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INSIGHTS

Africa's Infrastructure Paradox: Transmission Infra in Ghana

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Introduction

Africa's infrastructure needs – including road, rail, ports, transmission and power – are considerable, and will become increasingly pronounced on account of the continent's need for such infrastructure to support its social and economic growth. It is estimated that international investors' interested in Africa have as much as US$550 billion in assets***[1]*** that could be deployed to meet the estimated US$130-170 billion in infrastructure investment required by the continent each year***[2]***. However, there is a gap to bridge due to the lack of investment opportunities that meet such investors' criteria, with a 2018 African Development Bank (AfDB) study noting a financing gap of US$68-108 billion.***[3]***

Bridging the gap

Despite the clear need and availability of capital, few infrastructure projects in Africa achieve financial close – in fact, according to McKinsey, 80 percent of potential projects fail at the feasibility stage.***[4]*** A number of reasons for this have been reported, including inadequate long-term policy plans and frameworks, developers and governments having limited experience in carrying out the relevant feasibility studies and front end work, poor coordination between the various governmental agencies and community resistance to certain projects.***[5]***

This challenge may be addressed by governments, supported by multilateral development organisations, improving the flow of private-sector financing into commercially viable infrastructure sectors. There is no shortage of private-sector finance, but investors struggle to match these funds against viable projects in Africa. Governments and their institutional partners can take decisive action to improve the commercial viability of projects, including by helping to mitigate political, currency, and regulatory risks, and, akin to some of the more successful procurement programmes, by creating a pipeline of bankable projects which leads to more focused investment.***[6]***

Power and transmission

A key area for infrastructure development in Africa is the power sector. Whilst much attention is being given to the generation of power, especially in the context of renewable energy, transmission infrastructure has often been the poor relation, suffering from decades of poor maintenance and underinvestment. Modern transmission infrastructure is therefore crucial not

only in terms of electrification, but also in providing both the flexibility and reliability needed to integrate additional power generation (especially less predictable sources, such as renewable energy) into the grid, as well as reducing transmission losses.

Transmission infrastructure requires significant investment and, given the depleted state of government finances across the continent, private investment opportunities. It also helpfully amplifies some of the underlying issues which can often drive infrastructure projects off course – land rights, permitting, the interface between state agencies and the private sector (for example the wheeling of privately generated power), and the interaction with domestic regulation, to name but a few.

Government programmes in this sector could therefore usefully look to structures, both regional and international, which have successfully mitigated some of these risks. This could be achieved by following the more traditional PPP/PF model, perhaps in conjunction with a structure which places risks, such as obtaining (access to) the land and permits, with the state (for example, the IFC scaling solar programme). However, other complimentary structures are also of note, such as:

- **Operating lease model:** a long lease model used, for example, in Uruguay whereby the private lessor constructs and leases the transmission infrastructure to the state transmission company (who takes on the land risk). This model is of particular interest where the alternative PPP model is not well developed in country;

- **Corporate Finance:** the government or SOE could look to raise a government/SOE loan (on balance sheet), potentially ECA backed, which could then finance the third party construction of the transmission infrastructure;

- **Institutional Investors:** whilst still applicable to the PPP model, noting the desire in certain jurisdictions to encourage local pension funds to invest in infrastructure projects, raising local equity through capital pool companies could help reduce the level of third party debt (and therefore the tariff), provide quasi political cover and potentially increase the developer upside; and

- **Long-term concession:** whereby a private company receives a long-term concession to manage and operate existing transmission assets and is in charge of expanding the transmission grid in its area of operation.

The above structures are not mutually exclusive. The key point is that each strives, in its own way, to mitigate some of the more fundamental blocks to private investment, and most critically the need to expedite the development process; the tyranny of time being the curse of many otherwise financially and developmentally sound projects.

Furthermore, increasing the involvement of national and multilateral financial institutions that can offer additional funding, subsidies and innovative financing structures would successfully encourage further private sector investment. Such institutions can offer governments critical skills in areas such as transaction support, planning and risk allocation — and they can embed those skills in government entities. For example, in 2019, AfDB, through its Africa Investment Forum (AIF) platform, helped secure 52 deals worth US$40 billion of investment towards infrastructure in Africa.*[7]*

Ghana

Power transmission is the vital middle sub-sector in the three broad components that make up a power/electricity grid i.e. generation, transmission and distribution.

The power sector in Ghana

The Volta River Authority ("VRA") was established in 1961 by the Volta River Development Act, 1961 (Act 46). The same legislation prescribed the functions of the VRA, vital amongst these being the generation of electrical power for domestic and industrial use in Ghana, the construction and operation of a power transmission system and the distribution of electricity to consumers at low voltages.***[8]*** This resulted in a considerable mandate on the VRA from the onset. In 1967 however, the Electricity Corporation Decree, 1967 (NLCD 125) established the Electricity Corporation of Ghana (ECG) which assumed the sole electricity distribution responsibilities of the VRA nationwide. In order to reduce the burden on the ECG, the VRA later created the Northern Electrification Department (NED) in 1987 and the organisation subsequently took over the distribution mandate in the Northern regions of Ghana.***[9]***

GRIDCo development and operations – The current framework and layout of the power sector in Ghana is largely as a result of Power Sector Reforms undertaken by the Ghanaian government in the late 1990s. These reforms included the creation of an Energy Commission in 1997 to oversee the technical regulation of the electricity, natural gas and renewable energy industries, the formation of the Public Utilities Regulatory Commission in the same year to provide guidelines for the tariffs and charges on public utility services and importantly, the unbundling of the then vertically-integrated Volta River Authority amongst other developments.***[10]***

The latter of the changes was initiated pursuant to the Energy Commission Act, 1997 (Act 541) and the Volta River Development (Amendment) Act, 2005 Act 692; with these laws providing for the exclusive operation of the National Interconnected Transmission System by a single independent public utility upon the grant of a transmission license by the Board of the Energy Commission.***[11]*** This license was granted to Ghana Grid Company (GRIDCo) and the organisation commenced operations in 2008 as the main organ responsible for power transmission in Ghana following its receipt of the requisite electricity transmission assets and core staff from the VRA.***[12]***

Despite these and the other changes made within the framework of the Power Sector Reforms, the issue of inconsistent power supply has remained a significant challenge facing the power sector in Ghana over the past few decades. A major cause of the inconsistent power is a lack of adequate and reliable infrastructure in the electricity transmission sector. Ghana for example is estimated to lose US$100 million annually from transmission losses or leakages.

Nevertheless, and notwithstanding the gap in diversification of power generation,***[13]*** the position at present is one of over-capacity in the power-generation sector. The magnitude and effect of this overproduction was made clear in the Ghana 2019 Mid-Year Fiscal Policy Review presented by the Finance Minister to Parliament where it was revealed that the installed capacity of the generating subsector at 5,083 MW was nearly double the peak demand at the time (2,700 MW).***[14]*** Ghana had to bear costs exceeding GHS2.5 billion annually for power generation capacity that was neither needed nor consumed.***[15]*** Regardless, this surplus capacity has not resulted in constant power supply due, in part, to inadequacies in the

electricity transmission infrastructure.

Technical challenges – Demand for electricity in Ghana has grown dramatically over recent years and is showing no signs of slowing down in times to come. The past five years have seen an annual growth rate of 10.3 percent in electricity demand with peak system demand figures moving from 2,118 MW in 2015 to 3090 MW in 2020. Within the same time span, the total annual electricity consumption rose from 11,678 GWh to 19,717 GWh.***[16]*** This growth in demand can generally be attributed to economic growth, urbanization and increases in industrial activity.***[17]***

Over this same period, power transmission facilities have also been expanded. As of 2016, the National Interconnected Transmission System consisted of approximately 5,207.7 circuit kilometres of high voltage transmission lines employed to connect the operating power generation plants at Akosombo, Kpong, Bui, Tema and Aboadze to the sixty-four (64) Bulk Supply Points operated by GRIDCo across Ghana. The NIT also comprised of 123 transformers with an overall Transformer Capacity of 4,598.86 MVA.***[18]*** By the close of 2020, the transmission network had grown up to 7,200.5 circuit kilometers and its overall Total Transformer Capacity had more than doubled, standing at 8,901.8 MVA with sixty-five (65) Bulk Supply Points across the nation.***[19]*** Nevertheless, this expansion has been insufficient in catering to the state's growing power demands and diversification of energy sources. Nationwide access to electricity as at 2020 was at 83 percent, with 91 percent of residents in urban areas having access to electricity while the same was true for only 50 percent of residents in rural parts of the country.***[20]***

At present, several whole communities in rural remote areas do not have access to power and this is primarily due to a lack of infrastructure to transmit electricity from the power generating plants to these inland locations, particularly in the mid-portion and Northern parts of the country.***[21]*** Attempts to improve power transmission to rural areas have been embarked on over the years, key amongst them being the Self-Help Electrification Program, an initiative introduced by the National Electrification Scheme whereby rural communities complement the efforts of the government with regards to provision of basic transmission facilities to secure their accelerated connection to the national grid. However, the data suggests that much more work needs to be done and barring significant infrastructural investments, the strain created by the nationwide growth in electricity demand would adversely affect the limited progress that has been made in rural electrification.

In addition, a considerable number of the transmission facilities on ground are notoriously outdated; a problem which has resulted in transmission bottlenecks, overloaded transformer sub stations and high system losses.***[22]*** Between 2006 and 2016, Transmission and Distribution losses made up as much as 20.1 percent of the total electricity supplied and although distribution losses have proved more significant with 16.2 percent of losses stemming from distribution and commercial losses by the ECG and NEDCo, as opposed to 3.9 percent losses reported in the transmission sub-sector***[23]***, recent trends have shown an increase in transmission losses which moved from 3.8 percent in 2017 to 4.5 percent in 2020 representing 888GWh of losses in that year alone. Needless to say, the 4.5 percent losses recorded fall below the set benchmark by the PURC and the Energy Commission has reported that investment in new transmission lines and the upgrade of existing outmoded lines is paramount to averting the rising trend in transmission losses.***[24]***

The lack of adequate infrastructure has been especially felt in recent times with a series of power outages around the country between January and April of 2021 attributed to system challenges on the NITS spurring an investigation by the PURC into the causes of the erratic power supply.***[25]*** The ensuing report stated faults in transmission lines and line insulators, compressor failures, emergency upgrades and modification works, construction of new infrastructure on the NITS, scheduled maintenance and delayed investments and completion of projects as some of the causes of the power outage over the observed time period.***[26]*** Briefs released by the Ministry of Energy, likewise attributed the power outages to maintenance work and improvements being carried out on outdated systems in the NITS indicating that the discomfort experienced in the short-term was inevitable in the quest to secure long-term improvements in the system.***[27]***

Financial hurdles – These issues are only compounded by the financial difficulties facing the companies operating in the transmission and distribution subsectors. In 2018, despite attaining a 16.67 percent increase in power transmitted, GRIDCo recorded a net loss of GHC114.3 million. This was in part due to a significant loss in transmission revenue from GHC715.2 million in 2017 to GHC490.2 million in 2018, caused by the 50 percent decrease in the Transmission Service Charge set by the PURC.***[28]*** The events of the year only draw attention to a wider issue within the industry that speaks to a lack of financial sustainability/commercial viability. The prices in the sector are not regulated by the traditional market forces of demand and supply due to state intervention and this has led to the transmission and distribution entities running at a deficit for a number of years.

As of 2017, the total debt owed to GRIDCo by the ECG and the Volta Aluminium Company (VALCO) stood at GHS862 million.***[29]*** The dire financial situation of the sub-sector has severely hampered planned infrastructural investment and left a widening infrastructural gap as demand continues to increase around Ghana. The Preliminary Investigative Report on Erratic Power Supply conducted by the PURC in April 2021, noted that several key projects provided for in the 2020 Electricity Supply Plan which were scheduled to have been completed were stalled due to delays in investment.

GRIDCo is purely a state-owned entity and there has been little or no private investment in the company or its projects. As a result, a significant portion of the infrastructural development that has taken place over the years has been financed by multinational agencies and financial institutions. In 2017, GRIDCo completed one infrastructural development project, commenced another and reported eight more ongoing projects.

These included the 330kV Prestea-Kumasi Power Enhancement Project at a cost of US$58,150,352 financed by the Export-Import Bank of Korea; the Project for Reinforcement of Power Supply to Accra Central at a cost of US$58,000,000, jointly financed by the Japanese International Cooperation Agency and GRIDCo; and the Substation Reliability Enhancement Project (SREP) at a cost of EUR 31,762,217 and GHS 10,218,312, also jointly financed by Société Générale and GRIDCo amongst other projects.***[30]***

Likewise, in 2018, GRIDCo reported eight completed major engineering projects and six more ongoing ones. The year saw the completion of the 225 kV Bolgatanga-Ouagadougou Interconnection Project with a project cost of US$12,806,475.91 and GHS923,710.18 (for the 330/22 kV substation) and US$829,280.70, EUR398,395.92 and GHS1,510,221 (for the 330/225kV transmission line) jointly financed by the World Bank (330/22kV substation) and the

French Development Agency (225kV transmission line); the 34.5kV AND 11.5 kV Switchgear Upgrade Project with a project cost of EUR11,446,845, jointly financed by the African Development Bank and GRIDCo; and the 225 Kv Bolgatanga-Ouagadougou And 330kv Kumasi-Bolgatanga Transmission Line Projects, with a project cost of GBP2,505,763 and US$1,221,434 financed by a grant from the European Union, amongst other projects.***[31]***

Given the age of Ghana's transmission lines and the shortfalls in such transmission lines reaching certain rural areas, a concerted effort to invest in such infrastructure using innovative means and the suggested reforms above would significantly close the infrastructure gap.

Proposed reforms – At risk of oversimplification, the solution to the electricity transmission issues faced by Ghana lie in large-scale and comprehensive upgrading and expanding the transmission infrastructure in the country. As mentioned in the Energy Outlook document by the Energy Commission, investments in infrastructure are necessary to curb the rising trend in transmission losses.

The Investigative Report on Erratic Power Supply in the state conducted by the PURC concluded that delays in the execution of capital projects were partly responsible for the irregular power supply and recommended that the relevant stakeholders work towards the timely completion of these projects especially through requisite capital injection and adequate monitoring and supervision mechanisms.***[32]*** In addition, the increasing proportion of intermittent energy sources, such as solar PV, requires a more robust, modern and adaptable transmission grid to help ensure a steady supply of power.

On the part of the government, the recent passing of the Public-Private Partnership Act, 2020 (Act 1039) is a step in the right direction as the establishment of a definite framework within which these partnership agreements can be created and managed should increase the confidence and willingness of private-sector investors to enter into these arrangements, allowing for the capital and expertise required to secure the development of infrastructure in the electricity transmission sector. In addition, the implementation of the Cash Waterfall Mechanism by the Government in 2020 to ensure a more transparent distribution and management of the revenue received by the Electricity Company of Ghana should go some way to address the liquidity issues being faced in the transmission sector, especially as a certain fixed percentage of the revenue is allocated to GRIDCo.

In light of the above, the Government of Ghana in 2021 is accelerating reforms premised on a GRIDCo development plan with emphasis on transmission. This is taking a more concrete shape as demand for power increases. In line with these reforms, the government is constructing the Pokuase Bulk Supply Point (BSP), which is 95 percent complete and expected to be done at the end of July 2021. The Kasoa BSP is 60 percent complete and is expected to be completed by end of August 2021. Further, the Tema to Achimota line rehabilitation is ongoing, whilst the gap in the transmission backbone between Kumasi and Kintampo is to be fixed to complete the transmission system between the coastal part of Ghana and Bolgatanga in the Northern part of Ghana. These transmission upgrades with an estimated CAPEX of US$533 million are a big step in the right direction towards ensuring that the grid is able to accommodate the load being transmitted. However, more is needed and it is hoped that some of the funding models discussed in this article can help fund the additional investment that is needed to ensure a bright future for Ghana.

Conclusion

Closing the gap of Africa's infrastructure paradox will take time and commitment. The suggested reforms referred to in this article require strong commitment and the political will of African governments, as exemplified by the Ghanaian case. African governments should seek to build on the positive experiences of other countries and regions (for example, by obtaining the services of domestic and international advisors with the relevant structuring experience) in line with all proposed reforms.

Too often, projects in Africa are delayed by government bureaucracy, changes in political administrations, lack of effective investment propositions to potential investors and media miscommunication. This leads to waning levels of public support for reforms, thereby impacting on the ability of private investors to effectively plan and participate in long-term energy projects across the continent. Despite these challenges, reforms across the continent in the energy sector, as seen in countries such as Kenya, Ghana, Rwanda, South Africa, Morocco, Egypt, Zimbabwe among others, is bringing about a new wind of change which is providing opportunities for PPAs/PPPs and other multilateral funding and capacity development arrangements. These efforts, together with the right investments, funding models and incentives for both governments and private investors can contribute to the elimination of the this infrastructure paradox.

Footnotes

[1] McKinsey & Company, see section headed "*Closing Africa's infrastructure gaps*", ***Solving Africa's infrastructure paradox***, 6 March 2020

[2] African Development Bank, ***Africa's Infrastructure: Great Potential but Little Impact on Inclusive Growth***, 2018

[3] See footnote 2.

[4] See footnote 1, section headed "*Why so few African projects get funding*"

[5] See footnote 1, section headed "*The causes of Africa's infrastructure paradox*"

[6] See footnote 1, section headed "*Actions for governments and development institutions*"

[7] African Development Bank Group, ***Africa Investment Forum 2018: a new bold vision tilts capital flows into Africa***, 14 November 2018

[8] Volta River Development Act 1961, (Act 46), s.10

[9] Abeeku Brew-Hammond, 'The Electricity Supply Industry in Ghana: Issues and Priorities' (1996) Africa Development Vol.21 No.1 81, 82

[10] Ishmael Ackah, 'Ghana's Power Reforms and Intermittent power supply: A critical Evaluation' (2014) JESD Vol.5 267, 268

[11] Energy Commission Act, 1957 (Act 541), s.23

[12] 'Overview/Our History' (GRIDCo) <***https://www.gridcogh.com/home/overview/***> accessed 7 July 2021

[13] Kimathi & Partners Corporate Attorneys, 'Electricity Regulation and Transfer in Ghana' (Lexology 31 October 2019) < ***https://www.lexology.com/library/detail.aspx?g=910beca2-f3bf-420f-8597-e7e3e6f53b38***> accessed 7 July 2021

[14] Ministry of Finance, *2019 Mid-Year Fiscal Policy Review and Supplementary Estimates* (2019) para 19

[15] Ministry of Finance, *2019 Mid-Year Fiscal Policy Review and Supplementary Estimates* (2019) para 19

[16] Ghana Energy Commission, *2016 Energy (Supply and Demand) Outlook for Ghana* (April 2016) para.1; Ghana Energy Commission, *2021 Energy (Supply and Demand) Outlook for Ghana* (April 2021) p.ii

[17] Ishmael Ackah, 'Ghana's Power Reforms and Intermittent power supply: A critical Evaluation' (2014) JESD Vol.5 267, 268

[18] Ghana Energy Commission, *2017 Energy (Supply and Demand) Outlook for Ghana* (April 2017) p.25

[19] Ghana Energy Commission, *2021 Energy (Supply and Demand) Outlook for Ghana* (April 2021) p.38

[20] International Trade Administration, *Ghana- Country Commercial Guide Energy Sector* (August 2020) <***https://www.trade.gov/country-commercial-guides/ghana-energy-sector***> accessed 8 July 2021

[21] Public Utilities Regulatory Commission (PURC), *Ghana Preliminary Investigative Report On Erratic Power Supply* (April 2021) para.5.1

[22] Ministry of Energy, *National Energy Policy* (2010) p.10

[23] Ebenezer Nyarko Kumi, 'The Electricity Situation in Ghana: Challenges and Opportunities' (2017) CGD 10

[24] Ghana Energy Commission, *2021 Energy (Supply and Demand) Outlook for Ghana* (April 2021) p.14

[25] Public Utilities Regulatory Commission, *Preliminary Investigative Report On Erratic Power Supply* (April 2021)

[26] Public Utilities Regulatory Commission, *Preliminary Investigative Report On Erratic Power Supply* (April 2021) p.4

[27] Dr. Matthew Prempeh, 'Bear With Us As We Fix Power Transmission Issues' (*Ministry of Energy Blog* 21 May 2021) <***https://www.energymin.gov.gh/bear-us-we-fix-power-transmission-issues-napo***> accessed 8 July 2021

[28] Ghana Grid Company Limited, *Annual Report* (2018) 10

[29] Ghana Grid Company Limited, *Annual Report* (2017) 10

[30] Ghana Grid Company Limited, *Annual Report* (2017) pp. 21-24

[31] Ghana Grid Company Limited, *Annual Report* (2018) pp. 23-28

[32] Public Utilities Regulatory Commission, *Preliminary Investigative Report On Erratic Power Supply* (April 2021) p. 9

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