



Review of proposals for practical power sector restructuring and reforms in a dynamic electricity supply industry



Muhammad T. Khan, George Alex Thopil*, Jorg Lalk

Department of Engineering and Technology Management, University of Pretoria, South Africa

ARTICLE INFO

Article history:

Received 8 February 2016

Received in revised form

20 April 2016

Accepted 26 April 2016

Keywords:

Monopoly

Unbundling

Vertically-integrated utility

Power sector reform

Eskom

Southern Africa

ABSTRACT

South Africa's electricity supply industry (ESI) remains a vertically-integrated monopoly despite global trends towards restructuring. The monopolistic nature of the ESI could hinder the development of distributed power systems as penetration of renewable electricity increases. The research aims to rationalise South Africa's ESI evolution; propose practical power sector restructuring in the short-to-medium term; and to determine their potential impact. The research methodology included a single case study instrument, with embedded sub-units of analysis. Primary research data was gathered using semi-structured interviews with industry experts in addition to which secondary data from government documents and archival records were used for triangulation. Research results conclude that South Africa's ESI grew due to techno-economic industrialisation factors, while Apartheid-era policies influenced the ESI in only some specific respects. The vertically-integrated status quo was sustained in the post-transformation period due to government's focus on social imperatives; lack of regulatory & policy certainty; and conflicts in political ideology. South Africa did not experience the pre-conditions that triggered global power sector reforms in the late 20th century but these pre-conditions are now becoming evident. Privatisation of Eskom Generation and introduction of wholesale and retail competition are not practical in the short-to-medium term, proving the infeasibility of the standard model of reform locally. The introduction of an Independent System and Market Operator (ISMO) using a single-buyer model is seen as the most favourable and practical option, with the ISMO owning transmission infrastructure. The research suggests that ESI changes will increase system efficiencies, economic performance and private sector involvement, but will not reduce electricity tariffs. The scenarios, challenges and proposals identified in this research are also applicable to other countries in Africa and other developing regions of the world, that have similar social and political backgrounds, ensuring sustainable supply of electricity.

© 2016 Elsevier Ltd. All rights reserved.

Contents

1. Introduction	326
2. Background	327
2.1. Proposed model	328
3. Research methodology	329
4. Results	330
5. Conclusions and recommendations	333
References	334

1. Introduction

Electricity is a fundamental enabler of economic development, social equity and modern life in general, the necessity of which spans across all industrial, commercial and residential sectors. Two

* Corresponding author. Tel.: +27 12 4206476; fax: +27 12 3625307.

E-mail address: george.alexthopil@up.ac.za (G.A. Thopil).

aspects that underpin much of the public debate around electricity provision are cost and security of supply. Security of electricity supply is a general concern for all nation states [1]. However, this concern has grown significantly in South Africa ever since the severe and multiple power delivery failures from 2005 to 2008 when the state-owned electricity utility Eskom could not cope with load demand and had to resort to load-shedding across the country [2]. The utility has had to re-initiate scheduled load-shedding since the latter half of 2014 because of critical supply constraints resulting from maintenance backlogs and limited capacity [3].

The paper attempts to investigate why and how a historically vertically integrated ESI should consider restructuring while ensuring supply continuity and stability. The objective of the investigation is to review existing electricity restructuring research while analysing the challenges and realities of electricity restructuring in South Africa and eventually linking the review with South African ESI restructuring propositions. The research aims to contribute to the field of electricity restructuring by proposing partial restructuring rather than complete restructuring for South Africa within the short to medium term, for the sustained stability of the ESI. The investigation is pertinent for utilities (and governments) trying to transition from centralised generation towards distributed generation in order to include a viable mix of renewable and distributed energy technologies. The lessons learnt from this paper can be useful in any country (or regions within a country) with significant electricity industry shifts. Restructuring will enable improved electricity transfer within the Southern Africa region via the Southern African power pool which includes twelve countries with a combined production of more than 300 TWh (with South Africa contributing to roughly 80% of production) [4].

Unbundling, privatising and restructuring of a country's ESI (i.e. electricity generation, transmission, distribution, and system operator) in some form or another, may lead to numerous benefits such as increased system efficiency [5,6], increased competition, increased private investment, and ultimately increased security of supply, reduced electricity costs and increased economic growth within a country [7–10]. This notion is widely supported in first-world countries and based largely on industrial economics models and global trends towards free and liberalised markets, as discussed by Knops [11] and the US Congress [12]. These notions are also built upon the “standard model of reform” which was developed to explain the evolutionary steps towards liberalisation of an ESI [9], as explained later. A liberalised energy market also aids the functioning of distributed generation when multiple sources of electricity technologies are available [13,14]. Advanced reforms in electricity generation are consistent with more ambitious renewable energy policy, necessitating concessions to renewable energy constituencies with indications that the politics of power sector reform may encourage new renewable energy policies through the dynamic issue of linkage [15]. Evidence from the US shows that distribution network operators can promote cost-effective distributed generation by the means of competitive auction mechanisms [16]. However, a dynamic market with multiple fuel sources adds volatility [17].

Despite the popularity of the above views, they are still contested by others which call into question the claims of any proposed benefits, as discussed by Victor and Heller [18], Borenstein [19] and the US Congress [12]. To compound the problem, majority of research has focused on countries in Europe and North America [20–23] with fewer studies conducted in Latin America [24] and Asia [25], and even fewer focused on the Sub-Saharan African context, despite the fact that many of the continent's countries are considering or have even commenced with steps towards restructuring and reforming their ESIs.

This research paper investigates the reasons behind the current long-standing vertically-integrated nature of Eskom in South Africa and analyses the current South African electricity supply industry restructuring measures being considered and on-going. This was done in relation to global trends already considered by both first-world and other developing nations. The paper also investigates the potential impact and implications that radical transformation along the entire power sector value chain (i.e. generation, transmission, distribution and system operator) would have on South Africa in the short-to-medium term.

The paper initially identifies a possible implementation model based on existing work. However weaknesses in the existing model are identified and augmented using qualitative analysis to reach emergent views. Based on the emergent views a revised structural framework and roadmap that would best suit the South African ESI is proposed. The proposed model is envisaged to be applicable in other countries in Africa and developing regions of the world, which encounter similar socio-political backgrounds.

2. Background

Eskom is a vertically-integrated electricity utility that owns and operates the majority of South Africa's generation, transmission and distribution infrastructure making up the ESI. Following the electricity supply crises up to 2008, funding for Eskom's new generation-build programmes (and subsequent cost escalations due to completion delays) have led to significant electricity tariff increases. These factors, coupled with the generally depressed global economic environment post-2008, has increased the debate around the structure, legislation, regulation, and management of the South African ESI, with the discussion coming into sharp focus within the country's governing, industrial, civil and private sectors, as well as within the general public discourse. For the past two decades, lobbyists have argued for changes to the ESI citing increased competition, private sector involvement, system efficiency and security of supply as key outcomes that would benefit the country at large [26–28]. To date, government has publicly acknowledged the above viewpoints and have claimed to be taking steps, citing planning, policy and regulatory efforts put in place to facilitate changes to the vertically-integrated and monopolistic nature of South Africa's ESI. However, it can be argued that not all efforts have been focused correctly or with the necessary vigour, while other areas have not been given the necessary amount of attention and urgency, whilst still other areas have been ignored completely.

Preliminary research investigations in this study uncovered that South Africa is no exception, and is at a pivotal point. There exists some government policy, legislation and leadership pronouncements that tend to support the call towards power sector reform in the country's ESI [29]. This is despite the fact that to date, there has not been any significant pace of action to fully address Eskom's controversially dominant position within the country's ESI. Unbundling, privatising and/or deregulation of a vertically integrated national utility has not always resulted in the promised benefits of low tariffs and security of supply [30]. On the other hand, some critics argue that in the past decade South African regulatory and policy frameworks have actually inhibited IPP (Independent Power Producer) investment and competition in the sector which are seen as the necessary factors in order to realise any benefits [31]. Preliminary investigations in this study further reveal that the current South African status quo with Eskom's vertically integrated position in all stages of the value chain does present some serious conflict of interest, and that there are indeed unclear and often overlapping roles of responsibilities between NERSA (National Energy Regulator of South Africa), the

Download English Version:

<https://daneshyari.com/en/article/8113440>

Download Persian Version:

<https://daneshyari.com/article/8113440>

[Daneshyari.com](https://daneshyari.com)