An appraisal of investment vehicles in the Tanzania's electricity sector

Donna Peng, Rahmatallah Poudineh*

Oxford Institute for Energy Studies, Oxford, UK

A B S T R A C T

Investment in Tanzania's electricity sector can be made through five different vehicles: the state-owned utility company TANESCO, independent power producers (IPPs), emergency power producers (EPPs), small power producers (SPPs), and public-private partnerships (PPPs). This research examines the role and performance of these vehicles, in light of massive power infrastructure investment needs in Tanzania. We analyse the investment vehicles' historical performance in attracting generation investment and their likely role in the coming years. The paper also discusses the implication of recent natural gas discoveries for investment in Tanzania's power generation sector.

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1. Introduction

Access to modern energy such as electricity is necessary to further economic and social development everywhere in the world. The Sustainable Development Goals, a set of aspirational inter-governmental goals spearheaded by the UN, call for universal access to affordable, reliable, sustainable, and modern energy by 2030 (United Nations, 2016). Sub-Saharan Africa lags behind other world regions in terms of infrastructure development, especially in the power sector (Foster and Briceno-Garmendia, 2010). In 2014, per-capita electricity consumption in Sub-Saharan Africa was 497 kWh per year. In comparison, the world average for the same year was 3144 kWh per person per year, and the OECD member average, 7984 kWh per person per year. In terms of access to electricity, less than a quarter of the region’s 800 million inhabitants had access to electricity, compared to about half in South Asia and more than 80% in Latin America (Eberhard et al., 2008). From 1990 to 2005, while advances in the provision of telecommunication services greatly contributed to per-capita economic growth in the region, deterioration in the provision of electricity stunted growth (Foster and Briceno-Garmendia, 2010). Lack of access to reliable power by the commercial sector results in forgone sales and damaged equipment. It also forces businesses to engage in costly self-generation with funds that could be invested elsewhere. According to the Africa Infrastructure Country Diagnostic, the economic costs of power outages in Sub-Saharan African countries range from 1 to 4 percent of national GDP (Eberhard and Shkaratan, 2012).

In the coming decades, investment in Sub-Saharan Africa’s power generation capacity is essential to eliminate infrastructure constraints on power availability and reliability. The exact figure is dependent on the electrification rate, population growth, urbanization, and changes in consumption patterns. The range of estimates that exists has a similar order of magnitude: $14 billion per year between 2010 and 2020 (Rosnes and Vennemo, 2009), or $490 billion in total between 2015 and 2040 (Castellano et al., 2015). These figures do not include the investment required for transmission and distribution network expansion, which is of similar magnitude ($14 billion per year between 2010 and 2020 or $345 billion between 2015 and 2040). This large sum of capital required poses a financing challenge even greater than that in the water, sanitation, and transport sectors (Eberhard et al., 2011).

The market structure of the power sector in much of Sub-Saharan Africa is a hybrid: typically, the historical state-owned monopoly model has undergone some reform, but full vertical and horizontal unbundling, with wholesale and retail competition, is rarely attained (K. N. Gratwick and Eberhard, 2008; Williams and Ghanadan, 2006). As a result of this hybrid structure, multiple investment vehicles, spanning public and private finance, can be used to funnel in power-sector investments.

Tanzania’s power sector is representative of Sub-Saharan Africa in many ways: a low but growing electrification rate, burgeoning demand constrained by limited infrastructure, and a hybrid market structure. Thus, the experiences of financing power generation in...
Tanzania can be a valuable reference for other countries in the region. In addition, Tanzania is unique, along with its neighbour Mozambique, in the recent discovery of large natural gas reserves in its off-shore blocks. This has propelled the East African nation to the ranks of gas-rich countries. The potential impact of this significant gas sector discovery on Tanzania’s ability to attract investments in its power sector is a topic of interest to local policy makers and potential investors alike.

This paper provides a case study of power generation investment in Tanzania, asking three sets of questions. First, what are the power generation investment vehicles in Tanzania? How have they performed historically in bring in investment? Second, what role can they be expected to play in the coming years? Third, what are the implications of the recent gas discoveries for investment in power generation in Tanzania? In the next section, the structure of Tanzania’s power sector is presented and the main institutions are introduced. Background information concerning the structure of the gas industry and its governing institutions are also included. In Section 3, Tanzania’s need in terms of power generation investment is outlined, followed by a detailed discussion of the five power generation investment vehicles that exist. Finally, Section 4 reflects on the opportunities and challenges that the significant gas discovery brings to the power sector, and Section 5 summarizes the answers to our research questions.

2. Sector structure and institutions

Before 1992, Tanzania Electric Supply Company Limited (TANESCO), a vertically integrated, fully state-owned utility, was the sole company responsible for electricity generation, transmission, and distribution in the country. The company was fully nationalized in 1964, after the United Republic of Tanzania was formed by the merger of Tanganyika and Zanzibar. In 1992, as part of the structural adjustment that started in the mid-1980s, and owing to drought-induced electricity crises, the government lifted TANESCO’s monopoly in power generation with the intention of attracting private sector investment to supplement the TANESCO-owned generation capacity (Vagliasindi and Besant-Jones, 2013). Today, TANESCO remains the sole licensee for transmission and the main licensee for distribution activities, though it purchases electricity generated by some Independent Power Producers (IPPs), Emergency Power Producers (EPPs), and Small Power Producers (SPPs). The semi-autonomous region of Zanzibar is served by a separate utility, the Zanzibar Electricity Corporation (ZECO) owned by the Revolutionary Government of Zanzibar. ZECO purchases electricity in bulk from TANESCO through three submarine cables to serve its retail customers (one of the bulk power off-takers shown in Fig. 2).

The Ministry of Energy and Minerals (MEM) oversees the power and gas sectors in Tanzania. The Ministry has a mandate to develop energy and mineral resources and has the power to develop and review government policies in the energy sector. The Petroleum Act of 1980 empowers the Minister of Energy and Minerals to grant, renew, suspend, or cancel licences for oil and gas exploration and development; the Minister is aided by the Commissioner for Petroleum Affairs, who is appointed by the Tanzanian President (Economic and Social Research Foundation, 2009). As a matter of general practice, all licences for petroleum explorations and production are issued to the Tanzania Petroleum Development Corporation (TPDC), a fully government-owned parastatal organization under the MEM. TPDC then engages with foreign companies through Tanzania’s tripartite Production Sharing Agreement (PSA) – the three parties being the Government of Tanzania (GoT), TPDC, and the investing company – authorizing the company to carry out petroleum operations on TPDC’s behalf, granting the company exclusive rights over the licence area. Currently, only two commercialized natural gas projects are present in Tanzania: Songo Songo, operational since 2004, and Mnazi Bay, operational since 2006. Songas owns the gas processing plant and the 225 km pipeline that connects Songo Songo to Dar es Salaam. Before August 2015, the Mnazi Bay project had been largely stranded; however, since then, a pipeline from Mnazi Bay to Dar es Salaam, with a connection to Songo Songos, has been completed and first gas delivery has taken place (Rigzone Staff, 2015). The pipeline is owned and operated by the Gas Supply Company (GASCO), a subsidiary of TPDC within its newly established downstream directorate. Most of Tanzania’s current gas production is used for power generation. But, the gas distribution network is under expansion to supply more residential, institutional, and industrial customers.

Operational since 2006, the Energy and Water Utility Regulatory Authority (EWURA), an autonomous multi-sectoral regulatory authority, is responsible for the technical and economic regulation of electricity, downstream oil and gas, and the water sector in Tanzania. EWURA awards licences to entities seeking to undertake licensed activities (EWURA, 2012). The Authority also approves and enforces tariffs and fees of licensees. Since 2007, the Rural Energy Agency (REA), another autonomous body under the MEM, has been responsible for the support and facilitation of improved access to modern energy in rural areas by running training programmes, financing rural grid expansion, and partially financing rural energy projects.1

The division of responsibilities among the public entities mentioned above is illustrated in Fig. 1. The administrative or contractual ties among the different segments of the gas and power supply chains are shown in Fig. 2.

The Tanzanian electricity sector has opened up toward private sector investments in generation, but transmission and distribution infrastructure investment remains the responsibility of the incumbent monopoly (TANESCO). Furthermore, although other vehicles have been created to channel private financial capital, most private generators do not directly enter into transactions with the Tanzanian electricity consumers. For most private generators, TANESCO acts as the single buyer of electricity, interfacing between private operators and electricity consumers. The exception is SPPs, which can directly sell electricity to customers in isolated mini-grids.2 Integral tariffs establishing rates and charges to electricity consumers have been regulated by EWURA since 2006, while the payments that TANESCO makes to purchase power from private power generators have been privately negotiated in the form of power purchase agreements (PPAs). The two existing IPP PPAs were signed before the establishment of EWURA. Recently, EWURA has established and approved Model Power Purchase Agreements (Model PPAs) for projects above 10 MW (Ngamlagosi, 2015).

3. Investment needs and vehicles

Today, TANESCO remains the primary company that owns and operates downstream power sector infrastructure. Based on the availability of connection to the national grid, the installed power generation capacity in Tanzania can be divided into two categories: on-grid facilities are connected to the national grid, and off-grid

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1 EWURA licensed activities include gas processing, transportation, distribution, import/export, and supply, as well as power generation, transmission, distribution, import/export, and supply, among others.
2 Rural distribution networks, once construction is complete, are transferred to TANESCO without payment from TANESCO (Innovation Energie Development, 2014).
3 Since SPPs are expected to contribute significantly to the expansion of rural electrification, the Electricity Act requires EWURA to pursue light-handed regulation of such projects (EWURA, 2011).
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