private investors and to market entry in the form of IPPs. The reforms have made way for robust concessions that guarantee investor returns, enabling a financially viable and profitable utility. The profitability of the distribution concession (agent) has relieved the government's treasury of the burden of previous huge subsides. In addition, institutional reforms resulted in the creation of an independent electricity regulator – ERA – with a devolved institutional mandate and powers to regulate and supervise new market players, a role that was previously carried out by MEMD. This devolution of powers from the principal (government) has, as previously mentioned, enabled ERA, in a balanced manner, to conduct fair competitive licensing of new generation plants; to conduct transparent tariff reviews; to set cost-reflective tariffs, and to monitor performance and enforce compliance standards on behalf of the principal (government). The regulator also approves PPAs and sets performance targets for distribution companies. Through its tariff-setting and performance monitoring, ERA has created a framework for distribution agents to reveal their operational performance through information reporting, thereby mitigating information asymmetry and moral hazard problems. Because ERA (as principal) is engaged in a long-term relationship with the agent (Umeme) – defined in a 20-year distribution and supply licence – it is accorded an opportunity to learn about the agent's behaviour and is able to assess performance more readily.

At a utility level, power sector reforms introduced new market-oriented governance arrangements defined in a concession model. The concession is highly legalistic and defines a long-term (20-year) contractual relationship between government, represented by UEDCL (the principal) and Umeme Ltd (the agent) and offers incentives for efficient and robust utility management frameworks that drive performance while optimizing risk-bearing between the principal and the agent. Specifically, the concession model provides strong incentives for efficient costs and for capital raising through shareholder

equity and private finance, with a guaranteed return on investment of USD 20%[62] The concession is both a behaviour- and outcome-based contract. Through UEDCL, as the principal signatory to the LAA contract, government retained ownership of distribution assets, while Umeme assumed rights and leasehold interests and obligations to invest in as well as to operate and maintain the distribution network. UEDCL retained rights, but not an obligation, to "observe and inspect" (monitor) Umeme's investments into the distribution network, subject to the LAA agreement's 'Refurbishment and Restoration Plan'. Umeme is then obligated to pay monthly or annual lease rental fees (max, US$16.3 m) for use of network assets, which are also used to replenish the escrow account (comprising of UEDCL legacy debts, depreciation, return on equity (10%) and administration fees (including O&M costs approved by ERA) and is also obligated to make quarterly reports and to provide an asset register to UEDCL.

This contractual arrangement removes the conflict of interest between the principal and the agent in the operation of the network. The statutory quarterly inspections and reporting obligations help remove potential information asymmetry and misrepresentations of modifications of the network (adverse selection) to the principal. This relationship is regulated by the ERA which, jointly with UEDCL, monitors and verifies all investments made to the network, oftentimes disallowing certain components of investments executed without ERA approval or considered inefficient in delivering intended objectives – an issue that has to date seen over US$107 million in investments unrecognized in the asset base. Meanwhile, ERA retains responsibility to approve the amount of lease fees allowed in the determination of annual base tariffs. Except for administration fees, in an effort to lower tariffs, lease fees, since 2012, have been removed (upon government conversion of UEDCL debt to equity).

Another contractual relationship exists between Umeme and the Uganda Capital Markets Authority and that for Kenya. Being cross-listed on the Uganda and the Nairobi Securities Exchange implies that Umeme must satisfy the same governance regulations as those applicable to KPLC – discussed in previous chapter 4 – in addition to the Uganda Securities Exchange listing rules (USE-Uganda, 2003). As with KPLC, these listings alter the governance arrangements of Umeme by (1) adding another regulator; (2) adopting mandatory requirements for inclusion of independent non-executive board members for balanced monitoring and for minimizing agent opportunism by senior executives, and (3) providing for accountability reporting, not only to the board, but also to the wider stakeholders such as customers, the

[62] Because outcome uncertainty was higher in 2005 and within the context of Uganda as a low developed country with unstable political, economic and social conditions, the agent's (Umeme) risk aversion was higher, attracting a higher risk premium and necessitating use of a positively related behaviour contract.

public, the media, investors and other market participants. Listing regulations require Umeme's reporting and disclosure of 1) audited half-year and end-of-year financial statements; (2) board operations and control systems; (3) rights of shareholders and stakeholder relations; (4) ethics and social responsibility; (5) management accountability, risk management and internal controls, and (6) transparency and disclosure of material information that may affect the company's financial performance and share price, including profit/loss warnings to shareholders, and (7) the insider trading policy. Compliance reporting is mandatory – that is, not later than four months after the end of every financial year.

This intensive reporting system helps to increase agent transparency, to limit information asymmetry and to align agent interests with those of the principal. In addition, the First Schedule of the Capital Markets (Securities) (Public Offers, Listing and Disclosure) Regulations, 2002 (amended 2016) sets out minimum requirements for listing as well as the continuing obligations of the listed entity. Among these are mandatory obligations to have a clear future dividend policy, a track record of profitability and the future prospects of declared profits after tax. The code of corporate governance practices for issuers of securities to the public (Government of Kenya, 2015b) reiterates the rights for every shareholder's entitlement to distributed profit in the form of dividends and other bonus shares, script dividend or rights issue, as applicable. The listing and disclosure regulations further outline a requirement for solvency and adequacy of working capital. Umeme is thus required to be solvent and to have adequate working capital. It also sets as a mandatory requirement for the company not to be in breach of any of its loan covenants, particularly regarding the maximum debt capacity. In return, the company can access cheap equity through rights issues. These incentives have pushed Umeme to strive for improved financial performance over time.

The concession shifts most of the management, operational and financial risks of the traditional state-owned utility model – which were mostly in failure mode – to a private utility but within a framework that has enabled the concessionaire's financial viability and profitability. Through concessioning, there is delegation and devolution of management of operations of the utility from government (SOE) to an independent company (agent) with more diversified skill sets, experience and competencies to operate efficiently. The shareholders and investors, through a management services agreement (contract), allocate risk management and operations to a newly selected competent team of directors (board) as well as to a senior management team (SMT). The board – by internally controlling, monitoring and supervising senior management so as to align behaviour through performance target-setting and strategy execution and, externally, via quarterly reporting to investors – assists in reducing information asymmetry. For

example, the ESG committee of the board helped not only to establish and monitor compliance with acceptable ESG practices but also to improve financial transparency and reporting, and to hold management accountable for clear, measurable targets of finance and operation. Unsupervised managers can behave opportunistically. The ESG committee was especially critical to Umeme's growth and development as it was a key enabler in protecting shareholder interests and attracting additional capital from international investors such as the IFC. Risk management and roles are further allocated and cascaded through individual employment and performance contracts. Critical services such as new connections, prepayment retrofits and CapEx execution are outsourced to private contractors for faster turnaround. This facilitates timely completion of set targets. Other mechanisms utilized to improve performance include the use of external lawyers and consultants (Actis ESG's global team of specialists), helping to align the company's strategy and performance obligations. Hence, both new ownership, top management and professional staff are vital for post-privatization success.

Regarding access to electricity, structural reforms establishing the REB/REA – which is responsible for grid extensions to rural areas – have helped to marginally increase public and donor funding to moderately expand distribution infrastructure in rural areas. However, insufficient connections have been made as LV lines still go overhead households. Umeme has not adequately invested in connections. Connection affordability has long been a major barrier to access expansion and is foreseen to remain that way into the future if the concession terms are not revised. Nevertheless, ERA has played a positive role to overcome these challenges by setting electrification targets as part of the power supply and distribution licensing process, first for the period 2005–2011 and then for the period 2019–2025. While the initial targets set for Umeme in 2005 were not ambitious, and lacked penalties if the targets were not met (later dropped in the 2012–2018 period), the ERA has recently been impressive in setting stretch connection targets for Umeme. It has also provided for a requisite capital investment allowance in the tariff (earning 20% return) that has allowed Umeme to expand the network and to increase connections on average by 150,000 per year – total connections1.4 million to date relative to the pre-reform period. While this financial incentive is adequate, Umeme has been less than enthusiastic and did not expand connections citing concerns about affordability and low loads/consumption among rural customers, which does not result in a positive cost-benefit analysis. Umeme was also wary of high losses, which would overturn its profitability objectives to shareholders (considering it has a 50% PAT dividend policy) and unwind efforts to achieve loss reduction targets set by ERA. Specifically, Umeme chose to pursue a profit motive at the expense of greater electrification. To increase access, deliberate public funding must be provided to compliment private capital as is the case in Kenya.

ERA has also created an enabling regulatory framework for market entry of other distribution concessionaires and mini-grid operators, including the pilot Utilities 2.0 project that seeks to increase access in areas under the grid within central Uganda. Despite this increase, the overall proportion of the population with access to electricity remains unacceptably low. Affordability remained a huge challenge until the advent of the electricity connection policy in November 2018. While Umeme has made efforts to increase connection numbers, the private sector model of driving universal access is inadequate on its own, without subsidies. This is a fundamental weakness of the concession design. Recent cooperative relationships between sector agents and donors have helped to marginally increase connections but these fall short of what is being achieved in Kenya and Tanzania and calls for government and donors to help subsidize connections for low-income households.

By contrast, private sector participation reforms have resulted in a high number of IPPs (38) through the GETFiT programme, the Bujagali project and through other IPPs –which have increased security of supply – along with the two large Chinese-funded hydros. ERA has also helped to streamline the licensing process and is developing templates and financial models for new projects. It is standardizing PPAs and implementation agreements, which have encouraged entry of small IPPs (capacity up to 20 MW). In addition, the regulator in 2019 revised the REFIT regulations to streamline tariff negotiations for IPPs, helping to improve transparency in pricing.

Despite retaining a significant level of influence in large hydro developments, the Ugandan government has advocated for private-sector-led investments. Continued government involvement in directly negotiated procurements such as the 50 MW Albatros multi-fuel thermal plant in Hoima, however, is seen by industry experts as a conflict of interest that does not allow for competitive and timely execution of least-cost power development plan projects (Eberhard et al., 2016). Nonetheless, through the GETFiT programme, Uganda has proved that with the right incentives, and empowered agents such as ERA, competitive procurement of renewable energy is possible in an African country that is different from South Africa and its large renewable-energy auctions. Uganda has subsequently built a track record and reputation for renewables within an unbundled sector despite skepticism about its system size and which many said was not possible.

Meanwhile, Umeme (the agent) has mobilized private capital and invested over US$656 million in infrastructure rehabilitation and distribution systems. The distribution network footprint has expanded marginally but has been densified, especially within the economically viable Kampala-Jinja corridor, relative to the dilapidated, limited coverage prior to the reforms in early 2000s. Despite significant

investments, reliability challenges remain, especially on the low voltage network, making it a nuisance to users. As was discussed above and similar to electricity access, the initial concession agreement did not have sufficiently strong performance incentives for reliability improvements – a concession design issue, rather than a flaw of the concession model per se. The regulator, too, lacks adequate resources to monitor and enforce quality of supply obligations. Nevertheless, recent regulations by ERA in 2019, setting quality of service targets and incentives/penalties (S-factor) as part of the tariff revenue requirement, will go a long way to compel the agent to perform better and are a positive achievement for ERA, unlike EPRA and EWURA in neighbouring east African countries.

Regarding the affordability of electricity, power sector reforms have driven cost reflectivity in tariff-setting, which has kept the sector financially viable, but higher tariffs have been to the detriment of consumers. Despite recent efforts by ERA and the ministry of energy (MEMD) providing lifeline tariffs and connection cost subsidies respectively, further efforts will be required to lower supply costs and tariffs to more affordable levels for poorer households, and to lower the current average of 7% of household expenditure spent on electricity by the bottom 40% of household income earners. Nevertheless, institutional reforms have allowed a relatively independent ERA to make the necessary tariff increases to ensure revenue adequacy for the sector. ERA has been fortunate, and is more successful, in exercising its independence in setting cost-reflective tariffs and allowing more utility incentives than EPRA and EWURA, because of the political support it gets from the executive, parliament and ministries of energy and finance. The government of Uganda has shown more restraint in influencing tariff and licensing decisions by ERA as well as in making amendments to the licenses compared to Kenya and Tanzania. Secondly, ERA has over time built internal capacity to strengthen licence provisions and has earned the respect of sector practitioners, government and industry participants.

The poor performance of the UEB, in terms of inefficiencies in revenue collection and high system losses, was a major driver for reforms and the restructuring of the Uganda electricity sector, and gave credence to unbundling and the concession model as the best mechanisms for turning around the utility. The model has provided an efficient mechanism in which targets for loss reduction, O&M costs and revenue collection have been comprehensively analyzed and agreed upon, and appropriate incentives provided by the principals – ERA and UEDCL. ERA has been impressive in setting stringent loss reduction and revenue collection targets through the concession's tariff review renegotiation processes. The incentives are supposed to push the company to operate as if it were operating under the threat of perfect competition. Through deliberate investments in the distribution infrastructure and the use of technology, systems

losses have been reduced from 38% in 2005 to 16.6% in 2019, a commendable feat, although they fall short of the set targets. A study by PWC in 2016 estimated savings to the economy of USh 469 billion as a result of the reduction in energy losses and a saving of USh 1,836 billion as a result of reducing revenue collection losses (PWC, 2016, p. 4). The concession model has incentivized revenue collection and protection, amid various sector challenges, including a low willingness to pay. As a result, the concession has ensured sustainable revenue streams for the power-market value chain with no state subsidies (except for low-income household connections). Equally important is the role played by ERA in reducing losses and increasing revenue collection by approving dedicated funding for loss studies and corresponding investments in network refurbishment, deployment of technologies such as prepayment meters, and the use of aerial bundled conductor (ABC) without which Umeme would not have realized these gains as is currently.

Regarding financial sustainability, Umeme performs well in profitability, solvency and liquidity ratios, although with some areas for improvement. In contrast to other utilities in the region, the utility has not made any losses since the commencement of the concession and is profitable as reflected in the positive gross and net profit margins. As the revenue collection entity, Umeme's viability is critical for attracting private investments in IPPs and assuring future payment streams. In this way, the concession has proved that when agents are given autonomy, combined with appropriately designed incentives, they can align their interests to achieve the objectives of the principal. The transfer and lease of distribution assets to private management and ownership for a defined period of time minimizes perverse influence and patronage of the principals, allowing the agent to set clear goals to improve performance. In addition, the listing on the securities exchange, with a more diversified shareholding, creates a new ownership type and structure – combination of foreign investors, multinationals, local institutional investors, local individual investors managers and employees – that not only transfers ownership (for a fixed period) from principal (government) to new private shareholders (agents) with a profit motive but also for improved performance, as some of those local investors are also electricity consumers.

While the concession model limits the self-interest agency problems associated with political patronage, other agency problems arise from the entrenchment of majority shareholders and concerns about foreign ownership of assets perceived to be of national interest.

In addition, Umeme is highly reliant on debt. Since debt incurs a fixed cost of capital and stringent covenants, it plays a crucial role in aligning utility managers' interests with those of investors and creditors to choices that improve performance. The financial prioritization and compliance obligations are enabled

through the availability of information (that is, reporting and disclosures that limit information asymmetry) and potential threat of transfer of financial control to lenders or stiff penalties in case of default, thereby compelling the company to keep in line with the set financial performance covenants. Umeme does not yet have a credit rating, which would be an added incentive as it lowers the cost of capital and could improve the company's profitability. A good credit rating also enables the company to attract additional investors, especially those in different strata of society who could be attracted by a high rating since they understand the degree of certainty about timely payment of interest and principal on debt. Hence, a good credit rating can help management to improve or maintain better financial performance.

In sum, Uganda was the only country in anglophone Africa to adopt a concession model for its distribution assets and it has proved that concessions, if well designed to suit local country conditions and when well managed and consistently supported by all stakeholders, including governments, regulators, utilities and donor community, can be successful in turning around utility performance. Uganda's concession is highly successful in incentivizing efficiency improvements – that is, loss reduction, revenue collections and financial sustainability as these are driven by the profit motive of the concessionaire, but also well designed in the concession agreement to enable sustainability. Ultimately, the viable concessionaire has managed to attract adequate IPPs that have augmented the country's security of electricity supply. Uganda has a viable power sector that can provide adequate and reliable electricity services. One caveat in the Uganda success story has been the lack of adequate progress in electrification and affordability of tariffs for poor households. Power sector reforms, which include private sector participation, need to incorporate social policies and investments in extending affordable services for the most needy.

Overall, the Uganda concession has demonstrated the power of agency in delivering efficient services especially when a clear, well-articulated contractual relationship exist with principals and when proper incentives are allocated to cover existing risks.

CHAPTER 6

DISCUSSION AND CONCLUSION

6.1 Answering the Research Questions

At the outset of this thesis we posed the following research questions:

The main research questions

Why does the performance of power utilities in developing countries differ so widely? In particular, how can we explain, and understand, the varied performances of power utilities in East Africa? Merely examining the different rates of progress in power sector reforms does not appear to fully explain these performance differences. Therefore, at a more theoretical level, this thesis has probed to what extent principal–agent theory, combined with power sector reform theories, provides a more powerful analytical framework to better explain the differences in performance of the utilities in the three countries?

Subsidiary research questions

- To what extent, and how, do structural, governance and regulatory frameworks in differently structured power sectors change incentives and thereby the impact on power utility performance? For example, how do incentives for improved performance differ between the unbundled, privatized distribution company in Uganda, and the partially unbundled and partially privatized utility in Kenya as compared to the vertically integrated, state-owned utility in Tanzania?
- In which ways do the following power sector reforms alter the principal–agent relationship and incentives for improved performance: establishment of an independent regulator, structural unbundling, private management contracts, partial listings of equity, private debt covenants, and private concession contracts?
- To what extent can the difference in performance between the power utilities in Uganda, Kenya and Tanzania be explained by the above analytical framework or are there other important determinants of performance?

The central question of the thesis has been to determine why the performance of power utilities in developing countries differs so widely. This thesis makes clear that merely examining the different progress in power sector reforms does not appear to fully explain these performance differences. Therefore, at a more theoretical level, the question was asked: To what extent does principal–agent theory, combined with power sector reform theories, provide a more powerful analytical framework to better explain the varied performance of utilities?

To answer the primary and secondary questions, this thesis sought to provide a detailed understanding of structural, governance and regulatory incentives for utility performance. A comparative multi-country case-study approach covering Tanzania, Kenya and Uganda was used to provide evidence and deeper insights on the differing performance levels, and the context for such differences. Efforts were also made to unearth a possible rationale for contributing factors for such uneven performance. The analytical framework was informed by empirical case studies that provided rich data, insights and evidence that have deepened our understanding of utility performance in the region. Throughout, the thesis has repeatedly drawn on both the power sector reform literature, especially in relation to how the standard model was applied, and combined it with the principal–agent theory lens to provide an enriched investigation into why utility performance differs. Unstructured and semi structured interviews helped to support deeper analysis of governance, incentives and principal–agency arrangements in each country at particular times. The interviews made it possible to get behind the scenes to understand what had happened and why, and to obtain a range of perspectives and interpretations. The interviews provided considerable country-specific details to illustrate and support broad generalizations. Combining the power sector reforms literature and the principal–agent theory has provided a more nuanced understanding of drivers of utility performance as elaborated below:

6.2 Comparative Analysis of Power Sector Reforms and Governance Arrangements

The adoption of power sector reforms in the electricity sectors of the countries of the three case studies has had different impacts on the performance of their respective utilities. These reforms altered certain governance and regulatory arrangements, creating varying incentives for improved performance. This final chapter provides a comparative analysis of power sector, regulatory and governance reforms in Tanzania, Kenya and Uganda and their impact on utility performance. In combination with the power sector reform literature, and applying the principal–agent theoretical framework, we seek to answer the research questions posed above.

6.2.1 The Standard Model of Reform

Poor technical and financial performance were defining features of many electricity utilities in developing countries in the 1980s. Transmission and distribution losses were high, blackouts were frequent, financial performance was poor –reflected in low debt-service-coverage ratios as well as in insufficient cashflows for new investments – translating into very low electricity access rates, with only 16% of the population in sub-Saharan Africa having access to electricity. Among the immediate causes of technical and financial deterioration were below-cost tariffs. At the time, this situation called for more government subsidies that were greater than the total official development assistance to most countries in the region (Gratwick & Eberhard, 2008b). This underpricing meant that utilities were not able to finance technical improvements through their own resources let alone consider expansion of the grid. Poor financial metrics further prevented many utilities from accessing capital markets given their perceived lack of creditworthiness and institutional governance challenges. In combination, these factors undermined any meaningful economic and financial sustainability of the electricity supply industry (Gratwick & Eberhard, 2008b). To address these performance challenges, and building on the reform experiences of early reforming countries like Chile, England and Norway, the World Bank, in 1993, issued a power sector reform policy that was later adopted by most development financial institutions as a precondition for lending and involved a series of key reform steps in what became known as the 'standard model'. These steps included commercialization, corporatization, independent regulation, restructuring, private sector participation, and competition. The overall thrust of the reform model was to encourage developing countries to develop appropriate market structures and encourage greater competition in the electricity sector, leading to better technical and financial efficiencies. The following sections give a comparative analysis of five key standard reform steps in Uganda, Tanzania and Kenya and their impacts as well as altered governance arrangements.

6.2.2 Corporatization

As the first step of the standard reform model, corporatization aimed to transform the utility into a SOE legal entity separate from the principal line ministry (government), with rights and obligations to transact independently under the regulatory structure of the Companies Act. The new corporation is established with rights and obligations that allow independent governance structures – an independent board of directors, transparent accounting and reporting, perhaps new equity shareholders, but mostly government maintains its ownership. It autonomously manages procurement, labor employment and can engage in borrowing from commercial markets, as well as payment of taxes and dividends. Hence the

transformation aims to give the SOE a more market-oriented focus or to adopt more business-like methods to improve efficiency and performance. Corporatization further aims to put state companies on a level playing field with private firms by removing barriers to entry, subsidies and special privileges thereby forcing SOEs to compete for finance on an equal basis with private firms, and giving state managers the same powers and incentives as private managers (Shirley, 1999). Additional energy or electricity acts were enacted by different governments to explicitly grant utilities greater autonomy.

This corporate restructuring process alters the governance arrangements to directly mimic the private sector enterprise, although implementation might differ, ranging from situations where ownership may be mixed - as is the case in KPLC - to different governance arrangements that formally permit different levels of autonomy or even maintaining the existing political and hierarchical relationships (James, 2005), as is the case in TANESCO. Adopting a new organizational form can lead to a change in agency behavior because of the changed relationship between the central government authority and the new corporation and in the changed agency-employee relationship that increases managerial autonomy and incentives. According to Talbot (2004), most privatizations of SOEs go through a corporatization phase and that is where most of the performance efficiency gains arise because managers expect to reap the rewards following privatization. Interview respondents in Kenya argued that corporatization was preferred because it offered better prospects of incentive schemes linked to performance, better job security rather than outright privatization and enhanced job salaries relative to public service remunerations. Corporatization therefore leads to realignment of incentives for managers and employees within the new entity thereby resolving potential multi-principal-agency problems associated with self-interest, shirking and goal incongruence. For example, the composition of an independent board of directors is crucial in managing the influence of ministers and policy by creating an 'arm's length' relationship between the government and the new corporation thereby improving clarity in business decisions (Nelson & Nikolakis, 2012).

According to Shirley (1999), principal-agent problems arising out of corporatization – information asymmetry, incentives allocation and commitment (moral hazard) - can be solved by using management and regulatory contracts that lead to better outcomes (measured in terms of efficiency and productivity improvements) relative to performance contracts. This is because under management and regulatory contracts, the managers of the new corporation typically have an incentive that gives them some claim to the returns, or managers can demand that the government demonstrates evidence of some kind of commitment before entering the contract, or the contract awarded to private managers is usually

allocated through a competitive process. Corporatization therefore leads to enhanced commercial performance through improving clarity around business decisions and increasing the autonomy of managers. Unfortunately, this is not the case in TANESCO as these powers (autonomy) were retained by the government, unlike in KPLC and Umeme. Because there is no specific law establishing TANESCO as an autonomous entity, this independence – especially regarding possible diversity in ownership (as in the case in KPLC and Umeme) – is non-existent. The utility also has restrictions on borrowings and accessing capital markets – mainly exercised through government. The government of Tanzania still directly influences key operational, management and technical decisions which undermine techno-economic choices of the utility. While it was imperative that commercialization be adopted – by which it was meant that entities within the electricity supply industry must operate as commercial enterprises and with more transparency – governance arrangements in Tanzania continue to be largely opaque and appear to be broken, hence impeding the desired good management of the company.

Governance arrangements in Tanzania's power sector are typified by an enduring malfeasance, especially in procurements of new IPPs and financial handouts to politicians and ministry technocrats. Despite efforts to put in place a performance contract (PC) to guide commercialization practices, the government still influences key provisions of the PC by inserting additional social or developmental obligations that are not directly related to the provision of electricity services and, as a result, impose a huge financial cost to the company's resources. Regrettably, the PC itself is poorly designed and does not provide any incentives for performance improvements. TANESCO's organizational reform must directly and contemporaneously address labour issues since most serious efficiency and performance problems are rooted here.

While corporatization reforms created stronger governance arrangements in Kenya's KPLC, similar government interventions with the insertion of provisions in the PC to achieve social and development objectives exist. Some of these include presidential directives, local content in procurements, employment quotas and ambitious electrification targets that have affected the utility's financial health, although, in sum, not to the same extent as TANESCO has been affected. In contrast, Umeme has well-defined laws establishing it as a private company, which have insulated it from government influence. Corporatization reforms enabled the establishment of UEDCL (asset owner), UETCL and UEGCL, all operating under company law with specific statutes in addition, confirming their semi-autonomy status, and with independent boards of directors, which have facilitated the well-functioning governance framework of the sector.

6.2.3 Regulation

Regulatory reform refers to the establishment of an autonomous entity with responsibilities for regulatory oversight and decision-making in key areas such as licensing (market access), tariff-setting and technical and service standards. Regulatory reform is concerned with defining the scope, authority and methods used by the regulator to address privatization or PSP issues associated with incomplete information, monopolistic behaviour, market uncertainty and conflict of interest, protecting investors from unacceptable risks and for the protection of consumers. It is also concerned with introducing efficiency, transparency and fairness in the management of the sector participants. Autonomy or independence is usually understood to be independence in making regulatory decisions, which might only be overturned via a pre-defined appeal mechanism. Historically, in most developing countries, electricity sector policy-making, regulation and service provision had been combined within the line ministry of energy. However, with widespread corporatization of the service providers to establish utilities distinct from the line ministry (as well as growing delegation of these activities to the private sector) the need for clearer regulation has been essential. All three case study countries have successfully established an independent regulatory entity. However, in Kenya and Tanzania, the government (principal) has not fully delegated its oversight and supervisory role to the regulator (agent). Independence is considered important to insulate the regulator and ultimately the utility (agent) from short-term opportunistic political interference and conflicts of interest that may threaten the achievement of certain long-term strategic objectives of the sector. However, in practice and from our findings, complete independence has proved difficult to realize in the three countries. Governments still influence key regulatory decisions because they find it difficult to cede their discretionary powers to control important resources and regulatory outcomes that guarantee political patronage. For example, in Tanzania, tariffs were kept below cost-recovery levels when the 2012 and 2017 tariff reviews were overturned and, subsequently, the director-general was fired. Likewise, in Kenya, the ERC/EPRA has conducted only three tariff reviews in a period of 20 years, despite the mandatory requirement to have the review done every three years. In both countries, political sensitivities (especially during elections periods) have prevented tariff reviews from being conducted. In Uganda, political pressure has led to a revision of the tariff structure to provide cross-subsidies for the extra-large industrial customers – a category newly established to promote manufacturing. This, however, is a less financially harmful act than the interferences in Kenya and Tanzania. Interestingly, Tanzania's electricity act grants EWURA powers to approve the initiation of procurement of power projects, unlike Kenya's ERC/EPRA and Uganda's ERA. This provision is a commendable provision in the regulatory framework in Tanzania as it seeks to discourage costly, unsolicited proposals that fall outside the

masterplan. As a result, the provision has helped EWURA to procure more small power-producers more competitively. However, EWURA has not had much influence over the procurement of larger power projects and Tanzania has been exposed to a litany of scandals around non-transparent, directly negotiated power deals. Unfortunately, regulation in all three case countries is still prone to high levels of information asymmetry and unobservable behaviour by the utilities (agents). This is particularly true of inefficient expenditures (CapEx and DOMCs) and weak operational supervision resulting in enduring problems of limited access, poor reliability, and financial challenges for utilities, and this ultimately continues to increase the cost of electricity. In addition, since the leadership of independent regulatory agencies are appointed by the line minister of energy, or the president, their independence can be compromised. Nevertheless, Uganda's ERA has achieved more legal, technical and commercial independence and has been more successful than EPRA and EWURA, because of government restraint in regulatory decision-making as well as from ERA's ability to build capacity overtime and its good leadership. This capacity has enabled the ERA to gain respect and credibility among public and private stakeholders. The Electricity Regulatory Index survey undertaken by the African Development Bank (ERI, 2018, 2019, 2020) has, for the third time in a row, ranked Uganda as the best-performing regulator on the continent, followed by Tanzania and Kenya in 2020.

The delegation of regulatory authority from political decision-makers to an independent regulator enables the development of the expertise needed to resolve technical regulatory matters and to move towards information symmetry between the agent and principals (government). Regulation helps to minimize the information rents enjoyed by utilities.

However, delegation may also create a new set of information asymmetries between the regulator, line ministry and the regulated utilities since it is impossible to spell out in explicit detail all the precise obligations of the agent through the lifespan of the contract- adverse selection. Regulation also enables monitoring of the performance of private agents to minimize information asymmetry and other conflicts of interest since certain actions of utilities cannot be ordinarily observed by the regulator who only sees the outcome (moral hazard) (Pardina & Schiro, 2019). Regulation, therefore, occupies an intermediate position along the continuum between public and private ownership and their interests. For example, because most regulatory agencies still draw budgets from government (principal) and their leadership is appointed either by the line minister or the president, they lack absolute independence in exercising their mandates. On the other hand, regulatory agencies are obligated to ensure full recovery of investment capital owed to private investors. Hence, with regard to facilitating utility performance improvements,

regulators are expected to play a delicate balancing act between the principals (government) and the agent (utility), which, more often than not, has become complex in environments with inadequate institutional capacity and lack of political support.

Regulation can also help to mitigate operational information asymmetry and minimize risk-bearing costs and preferences (Sappington & Stiglitz, 1987). Typically, the objective function of the independent regulator as a principal is to minimize price subject to financial sustainability of the company. However, the regulator may not have legal authority (incomplete agency contract) to collect all the necessary data (information asymmetry problem) to conduct efficient price reviews that deliver an optimal tariff for consumers. Additionally, since regulated utilities and IPPs are generally characterized by complex management and production techniques so that the capabilities of each, and the risks inherent in production are difficult to discern, independent regulators play a crucial role in gathering information that can inform policy decisions and limit rent seeking behaviour. In doing so, the regulator, when properly incentivized, develops the expertise necessary to direct activities of the agent (utility) in the best interest of the consumers. Therefore, regulation helps to lower transaction costs of intervention by government and the private sector.

In the matter of costs, however, because utilities use complex specialized equipment and assets to run the system networks, which have limited alternative use, they face a high-risk exposure and are prone to expropriation once installed (Vagliasindi, 2012). Consequently, to attract investment in these assets (especially generation IPPs or concessions), the government must be able to credibly commit itself to not exploit the owners of these assets once they are in place. The institution of regulation helps to provide such commitment ability. Hence, regulators, in approving tariffs, should award fair rates of return to investors. In this way, the role of the independent regulator is to facilitate risk sharing in a manner that does not eliminate incentives for efficient performance. By defining the rate base on which a fair rate of return is allowed, independent regulators can penalize the utility for underperformances that were due to its own shortcomings, while, at the same time, ensuring that consumers share some of the burden of unfavourable events that could not have been foreseen and avoided.

6.2.4 Unbundling/ Restructuring

Unbundling reform is defined as the movement along a continuum towards full vertical and horizontal unbundling of the electricity sector. The starting point is usually a vertically integrated national monopoly utility, and the envisaged end point a fully restructured sector entailing vertical and horizontal unbundling of the generation and distribution segments to create multiple companies operating in parallel. Vertical

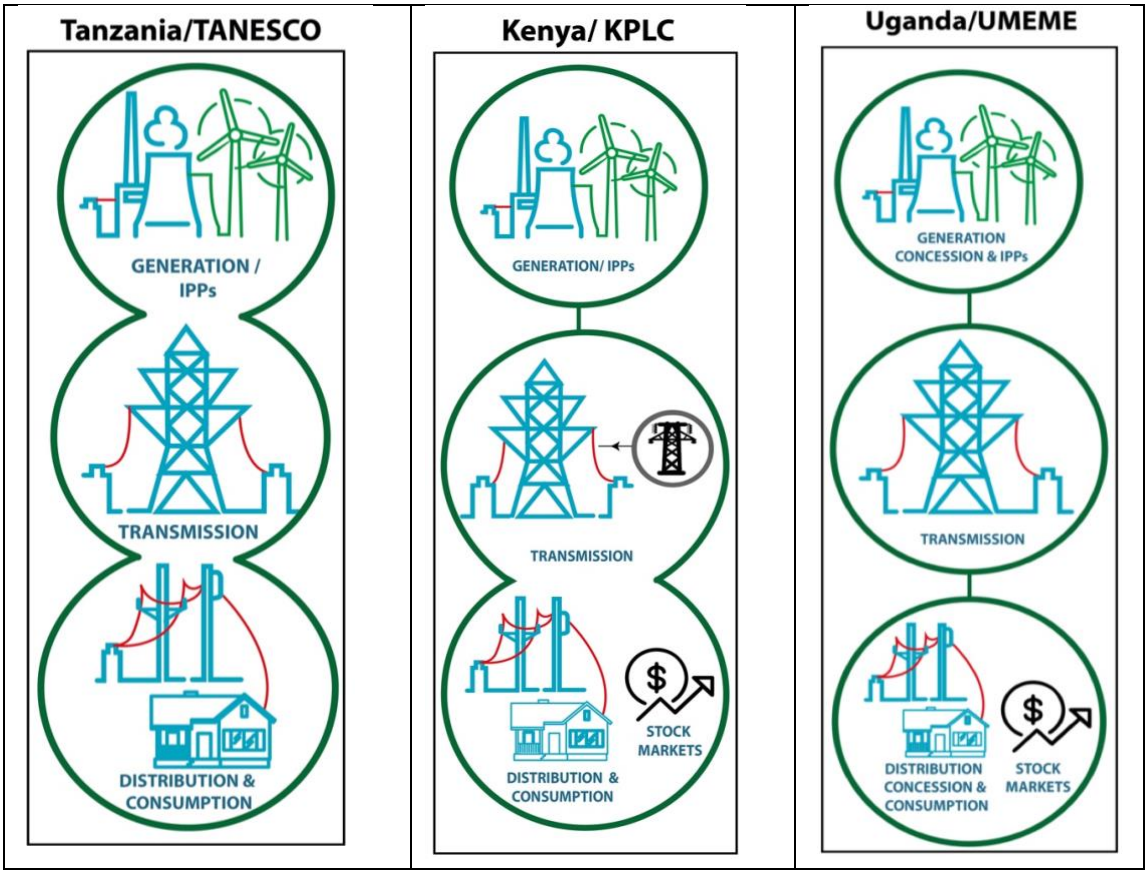
unbundling also refers to separation of generation, transmission and distribution to separate the competitive elements of the industry from the natural monopoly components in preparation for private sector participation and the introduction of competition. Horizontal unbundling, on the other hand, involves the separation of generation into a number of competing companies and allows the entry of new players (IPPS). The distribution sector can also be broken up into regional distributors whose performance can be benchmarked against each other. Table 6.1 below shows a comparison of restructuring progress in the three case studies.

Table 6.1: Comparison of Restructuring Reform Adoption and Progress

	Model Classification	**Defining Characteristics**	**Tanzania**	**Kenya**	**Uganda**
1	Vertically Integrated	Generation, transmission and distribution are undertaken by a single vertically integrated entity.	x		
2	Partial vertical unbundling	Either generation has been separated while transmission and distribution remain combined, or distribution has been separated while generation and transmission remain combined		x	
3	Full vertical unbundling	Generation, transmission and distribution have each been separated from each other			x
4	Full vertical and horizontal unbundling	Generation, transmission and distribution have each been separated from each other, and further generation and/or distribution tiers have been restructured into multiple entities			x

Source: Author's creation

Figure 6.1: Current Status of Reformed Power Structures in Tanzania, Kenya and Uganda



Source: Author's creation

The rationale for unbundling is that some parts of the electricity value chain are open to competition (such as generation) while others (such as the wires – transmission and distribution) tend to be a natural monopoly. The retail aspect of distribution is also potentially competitive – that is, traders or sellers of electricity may compete for customers. Vertical separation of the distinct market segments was believed to guard against cross-subsidization between competing and regulated businesses, and to minimize discrimination and conflict of interest practices such as denial of access to networks, procurement of new capacity and in dispatch prioritizations.

Unbundling introduces several agency relationships aimed at improving efficiencies and better management of risks and uncertainties in the different segments to allow for allocation of better-targeted incentives. For this reason, utility performance improvements to the forms and degrees of unbundling in the power markets has been traced. Because corporatized companies operate as independent legal entities, unbundling helps to limit political influence, while helping to achieve commercialization of services.

Evidence from our case study principal–agency analyses shows that managers in SOEs might focus on the objectives of politicians, rather than on maximizing company efficiency[63]. Therefore, critical agency problems relating to vertically integrated SOEs have more to do with agency issues of political control than with agency issues of managerial discretion, which unbundling helps to minimize.

Commercialization is easier to achieve in the distribution segment where revenue collection for the upstream generation and transmission, by a dedicated agent, is a priority objective. Unbundling also allows for enhanced corporate governance, easier institutional capacity-building[64], increased managerial focus, accountability and transparency in each unbundled segment. Because of increased managerial focus and dedicated teams within the separated legal companies, unbundling increases specialization in task execution, reduces information asymmetry and moral hazard. It further lessens concealed conflicts of interests, including insider trading scenarios. There is greater visibility of staff contributions to overall company performance, making it easy to detect and limit managerial (agent) shirking. This degree of enhanced corporate governance is harder to realize in a large vertically integrated monopoly. These accountability and transparency mechanisms foster improved performance, especially in the distribution segment.

Despite multiple policy pronouncements that Tanzania was going to unbundle its power sector, TANESCO has remained a traditional vertically integrated monopoly, although a handful of IPPs have been allowed to enter the market. Compared to Kenya and Uganda, which have unbundled generation from transmission and distribution, Tanzania's electricity supply industry manifests a major conflict of interest as the vertically integrated SOE continues to engage in direct procurement of new generation capacity (competing with IPPs) and has incentives to prioritize grid access for its own generation capacity as opposed to that of competitors. In addition, technical and commercial inefficiencies, as well as governance challenges, permeate in the transmission and distribution segments, impacting its financial viability and limiting cashflows. Ultimately, service delivery deteriorates.

[63] Productive efficiency requires a utility to minimize the cost of generating, transmitting and distributing electricity to serve existing customers or if it can maximize the utilization of available energy resources and infrastructure to deliver a reliable service to consumers. In contrast, allocative efficiency requires that prices be set to reflect the marginal cost of production so that an efficient level of investment can be implemented and for consumers to have reliable services. However, most often SOEs have less or no incentives to aspire for productive efficiency and regulatory independence in setting cost reflective tariffs has been undermined or rescinded thus affecting the allocative efficiency objective.

[64] Training management to meet or exceed the set performance targets, easier recruitment of new staff with relevant expertise.

In Kenya, generation has been unbundled, leaving transmission and distribution vertically integrated, which has allowed for KenGen, the power generator, to operate on a commercial basis. Restructuring has also enabled more easily market entry for more IPPs, contracted by KPLC. Subsequently, more than 17 IPPs have been operational and a further 25 are in the pipeline with approved PPAs. Kenya is one of the few countries in Africa with a surplus reserve margin in generation capacity. Despite this achievement in generation, challenges remain in the transmission and distribution segment. In contrast, Uganda has undertaken the most extensive form of full vertical unbundling, unbundling generation, and transmission and distribution, and was able to realize this in a short time span of six years. Uganda has subsequently been able to attract the highest number of IPPs (38) relative to Kenya and Tanzania. This is partly because of increased transparency, competition and elimination of the conflict of interest in new generation capacity acquisition, enabled through separation from the transmission system operator.

In the standard model of power sector reform, horizontal unbundling of generation was meant to create competition by facilitating power trade through a power exchange, spot market or bilateral contracts. To encourage competition, private investment was encouraged in the form of IPPs with long-term contracts, or through full divestiture and privatization of assets. While no spot market or power exchange exists in any of the three case-study countries, bilateral cross-border exchanges of power (primarily for system stabilization) exist between Tanzania, Kenya, Uganda. Efforts are being made to create a functional Eastern Africa Power Pool that will, in future, facilitate power trade and, hopefully, a spot market.

Another consideration for vertical unbundling relates to the desire to achieve greater transparency and accountability of management along the electricity supply chain. Vertical unbundling in Uganda and Kenya has achieved this objective compared to Tanzania. The introduction of focused management teams for the distribution segment of the market, coupled with listing on the stock exchange and its strong compliance obligations, has helped to increase focus on performance objectives – translating into reduced losses and increased financial viability and sustainability. This is not to say there are no remaining challenges. However, overall, more incentives have been created which have spurred greater transparency and accountability and have ultimately translated into increased technical performance, financial viability and shareholder value. For example, restructuring enabled KPLC and KenGen to achieve a rebalanced and near cost-reflective tariff that helped to generate revenues which improved their balance sheets. Subsequently, they both have been listed on the stock exchange and are able to raise private equity for system expansion and operations. Listing on the stock market has further helped to improve governance arrangements in KPLC – reflected in enhanced accountability, transparency,

managerial focus and compliance – over time helping to improve its financial health. Likewise, Umeme has greatly benefited from listing on the securities exchange as a result of greater governance and compliance regulations which, in turn, have helped to sustain its financial performance. By contrast, TANESCO, which is still vertically integrated and government-owned, is riddled with operational and financial failures.

6.2.5 Private Sector Participation (PSP)

Private sector participation was recommended as an alternative market intervention to counteract the pre-reform inefficiencies and poor performance associated with SOEs. PSP was encouraged as a means to shift investments and create managerial incentives towards profits, cost control and customer orientation. It was further envisaged that PSP would facilitate a faster expansion and efficient growth of the electricity system – especially in generation – to do away with pervasive power shortages, while efficiencies would lower costs and increase profits. In instances where tariffs were below cost, privatization would help to increase them to optimal levels.

Private sector participation and privatization efforts in developing economies typically result in the transfer of ownership (whole or in part) from the state to new owners and, therefore, create agency problems of managerial perquisite consumption (Gedajlovic & Shapiro, 1998) and entrenchment (Claessens, Djankov, Fan, & Lang, 2002). PSP arises out of the high-risk aversion of the principal in managing utilities or bearing the high cost of investment needs. PSP helps to solve the principal-agent problem by realigning incentives such that the private owners (not the government) claim the residual benefits.

According to one of the interviewees in Kenya, "PSP further helps to cut agency problems of vested interests and networks of political patronage that prevent many utilities from providing optimal electricity services". By introducing a profit motive, the private sector agents create incentives for efficiency and allow utility businesses to be conducted according to commercial principles. In practice, PSP is preferred because it introduces incentives for hard budgets, cost control, greater revenue collection and customer orientation, which result in strong revenue streams for the utility. Strong financial positions help to minimize subsidies from governments (Pollitt, 2007).

Private sector participation can involve management contracts, leases, concessions or divestiture. The transfer of control and/or ownership alters the governance framework of the utility and introduces agency relationships between the state or asset-owner (principal), and the new concessionaires or owners and

management (agents) of the privatized company, in the form of function delegation. Often this delegation and relationship is in the form of a contract. In some cases, PSP contracts, especially with IPPs, have fixed terms of up to 20 or 30 years, but they can also take the form of complete, indefinite privatization. Concessions, leases and private management contracts, on the other hand, transfer 'rights to operate' the network for a specified period of time – usually 20 to 25 years for concessions, and 2–5 years for management contracts. Private sector participation in Tanzania, Kenya and Uganda has been implemented differently and to varying degrees along a number of dimensions including scope, segment and coverage, depending on the host country's degree of preference. The table below provides a comparative assessment of PSP in the three case study countries.

Table 6.2: Forms of Private Sector Participation and Levels of Adoption

	Model Classification	**Sector Structure Characteristics**	**Tanzania**	**Kenya**	**Uganda**
1	Public ownership	All generation and distribution companies are under public ownership and management	x		
2A	Some degree of private sector participation in generation only	At least one generation company has been privatized, or there is at least one public–private partnership for power generation, typically as an *Independent Power Producer*. The precise extent of private sector participation in generation can be gauged by calculating the share of installed generation capacity that is under private control. But there is no private sector participation in distribution	x		
2B	Some degree of private sector participation in distribution only	At least one distribution company has been privatized, or there is at least one public–private partnership for power distribution, typically a management contract or concession. The precise extent of private sector participation in distribution can be gauged by calculating the percentage of distribution companies in the country that are under private control. But there is no private sector participation in generation			x
3	Some degree of private sector participation in both generation and distribution	At least one generation company and at least one distribution company has been privatized or has some form of private sector participation		x	x
4	Some degree of private sector participation in transmission or distribution through capital markets	At least one generation company or at least one distribution company has been privatized or has some form of private sector participation through a rights issue (IPO) and is listed on the stock exchange		x	x

As can be seen in the table above, Uganda has gone deepest into the adoption of private sector participation, reflected in its numerous IPPs, a 20-year private distribution concession and publicly listing its stock on the Uganda and Nairobi securities exchanges. Listing altered governance incentives and created entry and 'quasi-ownership' by private shareholders. Kenya comes second with a significant

number of IPPs and, too, has private sector participation in the form of stock listings in two of its market-oriented utilities – KPLC and KenGen. KPLC was also once operated under a management contract – Manitoba Hydro. In contrast, Tanzania has the least level of private sector participation in the form of two IPPs, and its utility TANESCO remains publicly owned and managed. TANESCO, too, had experience with the NETGroup management contract between 2002 and 2006. All three countries have public rural energy or electrification agencies, but they also have active private sector participation in off-grid and solar home-business models, including pay-as-you go and mobile phone payments systems.

A respondent in Uganda argued that "private sector participation in the distribution segment brings obligations to grow shareholder value through distribution of mandatory dividends (bi-annually). This incentive compels us as private agents (either through concession or stock listings) to focus on improving technical and financial performance or face penalties, which may be financial or legal". Consequently, the empirical analysis shows this to be one of the motivations for improved performance in Uganda and Kenya.

6.2.5.1 IPPs

Uganda stands out in the uptake of private sector participation in the form of IPPs (38) in the east Africa region (second to South Africa continentally), followed by Kenya (17) and Tanzania, with the fewest (4). Uganda is also host to the largest hydro IPP in the East African region – the 250 MW Bujjagali plant. Despite the high number of IPPs in Uganda, their total contribution to installed generation capacity is 638.6 MW or 51% of the nation's total installed capacity, indicating the small size of most of the plants. The majority of these IPPs were successfully procured timeously and competitively through the GETFiT programme. Despite the small size of the IPPs, Uganda was able to provide a robust regulatory, incentive and de-risking framework, creating a conducive and predictable investment climate that attracted a raft of international developers within a shorter time period (pace) compared to in Kenya and Tanzania. This incentive and regulatory framework enabled IPPs to reach financial close faster and projects to be built. Uganda has subsequently built the reputation and credentials for IPP investments within an unbundled electricity sector where many said unbundling was not wise. Kenya, too, has a high number of IPPs with a larger installed generation capacity – 1,013 MW or 36% of total installed capacity. For a long time, Kenya's favourable investment climate, robust planning linked to LCPDPs, transparent competitive processes, and timely initiation of procurements has enabled greater PSP in acquisition of new generation capacity, helping to reassure security of electricity supply. The listing of KPLC and KenGen on the securities exchange has helped to bolster investor confidence in the electricity industry (as investment grade) and,

over time, its financial performance. In contrast, TANESCO continues to be state-owned with minimal allowance for private sector participation in generation. Excluding disputed emergency power plants, only four IPPs remain of which only two, Songas 189 MW, and Mtwara 12 MW OCGT gas plant, are operational. Despite Tanzania being an early leader and pace-setter in IPP investments in SSA, the country has recorded no new IPPs in the last decade, owing to lack of structural reforms. Previous experience in procurement of IPPs was disastrous because they were poorly planned, poorly negotiated (directly and non-transparently) and poorly managed – resulting in a colossal loss of revenue, time and image. Tanzania remains non-accommodative of IPPs given its recent informal policy encouraging public development of new energy sources through TANESCO, even when the utility is financially stressed and incapable of financing such projects. Stringent reforms to unbundle the sector will help to encourage more private sector participation to turn around its financial fortunes.

6.2.5.2 Management Contracts

Both Kenya and Tanzania had periods of private management contracts. Results from the analysis in this thesis indicates significant performance improvements relating to reductions in system losses, increased revenue collections, increased connection numbers, innovations for reliability improvement and increased capacity-building in Kenya. Despite its short spell, the management contract propelled KPLC onto a sustainable path for continuous performance improvements. Likewise, the management contract for TANESCO achieved increases in revenue collections, loss reduction in its first phase, and a reduction in government arrears. While it was less fortunate in improving some of the technical indicators owing to limitations in technical turn-around activities, its two phases from 2002–2006 registered financial success unlike before. While in both cases the management contracts were not renewed, they introduced incentives that facilitated improvements in technical and commercial performance relative to prior periods, and demonstrated the benefits associated with private sector participation.

6.2.5.3 Concessions

While some proponents for the prescriptive standard model advocated for outright divestiture and privatization of profitable segments of the power supply industry, Uganda adopted a moderate form of PSP in the form of a 20-year concession. Uganda was the first country in anglophone Africa to award a distribution concession to Umeme and is still the only one of the three in the case study. The concession is a deeper level of PSP that grants ‘quasi-ownership’ and ‘rights to operate’ distribution assets to private investors, especially in a sector considered to be of national security to governments. By undertaking this bold decision, Uganda has the most extensive form of PSP and demonstrated its commitment to PSP

reforms, which has helped to turn around of the performance of the previously failed electricity sector. The concession has been enhanced with the listing of Umeme on the Uganda and Nairobi securities exchanges, further allowing private shareholding through a rights issue. Considering that the current top shareholder (NSSF – 23.2%) – a local pension fund – has helped to allay fears of outright privatization of national distribution assets.

6.2.6 Competition

Competition reform refers to the introduction of wholesale and retail markets where the objective is to increase benefits to consumers, including lower electricity prices and access through a wider range of retail services, and attracting private investments. Competition is sometimes assessed as a movement along a spectrum that takes place in stages from complete monopoly, to wholesale competition in generation, to full retail competition. The purpose of competition is to promote efficiency and innovation by creating competitive pressures among service providers. When multiple companies compete for consumers, a market discipline is established, resulting in pressure to keep costs low-to-efficient levels and to innovate with regard to service quality.

Competitive markets provide the external discipline to operate efficiently by restraining opportunism and reducing inefficiency associated with agency loss (Frantz, 1992).Competition also reduces uncertainty associated with the agent's performance because competitive markets provide more information about the company's environment as they seek to increase market share. As a result, shirking (moral hazard) is easier to detect, and the manager's performance can be measured with higher precision (Vagliasindi, 2008a). The table below shows a comparison of levels of competition in the countries in the study.

Table 6.3: : Comparison of Competition Levels in Tanzania, Kenya and Uganda

	Model Classification	Defining Characteristics	Tanzania	Kenya	Uganda
1	Monopoly	A single company has responsibility for generation, transmission, distribution and retail sales	x		
2	IPPs	As above but, in addition, private independent power producers (IPPs) are allowed to compete *for* the right to generate power	x	x	x
3	Single-Buyer Model	A single wholesale power trader, which may be (i) a transmission entity, (ii) a distribution entity, or (iii) a combined transmission and distribution/retail entity, as long as it has no direct interest in generation. The single wholesale-power-trader purchases power from all generators and sells to all distributors as well as any to large wholesale customers		x	x

4	Bilateral Contract with Third Party Access	A transmission operator or some other entity acts as a single buyer of power for the majority of retail customers, while allowing large customers to purchase power directly from various generators – by wheeling power through the grid on a non-discriminatory basis		x	
5	Wholesale Competition	Power market of multiple generation companies selling competitively in a power exchange, or directly to distribution companies and other large customers, supported by an independent system operator or market operator. Small captive customers can buy only from their local distributor			
6	Retail Market Competition	As above, but allowing all customers – large and small – to purchase power directly from retail companies, entailing prior vertical unbundling of distribution and retail companies, with distribution companies providing open access wheeling services to numerous power retailers			

Source: Author's creation

With the passing of the Energy Act 2019, Kenya has become the most advanced country in implementing the fourth level of competition reform – bilateral contracting with third party access, compared to Uganda and Tanzania. Uganda follows in second position with a Single Buyer Model, a number of IPPs and has recently launched a competitive tender for creation of a framework that allows private sector participation in financing and constructing transmission lines, using both public and private funding, with the aim of expanding the transmission network at a cheaper cost. Although TANESCO is still vertically integrated, and competition is largely stifled, there has been contracting of a few IPPs. In all the three cases, nowhere do we have full wholesale or retail market competition. It can also be argued that the power sectors in the three countries have not yet matured enough to transition to the more complex stages of competition, because their power systems do not support sufficient generators and distributors, limited infrastructure and technology adoption levels, as well as to country-specific market conditions and political economy factors. However, efforts have been made to build technical capacity for power system planning that is directly linked to competitive procurement of new generation capacity, especially in Kenya as compared to Uganda and Tanzania. Both Kenya and Uganda have run competitive actions for new capacity through the REFiT and GETFiT programmes respectively. Further efforts are required in all e three countries to build capacity for conducting complex auctions, as well as introducing economic dispatch criteria where SOEs continue to compete with IPPs.

In addition, unbundling allows the possibility of introducing more competition in the market between generators and supply to consumers. This would provide a further push to improve efficiencies since lower costs can be used to increase market share as prices are lowered relative to rivals. Consumers then can benefit from the changed market structure. Regarding competition in the distribution sector, only Uganda has smaller geographically dispersed distribution cooperatives (seven in number), which could be benchmarked against each other, but these are also struggling to achieve financial viability after more than 15 years of unbundling and liberalization of the sector. Their tariffs are still too high for rural consumers. Nevertheless, the cooperatives have helped to increase the number of connections in off-grid areas, albeit marginally. While some of these cooperatives have collapsed, the 2019 *Uganda Distribution Sector Diagnostic Review and Directions for Future Reform Report* by the World Bank shows that there is growing interest among sector stakeholders to either consolidate them into two regional utilities to compete with Umeme or, alternatively, to not renew their concessions and to revert to one distribution company for retail services only.

The above analysis begins to answer the first subsidiary question and demonstrates the extent to which structural reforms and governance frameworks in differently structured power sectors have changed incentives and impacted overall utility performance. Later in this chapter, we'll undertake a more in-depth comparative analysis of the performance of the utilities across the three countries.

6.3 Comparative Summary of Reforms across Kenya, Tanzania and Uganda

Whereas the standard model was recommended as a one-size-fits-all index or scorecard, its variants have since emerged as a hybrid reform model in various developing regions, including East Africa. Empirical results show that corporatization reform was not adequately designed and implemented in Tanzania, unlike in Kenya and Uganda. As a result, TANESCO lacks a legal instrument that establishes and grants it autonomy from mainstream public service. KPLC and Umeme have specific statutes and memorandums of association that delineate them from mainstream public service regulations. This lacuna has enabled unfettered influence from government in TANESCO's management and operations, often to its detriment. While independent regulatory agencies have been established in the three case studies, the degree of independence has been strongest in Uganda's ERA, but weak in Kenya and Tanzania, as demonstrated by government reversals of tariff decisions, or implementation of non-cost-reflective tariffs, and sometimes in termination of their top executives and boards of directors. There were previous periods when both EWURA and EPRA's predecessor (ERC) had a reputation for independence and competence, but cynical political interference has undermined both institutions in recent years. Nevertheless, EWURA appears to

be better than EPRA owing to its legal mandate to approve initiation of procurement of power projects even when there is no specified entity assigned to do the actual procurement. Uganda has performed best in restructuring: it has the most extensive restructuring reforms (vertical and horizontal unbundling) not only in Eastern Africa but also on the continent. Unbundling has allowed for more competition in generation with the entry of numerous IPPs. It has also allowed for enhanced managerial focus, accountability and transparency in the management of the different electricity supply segments. Additionally, Uganda is the leader in the adoption of private sector participation reforms reflected not only in the high number of IPPs that have achieved financial close, but also in awarding of the first long-term private distribution concession in anglophone Africa that has been a boon for the financial viability of the electricity sector. Kenya, too, has performed relatively well in attracting a significant number of IPPs with sizeable capacities through its robust planning and transparently competitive procurements, although not as many as Uganda's. However, in nominal terms, Kenya has attracted more private capital (US$2–2.99 billion) than Uganda (US$1–1.99 billion). Both Kenya and Tanzania had successful management contracts that laid a strong foundation for commercialization and revenue improvements. While these management contracts were short-lived, Uganda advanced deeper PSP reforms by contracting and awarding a 20-year distribution concession that introduced market-oriented governance systems that have turned it into one of the financially viable utilities in the region and on the continent. Both KPLC and Umeme have introduced additional governance controls and financing by listing on the Nairobi and Uganda securities exchanges, helping to access cheaper capital as well as to improve their governance systems that promote intensified monitoring and compliance obligations. The listing on the securities exchange is a new variation of the standard model that ought to be replicated in other utilities with poor financial performance and service delivery to mitigate governance challenges associated with political influence currently being encountered. Although no case study country has achieved wholesale or retail competition after more than two decades of the first wave of reforms in Africa, Kenya has advanced further by enacting energy laws that grant bilateral contracting and third-party access to the grid. Uganda appears to have stagnated by only allowing IPPs in generation, while Tanzania has scaled back its commitments to private sector participation in IPPs, let alone go into competition and remains an unreformed, state-owned, vertically integrated utility. The table below summarizes the extent of power sector reforms in the three countries.

Table 6.4: Comparison of Reforms - Leading Performers Regarding Extent of Adoption

	Reform Actions	**Tanzania**	**Kenya**	**Uganda**
1.	Corporatization	↓	↑	↑
2.	Regulation	↑	↓	↑

3.	Unbundling/Restructuring	↓	↑	↑
4.	Private Sector Participation			
a)	IPPs (BOO, BOOT)	↑	↑	↑
b)	Management Contracts	↑	↑	—
c)	Concessions	—	—	↑
d)	Stock Listings	—	↑	↑
5.	Competition	↓	↑	↑

Extensive-in-reform action (leader)
Moderate-reform action
Least-reform action

6.4 Comparative Analysis of Governance Arrangements

Theoretically, governance mechanisms are developed to overcome agency problems between contracting parties in organizations. Internal governance mechanisms involve design of authority arrangements within the utility to form a system of self-discipline and management to achieve stakeholder objectives. In contrast, external mechanisms may include market for corporate control, external auditing, capital markets, legal mechanisms and so on (Denis & Mcconnell, 2002).

The governance arrangements in the three case-study utilities differ significantly. Umeme employs a concessional framework of governance while KPLC and TANESCO utilize performance contracts. Both frameworks function through an internal delegation-management system that allocates roles and functions to various managerial and operational levels. However, the complexity and focus of each system differs. For example, while the concession scenario in Uganda has an inbuilt management services contract for delegation of roles and targets to be achieved, with corresponding incentives as an extra governance mechanism, the performance contracts in KPLC and TANESCO are only operationalized through a traditional Human Resource function. TANESCO once (that is, during 2011–2015) had successful performance development plans (PDPs) (also known as 'performance improvement plans') which helped to improve its institutional capacity, business planning, and provided staff incentives based on contracted performance targets, but these were later abandoned owing to political influence from the line ministry of energy.

At a strategic level, the design, nature, detail and complexity of contracts influences performance outcomes of a utility. The use of the concession has fundamental strengths that peg back performance contracts and management contracts. The Umeme concession is a highly legalistic contract, defining the relationship between the principal (government) and the concessionaire (agent), to undertake responsibility for investments, operations and exposure to commercial risk for a long-term period – 20

years. The concession is very specific and unambiguous in its definition of roles, mandates, statements of work, expectations, deliverables or outputs, and has the strongest commercial and market orientation – specifically profit motive, operational incentives and customer focus. Hence, the concessionaire's focus can be broadly categorized under 7 R's (roles, responsibilities, rights, recourse, risks, rewards and respect). The concession is also highly reliant on private sector management behaviour, including use of investor representatives, independent board members and specialist management teams to drive utility performance. Because the concession contract is highly specialized to cover risks, it attracts correspondingly high incentives and penalties, as well as high premiums for the risk assumed. Such risks result from assumption of complete delegation and from transfer of rights of ownership of electricity distribution network assets. Similarly, because the concession contract has been applied in unpredictable environments (with weak institutions relative to developed countries), where both the principal and agent are on a learning phase there are additional risks. Nevertheless, the concession provides a dependable source of revenue since the private concessionaire retains the entire sector's revenue collection stream and assumes responsibility for investment for a longer period. It is these revenues that provide assurances and guarantees of payment for investments in generation/IPPs. With a steady revenue base, IPPs can increase generation capacity, thereby increasing security of supply while Umeme can expand the electricity network and access.

Additionally, since the concession has less partnering with principals once the contracts are signed, Umeme has been able to operate with greater independence, and to minimize political patronage and influence from government; hence, mitigating the conflict of interest and governance failures typical in SOEs like TANESCO. This has allowed Umeme freedom to take risks, innovate, optimize costs, enforce revenue collections, and to invest in the portions of the networks where returns are deemed optimal. Because the private concessionaire is driven by profit, he is motivated to drive the operational and financial performance of the company on a growth trajectory. Similarly, management contracts, as seen previously from the Kenyan and Tanzania examples, are also fairly legalistic and have a more commercial orientation that spurs utility performance within defined key performance indicators. However, management contracts typically have no responsibility for investment or any large exposure to commercial risk owing to their short-term nature. In contrast, performance contracts (PCs) or agreements with government/public sector, as used in KPLC and TANESCO, are rarely legally binding and are not strong enough to enforce performance improvements. This is because the PCs are implemented by administrative or managerial discretion rather than under statutory or legal basis. Because they are not legalistic as with management contracts or concessions, PCs are inclined to be in the form of partnerships,

governed by the spirit of agreement and mutual trust with no repercussions and sanctions for failure (penalties) to achieve the set performance targets or objectives. This is true for Kenya and Tanzania experiences. Regardless, while PCs can create a short-term positive dynamic for reform, they should certainly not be considered as a substitute for carrying out structural and institutional reforms necessary to promote the operational and financial sustainability of the electricity sector.

At board level, the directors influence corporate performance through monitoring management, especially in reporting and earnings manipulation. Specifically, Fama and Jensen (1983) emphasize the role of outside independent directors in resolving agency problems and reducing agency costs through the design of incentive contracts and the monitoring of management behaviour. According to Beasley (1996), firms with boards dominated by outside directors are less likely to engage in accounting fraud. This is because outside or independent directors have incentives to build reputations as expert monitors and thus are tougher on managers – helping to mitigate agency problems between firm shareholders and managers and to lower agency costs (Fama, 1980; Fama & Jensen, 1983). Fama and Jensen (1983) further argue that in order to fulfil their various responsibilities, and enhance their reputations, independent directors have incentives to reduce information asymmetries between themselves and executive directors. In instances where the companies are listed on the securities exchange like KPLC and Umeme, capital markets view outside directors as efficient monitors of management. There are instances however, where despite having independent directors, managers have still been involved in agency problems of corruption, tunnelling company resources and blind investments that exceed the capacity of rational expectation as was the case in Kenya, leading to termination of KPLC's entire executive management in 2018 (Ghanghis Capital, 2018; Kahawa Tungu, 2020). In contrast, in SOEs like TANESCO, agency problems are potentially greater. Because the board and top management are largely constituted by political appointees (Chen, 2010), agency problems are more serious than that of its peers in the region.

At an operational level, the management services contract allows for nomination and appointment of expert professionals to the board of directors of Umeme, and a dedicated team of international consultants, local staff and expatriates (that is, the senior management team – SMT) to lead operational activities including finance, technical and operational activities, investor relations, information technology and CapEx project implementation. Until 2018, the expatriates constituted a significant portion of management and played a crucial role in advising the board and managing director on key technical decisions that drive performance. Through the environmental, social and government (ESG) value-creation governance strategy, Umeme developed a methodology and model (Energy Impact Model) for

quantitative assessment of the ESG impact on KPIs in finance, people/staff, social, infrastructure, environment and governance that was cascaded from the board and delegated to functional operational areas within individual performance contracts to drive company performance. Corresponding incentives are provided for achievement of the set targets. The incentives include: (1) risk-based incentives – pegged to the high uncertainty in the operational environment, including political risks, regulatory risks, financial and market risks; (2) performance-based incentives pegged to targets set by the regulator and/or complemented by government, and (3) pay-roll incentives also pegged to targets set internally by the board and management, used to reward staff and management. These incentives often include bonus payments, long-term incentive plans, enhanced salaries, staff stock/share incentive schemes, provident funds, health insurance schemes, annual salary increases, vehicles, telephone, activity allowances, and so on. A robust monthly and quarterly reporting mechanism – as an information management system – helps to track progress and feedback on prioritized activities.

In Kenya, the PC between government and the KPLC board provides an overarching framework for the company's strategy and the utility's performance focus areas (through a balanced score card) and is operationalized through a cascade of short-term individual performance contracts for the MD and senior managers, and between managers and staff to drive utility performance. This has helped to create a top-down pressure for continuous improvements in performance. However, incentives are lacking. KPLC's IT and PPA board committee has been instrumental in providing oversight guidance to contracting of long-term IPPs. The Mwongozo code (elaborated in the Kenyan Chapter 4) has helped to streamline governance priorities by emphasizing transparency, accountability and equity in management of KPLC and other SOEs.

By contrast, in Tanzania, the overall governance framework appears broken. While the PC exists, it is poorly designed, weak, lacks an incentive framework and is not enforced. The contract is not adequately cascaded to operational units and, hence, does not send signals and incentives for improvements in performance. Only the heads of department appear to have contracts with the MD. This systemic failure requires major structural and institutional reform to turn around.

Umeme has the best incentives – remuneration packages, for its board members – followed by KPLC, and TANESCO has the least.

The analysis above begins to answer the second subsidiary question and explains the ways in in which power sector reforms alter the principal-agent relationship and incentives for improved performance.

6.5 Comparative Analysis of Operational Performance

The SSA region is faced with five key, enduring power challenges: inadequate generation capacity; unreliable supply; low access to electricity; high cost of power, and the poor technical and financial performance of utilities. These have, in combination, constrained delivery of electricity services on a sustainable basis and have serious consequences for economic development and human welfare. Most utilities in the region have been technically and commercially inefficient over the years and continue to struggle. The utilities are not financially viable and are unable to provide adequate, reliable and competitively priced electricity services, desired most by customers.

To devise appropriate solutions, five KPIs were selected as a basis of analysis in this thesis: lack of access; inadequate and reliable electricity supply; technical and commercial inefficiencies; financial viability, and sustainability. These are presented below.

6.5.1 Access to Electricity

Tanzania's electricity access rates have remained low owing to the persistent power supply constraints and fragile financial performance of TANESCO, coupled with weak governance arrangements. Access rates, measured by the number of connections, remained flat in the 1990s but started to gradually increase in the between 2000–2010, reflecting the growing pace of electrification programmes. The establishment of the Rural Energy Agency, coupled with government and donor funding, has expanded electrification efforts. TANESCO has, on average, connected about 215,000 dwellings per annum since 2012. The combination of TANESCO and REA connections have allowed the country to more than double its access rates from 18% in 2010 to about 35% in 2018. Recent advances in solar off-grid systems, reductions in connection charges and a political push from the government for universal access by 2040, have provided further impetus. Despite this progress, Tanzania's access rates are much lower than its neighbour Kenya.

Kenya has performed the best of the three case studies in recent years, with access rates growing from 25% in 2013 to 75% in 2018. Progress in Kenya is attributable to a combination of factors: a strong grid connection push through the Last Mile Connectivity Project; continuous support by government for decentralized systems expressed through exemption from import and value-added taxes for solar products, and the adoption of international standards. Furthermore, the development of a mature mobile payment infrastructure has enabled innovative business models and payment mechanisms to emerge. These factors allowed the country to increase grid connections by almost one million households per year (or more than five million people), and to provide more than 700,000 households with access to electricity

through decentralized systems by 2018. KPLC, which has been at the forefront of the connectivity programme, has utilized its internal finances (including commercial loans) and a blended credit facility (Stima Loan) from the utility pension fund to provide connections for some of its qualifying customers. Although KPLC's average number of annual connections has declined to about 570,000 connections in recent years, it is still the highest in the region. KPLC's efforts were complemented by government's mobilized funding of up to US$700 million for infrastructure expansion through four key projects: (1) Kenya electricity modernization project; (2) Kenya electricity expansion project; (3) Output-Based Aid (OBA) – slum electrification project, and (4) Kenya off-grid solar access project (KOSAP). Unfortunately, this ambitious project has dented the financial health of KPLC, as alluded to in earlier sections. Had it not been for government's imposition of costly and ambitious connection targets, KPLC's financial performance would have remained sufficiently stable, although the downside is that electrification rates would have remained dismally low. There is, therefore, a trade-off to achieve growth in access rates, which requires adequate, reliable and timeous government subsidies. While regulatory reforms have also allowed fast penetration in mini-grid and solar home systems (market entry), the majority of progress over the past decade has been made as a result of grid connections.

Uganda, on the other hand, has performed the poorest of the three case studies in access, as evidenced by its low access rate of 22% and lower connection numbers averaging 75,000 per annum. The low connection figure has largely been due to the design of the concession that limited Umeme's operational areas to a maximum of 1 km geographical radius around the existing grid from the time of commencement (for a 20-year duration of the concession), as well as from weak connection targets especially in the initial six-year period. Connection targets, as a trade-off for reducing losses, were later dropped in the 2012–2018 tariff review period, which further removed incentives for access. The targets, not surprisingly, were reinstated in 2019. While the REA has tried to invest in grid expansion using public and donor funding and has handed over commissioned infrastructure to Umeme, very few connections on these power lines have followed – another weakness of the concession. Recent policy shifts introducing the subsidized electricity connection policy, and the international development programmes for universal access such as the output-based aid (OBA) programmes, are starting to promise increased connections, although significant funding constraints remain. While power sector reforms have been successful in introducing governance arrangements that have catalyzed financial viability through the concession model, a lack of equivalent focus on access has been its major oversight and drawback. A key lesson from this experience is that major subsidies and government funding are required if Uganda and Umeme are to replicate what Kenya and Tanzania are doing.

Figure 6.2: Comparison of New Connections – Annual

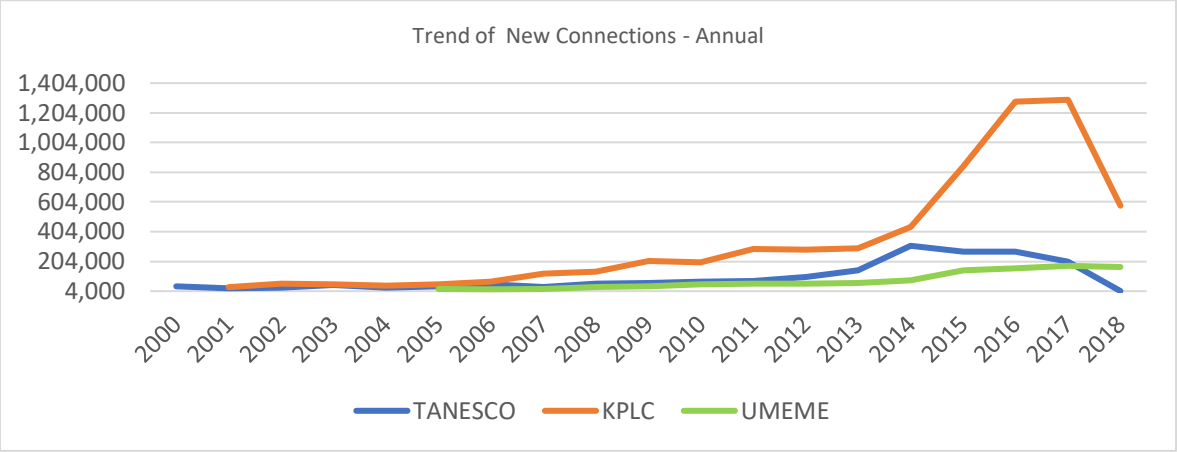
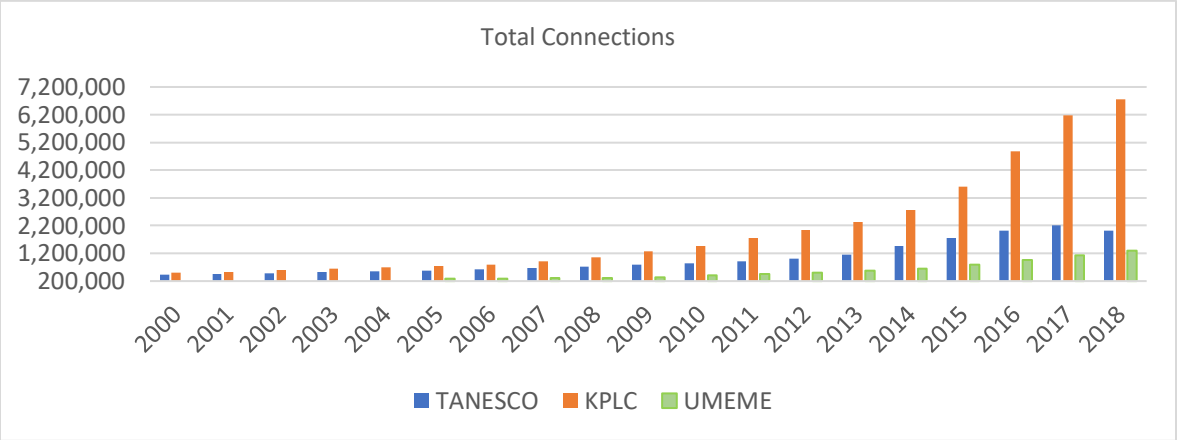


Figure 6.3: Comparison of Growth in Total Connections



It is apparent from the above analysis, that progress in electrification is largely independent of the standard reforms measures – such as corporatization, regulation, unbundling, private sector participation and competition – and requires additional policy, planning, institutional and funding interventions.

6.5.2 Adequate and Reliable Supply

While the three countries have broadly similar population levels (with Tanzania being slightly higher), Kenya stands out as the power leader in the region with the highest installed generation capacity (2,712 MW) and a larger surplus reserve margin, reflecting assurances for security of supply into the future. The country has a well-established procurement framework and currently is in a fortunate position to have excess supply – an outcome of its earlier structural reforms that separated KenGen from KPLC, creating a

favorable investment climate. The KPLC has also built institutional capacity for system planning that has been the bedrock of timeous and competitive procurement of new capacity. As a result, the country has become an investment destination for IPPs, although unsolicited bidding practices and a few direct negotiations are still evident. The largely government owned KenGen runs EPC tenders for projects that the LCPDC earmarks for development using public resources, while KPLC runs tenders for IPP projects. KenGen has also leveraged its private equity to boost its financial record in mobilizing commercial loans and bond finance. The combined result has been the tripling of Kenya's generation capacity since the 1990s and the realization of a reserve margin of 47% by June 2020. Kenya also has in the pipeline an additional 25 IPPs with approved PPAs of a combined capacity of about 4,000 MW – more than it needs according to demand projections. Kenya's security of supply has also been enhanced by significant diversification of the energy mix through donor supported programmes that provided financial enhancements and de-risking arrangements for its geothermal resources. Geothermal has, to date, become the country's largest source of energy with a generating capacity of about 828 MW – the largest in Africa. Wind power has emerged as another reliable source of energy, indicating a shift from the traditional hydro sources. Renewal energy contributes 72% of Kenya's power, including geothermal, hydro, wind and solar power.

Tanzania, on the other hand, which has abundant energy resources including natural gas, continues to struggle to provide energy security to spur the growth of its economy or to match the needs of its large population. Despite having the second-highest installed generation capacity of the three countries, both the country itself and the state-owned utility TANESCO continue to grapple with the challenges of power procurements and investments. Whereas the country had, in the 1990s, registered considerable progress in expanding its power system, backed by donors and reaching the 1 GW mark by 2006, investments in the past decade have slowed, as promises of reforms have failed to materialize and donor support has been withdrawn. Despite Tanzania initially opening to private sector participation, a lack of capacity, poor planning practices and abandonment of sector master plans, unlike in Kenya, resulted in non-transparent, non-competitive, directly negotiated procurements of expensive IPPs and EPPs, shrouded in corruption that dented the country's investment profile and left a lasting impression on the private sector. Subsequently, IPPs have been limited to a contribution of only 300 MW new capacity – half of which has since been decommissioned. The recent informal government policy shift, from IPPs to public expansion of generation capacity through TANESCO as the main investment vehicle, has crowded out private sector participation, even when the utility continues to be financially distressed and unable to raise the required capital. Despite the vast natural gas resource potential, only a small portion has been developed for power

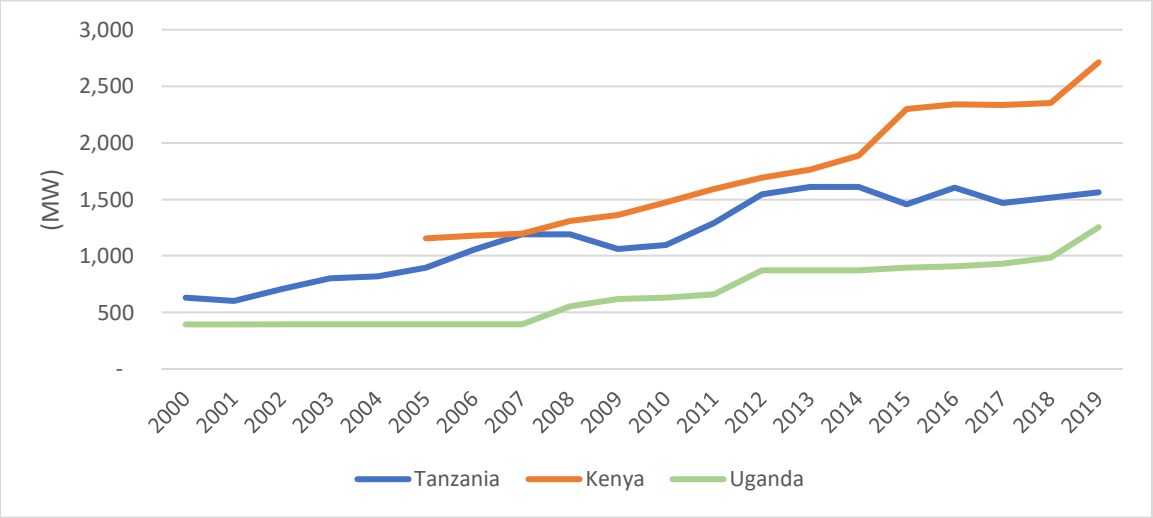
generation. The ongoing Chinese development of the Mnazi Bay gas field may offer relief but will require funding from TANESCO, too. Likewise, the earlier planned wind projects for private sector development stalled after a period of about 12 years of development (owing to vested interests) and have since been identified among near-term PPPs for TANESCO. Unfortunately, the utility is financially incapable of developing them. While the government has sanctioned construction of the 2.1 GW Rufiji/Nyerere Hydro Power Project, it remains to be seen how significant its full costs will be and the implications for end-user tariffs. In addition, vulnerability to drought periods will potentially limit its availability. What is clear is that Tanzania's current electricity supply remains unstable, inadequate and insecure and its annual capacity expansion rate of 4% has barely been able to keep pace with demand growth at almost 6% annually.

Uganda, currently, has the lowest installed capacity of the three countries, coming off a low base after periods of prolonged civil strife in the 1970s and 1980s that adversely affected economic activity and the pace of industrialization. However, with the advent of a stable political regime and power sector reforms, which have included unbundling of the power market and opening of the sector to IPPs, there has been a fast-paced attraction of 38 IPP investments in the generation segment. IPPs have added capacity of about 638 MW between 2012 and 2020, many of which were contracted through the GETFiT programme. Despite this achievement, Uganda, like Tanzania but unlike Kenya, continues to rely on directly negotiated deals for its large publicly funded projects, especially the Chinese-funded 600 MW Karuma and 183 MW Isimba hydropower projects. While these and others in the pipeline seem to have secured Uganda's power supplies for the near future (as peak demand is nearly half of installed capacity in the LCPDP base case up to 2027), there is enduring concern about the lack of capacity in the Ministry of Energy and Mineral Development to conduct timely competitive tenders for future projects – for which any delays may see the country reverting to use of costly emergency power. Sector coordination challenges persist, affecting timeous planning and initiation of procurements, let alone gaining sector consensus on the optimal choices of projects to undertake. Uganda has a suppressed demand that has not yet been quantified but which could potentially outgrow electricity supply capacity if the country's population growth (3% per annum) and GDP (6% per annum) continue to grow at current rates. Uganda, like Kenya, has also diversified its mix to include solar and bagasse, offering to cushion any decline in hydro capacity due to droughts. Despite these challenges, Uganda's unbundled transmission company provides an independent and unconflicted platform for contracting new power, and for providing non-discriminatory access to the grid. This feature of the Uganda power system is one of reasons Uganda has been so successful in attracting numbers of IPP investments. A further reason was the efficient procurement capacity built during the GETFiT programme, hosted by the regulator, ERA. Uganda's future prospects around

generation adequacy rest, in large measure, around maintaining and building the capacity in these institutions to run timeous and competitive bids for new power.

Increased generation capacity improves the overall reliability of supply. Adequate investment in electricity networks, and their efficient operation, is another key ingredient. Of the three countries under investigation in the case study, Kenya has had better reliability of supply owing to significant investments in generation capacity, as well as reasonable planning, maintenance and operation of its transmission and distribution network. That is not to say that challenges do not exist, and Kenya could still improve its reliability performance. In contrast, Tanzania's poor reliability is noticeably linked to deficiencies in both its generation capacity and in transmission and distribution segments. Uganda's poor reliability is associated with a limited and an old transmission and distribution infrastructure network, a lack of competent technical staff to manage the network and a lack of an outage management system to locate and resolve faults on the network. What is clear from this analysis is the unreformed, vertically integrated, state-owned utility – TANSESCO – has performed the worst, and unbundled power systems with a degree of private sector participation in Kenya and Uganda have performed better. Uganda's Umeme could, and perhaps should, have performed better, given its status as a private concession with its stronger governance and incentives framework, but the design of the reliability of KPIs in the concession, and the management of those KPIs has not been as ambitious as it could have been.

Figure 6.4: Installed Generation Capacity (MW) Comparison



Two major lessons can be drawn from the above analysis: (i) a clear regulatory framework for procurement and licensing of IPPs is crucial for increasing energy security; (ii) structural reforms are also

effective in facilitating investment in power generation and bringing in IPPs, thus contributing to adequate and reliable supply. But they need to be complemented with investments in transmission and distribution segments. The Manitoba Hydropower management contract provides a good example of improvements in supply reliability interventions undertaken in Kenya. Umeme's concession has helped to mobilize and invest about US$656 million in the distribution network.

6.5.3 Efficiency (Revenue Collection Rates and Loss Reduction)

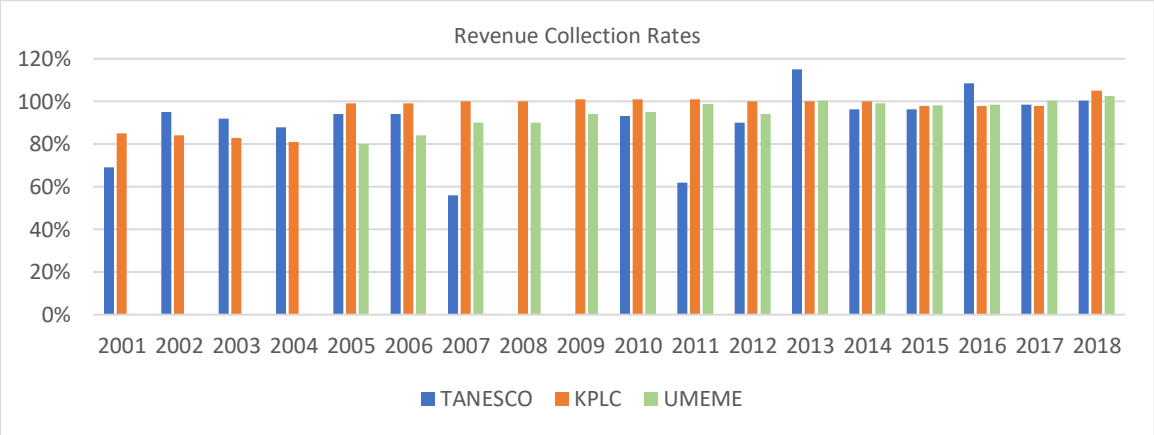
A comparison of loss reductions and revenue collection rates shows that KPLC and Umeme have been performing exceptionally well compared to TANESCO, although KPLC stands out as the leader for consistently achieving collection rates close to, or at 100%, over the period. The commercialization reforms introducing a performance contracting framework for KPLC in 2004 drove collection rates from 81% to 99% in 2005. Subsequent reforms pioneered during the Manitoba Hydro management contract in 2006 improved revenue collection further from 99% to 100%. The period under the management contract saw KPLC invest significantly in technology – automation of its billing system, customer database validation, and adoption of prepaid meters – as well as building staff capacity for extensive customer outreach in revenue collection programmes. The utility's early adoption of mobile payment platforms, such as 'M-Pesa,' augmented its revenue collection efforts, which have since been maintained. Government non-payment of utility bills in recent times, however, threatens to reverse this performance.

In Uganda, structural reforms and management improvements in the Umeme concession, initially driven by external management experts, coupled with regulatory targets, the introduction of hard budgets – which resulted in better cost control and an increased management focus on revenue collections – resulted in these increasing from 80% in 2005 to 99% in 2011. Collection rates have since been maintained close to, or at, 100%. These achievements have been assisted through adoption of a combination of technologies: prepaid metering for all domestic and commercial customers; automated meter-reading (AMR) for large industrial customers, and, more recently, 3-phase prepayment metering for all government installations such as police and army barracks, prisons and hospitals. Umeme also utilized its concessional accounting, legal rights and tariff formulae to exercise offsets against bulk supply tariff revenues due to UETCL, thus recovering energy arrears from government institutions. In addition, disconnections and deployment of mobile-money payment platforms have helped to sustain the trend in improved collections.

In contrast with Umeme and KPLC, TANESCO's collection rates have been fluctuating, indicating challenges in its revenue cycles. The NETGroup management contract in 2002 saw collection rates immediately

increase in its first year, from 85% in 2001 to 95% by 2006. The contractors deployed a combination of negotiated payback of public arrears from government, the introduction of debt collectors and a disconnection campaign in September 2005 for non-payments that led to TANESCO 's largest revenue collection in the utility's history – recovering TShs 24.7 billion in a single month. With the end of the private management contract in 2006, these measures were, however, not sustained. Regulatory pressure from EWURA facilitated investments in prepayment metering and, more recently, TANESCO's new management's partnership with banks, and the adoption of the online government platform (GePG), have helped to raise collection rates. Collection rates above 100% in 2013 in some years are due to one-off direct government transfers for accumulated arrears, while those in 2016 are due to the forced payment of Zanzibar Electricity Corporation's (ZECO's) arrears sanctioned by President Magufuli (ESI Africa, 2016b, 2017a) without whose intervention it would have been nearly impossible for TANESCO to recover the arrears (TShs 85 billion or US$ 38 million) on its own. ZECO charges a lower retail tariff relative to the bulk supply tariff charged by TANESCO, thus creating a revenue gap. In addition, TANESCO reports collections as a ratio of payments from meters read rather than from amounts billed. However, many consumers remain unknown to TANESCO as they are illegally connected, unmetered and are not reflected in its billing system. The utility remains inadequately facilitated to enforce revenue collections from post-paid metered customers spread through the expansive country. Despite the revenue collection efforts, TANESCO remains burdened with huge debt obligations. Furthermore, government entities and ZECO continue to be delinquent customers with energy arrears of over TShs 300 million. Added to revenue collection failures, governance challenges continue to plague the company and the sector, making financial sustainability difficult.

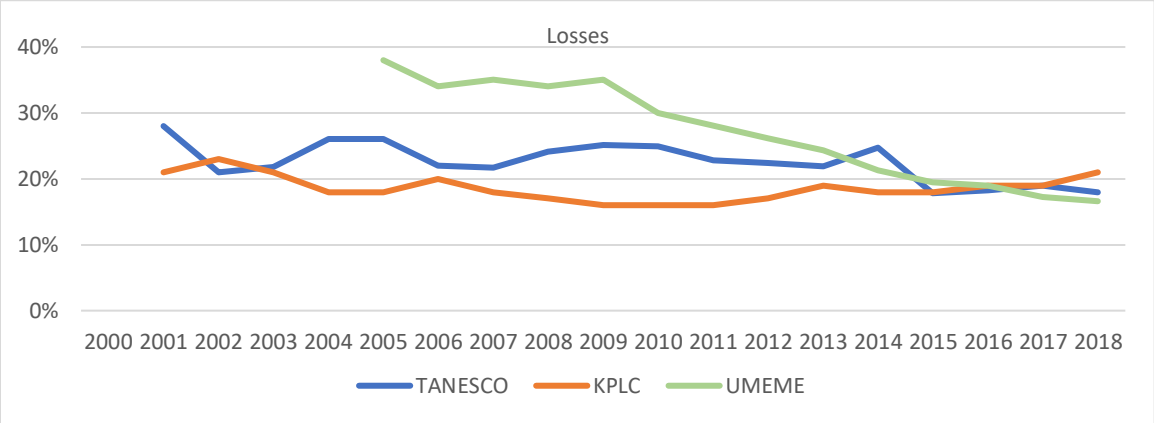
Figure 6.5: Comparison of Revenue Collection Rates



With regard to losses (that is, the percentage of total electricity generated for which no revenue is received, involving both technical losses and 'non-technical losses' – otherwise known as theft) TANESCO's performance has fluctuated between 28% and 18% with a significant reduction (by 7 percentage points) being registered in 2015. The latter arises from a combination of some enhanced investment initiatives driven by the regulator (EWURA), including deployment of prepayment meters and automated meter-reading (AMR) technology; investments in network refurbishments and upgrade of substations and transmission lines; network reticulation; targeting high-loss feeders by introducing shorter distance transformer zones, and meter audits to identify non-vending meters and to limit power theft.

For a long time KPLC maintained a lower level of losses compared to TANESCO and Umeme until 2015 (18%). Subsequently, with the aggressive implementation of the Last Mile Connectivity Programme, KPLC's losses started to rise, reaching 21% in 2018 as a result of increased power theft and technical losses from long transmission and distribution lines and unoptimized transformer loads. Increasing losses have compounded the financial decline of the utility. Previous commercialization reforms, introduced by the Manitoba Hydro management contract in 2006, led to an immediate reduction in losses from 20% to 17% by 2008, indicating the positive benefits of private sector participation. In contrast, Umeme, which started from a higher level of losses at 38% in 2005, has recorded the largest reduction in losses in a shorter period. It currently has the lowest level of distribution losses of the three case studies and is by far the best performer, although this performance is short of the set regulatory targets. Nevertheless, Umeme's gains have been realized from a focused and intensive investment approach targeting refurbishment of high-loss feeders; reconductoring; use of ABC for LV networks; prepayment metering technology to minimize power thefts; intensive commercial loss reduction initiatives, and campaigns. These have been underpinned by regulatory incentives for loss reduction embedded within the tariff.

Figure 6.6: Comparison of Losses Performance



6.5.4 Affordability

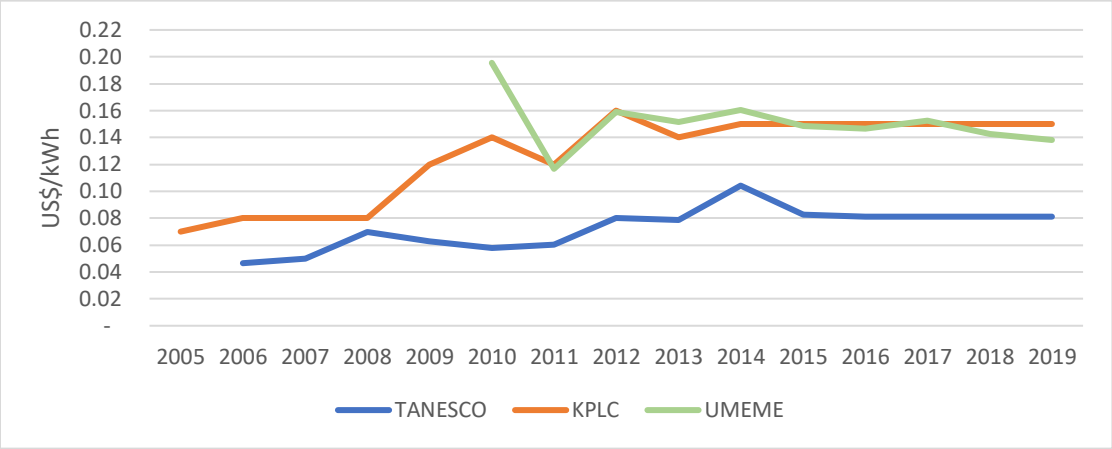
Tanzania has lower tariffs than its peers Kenya and Uganda, with average retail tariffs of US$0.08 perkWh, but these are not cost-reflective. Affordability does not appear to be a concern in Tanzania, partly due to incorporation of lifeline subsidies into the tariff, making the cost of subsistence consumption of 30 kWh affordable with electricity expenditure of just 2% of the GNI by the bottom poor 40% of the population (ESMAP, 2018). Average annual electricity consumption per capita has increased steadily to about 147 kWh by 2016, although it still far short of the upper bound for lower-income countries – of 490 kWh per capita per annum. In addition, electricity connection costs are heavily subsidized by government and donor funding. The downside to these subsidies is that tariffs have been set far below cost-recovery levels and have stagnated over time with no tariff reviews implemented in recent years – which has adversely affected payments to IPPs and the profitability of the off-taker TANESCO.

Historically, KPLC's tariffs have been largely cost-reflective, helping to finance the numerous IPPs and keeping the sector financially viable. However, recent reversals of tariff reviews threaten this viability and cost reflectivity. The tariffs have been comparable to Umeme's in Uganda. Despite the relatively high cost of electricity, the cost of the subsistence volume of 30 kWh per month is below the 5% threshold of the budget of the poorest 40% of households. This is due to the restructuring of the tariff levels that increased lifeline rebates up to 100 kWh, and to government and donor subsidies occasioned through the Last Mile Connectivity Programme.

Uganda tariffs have been set to cost-reflective levels, helping Umeme to achieve financial viability and sustainability. This has meant a trade-off in affordability levels for domestic consumers, as the poorest 40% of the population need to spend on average 7% of their income on the subsistence consumption level

of 30 kWh per month. The 4th and 5th quintile customers are able to afford the high tariffs. The sharp drop in the tariff in 2011 was due to government subsidies for thermal EPP costs, while the increase in 2012 was as a result of a 46% tariff increase to cost-reflective levels upon the phasing out of subsidies and the commissioning of the Bujagali Hydropower Project. Subsequently, tariffs were kept relatively stable until 2017 when the expensive Bujagali IPP generation debt was restructured through refinancing, subsequently leading to a reduced average tariff. More effort is required to further reduce generation tariffs. Generally, in practice, because of inflation, electricity tariffs have been declining in all the three countries since 2014.

Figure 6.7: Comparison of Average Retail Tariffs in Nominal Terms



Assessing affordability of electricity tariffs – as a measure of the effectiveness of utilities providing services to customers – is clearly complicated by the issue of regulation and whether tariffs have been set at cost-reflective levels. TANESCO's performance looks good in the above figure but, as the analysis below shows, its tariffs are not cost-reflective and its financial sustainability is threatened. Affordability of electricity is affected by the least-cost generation and efficiency of the distribution utility. But electricity prices are also impacted by regulatory decisions and this has been the major factor impacting prices and lifeline tariff support for low-income households, where these tariffs maybe supported by cross subsidies. EPRA and EWURA have provided the highest lifeline tariff thresholds of 100 kWh per month and 75 kWh per month respectively to support affordability objectives in Kenya and Tanzania. Uganda's ERA has the lowest lifeline of 15 kWh. Affordability in Uganda remains a challenge despite more efficiencies registered due to a smaller customer base.

6.5.5 Financial Sustainability

Financial stability is assessed through an examination of the utilities' ability to generate sufficient income covering OpEx and full CapEx, including a return on the new and replacement value of existing assets to allow for growth while maintaining efficient service levels. The comparative analysis utilizes the profitability, solvency and liquidity ratios that help us to gauge the utilities' financial performances in the long and short term, and through examination of relationships among the ratios. The chosen ratios explain the three utilities' efficiency in deploying their assets to work, and addresses financial risks resulting from the company's choice of how to finance the business using either debt or equity for its sustainability into the future.

Figure 6.8: Debt-Service Coverage Ratio (with opening cash)

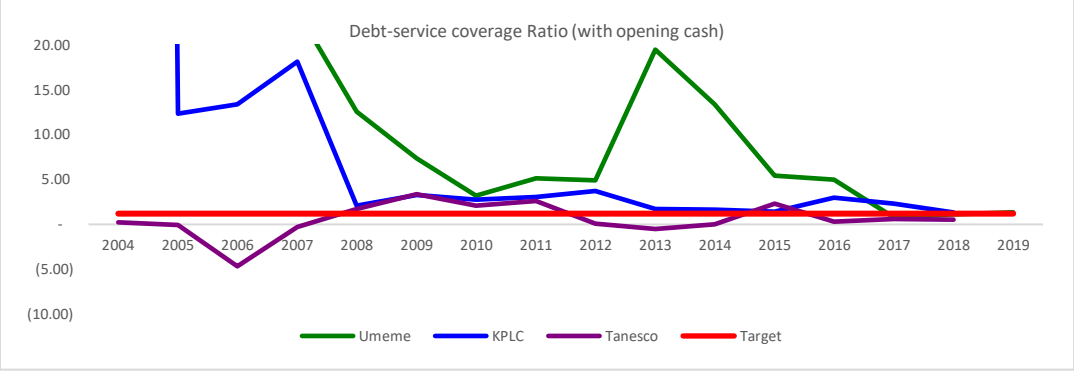


Figure 6.9: Interest-Coverage Ratio

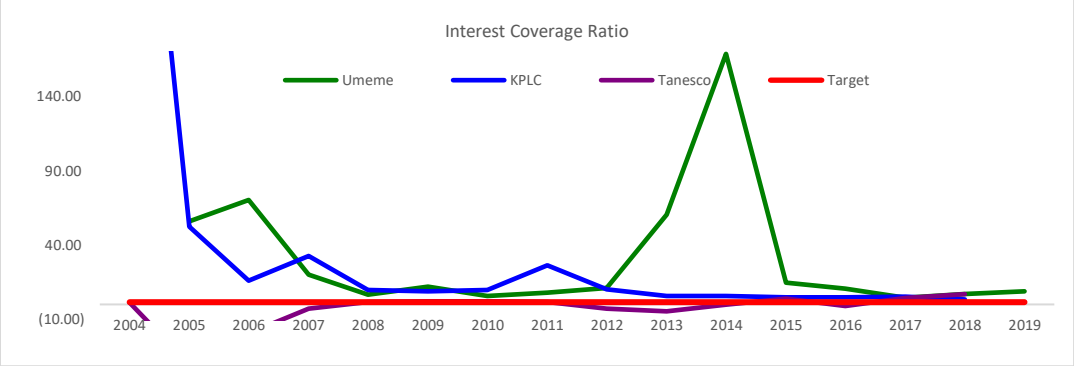


Figure 6.10: Quick Ratio (acid-test)

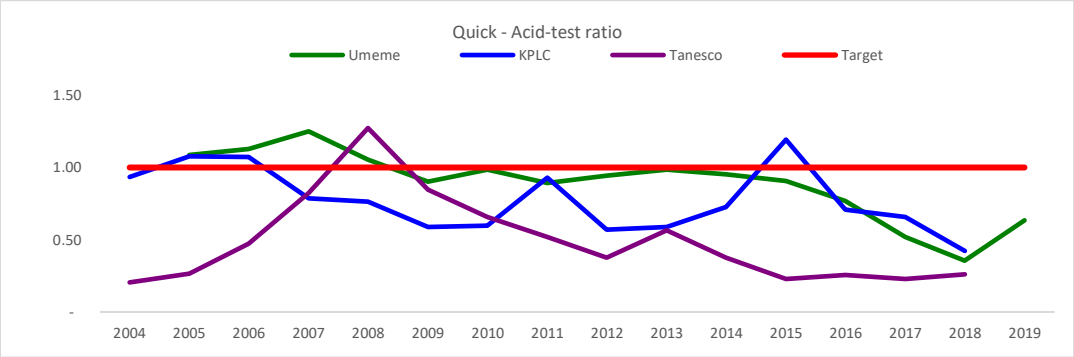


Figure 6.11: Current Ratio

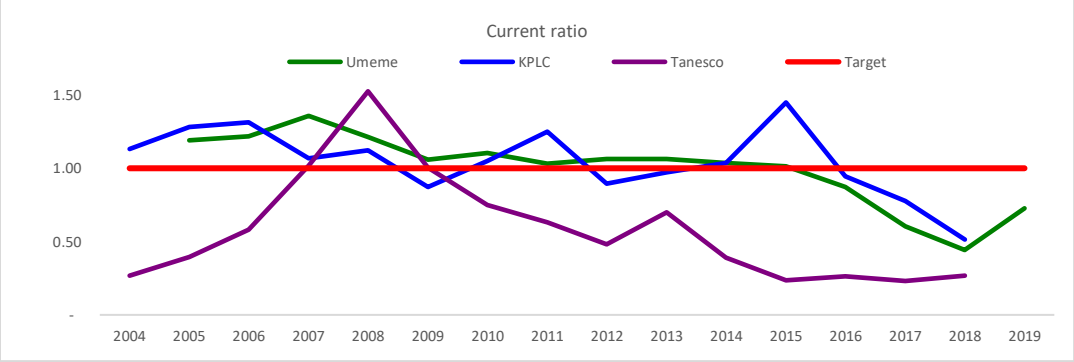
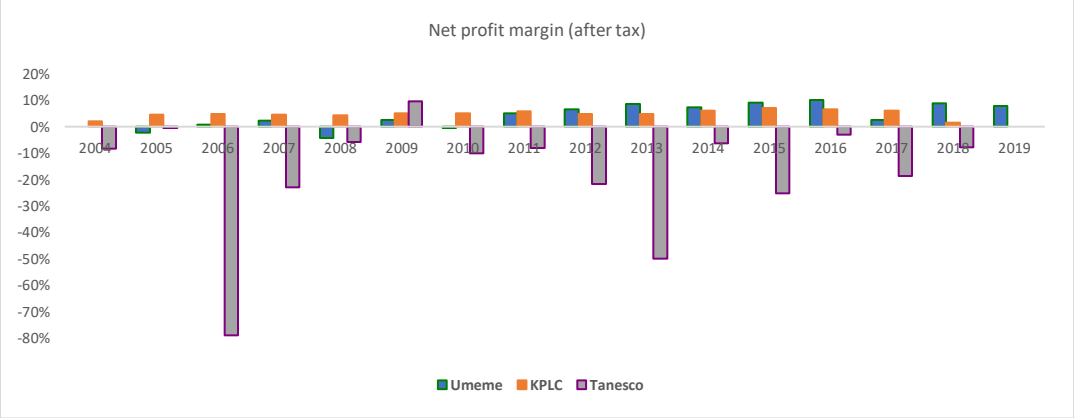


Figure 6.12: Net Profit Margin After Tax



The comparison of solvency, liquidity and profitability ratios shows marked differences in the performance of the three utilities. Umeme has the most favourable trend in its DSCR, which is consistently above the target of 1.2 during the period. This is attributed to a favourable 20% return on investment that boosts its revenue streams, assisted also by the shareholder loan in the early years (2005–2009), whose interest

was capitalized for repayment later, thereby reducing the nascent company's debt burden. It also benefited from the grace period granted in terms of debt repayment. A spike is observed in 2012–2013, when the company issued its initial public offering and used the proceeds to settle the majority of its outstanding debt. In the latter years – 2015 onwards – Umeme's DSCR dropped, owing to increased borrowing (US$235 million on Facility A and B) to finance its capital investments, and the effects of amendment Number 5 – write-off of USh 111.5 billion for the combined provision of growth factor revenues, Tax IN receivables, and tribunal appeal costs receivables – which saw the DSCR drop to 1.2 in 2017 but was still above covenant target levels. KPLC also has a favourable DSCR trend, that is consistently above the target of 1.2, except for 2015 (lowest at 1.08). Generally, this points to healthy cash flows from operating activities that are sufficient to cover the company's debt obligations except in more recent years when challenges associated with universal access programmes arose. In contrast, TANSECO has an undesirable DSCR trend that fluctuates below the target for a majority of the years assessed. This points to the fact that TANESCO's operations do not generate sufficient cash flows to cover the company's debt obligations. Despite the debt relief offered to the company in 2005, where government debt was converted into equity, TANESCO's DSCR dropped to below target levels in subsequent years. Compared to Umeme and KPLC, it may be argued that TANESCO's operations are not adequately managed to generate sufficient cash flows and also because of the poor governance arrangements around it.

Governance arrangements also explain the differing DSCR ratios for the three companies. Because Umeme is cross-listed on the securities exchanges of both Uganda and Nairobi, there is a heightened level of scrutiny placed upon the company regarding its financial reporting. This creates financial and governance incentives that increase its efficiency in cost control and revenue management, as the company's executives aim to increase shareholder value, while decisions to take on additional debt are thoroughly vetted to ensure that value is derived from the loans obtained. Similarly, KPLC's listing on the NSE brings additional governance scrutiny and compliance obligations (with corresponding incentives) that increase operational efficiencies, which enhance the company's revenue management practices, thereby increasing the funds available to fund debt obligations. On the other hand, TANESCO is a public parastatal that often relies on inadequate subsidies from the government of Tanzania. TANESCO therefore does not benefit from the efficiencies seen in private companies, and decisions to take on additional debt are more aligned to political interests, as opposed to an economic need for additional funding for system expansion. This has resulted in unsustainable levels of debt, which cannot be sufficiently covered by cash flows from the company's operations, reflecting its poor financial performance.

Regarding the interest coverage ratio which is used to determine how easily a company can pay interest expenses on outstanding debt (or how many times a company's operating profits exceed its interest payable), shows that KPLC and Umeme's performance exceed the target while TANESCO's is below the target. One of the reasons for this performance is the incentives and the resultant efficiencies in Umeme and KPLC's operations brought about by extensive scrutiny from their private investors and other private equity shareholders, since the companies are publicly listed with stringent compliance obligations to maintain profitability, solvency and adequate working capital. This results in healthy levels of operating profit that are sufficient to cover the utilities' interest payment obligations. Conversely, TANESCO, being an SOE, does not face as much scrutiny. Additionally, it does not significantly rely on financing from private lenders, and therefore does not have stringent debt covenants similar to those of Umeme and KPLC. The declining trend in the ratio for Umeme between 2015 and 2018 is due to drawdowns on facility A and facility B loans in 2016 and bridge financing in 2017, coupled with a write off of regulatory receivable under amendment 5. For KPLC, the decline is attributed to increasing short-term debt for the Last-Mile Connectivity Programme.

The liquidity ratios (acid-test ratio and current ratio) for all three utilities are deteriorating and not favourable, although Umeme performs closer to the target as can be seen from the figures 6.10 and 6.11 above. The acid-test ratio, which does not consider inventory as a liquid asset, was consistently below the targeted value of 1 for all three utilities. This implies that, for this period, the utilities' liquid assets were insufficient to meet their short-term obligations for the period. The utilities, therefore, regularly needed additional external liquid funds to meet their short-term obligations owing to the intensive CapEx involved. Even when inventory is considered a liquid asset, the current ratio is not enhanced favourably. Umeme's current ratio trend was relatively good until 2015. The current ratio performance trend (figure 6.11) does not significantly exceed the target of 1, which further reinforces the assessment that the utilities do not maintain sufficient liquid assets to cover their near-term obligations, since they barely had sufficient liquid assets. Specifically, the decline in the years 2015–2019 for Umeme is attributed to the increase in current loan liabilities arising from growth in the borrowings on facilities A and B which increased from USh 1.2 billion in 2015 to USh 124 billion in 2016. These facilities could have been structured better, leaving the current ratio positive. In 2017, current liabilities grew by USh 168.7 billion, yet the corresponding current assets increased by only USh 44.8 billion. The increase is attributed to the short-term bridge facility of US$20 million from Standard Chartered Bank and the effects of Amendment Number 5. In KPLC, the decline is attributed to the overdraft (Ksh 12 billion) and short-term loans (Ksh 70 billion) for network expansion and the Last Mile Connectivity Programme. TANESCO's situation is due to

the legacy debts from its EPPs and IPPs, its gas suppliers as well as its inefficiencies in revenue collection. Nevertheless, profitability ratios – net profit margin after tax – show Umeme consistently outperforming its peers (figure 6.12) due to incentives embedded within the concession and the tariff increases.

In general, KPLC and Umeme have performed much better financially than TANESCO, and Umeme has mostly performed better than KPLC. As discussed in more detail below, and in the final chapter, the greater depth of structural and private sector participation reforms in Uganda strengthened governance frameworks and incentives for improved performance.

The third subsidiary question is answered by the above operational performance analytical framework that explains the extent to which the performance between the power utilities in Tanzania, Kenya and Uganda differs. The subsidiary question further seeks to unearth whether there are other important determinants of performance – examined in the following section 6.6.

6.6 Other Variables Impacting on Performance

- **Different starting conditions for countries and their preference for reform adoption:**

Tanzania, Kenya and Uganda have different country and energy sector starting conditions of reforms which filter through to their utilities' level of performance. Kenya's electricity sector is more mature and has existed longer than its case study peers, implying a considerable growth in electricity infrastructure since the formation of the East Africa Power and Lighting Company[65] (EAP&L) in 1922, which gradually expanded its geographical reach 15 years later by acquiring a controlling stake in Tanzania's Tanganyika Electricity Supply Company (TANESCO) and moving into Uganda soon after. The EAP&L (which later became KPLC in 1983) was also listed on the Nairobi Securities Exchange in 1954 and was run according to commercial principles. Kenya's post-independence government under President Jomo Kenyatta encouraged a strong institutional culture grounded in targeted capacity development and training for the energy sector and for KPLC, which was later reinforced during the second wave of reforms during 2003–2013 by President Mwai Kibaki and Ministry of Energy and Petroleum permanent secretary Patrick Nyoike as reform champions. This growth curve gives Kenya a comparative advantage in terms of electricity infrastructure growth, energy security and stability. While countries such as Uganda and Tanzania experienced periods of civil unrest in late 1979 and during the early 1980s, during which electricity sector developments could not be undertaken, thus plunging the countries into periods of electricity shortage. Kenya, on the other hand, has been relatively politically and economically stable, which accorded it an

[65] In 1983, the EAP&L was rebranded as Kenya Power and Lighting Company (KPLC)

opportunity to invest in its power system. Uganda, conversely, started from a small power system and very limited coverage. Kenya and Tanzania's power sector reforms were prompted by the aid embargos in the 1990s and early 2000s and as a result of declining donor support. Funding for the utility's development programmes were curtailed during this period, making it difficult to expand generation capacity and access. While Tanzania initially had relatively good donor support, this was withdrawn owing to its ambivalence to commit to the agreed-upon reforms.

- **Different reform commitments:**

Differences in reform commitments, especially the extent of reforms, translate into enhanced incentives that facilitate better performance for countries exhibiting extensive reforms. TANESCO's poor performance relative to that of KPLC and Umeme is partly due to Tanzania's fluctuating commitments to reforms. The Tanzanian government's ambivalence and risk aversion to restructuring and private sector participation reforms (IPPs), even after expressing commitment, has often dissuaded donors and private investors from providing the necessary financial support to the electricity sector. For example, while TANESCO was earmarked for privatization by the Parastatal Public Sector Reform Commission in 1997, with further reform commitments to rationalize its operations through the 1999 IMF ESAF policy paper (unbundling, privatization, introducing independent regulation, least-cost planning and competitive procurements), most of these commitments did not materialize and, in fact, TANESCO was de-listed from privatization in 2005, further undermining private sector participation efforts, including the management contract that was underway in TANESCO.

In addition, the earlier corruption controversies, lack of sustained commitment to private sector participation and non-transparent bidding practices – especially surrounding the 100 MW IPTL IPP in 1995 and the adverse selection of the 100MW Richmond/Symbion project in 2006 – had lasting impressions on the private sector. Such controversies increased risk aversion and outcome uncertainty and ultimately affected the country's investment climate, especially in generation. Whereas Tanzania and TANESCO had experience with a private management contract – NETGroup Solutions – which exposed TANESCO to market-based practices earlier than KPLC and Umeme, and generated better performance results during that contract period, this PSP reform was not sustained. Consequently, the gains realized during the management contract period withered. Similarly, commitments to increase generation capacity to 10,000 MW under the "Big Results Now" programme, have been scaled back from 10,000 MW to 5000 MW by 2020, and to 7000 MW by 2025 by the new regime under President Magufuli. To date, little progress on unbundling has materialized, and privatization plans have been formally revised. The Electricity Supply

Industry Reform Strategy and Roadmap (ESIRSR), which had been set for 2014–15, has been extended to 2025 and no major reforms are envisaged soon. This policy shift does not signal improvements in energy security for the country, let alone its financial viability.

Tanzania also exhibits a lack of coherent planning linked to timely initiation and procurement of generation projects. The country has not consistently followed the least-cost power development plans, and the 2012 master plan has frequently been abandoned at implementation stages due to inadequacy of funds by government and TANESCO's precarious financial position. TANESCO used to ably do five-year rolling master plans until the 1990s; however, this was undermined by the principal (ministry of energy) taking over the procurement of generation projects, using consultants. This conflict has repetitively resulted in uncompetitive tendering processes riddled with allegations of corruption, translating into delayed power development. In contrast, Kenya and Uganda have developed competitive processes for new power projects such as the REFiT and GETFiT programmes that have seen the fast growth of IPPs in the region, creating security of supply. Kenya through the 5,000+ MW programme was able to increase its generation capacity and currently has 17 operational IPPs and a further 25 in the pipeline with a capacity of 4,000 MW, while Uganda has 38 IPPs in operation and others under construction. Similarly, Uganda has been able to undertake extensive, deep and fast reforms (1999–2004) entailing full vertical and horizontal unbundling of its power market and award a 20-year private distribution concession to Umeme Ltd, which has allowed for more investments in IPPs and has resulted in better operational and financial performance of the utility – as one of the only two financially viable utilities on the continent.

- **Different sector governance arrangements and power market structure explain the dissimilar performance in the three utilities:**

The choice between private sector-led (market-oriented reforms) versus state-owned governance arrangements explains differences in utility performance. Market-led governance arrangements attract significant incentives. For example, Umeme operates a specific long-term private concession contract (20 years) that clearly defines contractual relationships with sector principals and is compensated with significant incentives for the many operational risks. This contract (behaviour and outcome-based) has clear separation of roles and responsibilities with various principals; accountability and transparency frameworks which increase managerial focus; easier institutional capacity building; contracted operational and commercial performance targets, and an investment goal in distribution infrastructure. The contract further provides definitive incentives for the private concessionaire which underpin its technical and financial performance. These include, a 20% ROI, risk mitigation guarantees, and financial

and market risk incentives. These mechanisms offer guarantees and reassurances to management and staff to drive performance. Similarly, KPLC, a mixed capital enterprise (MCE) that combines majority government shareholding (50.1%) and minority private shareholding (49.9 percent) implements a relatively well-defined performance contract. The PC is complemented by other governance arrangements – such as the Mwongozo code which articulates the transparency and accountability controls required of the company's management as well as the objectives of improving service performance towards consumers. In contrast, Tanzania's electricity sector's governance arrangements appear broken, manifesting in several conflicts of interest between multiple principals, including the line ministry of energy, the treasury registrar and the presidency, plus a lack of role clarity and information symmetries that impede utility performance. For example, TANESCO's PC with government is poorly designed, weak in targets, lacks a principal signatory at the line ministry and has no incentives to drive performance. The contract does not provide real autonomy and authority to the utility. Hence, political conflicts of interest permeate, affecting TANESCO's overall performance.

KPLC, which has majority government shareholding, exhibits a new agency problem – principal-principal conflict (Young, Peng, Ahlstrom, Bruton, & Jiang, 2008). This conflict is between the controlling shareholder (government) and minority or dispersed (private) shareholders especially in deciding who is on the board of directors, and sometimes in selecting the CEO, a conflict that has started to undermine the effectiveness of the board, as evidenced by the recent firing of KPLC board members and previous management team as discussed in Chapter 4.

- **Different regulatory frameworks:**

The regulatory reforms advanced in the three countries are fundamentally similar in terms of regulatory governance and regulatory substance (Brown, Stern, Tenenbaum, & Gencer, 2006). However, variations manifest between the de jure and the de facto application of regulations. Despite the creation of independent regulatory agencies in all countries, this study's empirical findings show that independence from government remains challenging for some regulators like EPRA and EWURA. Government influence on regulatory decision-making undermines its independence, especially in relation to tariff-setting and licensing. Specifically, the two regulators have not been able to implement necessary tariff increases – in 2017 for EWURA and in 2018 for KPLC, owing to political rejections as discussed in the respective chapters. Failure to effect tariff increases or conduct tariff reviews has negatively affected the financial performance of KPLC and TANESCO. In contrast, ERA in Uganda enjoys significant independence and political support since government has exercised restraint in influencing tariff and licensing decisions. Consequently,

Umeme has been able to implement near-cost-reflective tariffs that have sustained its financial performance better than its peers. In addition, the different capacity of regulators in implementing policy and technical regulations further explains the differences in regulatory outcomes[66] and utility performance. ERA has built capacity in formulating sound techno-economic decisions and has, over time, gained the respect and credibility of electricity sector stakeholders. Conversely, EPRA and EWURA have not yet built similar capacity and are often challenged by the utilities and policymakers on technical matters, for example, in deferment of tariff adjustments for fuel, foreign exchange and inflation changes in Kenya resulted in a financial cashflow gap for KPLC and dented its ability to pay IPPs in time. Regulatory capacity enables utilities to benefit from outcomes of regulatory decisions.

- **Different internal utility governance arrangements:**

Umeme has adopted a purely commercial approach to electricity supply distribution. At the level of board of directors, this has involved hiring directors with a commercial orientation and diversity of skills, as well as experience in the energy sector to drive the company strategy towards continuous profitability. The board, as agent, plays a critical role as an information system that owners–principals (investors and stockholders) use to monitor and control the opportunism of top executives. Through separation of ownership and control, agency problems associated with management entrenchment and information asymmetry are mitigated (Fama & Jensen, 1983), thereby allowing the board to have a clear view of operational activities through routine reporting systems. Because the board as a principal has information to verify agent behaviour, the managers (agents) are most likely to behave in the interests of the principal in executing the company strategy. The company's strategy is highly driven by the embedded incentives, performance-based targets and commercial and financial objectives. These incentives are the primary drivers of its performance. KPLC, as a mixed capital enterprise, applies a hybrid of commercial and public governance arrangements, including independent directors and representatives of government, that enable it to operate on sound commercial principles, although with fewer incentives. Such commercial elements include the ability to acquire debt from capital markets, a relatively high level of financial autonomy and the preparation of financial statements in accordance with international financial reporting standards and are subject to external auditing. The utility is required to comply with listing obligations of the Nairobi Securities Exchange.

[66] 'Regulatory outcome' assesses the outcomes of regulatory decisions, actions and processes on the sector from the perspective of regulated entities. It offers insights into how the actions of regulators have affected the performance of the sector or utility.

Alongside this commercial orientation is the requirement to fulfill government developmental goals and certain social objectives, and the KPLC, in return, receives direct subsidies or on-lent loans from government. This has consequences on prioritization of its operations and enduring conflicts of interest – for example, the utility is required to implement presidential directives, provide quotas for employment of staff, and create procurement opportunities for local manufacturing. The implementation of the Last Mile Connectivity Programme as a government driven development goal, for instance, was allocated to KPLC since government is the majority shareholder. Unfortunately, the programme has increased electricity losses and has negatively affected the company's cashflows and financial viability – an agency problem and burden due to goal incongruence between the principal (government) and agent (KPLC), that would have been rationalized under a purely private governance arrangement. In contrast, TANESCO, which is a state-owned monopoly, has less ambitious governance arrangements – that is, a performance contract with no incentives to drive performance and conflicts of interest that are pervasive, all of which have led to a deterioration in the company's operational and financial performance.

- **Different incentives**

Where the desires of the principal and agent conflict, and the agents are not provided with proper incentives, or are constrained in some manner, perhaps through the terms of the contract, agents may act more in their own interests than in those of the principal. Performance in the three countries differs because of differences in incentives employed. Using the principal–agent theory shows that agency problems can be resolved by increasing incentive alignment between principals and agents (Fama, 1980). For example, equity stock ownership by managers aligns manager's interests with those of owners (Jensen & Meckling, 1976). Evidence from Uganda's Umeme shows that staff and board members hold stock as part of their long-term incentive plan and schemes. This equity ownership aligns their interest with those of the principal by motivating them to strive for better performance in anticipation of growth in the stock value and resultant dividends. The prospect of dividends therefore provides shareholding staff with incentives to minimize agency costs and improve the company's turnover. In addition, the efficient capital markets or stock listings in Uganda and Kenya are robust information mechanisms that are used, or have helped, to control the self-serving behaviour of top executives (Fama, 1980). The capital markets authorities in both countries impose stringent financial and governance reporting obligations that increase levels of transparency, thereby mitigating potential agency problems of information asymmetry and adverse selection. Such reporting, for example, requires KPLC and Umeme to use external auditors to audit financial statements before publication. The demand for external audit is assumed to resolve agency

problems because audited annual reports are widely viewed as a means of mitigating agency costs. In addition, as agency costs increase, there is a demand for high quality auditing to reduce agent fraud (Chen, 2010). Other considerations include requirements to publish financial results every four months, at the end of each half year, or at the end of year in major media outlets, as well as provide profit cautionary warning to shareholders in case there are material changes to the company's financial performance.

Additionally, incentives accruing to employees and board members in the three utilities differ. Employees (as agents) whose wages or salaries are not linked to the utility's performance may have limited incentive to work diligently, particularly when employee shirking and skirting (moral hazard) cannot be documented accurately to any third party and is not easily verifiable. Payroll and team-based incentives like annual salary increments, bonuses, task allowances, programme allowances, medical insurance schemes, provident funds and so on, motivate staff to improve operational performance. According to Sappington (1991b), employee behaviour can be positively re-aligned when they become residual claimants of the firm's stream of profits. In this way, employee's productivity increases with bonus payments. Incentives become real performance drivers if employees are convinced that the proposed rewards are realistically achievable. If employees put in extra effort and improve performance above the baselines and no reward is paid, they will lose morale and revert to business as usual (Mugisha, 2011). That is why incentive design should adopt a pro rata and progressive approach rather than pass/fail (yes/no) criteria. Umeme provides a good example of an incentive system that rewards the board and the employees' progressive contributions for improving performance. KPLC has a moderate incentive for board members and the MD only. In contrast, TANESCO's board is poorly incentivized and staff have no kind of incentive rewards.

6.7 Conclusions Based on the Comparative Analysis

The thesis has reviewed the empirical and theoretical literature on linkages between electricity sector reforms, governance arrangements, technical and operational performance, assisted by the employment of principal–agency theory, in the three case studies: Tanzania, Kenya and Uganda. A comparative assessment of performance provides an understanding not only of the context and motivation for reforms but also has shown different levels of progress in the implementation of reforms with varying performance outcomes. From the empirical findings herein, the following summary of conclusions from the different reforms is offered and reasons why the three utilities have performed differently.

- **The overall conclusions on the effect of the extent and depth of reform:** The countries that made efforts to design inclusive reforms, and getting the buy-in of key stakeholders, were more

successful in the adoption, including the depth and extent, of the reforms. In particular, Uganda and Kenya have had much more successful reforms than Tanzania, with consequences for the performance levels of their utilities (Gore et al., 2019). Specifically, acceptance of reform among government officials and technocrats enabled the unbundling of UEB in Uganda, and KenGen from KPLC in Kenya, and has resulted in more-focused management teams with greater accountability and transparency practices that facilitate performance improvements in service delivery.

- **While there are similarities in some aspects of the reforms, there are also stark differences.** While all three countries have instituted independent regulators, and permitted the entry of IPPs, Tanzania has been the least enthusiastic around private sector participation and, in recent years, has undermined their regulator – EWURA – through blocking or over-turning decisions and firing senior executives. This lack of buy-in to the reform agenda has also meant that TANESCO has remained fully state-owned, compared to the mixed capital enterprises – KenGen and KPLC – in Kenya and the Uganda Umeme private concession, also with stock-exchange listings. At the broadest level, a clear overarching conclusion can be made: the deeper power sector reforms in Kenya and Uganda have resulted in superior utility performance compared to that in Tanzania. And the lack of the opening of the sector to private participation in Tanzania has resulted in inferior investment, a deficit in power generation, power cuts and poorer service delivery. Power sector reform clearly matters – also the extent and depth to which it is accepted and adopted.

- **Corporatization is an important initial reform, but it needs to be effectively implemented.** Autonomy from government influence in operational matters facilitates more efficient management of utilities. Those utilities that have enhanced corporatization and commercialization laws – explicitly stated either in the Electricity Act or in statutes, such as in Kenya and Uganda – have a greater degree of independence in exercising their technical and managerial expertise to improve performance, away from the direct influence of government. Corporatization leads to enhanced commercial performance through improving clarity around business decisions and increasing the autonomy of managers (Nelson & Nikolakis, 2012). This is because corporatization realigns incentives for managers and employees within the new entity – better salaries, enhanced job prospects and incentive schemes linked to performance. For example, corporatization that includes management contracts enables managers to reap the benefits of ownership. A key feature of corporatization success is the establishment of new governance arrangements and how they are implemented.

- **The existence of an independent regulator is important, but its independence needs to be protected and it needs to be capable.** Regulatory independence that facilitates cost-of-service studies, establishes adequate revenue requirements and implements increases in tariffs to cost-reflective levels, has helped to build sufficient revenues and financial viability for utilities like Umeme and, to some extent, for KPLC. Enforcing tariff methodologies consistently (or consistent implementation of the same) has enabled Umeme to achieve financial viability compared to TANESCO and KPLC. To achieve such viability, government restraint and support is required, especially from the executive arm of government and the line ministry of energy. This has been the case in Uganda. In addition, regulatory capacity-building has helped to make and sustain techno-economic decisions enabling the regulator to gain respect and credibility among various stakeholders.

- **Unbundling helps create management focus, easier institutional capacity-building and improved utility performance.** Unbundling allows for enhanced corporate governance, easier institutional capacity building, increased managerial focus, accountability and transparency in all governance, and managerial and operational activities in each unbundled segment. Because of increased managerial focus and dedicated teams in each functional unit within the separated legal companies, unbundling increases specialization in task execution; reduces information asymmetry and highlights concealed conflicts of interests such as insider trading scenarios. There is greater visibility of staff contributions to overall company performance, making it easy to detect and limit managerial or staff (agent) shirking; easier for enhanced monitoring and supervision of operations, and easier to allocate responsibilities and accountability controls. This reform and mechanism places more responsibility and relative liability on the respective chief executives and staff to indemnify the company in case certain obligations are not met. Uganda's unbundled segments – UEGC, UETCL, UEDCL and Umeme – have better management systems and improved governance systems for their respective separate companies with independent boards of directors. Similarly, KPLC has greater focus on transmission and distribution services, while KenGen has been able to focus on growing generation capacity. This degree of enhanced corporate governance may be harder to realize in a big vertically integrated monopoly such as TANESCO. These accountability and transparency mechanisms foster improved performance, especially in the distribution segment. Such is the situation with KPLC and Umeme's performances. Additionally, heavy cross-subsidizations exist in the distribution, transmission and generation segments of TANESCO, which have perpetuated inefficiencies that have led to

deterioration of its financial viability. Good corporate governance practices have also failed to materialize. Hence, TANESCO should urgently be unbundled to allow for the benefits from managerial focus, efficiency, accountability and transparency.

- **Unbundling removes conflicts of interest and results in more investment.** The separation of generation from transmission and distribution removes conflicts of interests in procurement of new capacity, grid access and dispatch prioritizations, and allows for competition, which has seen an influx of private investment in IPPs – as is the case in Kenya and Uganda (Godinho & Eberhard, 2018, 2019a). Because TANESCO is still a monopoly, conflicts of interest in procuring new power have tended to dissuade IPPs as TANESCO continues to be the system operator, single buyer and the only participator in planning for procurement of new generation capacity. In Uganda, the separation of UETCL from generation, and, in Kenya, KPLC from KenGen, has mitigated such conflicts and given more investor confidence in the power market.
- **Private Sector Participation in generation is now widespread and it brings in much-needed investment; best outcomes in the quantity of investment and competitive prices; best outcomes through timeous translation of least-cost plans into international competitive bids or auctions**. Kenya and Uganda have been able to attract the highest number of private IPPs at 17 and 38 respectively, helping to improve their energy security. It is estimated that Uganda has attracted about US$1–1.99 billion and Kenya US$2–2.99 billion in private capital that was lacking for the expansion of generation capacity (Power Futures Lab Database, 2020). Private capital has helped to relieve governments of subsidies that previously strained their treasuries.
- **Private sector participation in transmission and distribution is still limited.** Kenya and Umeme's experience demonstrated how stock-exchange listings create additional incentives for improved performance, by allowing in more private equity capital for investments in network expansions and operations. This nascent experience needs to be replicated in other utilities to bring in needed private capital for the transmission and distribution segments. However, a huge infrastructure funding gap still remains for extending electricity to unserved populations in the relevant countries.
- **Competition reforms have not diffused much given limited electricity infrastructure, inadequate technical capacity for power system-planning that is linked to timeous, competitive procurement of new generation capacity and the enabling technologies to facilitate wholesale and retail trade in spot markets.** Further investments in infrastructure development and

technological adoption, with enabling laws, need to be encouraged for competition to yield the envisaged benefits in reduced electricity tariffs and access. Capacity building for power system planning, directly linked to competitive procurement of new capacity – including use of auctions – is critical for lower costs (Eberhard et al., 2016; Kruger & Eberhard, 2018). Economic Merit Order Dispatch criteria should also be adopted by countries with a significant share of vertically integrated monopolies and SOEs in generation competition with IPPs. Kenya has taken the lead by enacting laws – the Energy Act 2019 – allowing bilateral contracting and third-party access to the grid for generators and commercial and industrial consumers. Both Kenya and Uganda have utilized competitive auction programmes like the REFiT and the GETFiT, which have yielded cheaper prices. TANESCO, on the other hand, has utilized opaque direct procurement processes which have resulted in high power costs that have dented the company's financial health.

- **Private concessions provide deeper incentives for improved performance.** The experience of Uganda shows that contracts such as concessions are more powerful performance drivers than management contracts or performance contracts, especially with regard to incentive allocation and financial sustainability. The 20% return on investment in Uganda provides a larger cushion for invested private capital. In addition, well-designed concession contracts, that provide comprehensive, clearly defined objectives, mandates, roles, responsibilities and activities, enable better risk-mitigation incentives, and operational and financial management of utilities. They also offer clearer pathways to sustainable investment decisions for private sector participation and ultimately filter into better performance outcomes. This is because every concession activity has a cost implication in corresponding penalties if not achieved. In contrast, performance contracts (PCs), or agreements between utilities and governments/public sectors, are rarely strong enough to enforce performance improvements, either in appropriate incentives or in penalties. PCs are generally implemented by administrative or managerial discretion rather than by having a statutory or legal basis. Because they are not legalistic, like management contracts or concessions, PCs are inclined to be in the form of a partnership governed by the spirit of agreement and mutual trust but seldom with repercussions for failure (penalties) to achieve the set performance targets or objectives. This is true for both Kenya and Tanzania, but particularly in Tanzania, where performance targets are not even negotiated and there is no framework that defines how performance will be measured at the end of the specified period.

- **Strong management incentives are critical for the success of any utility and, overall, comparative conclusions from power sector and governance reforms, and their impact on performance, show that the deeper and more extensive the reforms are, the more incentives there are for improved performance.** Utilities such as Umeme have strong incentives embedded in both the design of the concession (20% return on investment) and the linked tariff methodology. In addition, three critical categories of incentives have been identified: (1) risk-based incentives – pegged to the high uncertainty in the operational environment including political risks, regulatory risks, financial and market risks; (2) performance-based incentives pegged to targets set by the regulator and/or complimented by government, and (3) pay-roll incentives also pegged to targets set internally by the board and management, used to reward staff and management. These may include bonus payments, long-term incentive plans, enhanced salaries, staff stock/share incentive schemes, provident funds, health insurance schemes, annual salary increases, vehicles, telephone, activity allowances, and so on. Strong incentives for board members, too, are very crucial in driving company strategy and pushing the company to perform better – as evidenced in both Umeme and KPLC. In sum, Kenya and Uganda, which have undertaken deeper unbundling and private sector participation reforms, have greater incentives for improved performance and IPP investments and are much better than Tanzania. Uganda which has had more extensive reforms in form of a concession is better than Kenya. These incentives are most evident in the financial performance and its sustainability, enabled through the capable regulator, unbundling, private concession and stock listing resulting in superior performance.

- **Elements of the standard power sector reform model need to be complemented by additional governance reforms, such as effectively designed, implemented and monitored performance contracts (PCs), that promote greater supervision with appropriate incentives and penalties.** Corporatization and commercialization reform, as well as regulatory reform, need to be complemented with performance contracts that provide targets reflected in the tariff-setting methodology. This leads to corresponding incentives being awarded for performance improvement achievements or penalties being imposed for failure. While KPLC and TANESCO's PCs set out annual targets to be achieved, these are not translated into the regulatory tariff-setting process and, therefore, lack the incentives for any form of performance realized. In Uganda, the private sector participation reform in the Umeme distribution concession design provides for performance and regulatory targets (which are linked to the tariff-setting process

and methodology), and are incentive earning. This has helped to spur improvements in the utility's performance. At operational level, individual performance contracts provide stronger information systems for reporting and delegation of tasks which are crucial in realizing teamwork and the achievement of organizational goals as a whole. Individual PCs facilitate a deeply entrenched system of delegation of tasks and feedback loop (information system) that minimizes agent-shirking and information asymmetry, thus helping to effect individual accountability and responsibility in improving performance. For example, explicit laws that allocate individual accountability among staff as part of performance contracting are crucial. In addition, having independent directors on the board helps to minimize influence from majority shareholders or governments as evidenced from KPLC and Umeme. A board that has a greater diversity in skill sets, competencies and experiences with market-oriented management styles has greater incentives to improve the utility's performance than those without. In this regard, KPLC and Umeme perform better than TANESCO.

- **Stock market listing provides a strong impetus for strict compliance with market regulations and covenants of debt or equity providers.** Listing introduces strong scrutiny, accountability and transparency in reporting, with various levels of checks to ensure there is a sustained trend in performance. Capital markets also provide for stringent penalties, liability and sanctions to the company or to any company director or management/staff (jointly or severally) who contravenes the set regulations; to indemnifies the company/ utility against any loss arising from contravention of the CMA regulations including potential suspension and delisting of the company. This accountability mechanism compels directors and management to strive for improved financial performance to achieve the set regulatory standards – profitability, solvency, liquidity, minimum capital requirements, dividend distribution, and disclosure of material information to investors. The mechanism also places full responsibility for the operations of the utility and its compliance adherence obligations on its directors and employees with calls for a clear separation of duties and functions deemed to pose conflict of interest. KPLC and Umeme have been able to improve their performance as a result of the listing.

- **At an operational level, standard reforms are not sufficient. Additional incentives are needed to reduce losses, and to improve billings and collections to maximize revenues.** These incentives and penalties need to be appropriately incorporated into concession agreements or performance contracts and cascaded down to management and staff. While the Umeme concession provides

some targets, these are enhanced and complemented by regulatory performance targets, specifically covering losses and revenue collections which are crucial for utilities to achieve financial viability. Stretch targets, blended in regulatory frameworks, enable the regulator to improve supervision, monitoring and to limit information asymmetry in reporting. Because the regulator has powers to approve the targets, they can direct the utility to focus its performance areas to critical and priority developmental objectives, while also providing necessary incentives to achieve them. For example, ERA in Uganda prioritizes revenue collection, loss reduction and DOMC targets whose benefits build a sustainable revenue stream necessary to finance the much-needed IPP investments in generation segment. In this way, Umeme is incentivized to strive toward and achieve the targets, ultimately resulting in a growth trajectory.

- **Widened access to electricity is mostly independent of the standard model power sector reforms and requires additional interventions for success, such as electrification targets, better spatial planning, dedicated funding, and dedicated institutions. Some of these could also be integrated into the design of concessions.** Government subsidies, combined with concessional or donor funding, are critical for financing universal access programmes (PéRez-Arriaga, Jenkins, & Batlle, 2017). This financing approach has been successful for Kenya and Tanzania that have access rates higher than Uganda's. Stretch regulatory targets for access are also useful for increasing connection numbers. In addition, an enabling regulatory framework for market entry for renewables and off-grid electricity technologies, including mini-grids and home solar systems, has helped to increase access rates in Kenya and Tanzania.

- **Achieving financial viability and sustainability remains critical to creating bankable balance sheets that will attract private capital for system expansion, access and overall economic development.** Despite governance efforts being put in place, utilities continue to struggle to achieve financial sustainability. Focus on reducing technical and commercial inefficiencies, optimizing debt levels and well-planned developmental goals will help realize this (Eberhard & Dyson, 2019). Consistent regulatory decision-making for cost-reflective tariffs and adequate indexation or adjustment of macro-economic variables, as is the case of ERA and Umeme in Uganda, helps to achieve financial viability and sustainability. Governments should not deplete utility financial revenues by imposing costly development programmes – such as the universal access programme in Kenya, without providing matching subsidies to cover the viability gap.

Vertically integrated SOEs like TANESCO need to unbundle and introduce private management options or rationalized cost expenditures to minimize inefficiencies.

6.8 The Contribution of the Thesis to New Knowledge

The conventional literature and theory on power sector reform such as (Bacon, 2018; Foster & Anshul, 2019; Godinho & Eberhard, 2019b; Gratwick & Eberhard, 2008b; Jamasb et al., 2015; Pollitt, 2007; Urpelainen et al., 2017) does not provide a complete explanation for the drivers of utility performance at national and industry level. Previous power sector reform researchers have seen the reforms-performance relationship as a black box without understanding the implications and context of these structural solutions. Previous attempts to analyze reform performance have been limited to narrow econometric models and statistical analysis. Rather, the application of the principal–agency framework, in combination with power sector reform using a multiple in-depth case study approach, provides a more powerful analytical framework that explains the various relationships, governance arrangements and contracts that underpin performance in different circumstances and in different countries. The novelty of this research is that the thesis has largely adopted a positivist agency theory lens and perspective to describe the governance arrangements, or mechanisms, that solve the agency problem. Principal–agent theory further enables the researcher to demonstrate that owing to the pervasive goal conflicts between principals and agents; the high levels of information asymmetry; the high level of agent risk aversion and outcome uncertainty in utilities, the behaviour-based contracts are best suited to solve agency problems. Such behaviour contracts like concessions have been used to shift risks to private agents at a price and at premiums that co-align the agent and principal's interests, ultimately resulting in better performance improvements.

Using the empirical evidence from the three case studies, the thesis was able to distill new explanations and information about drivers of utility performance that extends the frontiers of knowledge unlike before. The thesis further distills lessons that may be relevant to other developing countries. Using a comparative case study approach the greatest novelty and contribution to knowledge of the thesis is its ability to provide a typology, an interplay and empirical evidence of drivers of utility performance through a powerful analytical framework that combines power sector reform and Principal Agent Theory. In this way, the thesis ably explains new concepts relating to information systems, outcome uncertainty and risk preferences in differently structured power markets – including lessons from global power reform experiences. The thesis further provides a systematic and in-depth analysis of motivations for reforms in

each country; the nature of unbundled power structures; vertical integration; power system planning and procurements; regulatory policy; concessions; compensations; incentives; board relationships; strategic alliances; ownership; financing, and stock listings and how these impact performance.

The researcher has further extended knowledge by applying the two bodies of theory in a context of poorly developed countries with weak institutions that do not protect property rights in order to analyze and explain how corporate governance and contracting problems may arise or be resolved, and to ably situate possible goal conflicts in the electricity sector. A new agency problem – principal-principal conflict between the government majority shareholding and private dispersed shareholding – is identified in Kenya to extend knowledge in governance challenges in a mixed capital enterprise. In addition, the researcher expands the two bodies of literature to richer and more complex contexts to explain governance systems especially in in electricity utilities. The thesis further provides a deeper and novel understanding of a broader range of contract alternatives including management contracts, performance contracts and concessions and how these have been applied in different contexts with different results that explain the different utility performance unlike before. Additionally, the thesis provides new knowledge on the efficacy of the principal–agent theory in explaining incentives for performance improvement and further lays a strong analytical foundation concerning how modes of performance improvement, measured in idiosyncratic terms, can be associated with individual incentives and power utility structures. Novelty is further revealed in the powerful use and explanation of stock and bond listings to alter the standard model of power sector reforms and to introduce new governance arrangements and incentives that underpin a strong discipline of private capital, which ultimately improves utility performance. This new and additional knowledge will potentially provide the much-needed driver to turn around the financial viability and sustainability of utilities in the next wave of reforms in developing countries in the future. A combination of the above contributions provides a rich extension of frontiers of knowledge on power sector reforms, the hybrid power markets and utility performance improvements in SSA.

6.9 Limitations of the Thesis and Further Research

As with all research projects, this thesis has a number of limitations. First, a few case study countries were used. While the research adopted a multi-country case-study research design that provides the benefit of increasing the power of generalizations, this approach limits the breadth of empirical information that can be collected had more countries been considered. Secondly, the respondent interviews were out of necessity limited to a moderate number of top-level decision-makers (CEOs and Heads of Departments)

who have been influential in decision-making in the three utilities and are perceived to have a well-grounded institutional knowledge of reforms and their impacts. Possibly, inclusion of more middle management staff and officers would have provided additional information. Data availability limitations especially on some macro-level indices and incentives was experienced. A comprehensive cross-case comparison of indicators considered priority for Generation and Transmission companies at operational level may shed more light on internal organizational challenges not addressed fully in this thesis. In consideration of these limitations, there are areas of interest which further research can address. For example, the impact of power sector reforms on electricity distribution investments is a virgin area that is unclear and under-studied. The welfare analysis of power sector reforms using a cost benefits analysis is still unexplored in the context of East Africa and in developing countries. Conducting a similar study in West Africa and Southern Africa or the entire Sub-Saharan Africa region would be interesting to see what the experience and impacts of the reforms have been. Further research analysis the social-cultural behaviors and staff attitudes would potentially be more revealing about the different staff attitudes in the three case study countries and how they influence utility performance. A deeper analysis of sources of risks, characterization of incentives for risk mitigation would be interesting to open-up a large area of investigation. The area of explicit incentives is another field warranting attention in the future especially the incentives provided by the regulator or internally by the utility in dollar terms. Lastly, future work might focus on how to better prioritize concession and performance contract targets since devoting resources to meet any target reduces resources that can be applied to meeting other targets. This would require sequencing performance improvements to involve both technical (planning) skills and sensitivity to political economy concerns. The author will explore further research in some of these areas for journal publications.

Acronyms

AFD	Agence Francaise de Development
AfDB	African Development Bank
BOD	Board of directors
BOO	Build own operate
BOOT	Build own operate transfer
BRN	Big results now
BST	Bulk supply tariff
CapEX	Capital expenditure
CAIDI	Customer average interruption duration index
CCGT	Combined cycle gas turbine
CDC	Commonwealth Development Corporation
CEO	Chief executive officer
CMA	Capital Markets Authority
CS	Cabinet secretary
COVID 19	Corona Virus
DFI	Development finance institution
DFID	Department for International Development
DOMC	Distribution, operation, and maintenance costs
D/A	Debt to asset ratio
DER (D/E)	Debt to equity ratio
DSCR	Debt service coverage ratio
EAC	East African Community
EBITDA	Earnings before interest, taxes, depreciation and amortization
ECG	Electricity Company of Ghana
EIA	Environmental Impact Assessment
EPC	Engineering, procurement, and construction
ERA	Electricity Regulatory Authority (of Uganda)
ERC	Energy Regulatory Commission (of Kenya)
EPRA	Energy and Petroleum Regulatory Authority (of Kenya)
EPP	Emergency Power Producers
ESI	Electricity supply industry
ESIRSR	Electricity supply industry reform strategy and roadmap
ESMAP	Energy Sector Management Assistance Programme
EWURA	Energy and Water Utilities Regulatory Authority (of Tanzania)
FDI	Foreign Direct Investment
GDP	Gross domestic product
GDC	Geothermal Development Corporation
GETFiT	Global energy transfer feed-in tariff
GNI	Gross national income
GoK	Government of Kenya
GoT	Government of Tanzania
GoU	Government of Uganda
GW	Gigawatt

HFO	Heavy fuel oil
HPP	Hydro-power plant
ICB	International competitive bid
IDA	International Development Association
IDF	Integrated distribution framework
IEA	International Energy Agency
IFC	International Finance Corporation
IMF	International Monetary Fund
IPO	Initial public offering
IPP	Independent power producer
IPTL	Independent Power Tanzania Limited
IRENA	International Renewable Energy Agency
ISO	Independent system operator
ICT/IT	Information communication and technology
KenGen	Kenya Generating Company Limited
KPI	Key performance indicator
KPLC	Kenya Power and Lighting Company
KETRACO	Kenya Electricity Transmission Company Limited
Ksh	Kenya shillings
kV	kilovolt
kVa	kilovolt ampere
kW	kilowatt
kWh	kilowatt hour
LAA	Lease and assignment agreement
LCU	Local currency unit
LC	Letter of credit
LCPDP	Least cost power development plan
LMCP	Last Mile Connectivity Project
Mcf	Million cubic feet
MD	Managing Director
MFI	Multilateral finance institution
MEMD	Ministry of Energy and Mineral Development (of Uganda)
MoEP	Ministry of Energy and Petroleum (of Kenya)
MoE	Ministry of Energy (of Tanzania)
MIRA	Managing infrastructure investment reform and regulation in Africa
MW	Megawatt
MWh	Megawatt hour
M-form	Multi-divisional form
MTEF	Medium term expenditure framework
NSE	Nairobi Securities Exchange
NORAD	Norwegian Agency for Development Corporation
OBA	Output-based aid
O&M	Operating and maintenance
OCGT	Open cycle gas turbine
ODA	Official development aid
OpEX	Operating expenditure
OECD	Organization for Economic Cooperation and Development
QFD	Quasi-Fiscal Deficit

QoS	Quality of supply
QDA	Qualitative document analysis
PC	Performance contract
PPA	Power purchase agreement
PPP	Public-private partnerships
PRG	Partial risk guarantee
PRI	Political risk guarantee
PSA	Power sales agreement
PSP	Private sector participation
PSP	Power supply price
PSR	Power sector reforms
PSCR	Parastatal Sector Reform Commission (of Tanzania)
PU	Privatization Unit (of Uganda)
PV	Photovoltaic
REA	Rural Electrification Agency (of Uganda)
REA	Rural Energy Agency (of Tanzania)
REREC	Rural Energy and Renewable Energy Corporation of (Kenya)
ROI	Return on equity
ROR	Rate of return
SAIDI	System average interruption duration index
SAIFI	System average interruption frequency index
SEEG	Societe d'Energie et d'Eau du Gabon
SDG	Sustainable Development Goal
SOE	State-owned enterprise
SSA	Sub-Saharan Africa
SPP	Special provisions period
T&D	Transmission and distribution
TANESCO	Tanzania Electric Supply Company Ltd
TOU	Time of use
TR	Treasury Registrar
TSO	Transmission system operator
TZSh	Tanzanian shillings
UEB	Uganda Electricity Board
U-form	Unitary form
UK	United Kingdom
USA	United States of America
USE	Uganda Securities Exchange
USD	United states dollars
Ushs	Uganda shillings
TAA	Turnround activities
WBG	World Bank Group
ZECO	Zanzibar Electricity Corporation

Bibliography

AfDB. (2019). Ghana: Government terminates PDS contract with ECG. Retrieved from Africa Energy Portal website: https://africa-energy-portal.org/news/ghana-government-terminates-pds-contract-ecg

Africa Business Insight. (2016, May 5). Power privatisation: Kenya case study. *Africa Business Insight*. Retrieved from https://www.howwemadeitinafrica.com/power-privatisation-kenya-case-study/54296/

Africa Research Institute. (2017). IPTL, Richmond and "Escrow": The price of private power procurement in Tanzania. Retrieved July 6, 2021, from Africa Research Institute website: https://www.africaresearchinstitute.org/newsite/publications/iptl-richmond-escrow-price-private-power-procurement-tanzania/

Alexander, I., & Estache, A. (2000). *Infrastructure restructuring and regulation: Building a base for sustainable growth*. Retrieved from http://documents.worldbank.org/curated/en/254651468779673755/pdf/multi-page.pdf

allAfrica. (2017, June 12). *Tanzania: What Next After Ewura Boss' Removal?* Retrieved from https://allafrica.com/stories/201706130068.html

Andersen, T. B., & Dalgaard, C. J. (2013). Power outages and economic growth in Africa. *Energy Economics*, *38*, 19–23. https://doi.org/10.1016/j.eneco.2013.02.016

Andres, L., Foster, V., & Guasch, J. L. (2006). *The impact of privatization on the performance of the infrastructure sector: The case of electricity distribution in Latin American countries* (No. WPS3936). Retrieved from http://documents.worldbank.org/curated/en/413111468277136667/pdf/wps3936.pdf

Anywanza, J. (2020, June 22). Kenya Power issues profit alert as business declines. *The East African*. Retrieved from https://www.theeastafrican.co.ke/tea/business/kenya-power-issues-profit-alert-as-business-declines-1443628

Bacon, R. (1995a). Appropriate restructuring strategies for the power generation sector: The case of small systems. In *World Bank Industry & Energy Department*. Retrieved from

http://documents.worldbank.org/curated/en/990541468767055999/pdf/multi-page.pdf

Bacon, R. (1995b). Privatization and reform in the global electricity supply industry. *Annual Review of Energy and the Environment*, *20*, 119–143. https://doi.org/165.0.104.178

Bacon, R. (1999). A scorecard for energy reform in developing countries. *Public Policy for the Private Sector*, *175*, 5–12.

Bacon, R. (2018). *Taking stock of the impact of power utility reform in developing countries: A literature review*. Retrieved from https://openknowledge.worldbank.org/bitstream/handle/10986/29889/WPS8460.pdf?sequence=5&isAllowed=y

Bacon, R., & Besant-Jones, J. E. (2002). Global electric power reform, privatization, and liberalization of the electric power industry in developing countries. *Annual Review of Energy and the Environment*, *26*, 331–359. https://doi.org/10.1146/annurev.energy.26.1.331

Balza, L., Jimenez, R., & Mercado, J. (2013). *Privatization, institutional reform, and performance in the Latin American electricity sector*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.874.151&rep=rep1&type=pdf

Beasley. (1996). An Empirical Analysis of the Relation Between the Board of Director Composition and Financial Statement Fraud. *The Accounting Review*, 443–465. Retrieved from http://lib.cufe.edu.cn/upload_files/other/4_20140522023523_7.pdf

Berle, A. a, & Means, G. C. (1932). *The modern corporation and private property*. https://doi.org/10.2307/3475545

Besant-Jones, J. E. (2006). *Reforming power markets in developing countries: What have we learned?* Retrieved from http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2007/03/07/000310607_20070307122641/Rendered/PDF/380170REPLACEMENT0Energy19.pdf

Blimpo, M. P., & Postepska, A. (2017). Why is Household Electricity Uptake Low in Sub-Saharan Africa? *Why Is Household Electricity Uptake Low in Sub-Saharan Africa?*, 1–41. https://doi.org/10.1596/33109

Boru, T. (2018). CHAPTER FIVE RESEARCH DESIGN AND METHODOLOGY. *Research Gate*, (December), 41. https://doi.org/10.13140/RG.2.2.21467.62242

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27–40. https://doi.org/10.3316/QRJ0902027

Brown, A. C., Stern, J., Tenenbaum, B., & Gencer, D. (2006). *Evaluating Infrastructure Regulatory Systems*. https://doi.org/10.1596/978-0-8213-6579-3

Bryman, A. (2008). Of methods and methodology. *Qualitative Research in Organizations and Management: An International Journal*, *3*(2), 159–168. https://doi.org/10.1108/17465640810900568

Burrell, G., Morgan, G., Burrell, G., & Morgan, G. (1979). Assumptions about the Nature of Social Science. *Sociological Paradigms and Organisational Analysis*, 36. https://doi.org/10.4324/9781315609751-1

Business Daily. (2018, November 24). Kenya Power shareholders to miss dividends as profit hits 10-year low. *Business Daily*. Retrieved from https://www.businessdailyafrica.com/corporate/companies/Kenya-Power-profit-hits-10-year-low/4003102-4865858-11rrbsez/index.html

Business Daily. (2020a, July 14). Half of Kenya Power directors quit. *Business Daily*. Retrieved from https://www.businessdailyafrica.com/news/Half-of-Kenya-Power-directors-quit/539546-5593294-u97tiez/index.html

Business Daily. (2020b, August 6). Kenya Power gets external debt relief in cost cut push. *Business Daily*. Retrieved from https://www.businessdailyafrica.com/corporate/companies/Kenya-Power-gets-external-debt-relief-in-cost-cut-push/4003102-5604630-b6sphnz/index.html

Businge, J. (2020, January 29). Why Karuma Dam commissioning has been extended again. *The Indipendent*. Retrieved from https://www.independent.co.ug/karuma-dam-commissioning-extended-again/

Castellano, A., Kendall, A., Nikomarov, M., & Swemmer, T. (2015). *Brighter Africa: The growth potential of the sub-Saharan electricity sector*. Retrieved from http://www.mckinsey.com/~/media/mckinsey/dotcom/insights/energy resources materials/powering africa/brighter_africa_the_growth_potential_of_the_sub-saharan_electricity_sector.ashx

Chen, Y. (2010). *Agency issues and the effects of corporate governance mechanisms on agency costs in*

Chinese listed companies. Retrieved from https://orca.cf.ac.uk/54376/1/U584477.pdf

Chitchyan, R., & Murkin, J. (2018). *Review of blockchain technology and its expectations: Case of the energy sector*. Retrieved from http://arxiv.org/abs/1803.03567

Claessens, S., Djankov, S., Fan, J. P. H., & Lang, L. H. P. (2002). Disentangling the incentive and entrenchment effects of large shareholdings. *Journal of Finance*, *57*(6), 2741–2771. https://doi.org/10.1111/1540-6261.00511

CMA-Kenya. *The Capital Markets (Secutirties) (Public Offers, Listing and Disclosures) Regulations 2002-Amended 2019*. , (2002).

CMA-Kenya. Regulations and Market Practice (Kenya). , Chartered Institute for Securities and Investment § (2016).

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (Vol. 3). Retrieved from http://repositorio.unan.edu.ni/2986/1/5624.pdf

Creswell, J. W., & Plano Clark, V. L. (2007). Designing and Conducting Mixed Method Research. In *Designing and conducting mixed methods research* (pp. 58–89). Retrieved from https://www.sagepub.com/sites/default/files/upm-binaries/10982_Chapter_4.pdf

Creswell, J. W., Plano Clark, V. L., & Hanson, W. E. (2003). Advances in Mixed Methods. *Handbook of Mixed Methods in Social and Behavioral Research, 209*, 240. Retrieved from https://cloudfront.ualberta.ca/-/media/ualberta/faculties-and-programs/centres-institutes/international-institute-of-qualitative-methods/webinars/mixed-methods/2016/jcreswellmmira-webinar.pdf

Cubbin, J., & Stern, J. (2006). The impact of regulatory governance and privatization on electricity industry generation capacity in developing economies. *The World Bank Economic Review*, *20*(1), 115–141. https://doi.org/10.1093/wber/lhj004

Cubbin, J., & Stern, J. (2008). Regulatory Effecuveness: The Impact of Good Regulatory Governance on Electricity Industry Capacity and Efficiency in Developing Countries. *City Research Online*, *37*(9), 1591–1601.

Daily Monitor. (2020, January 20). What led to Karuma dam's extension again? *Daily Monitor*. Retrieved from https://www.monitor.co.ug/Business/Prosper/What-led-Karuma-dam-extension-again/688616-5424884-14v81kmz/index.html

Denis, D. K., & Mcconnell, J. J. (2002). Purdue e-Pubs International Corporate Governance International Corporate Denis, D. K., & Mcconnell, J. J. (2001). Purdue e-Pubs International Corporate Governance International Corporate Governance International Corporate Governance.Governance Internation. *Journal of Financial and Quantitative Analysis*, *17*.

Drèze, J. H. (1979). Human capital and risk-bearing. *The Geneva Papers on Risk and Insurance: Issues and Practice*, *4*(2), 5–22. https://doi.org/10.1057/gpp.1979.11

Eberhard, A. (2006). Infrastructure Regulation in Developing Countries: An Exploration of Hybrid and Transitional Models. *Public-Private Infrastructure Advisory Facility*, (4), 47. Retrieved from http://www.gsb.uct.ac.za/files/hybridMIRpaper.pdf

Eberhard, A. (2007). Infrastructure regulation in developing countries. *Ppiaf.Org*, (4). Retrieved from http://www.ppiaf.org/ppiaf/sites/ppiaf.org/files/publication/Eberhard_PPIAF_Annual_Meeting_presentation_0.pdf%5Cnpapers2://publication/uuid/E081F63C-2307-4E8A-869A-CA2FF40BB49F

Eberhard, A. (2019). The Challenges of Regulating State-Owned Utilities. *Presentation Slides*, (October). Retrieved from www.gsb.uct.a.za/mir

Eberhard, A. (2020). *Power investment trends and challenges in sub-Saharan Africa*. Power Futures Lab, Graduate School of Business, University of Cape Town.

Eberhard, A., & Dyson, G. (2019, September 25). Revisiting reforms in the power sector in Africa. *African Development Bank Group*, p. 72. Retrieved from https://www.afdb.org/en/documents/revisiting-reforms-power-sector-africa

Eberhard, A., & Godinho, C. (2017). *A review and exploration of the status, context and political economy of power sector reforms in Sub-Saharan Africa, South Asia and Latin America*. Retrieved from https://escholarship.org/uc/item/11k4210h

Eberhard, A., & Gratwick, K. N. (2011). IPPs in Sub-Saharan Africa: Determinants of success. *Energy Policy*, *39*(9), 5541–5549. https://doi.org/10.1016/j.enpol.2011.05.004

Eberhard, A., & Gratwick, K. N. (2013). *Contributing elements to success of IPPs in sub-Saharan Africa*. 2–5.

Eberhard, A., Gratwick, K. N., & Kariuki, L. (2018a). A review of private investment in Tanzania's power generation sector. *Journal of Energy in Southern Africa*, *29*(2), 1–11. https://doi.org/10.17159/2413-3051/2018/v29i2a4389

Eberhard, A., Gratwick, K. N., & Kariuki, L. (2018b). Kenya's lessons from two decades of experience with independent power producers. *Utilities Policy*, *52*, 37–49. https://doi.org/10.1016/j.jup.2018.04.002

Eberhard, A., Gratwick, K. N., Morella, E., & Antmann, P. (2016). *Independent power projects in Sub-Saharan Africa: Lessons from five key countries*. https://doi.org/doi:10.1596/978-1-4648-0800-5

Eberhard, A., Gratwick, K. N., Morella, E., & Antmann, P. (2017a). Accelerating investments in power in sub-Saharan Africa. *Nature Energy*, *2*(2), 17005. https://doi.org/10.1038/nenergy.2017.5

Eberhard, A., Gratwick, K. N., Morella, E., & Antmann, P. (2017b). Independent power projects in Sub-Saharan Africa: Investment trends and policy lessons. *Energy Policy*, *108*, 390–424. https://doi.org/10.1016/j.enpol.2017.05.023

Eberhard, A., Kruger, W., & Volk, D. (2017). Renewable energy auctions in Sub-saharan Africa. In *Irena*. Retrieved from https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_Auctions_Sub-Saharan_Africa_2018.pdf

Eberhard, A., Rosnes, O., Shkaratan, M., & Vennemo, H. (2011). *Africa's power infrastructure: Investment, integration, efficiency*. https://doi.org/10.1596/978-0-8213-8455-8

Eberhard, A., & Shkaratan, M. (2012). Powering Africa: Meeting the financing and reform challenges. *Energy Policy*, *42*, 9–18. https://doi.org/10.1016/j.enpol.2011.10.033

Eisenhardt, K. M. (1989a). Agency theory: An assessment and review. *The Academy of Management Review*, *14*(1), 57–74.

Eisenhardt, K. M. (1989b). Building Theories from Case Study Research. *Academy of Management Journal*, *14*(4), 532–550.

Eisenhardt, K. M. (1991). Better Stories and Better Constructs: The Case for Rigor and Comparative Logic. *Academy of Management Review*, Vol. 16, pp. 620–627. https://doi.org/10.5465/amr.1991.4279496

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory Building from Cases: Opportunities and Challenges. *Academy of Management Journal*, *50*(1), 25–32. https://doi.org/10.5465/AMJ.2007.24160888

Energy Sector Management Assistance Programme. (1996). *Uganda energy assessment*. Retrieved from http://documents.worldbank.org/curated/en/358821468760763653/pdf/multi-page.pdf

ERA. (2014). *Letter from ERA to Umeme- Divestment of Shares in Umeme - 14 A.pdf*. Kampala, Uganda.

Erdogdu, E. (2011). The impact of power market reforms on electricity price-cost margins and cross-subsidy levels: A cross country panel data analysis. *Energy Policy*, *39*(3), 1080–1092. https://doi.org/10.1016/j.enpol.2010.11.023

Erdogdu, E. (2014). The political economy of electricity market liberalization: A cross-country approach. *The Energy Journal*, *35*(3). https://doi.org/10.5547/01956574.35.3.5

ERI. (2018). *Electricity Regulatory Index for Africa*. Retrieved from https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Electricity_Regulatory_Index_2018.pdf

ERI. (2019). *Electricity Regulatory Index for Africa*. Retrieved from https://africa-energy-portal.org/sites/default/files/2019-12/ERI 2019.pdf

ERI. (2020). *Electricity Regulatory Index*. Retrieved from https://africa-energy-portal.org/sites/default/files/2020-11/Electricity Regulation Index 2020.pdf

ESI Africa. (2016a). Tanzania: Songas Limited to suspend operations at Ubungo plant. *Africa Electricity Supply Industry (ESI)*. Retrieved from https://www.esi-africa.com/regional-news/east-africa/tanzania-songas-limited-to-suspend-operations-at-ubungo-plant/

ESI Africa. (2016b, October 31). Tanzania: Parliament orders gov't to settle electricity debt. *ESI Africa*. Retrieved from https://www.esi-africa.com/news/tanzania-parliament-orders-govt-to-settle-electricity-debt/

ESI Africa. (2017a). Zanzibar begins paying Tanesco outstanding power bills. *ESI Africa*. Retrieved from https://www.esi-africa.com/regional-news/east-africa/zanzibar-begins-paying-tanesco-outstanding-power-bills/

ESI Africa. (2017b, January 12). Tanzania: President fires TANESCO boss. *ESI Africa*. Retrieved from https://www.esi-africa.com/news/president-fires-tanesco-boss/

ESMAP. (2018). Regulatory Indicators for Sustainable Energy. In *Documents and Reports*. https://doi.org/10.4135/9781446219478.n3

Estache, A., Tovar, B., & Trujillo, L. (2007). *Are African electricity distribution companies efficient? Evidence from the Southern African countries*. Retrieved from https://openaccess.city.ac.uk/id/eprint/1474/1/

Fama, E. F. (1980). Agency problem and the theory of firm. *The Journal of Political Economy*, *88*(2), 288–307.

Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *Journal of Law and Economics*, *26*(2), 301–325. https://doi.org/10.1086/467037

Fobi, S., Deshpande, V., Ondiek, S., Modi, V., & Taneja, J. (2018). A longitudinal study of electricity consumption growth in Kenya. *Energy Policy*, *123*(November 2017), 569–578. https://doi.org/10.1016/j.enpol.2018.08.065

Foster, V., & Anshul, R. (2019, September 10). Rethinking power sector reform in the developing world. *World Bank: Understanding Poverty*, p. 356. https://doi.org/10.1596/978-1- 4648-1442-6

Foster, V., Witte, S., Banerjee, S. G., & Moreno, A. (2017). *Charting the diffusion of power sector reforms across the developing world*. Retrieved from https://esmap.org/charting-the-diffusion-of-power-sector-reforms-across-the-d

Frantz, R. (1992). X-Efficiency and Allocative Efficiency: What have We Learned? *The American Economic Review*, 82(2), 434–438. Retrieved from http://www.jstor.org/stable/2117440

Gassner, K., Popov, A., & Pushak, N. (2009). *Does private sector participation improve performance in electricity and water distribution?* https://doi.org/10.1596/978-0-8213-7715-4

Gedajlovic, E. R., & Shapiro, D. M. (1998). Management and ownership effects: Evidence from five countries. *Strategic Management Journal*, *19*(6), 533–553. https://doi.org/10.1002/(sici)1097-0266(199806)19:6<533::aid-smj957>3.0.co;2-%23

George, A. L., & Bennett, A. (1997). Process Tracing in Case Study Research. *October*, 104–105.

Gerring, J., & Thacker, S. C. (2008). Do neoliberal economic policies kill or save lives? *Business and Politics*, *10*(1–33). https://doi.org/10.2202/1469-3569.1212

Ghanadan, R., & Eberhard, A. (2007). *Electricity utility management contracts in Africa: Lessons and experience from the TANESCO-NET Group Solutions Management Contract in Tanzania, 2002-2006*. Retrieved from www.gsb.uct.ac.za/files/tanzaniamanagementcontract.pdf

Ghanghis Capital. (2018, July). *Lights off as top power men apply for bail*. Retrieved from https://www.genghis-capital.com/newsfeed/lights-off-as-top-power-men-apply-for-bail/

Giannakis, D., Jamasb, T., & Pollitt, M. G. (2003). *Benchmarking and incentive regulation of quality of*

service: An application to the UK Electricity Distribution Utilities. Cambridge Working Papers in Economics CWPE 0408.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking Qualitative Rigor in Inductive Research. *Organizational Research Methods*, *16*(1). https://doi.org/10.1177/1094428112452151

Godinho, C., & Eberhard, A. (2018). *Power sector reform and regulation in Tanzania*. Retrieved from https://edi.opml.co.uk/resource/tanzania-institutional-diagnostic-chapter-7/

Godinho, C., & Eberhard, A. (2019a). *Learning from power sector reform: The case of Uganda*. Retrieved from https://openknowledge.worldbank.org/handle/10986/31562

Godinho, C., & Eberhard, A. (2019b). *Learning from powesector reform: The case of Kenya*. Retrieved from https://openknowledge.worldbank.org/bitstream/handle/10986/31561/WPS8819.pdf?sequence=4&isAllowed=y

Gore, C. D., Brass, J. N., Baldwin, E., & MacLean, L. M. (2019). Political autonomy and resistance in electricity sector liberalization in Africa. *World Development*, *120*, 193–209. https://doi.org/10.1016/j.worlddev.2018.03.003

Government of Kenya. (1996). *Kenya: Enhanced Structural Adjustment Facility*. Retrieved from https://www.imf.org/external/np/pfp/kenya/kenya.pdf

Government of Kenya. (2003). *Economic Recovery Strategy for Wealth and Employment Creation (2003-2007)*. Nairobi.

Government of Kenya. (2004a). Sessional Paper No . 4 on Energy: National Energy Policy. In *National energy policy*.

Government of Kenya. *The State Corporations (Performance Contracting) Regulations, 2004*. , Pub. L. No. Legal Notice No. 93, 1 (2004).

Government of Kenya. (2013). *5000 + MW IN 40 MONTHS POWER TO TRANSFORM KENYA Republic of Kenya*. Retrieved from http://www.heminsleytiger.com/business-journal/wp-content/uploads/gok-moe-5000mw-prospectus-kenya.pdf

Government of Kenya. (2015a). *Mwongozo: The Code of Governance for State Corporations*. Retrieved from http://www.scac.go.ke/2015-02-16-09-34-58/mwongozo

Government of Kenya. *The Capital Markets Act: The Code of Corporate Governance Practices for Issuers of Securities to the Public 2015*. , 11 § (2015).

Government of Kenya. (2018). *Performance Contract between Ministry of Energy and Petroleum, and KPLC 2018*. Nairobi.

Government of Kenya. (2019). The Energy Act No 1 of 2019. *Kenya Gazette Supplement Acts, 2019*, *29*(29).

Government of Tanzania. *The Treasury Registrar (Powers and Functios) Act 2002.* , Pub. L. No. CAP 370 R.E. 2002 (2002).

Gratwick, K. N., & Eberhard, A. (2008a). An analysis of independent power projects in Africa: Understanding development and investment outcomes. *Development Policy Review*, *26*(3), 309–338. https://doi.org/10.1111/j.1467-7679.2008.00412.x

Gratwick, K. N., & Eberhard, A. (2008b). Demise of the standard model for power sector reform and the emergence of hybrid power markets. *Energy Policy*, *36*(10), 3948–3960. https://doi.org/10.1016/j.enpol.2008.07.021

Greenwald, B. C., & Stiglitz, J. E. (1990). Asymmetric information and the new theory of the firm: Financial constraints & risk behaviour. *The American Economic Review*, *80*(2), 160–165.

Guba, E., & Lincoln, Y. (1994). *Competing Paradigms in Qualitative Research.pdf*.

Hakansson, N. H., & Arrow, K. J. (1972). Essays in the theory of risk-bearing. *The Journal of Finance*, *27*(5), 1193. https://doi.org/10.2307/2978877

Harris, M., & Raviv, A. (2016). Some results on incentive contracts with applications to education and employment , health iInsurance, and law e. *American Economic Association*, *68*(1), 20–30. Retrieved from http://www.jstor.org/stable/1809684 Linked references are available on JST

Holmstrom, B., & Milgrom, P. (2009). Multitask principal–agent analyses: Incentive contracts, asset ownership, and job design. In R. S. Kroszner & L. Putterman (Eds.), *The economic nature of the firm: A reader* (3rd ed., pp. 232–244). https://doi.org/10.1017/CBO9780511817410.018

Huenteler, J., Dobozi, I., Balabanyan, A., & Sudeshna, B. (2017). Cost Recovery and Financial Viability of the Power Sector in Developing Countries. In *A Literature …* (No. WPS8287). Retrieved from http://documents.worldbank.org/curated/en/970281580414567801/pdf/Cost-Recovery-and-Financial-Viability-of-the-Power-Sector-in-Developing-Countries-Insights-from-15-Case-Studies.pdf

Hviid, M. (2000). Long-term contracts and relational contracts. In B. Bouckaert & G. de Geest (Eds.), *Encyclopedia of law and economics* (pp. 46–72). London, UK: Edward Elgar.

Imam, M. I., Jamasb, T., & Llorca, M. (2019). Sector reforms and institutional corruption: Evidence from electricity industry in Sub-Saharan Africa. *Energy Policy*, *129*. https://doi.org/10.1016/j.enpol.2019.02.043

International Energy Agency. (2019a). Africa Energy Outlook 2019 – Analysis Scenarios. In *Africa Energy Outlook 2019*. Retrieved from https://www.iea.org/reports/africa-energy-outlook-2019#energy-access%0Ahttps://www.iea.org/reports/africa-energy-outlook-2019%23africa-case

International Energy Agency. (2019b). *Tracking SDG 7: The Energy Progress Report*. Retrieved from https://trackingsdg7.esmap.org/

International Energy Agency. (2019c). *World energy outlook*. Retrieved from https://www.iea.org/topics/world-energy-outlook

International Energy Agency, & IRENA. (2020). *Tracking SDG 7: The Energy Progress Report 2020*. Retrieved from https://trackingsdg7.esmap.org/data/files/download-documents/tracking_sdg_7_2020-full_report_-_web_0.pdf

IRENA. (2012). Prospects for the African power sector. *Scenarios and Strategies for Africa Project*, 60 pp.

Jamasb, T., & Llorca, M. (2018). *Power sector reform and corruption: Evidence from Sub-Saharan Africa*. Retrieved from https://www.repository.cam.ac.uk/handle/1810/274670

Jamasb, T., Mota, R., Newbery, D., & Pollitt, M. G. (2005). *Electricity sector reform in developing countries: A survey of empirical evidence on determinants and performance*. Retrieved from http://documents.banquemondiale.org/curated/fr/2005/03/5698417/electricity-sector-reform-developing-countries-survey-empirical-evidence-determinants-performance

Jamasb, T., Nepal, R., & Timilsina, G. R. (2015). *A quarter century effort yet to come of age: A survey of power sector reforms in developing countries* (No. WPS7330). Retrieved from https://openknowledge.worldbank.org/handle/10986/22211

Jamasb, T., Nepal, R., Timilsina, G., & Toman, M. (2014). *Energy sector reform, economic efficiency and poverty reduction*. Retrieved from http://www.uq.edu.au/economics/abstract/529.pdf

James, W. (2005). The impact of corporatisation and national competition policy. An exploratory study of organizational change and leadership style. *Leadership and Organization Development Journal*,

26(4), 289–309. https://doi.org/10.1108/01437730510600661

Janssens, J. G., Carron, D., & Janssens, J. G. (2018). *Performance-based contracts (PBCs) for improving utilities efficiency: Experiences and perspectives: The way forward and perspectives/trends* (J. Janssens, D. Carron, P. Marin, P. Giantris, & T. Williams, Eds.). https://doi.org/10.2166/9781780405964_0163

Jensen, M. C. (1983). Organization theory and methodology. *Accounting Review*, *58*(2), 319–339. https://doi.org/10.2139/ssrn.94036

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, *76*(2), 323–329.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Johnson, R. B., & Onwuegbuzie, A. J. (2007). Toward a Definition of Mixed Methods Research. *Journal of Mixed Methods Research*, *1*(2), 112–133. https://doi.org/10.1177/1558689806298224

Joskow, P. L. (2008). Lessons learned from electricity market liberalization. *Energy Journal*, *29*(SPEC. ISS.), 9–42. https://doi.org/10.5547/issn0195-6574-ej-vol29-nosi2-3

Kahawa Tungu. (2020, July 14). Kenya Power Board Members Forced To Resign As Gov't Sets Up New Board. *Kahawa Tungu*.

Kapika, J., & Eberhard, A. (2013). *Power-sector reform and regulation in Africa: Lessons from Kenya, Tanzania, Uganda, Zambia, Namibia and Ghana*. Retrieved from http://www.gsb.uct.ac.za/files/Powersector.pdf

Kasemiire, C. (2021, January 26). Counting cost of suspending electricity connection policy. *Daily Monitor*. Retrieved from https://www.monitor.co.ug/uganda/business/prosper/counting-cost-of-suspending-electricity-connection-policy-3269890

Kenyan Wall Street. (2017). Kenya Govt Halts Plan to Add 5000MW of electricity to National Grid. Retrieved from The Kenyan Wall Street website: https://kenyanwallstreet.com/kenya-govt-halts-plan-install-5000mw-electricity-national-grid/

Kessides, I. N. (2012a). Electricity reforms: What some countries did right and others can do better. *Viewpoint*, *332*, 1–8. Retrieved from

http://siteresources.worldbank.org/EXTFINANCIALSECTOR/Resources/282884-1303327122200/VP332-Electricity-Reforms.pdf

Kessides, I. N. (2012b). The impacts of electricity sector reforms in developing countries. *The Electricity Journal*, *25*(6), 79–88. https://doi.org/10.1016/j.tej.2012.07.002

Kiwawulo, C., & Kalyango, R. (2011, September 7). Uganda got a costly Umeme deal. *The New Vision*. Retrieved from https://www.newvision.co.ug/news/1005680/uganda-costly-umeme-deal

Kojima, M., Zhou, X., Han, J. J., Wit, J. de, Bacon, R., & Trimble, C. (2016). *Who uses electricity in Sub-Saharan Africa?* Retrieved from http://documents.worldbank.org/curated/en/967821470756082684/pdf/WPS7789.pdf

KPLC. (2018). *Annual Report 2018*. Retrieved from https://www.kplc.co.ke/category/view/39/annual-reports

Kruger, W., & Eberhard, A. (2018). Renewable energy auctions in sub-Saharan Africa: Comparing the South African, Ugandan, and Zambian Programs. *WIRES: Energy and Environment*, *7*(4), e295. https://doi.org/10.1002/wene.295

Kruger, W., Eberhard, A., & Swartz, K. (2018). *Renewable energy auctions: A global overview*. Retrieved from http://www.gsb.uct.ac.za/files/EEG_GlobalAuctionsReport.pdf

Kruger, W., Stritzke, S., & Trotter, P. A. (2019). De-risking solar auctions in sub-Saharan Africa: A comparison of site selection strategies in South Africa and Zambia. *Renewable and Sustainable Energy Reviews*, *104*. https://doi.org/10.1016/j.rser.2019.01.041

Kruger, W., & Swartz, K. (2018). *Renewable energy auctions: Uganda's GET FiT solar facility*. Retrieved from https://energyeconomicgrowth.org/sites/eeg.opml.co.uk/files/2020-04/EEG Energy Insight UCT Uganda.pdf

Laffont, J.-J., & Martimort, D. (2002). *The theory of incentives I: The Principal-Agent Model.* Princeton, NJ: Princeton University Press.

Langley, A. (1999). Strategies for Theorizing from Process Data. *Academy of Management Review*, *691*(4), 691–710. https://doi.org/10.5465/AMR.1999.2553248

Lee, A. D., & Usman, Z. (2018). *Taking stock of the political economy of power sector reforms in developing countries: A literature review*. Retrieved from https://openknowledge.worldbank.org/handle/10986/29991

Lee, K., Brewer, E., Christiano, C., Meyo, F., Miguel, E., Podolsky, M., … Wolfram, C. D. (2016). Electrification for "under Grid" households in Rural Kenya. *Development Engineering*, *1*, 26–35. https://doi.org/10.1016/j.deveng.2015.12.001

Lin, C. P., & Chuang, C. M. (2011). Principal-principal conflicts and IPO pricing in an emerging economy. *Corporate Governance: An International Review*, *19*(6), 585–600. https://doi.org/10.1111/j.1467-8683.2011.00870.x

Ljung, P. (2007). *Energy sector reform: Strategies for growth, equity and sustainability*. Retrieved from http://www.energytoolbox.org/cec/bibliography/SIDA_Energy_Sector_Reform_2007.pdf

Mandu, S. F. (2018, March 27). Termination of Umeme contract was long overdue – MPs. *Eagle Online*. Retrieved from https://eagle.co.ug/2018/03/27/termination-of-umeme-contract-was-long-overdue-mps.html

Marques, R. C., & Berg, S. (2011). Risks, Contracts, and Private-Sector Participation in Infrastructure. *Journal of Construction Engineering and Management*, *137*(11), 925–932. https://doi.org/10.1061/(asce)co.1943-7862.0000347

MEMD. (2015). Scaling-Up Renewable Energy Program Investment Plan. *Ministry of Energy and Mineral Development*, (October), 94.

Metayer, M., Breyer, C., & Fell, H.-J. (2015). *The projections for the future and quality in the past of the World Energy Outlook for solar PV and other renewable energy technologies*. Retrieved from https://energywatchgroup.org/wp-content/uploads/2018/01/EWG_WEO-Study_2015.pdfs_.pdf

Meyer, R., Eberhard, A., & Gratwick, K. N. (2018a). Uganda's power sector reform: There and back again? *Energy for Sustainable Development*, *43*, 75–89. https://doi.org/10.1016/j.esd.2017.11.001

Meyer, R., Eberhard, A., & Gratwick, K. N. (2018b). Uganda ' s power sector reform : There and back again ? *Energy for Sustainable Development*, *43*, 75–89. https://doi.org/10.1016/j.esd.2017.11.001

Millan, J. (2005). Power sector reform in Latin America: Accomplishments, failures and challenges. *Economic and Political Weekly*, *40*(50), 5291–5301.

MoEP. (2013). *5000+ MW by 2016: Power to Transform Kenya*. Retrieved from http://admin.theiguides.org/Media/Documents/Kenya_Energy_Prospectus.pdf

Morgan, D. L. (2017). Mixed methods research. *The Cambridge Handbook of Sociology*, *1*, 153–161. https://doi.org/10.1017/9781316418376.015

Mugisha, S. (2011, June 1). *Utility Benchmarking and Regulation in Developing Countries: Practical Application of Performance Monitoring and Incentives*. https://doi.org/10.2166/9781780400938

Murefu, B. (2020, August). The Problem with Kenya Power's Revenue Model in Three Graphs. Retrieved from Energy for Growth Hub website: https://www.energyforgrowth.org/memo/the-problem-with-kenya-powers-revenue-model-in-three-graphs/

Nagayama, H. (2010). Impacts on investments, and transmission/distribution loss through power sector reforms. *Energy Policy*, *38*(7), 3453–3467. https://doi.org/10.1016/j.enpol.2010.02.019

Nelson, H. W., & Nikolakis, W. (2012). How Does Corporatization Improve the Performance of Government Agencies? Lessons From the Restructuring of State-Owned Forest Agencies in Australia. *International Public Management Journal*, *15*(3), 364–391. https://doi.org/10.1080/10967494.2012.725323

Nepal, R., & Jamasb, T. (2012). Reforming the power sector in transition: Do institutions matter? *Energy Economics*, *34*(5), 1675–1682. https://doi.org/10.1016/j.eneco.2012.02.002

Pardina, M. R., & Schiro, J. (2019). *Taking stock of economic regulation of power utilities in the developing countries: A literature review*. https://doi.org/10.1596/1813-9450-8460

Patton, E., & Appelbaum, S. H. (2003). The Case for Case studies in Management Research. *Management Research News*, *26*(5), 60–71. https://doi.org/10.1108/01409170310783484

PéRez-Arriaga, I. J., Jenkins, J. D., & Batlle, C. (2017). A regulatory framework for an evolving electricity sector: Highlights of the MIT utility of the future study. *Economics of Energy and Environmental Policy*, *6*(1), 71–92. https://doi.org/10.5547/2160-5890.6.1.iper

Pérez-Arriaga, I. J., Stoner, R., Rahnama, R., Lee, S. J., Jacquot, G., Protzer, E., … Santos, F. J. (2019). A utility approach to accelerate universal electricity access in less developed countries: A regulatory proposal. *Economics of Energy and Environmental Policy*, *8*(1), 33–50. https://doi.org/10.5547/2160-5890.8.1.iper

Plane, P. (1999). Privatization, technical efficiency and welfare consequences: The case of the Cote d'Ivoire Electricity Company (CIE). *World Development*, *27*(2), 343–360. https://doi.org/10.1016/S0305-750X(98)00139-9

Polemis, M. L. (2016). New evidence on the impact of structural reforms on electricity sector performance. *Energy Policy*, *92*. https://doi.org/10.1016/j.enpol.2016.02.032

Pollitt, M. G. (2007). *The arguments for and against ownership unbundling of energy transmission networks*. https://doi.org/10.17863/CAM.5164

Power Futures Lab Database. (2020). Prospects for Private Power Investment in Sub-Saharan Africa in the new decade Electricity access remains a challenge in SSA. *Energy and Economic Growth (EEG)*, (February).

Prasad, G. (2008). Energy sector reform, energy transitions and the poor in Africa. *Energy Policy*, *36*(8), 2785–2790. https://doi.org/10.1016/j.enpol.2008.05.018

PWC. (2016). *Umeme Limited Economic Impact Assessment*. Kampala, Uganda.

Ragin, C. C. (1999). Using qualitative comparative analysis to study causal complexity. *Health Services Researchesearch*, *34*(5), 1225–1239. https://doi.org/10.1177/0049124107313903

Reuters. (2017, January 16). Tanzania seeks $200m World Bank loan to clear arrears of state utility. *Reuters*. Retrieved from https://www.reuters.com/article/tanzania-power/tanzania-seeks-200m-world-bank-loan-to-clear-arrears-of-state-utility-idUSL4N1F63OC

Sappington, D. E. M. (1991a). Incentives in principal-agent relationships. *The Journal of Economic Perspectives*, *5*(2), 45–66. https://doi.org/10.1257/jep.5.2.45

Sappington, D. E. M. (1991b). Incentives in Principal-Agent Relationships Published by : American Economic Association Stable URL : http://www.jstor.org/stable/1942685 Incentlves in Principal-Agent Relationships. *The Journal of Economic Perspectives*, *5*(2), 45–66.

Sappington, D. E. M., & Stiglitz, J. E. (1987). Privatization, information and incentives. *Journal of Policy Analysis and Management*, *6*(4), 567–582.

Saunders, M., Lewis, P., & Thornhil, A. (2007). Research Methods for Business Students. In *Geological Magazine* (4th Editio, Vol. 4). https://doi.org/10.1017/S0016756800135770

Saunders, M., Lewis, P., & Thornhil, A. (2019). Research Methods for Business Students. In *Qualitative Market Research: An International Journal* (Vol. 8). https://doi.org/10.1108/qmr.2000.3.4.215.2

Schmidt, K. M. (1994). “A theory of incentives in procurement and regulation” by J.-J. Laffont & J. Tirole [book review]. *Jounral of Institutional and Theoretical Economics*, *150*(3), 543–588.

Shirley, M. M. (1999). Bureaucrats in business: The roles of privatization versus corporatization in state-owned enterprise reform. *World Development*, *27*(1), 115–136. https://doi.org/10.1016/S0305-

750X(98)00130-2

Shirley, M. M., & Xu, L. C. (2001). Empirical Effects of Performance Contracts: Evidence from China. *Journal of Law, Economic, and Organization 17 (1), 2001*, *17*(1), 1–43.

Shirley, M. M., & Xu, L. C. (2017). Information, incentives, and commitment: An empirical analysis of contracts between government and state enterprises. *Journal of Law, Economics, & Organization*, *14*(2), 358–378.

Sioshansi, F. P. (2006). Electricity market reform: What has the experience taught us thus far? *Utilities Policy*, *14*(2), 63–75. https://doi.org/10.1016/j.jup.2005.12.002

Smith, A. (2002). An inquiry into the nature and causes of the wealth of nations. In N. W. Biggart (Ed.), *Readings in Economic Sociology* (pp. 6–17). https://doi.org/10.1002/9780470755679.ch1

Stake, R. E. (2006). Multiple Case Study Analysis. In *The Guilford Press*. https://doi.org/10.1007/s40315-013-0039-6

Steinbuks, J., de Wit, J., Kochnakyan, A., & Foster, V. (2017). Forecasting electricity demand: An aid for practitioners. *LiveWire*, *73*, 1–12. Retrieved from https://openknowledge.worldbank.org/handle/10986/26189

Steyn, G. (2001). *Governance, finance and investment: Decision making and risk in the electric power sector*. (PhD Thesis) University of Sussex.

Stiglitz, J. E. (2000). The contributions of the economics of information to twentieth century economics. *Quarterly Journal of Economics*, *115*(4), 1441–1478. https://doi.org/10.1162/003355300555015

Stiglitz, J. E. (2012). *Market failure in the financial system: Implications for financial sector policies, especially in Developing Countries*. Retrieved from https://misr.mak.ac.ug/file-download/download/public/170

Streatfeild, J. E. J. (2018). Electricity Investment in Sub-Saharan Africa : A Historical Overview and a Way Forward. *Journal of International Commerce and Economics*, (June). Retrieved from https://www.usitc.gov/journals.

Stritzke, S., Trotter, P. A., & Twesigye, P. (2021). Towards responsive energy governance: Lessons from a holistic analysis of energy access in Uganda and Zambia. *Energy Policy*, *148*, 111934. https://doi.org/10.1016/j.enpol.2020.111934

Talbot, C. (2004). Executive Agencies: Have They Improved Management in Government? *Public Money and Management*, *24*(2), 104–112. https://doi.org/10.1111/j.1467-9302.2004.00402.x

Taneja, J. (2019). If You Build It, Will They Consume? Key Challenges for Universal, Reliable, and Low-Cost Electricity Delivery in Kenya. *SSRN Electronic Journal*, (July 2018). https://doi.org/10.2139/ssrn.3310479

TANESCO. (2018a). *Financial Statements 2018-signed.pdf*. Dar es Salaam.

TANESCO. (2018b). *TANESCO Annual Report 2018*. Retrieved from http://www.tanesco.co.tz/index.php/media1/downloads/financial-statements

Tashakkori, A., & Taddlie, C. (1998). *Mixed Methodology: Combining Qualitative and Quantitative Approaches* (D. . Laughton, Ed.). Retrieved from https://books.google.co.za/books?id=qtW04-pRJZ0C&printsec=frontcover&dq=editions:KGo7hG0bhXkC&hl=en&sa=X&ved=2ahUKEwiZhc3dsbvtAhUNURUIHfR6A7MQ6AEwAHoECAEQAg#v=onepage&q&f=false

The Citizen. (2017, January 2). *JPM sacks Tanesco boss*. Retrieved from https://www.thecitizen.co.tz/news/1840340-3504256-mwd43gz/index.html

The East African. (2011, July 11). *Donors query Uganda on excess capacity in Karuma dam*. Retrieved from https://www.theeastafrican.co.ke/news/Donors-query-Uganda-on--excess-capacity-in-Karuma-dam/2558-1197970-61c5abz/index.html

The New Vision. (2018, April 4). *Investigations on UMEME concession will not lower power tariffs*. Retrieved from https://www.newvision.co.ug/news/1474816/investigations-umeme-concession-lower-power-tariffs

The Star. (2020, February 27). Empty pockets for Kenya Power shareholders as profits plunge. *The Star*. Retrieved from https://www.the-star.co.ke/business/kenya/2020-02-27-empty-pockets-for-kenya-power-shareholders-as-profits-plunge/

The World Bank. (2018). Doing Business-2018 Report. *World Bank*, 1–312. https://doi.org/10.1596/978-1-4648-0351-2

Tolmasquim, M. T. (2020). *Renewable energy auctions in Brazil*.

Tosi, H. L., & Slocum, J. W. (1984). Contingency theory: Some suggested directions. *Journal of Management*, *10*(1), 9–26. https://doi.org/10.1177/014920638401000103

Trimble, C., & Kojima, M. (2016). *Making power affordable for Africa and viable for its utilities*. Retrieved from https://openknowledge.worldbank.org/handle/10986/25091

Trimble, C., Kojima, M., Perez-Arroyo, I., & Mohammadzadeh, F. (2016). *Financial viability of electricity sectors in sub-Saharan Africa: Quasi-fiscal deficits and hidden costs*. Retrieved from https://openknowledge.worldbank.org/handle/10986/24869

Trotter, P. A., McManus, M. C., & Maconachie, R. (2017). Electricity planning and implementation in sub-Saharan Africa: A systematic review. *Renewable and Sustainable Energy Reviews*, *74*, 1189–1209. https://doi.org/10.1016/j.rser.2017.03.001

Umeme. (2019). Umeme Annual Report 2019. In *Umeme*. Retrieved from https://www.umeme.co.ug/investor-relations/reports

United Republic of Tanzania. (1992a). *Energy Policy of Tanzania*. Retrieved from http://www.tzonline.org/pdf/theenergypolicyoftanzania.pdf

United Republic of Tanzania. *The Public Coporations Act, 1992*. , (1992).

Urpelainen, J., Yang, J., & Liu, D. (2017). Power sector reforms and technical performance: Good news from an instrumental variable analysis. *Review of Policy Research*, *35*(1), 1–33. https://doi.org/10.1111/ropr.12275

USAID. (2020). Tanzania Energy Sector Overview. Retrieved September 10, 2020, from https://www.usaid.gov/powerafrica/tanzania

USE-Uganda. *Uganda Securities Exchange Listing Rules 2003*. , Pub. L. No. 54 (2003).

Vagliasindi, M. (2008a). Governance Arrangements for State Owned Enterprises. *Policy Reseach Working Paper. The World Bank*, *4542*(March), 36.

Vagliasindi, M. (2008b). *The effectiveness of boards of directors of state owned enterprises in developing countries*. https://doi.org/citeulike-article-id:13936395

Vagliasindi, M. (2012). *Power market structure and performance*. (WPS 6123) Policy Research Working Paper, Private Sector Development Department, World Bank, Washington, DC.

Vagliasindi, M. (2013). *Revisiting Public-Private Partnerships in the Power Sector*. Retrieved from https://openknowledge.worldbank.org/bitstream/handle/10986/13118/761830PUB0EPI00LIC00pubdate03014013.pdf?sequence=1

Vagliasindi, M., & Besant-Jones, J. E. (2013). *Power market structure: Revisiting policy options*. Washington, DC: World Bank.

VOA. (2009). Tanzania President Dissolves Cabinet Over Graft Allegations. Retrieved July 6, 2021, from Voice of America website: https://www.voanews.com/archive/tanzania-president-dissolves-cabinet-over-graft-allegations

Williams, J. H., & Ghanadan, R. (2006). Electricity reform in developing and transition countries: A reappraisal. *Energy*, *31*(6–7), 815–844. https://doi.org/10.1016/j.energy.2005.02.008

Wolfram, C. D. (1999). Electricity Markets: Should the Rest of the World Adopt the United Kingdom's Reforms? *Regulation*, *22*(4), 48–53.

World Bank. (1993). *The World Bank's role in the electric power sector: Policies for effective institutional, regulatory and financial reform*. (Report No. 11676) World Bank Policy Paper, Washington, DC.

World Bank. (2004). *Public and private sector roles in the supply of electricity services*. Washington, DC: World Bank.

World Bank. (2017). *Annual Report 2017: End extreme poverty - Boost shared prosperity.* https://doi.org/10.1596/978-1-4648-1119-7

World Bank. (2018). Access to electricity (% of population) - Kenya. Retrieved September 21, 2020, from https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=KE

World Bank. (2020a). *Doing Business 2020* (Vol. 6). https://doi.org/10.1596/978-1-4648-1440-2

World Bank. (2020b). *Doing Business 2020 - Kenya*. Retrieved from https://www.doingbusiness.org/content/dam/doingBusiness/country/k/kenya/KEN.pdf

World Bank, & AFD. (2019). Electricity Access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact. In *Africa Development Forum*. https://doi.org/10.1596/978-1-4648-1361-0

Yin, R. K. (2003). *Case study research : design and methods*. Sage Publications.

Yin, R. K. (2018). Case Study Research and Applications: Design and Methods. In *SAGE* (Sixth, Vol. 6).

Young, M. N., Peng, M. W., Ahlstrom, D., Bruton, G. D., & Jiang, Y. (2008). Corporate governance in emerging economies: A review of the principal-principal perspective: Review paper. *Journal of Management Studies*, *45*(1), 196–220. https://doi.org/10.1111/j.1467-6486.2007.00752.x

Zhang, Y., Parker, D., & Kirkpatrick, C. (2008). Electricity sector reform in developing countries: An econometric assessment of the effects of privatization, competition and regulation. *Journal of Regulatory Economics*, *33*(2), 159–178.