

OF 'DUMSOR' AND GHANA'S ENERGY SECTOR CHALLENGES: PART 2

A. Introduction

In Part 1 of this series, we stated some baseline and other statistics on the energy situation in Ghana. In analysing these statistics, we underscored that the current power crisis is not the result of lack of generating capacity as we have in excess of 500MW to meet current demand conditions were all the plants fully functioning.

Therefore, we further underscored that the current round of loading shedding to account for the supply deficit of about 500MW has “more to do with fuel unavailability – light cycle crude oil and natural gas to power the thermal plants – and other causal factors.” The other causal factors were enumerated as “the very poor credit risk of ECG”; lack of gas supply from Nigeria; “poor infrastructure planning, maintenance and lack of system redundancy” which have led to maintenance and retrofitting works on some of the thermal plants “on or about similar times;” “distorted tariff regime”; and “low level of supply” by the Bui hydro plant.

In this paper, we will take a much closer look at the causes of the load-shedding exercise.

The projected demand for electricity in Ghana, which has an estimated 10% year-on-year growth, is such that the current limited level of supply has created a major deficit to the extent that even taking a power plant off for routine maintenance further compounds the inadequate supply condition.

Independent power producers (IPPs) have entered the electricity sector following its privatization in the late 1990s.

B. What Are The Causes Of This Supply Deficit?

The factors responsible for the supply deficit stated in summary form in Part 1 and in the section above will now be elaborated.

1. Gas and Fuel Supply Challenges

About 88% of gas demand in Ghana is from the power sector and the country currently needs about 191 million standard cubic feet per day (mmscfd) to power its thermal plants. This is projected by the Ministry of Energy to grow to 265 mmscfd in 2020 and 584 mmscfd by 2030.¹

Ever since the commissioning of the West African Gas Pipeline (WAGP) in 2008, Ghana has struggled to get her contractually mandated quantity of 123 mmscfd from Nigeria to the Aboadze Thermal Power Plant.

Supply at best has been limited to less than half of this quantity, thus preventing the thermal plants from being efficiently run. Ghana was initially meant to consume about 90% of the gas but this has been reduced as Nigeria prioritizes utilizing her gas to generate electricity to drive her domestic industrialization agenda over regional integration needs. For example, only an average of 31 mmscfd of gas was delivered through the WAGP in 2013, down 25% from 2012. Supply was estimated to range between 30-50 mmscfd in 2014.

Following the commissioning of the Atuabo Gas Processing Plant in the fourth quarter of 2014, domestic gas from the Jubilee Field became available for power generation at the Aboadze

¹ Ghana Gas Master Plan prepared by Economic Consulting Associates and Petroleum Development Consultants for the Energy Ministry.

Thermal Plant. However, supply has only ranged between 60-80 mmscfd, significantly below the 120 mmscfd optimal plant capacity.

The low volumes of both WAGP and Atuabo gas means that there was a gas supply deficit of 81 mmscfd [191-(40+70)].

The inadequate supply of gas has necessitated the use light cycle oil by the Volta River Authority (VRA) and IPPs to generate power. Power generation by light cycle oil is typically at much higher cost than gas-fired generation, though tariffs do not automatically adjust to reflect this. VRA (government) hasn't had the funding to buy light cycle oil to run these thermal plants largely on account of the ECG's indebtedness to them.

In summary, the unavailability of gas and light crude oil to run the thermal plants has decreased the supply of power.

2. Low Water Level

The supply of power has further been reduced by the low level of water in the reservoirs feeding the hydro plants.

As stated in Part 1, the low level of water has made it difficult for the Bui dam to produce at a high level, and this low level of supply from Bui has been a "major reason why 'dumsor' has worsened since December 2014."

Below average rainfall over the past three years has reduced the water level in the Volta Lake, which in turn has reduced the water level in the Volta reservoir that feeds the Akosombo hydro station. The shortage of water has resulted in only a 60% reservoir yield at Akosombo and Kpong.² The minimum operating water level for the Akosombo Dam is pegged at 240 feet. The water level in December 2010 was 275.40 ft; was 271.97 ft in December 2011; was 268.50 ft in December 2012; and was 257.80 ft in December 2013.³

3. Poor Credit Risk of ECG

The Electricity Company of Ghana (ECG) is currently the sole offtaker on the market but its poor credit risk has forced IPPs to demand sovereign guarantees in power purchase agreements (PPAs) before commencing operations. All but one of the PPAs underpinning IPP development in Ghana have the ECG as the offtaker, and that one has VRA as the concurrent co-owner and offtaker.⁴

Thus, many potential IPPs do not consider the ECG as a credible, bankable offtaker largely because the ECG has ran at a loss most years in the past three decades. Moreover, the Government's reluctance to issue sovereign guarantees has proven to be a major stumbling block for new IPPs for more over 15 years now.⁵

The World Bank's Ghana Energy Report of June 2013 noted that the ECG's cash flow difficulties are even worse than its profit and loss accounts would indicate because of poor revenue collection and rising dollar-denominated payment obligations. The ECG purchases power in dollars and sells in Cedis, thus it is exposed to foreign exchange losses.

About 51% of the ECG's customers are lifeline consumers, who account for 6% of energy consumption and 1% of sales. They are followed by residential consumers, who account for 34% of energy consumption and 36% of sales revenue. However, 56% of the ECG's revenues actually come from the 12% who are non-residential consumers, and not from the former two

² See page 49 http://www.gridcogh.com/media/photos/forms/rel-assessment/2010_GRIDCo_Reliability_Assessment_Report.pdf

³ <http://www.myjoyonline.com/business/2014/april-23rd/akosombo-dam-water-level-expected-to-drop-to-record-low.php>

⁴ See page 15 of the World Bank Ghana Energy Report.

⁵ ibid

groups. The high voltage mines and special load tariff account for the balance of both energy consumption and sales revenue.

The ECG's credit issues are further compounded by the fact the ratio of distribution (technical and commercial) to transmission losses has averaged 22% over the past ten years. The net effect of this is that almost 22% of total power generated cannot be accounted for. The ECG does not earn any revenue for this wasted energy, but has to pay for it regardless.

There was a media report on 13 February 2015 that both public and private institutions and individuals owe the ECG in the region of GH¢500million in accumulated debt.⁶

The VRA has also indicated that the ECG owes it in excess of GH¢1billion, which is making it difficult for it to purchase crude oil to power its thermal plants.⁷

4. Poor Infrastructure Planning, Maintenance and Lack of System Redundancy

As stated in Part 1, "poor infrastructure planning, maintenance and lack of system redundancy have resulted in many thermal plants going offline on or about similar times."

The current load-shedding situation has been worsened by the following maintenance and retrofit upgrades:

- 1) Refurbishment of TICO's 220MW to upgrade it from single cycle to a 340MW combined cycle operation⁸
- 2) Repairs of 132 MW Takoradi T3 thermal plant (also known as TAPCO)

In a 2014 World Bank Report on Ghana's energy sector, it was reported that an audit had raised serious concerns about the underperformance of VRA's thermal plants at Takoradi and Tema; that the plants are not performing well; and that they cannot operate at full capacity on a sustained basis. Moreover, the audit found that the performance of the VRA plants at Takoradi did not meet international benchmark tests for reliability, though some improvements had been made in 2009-2010.⁹

5. Distorted Tariff Regime

Electricity production costs about US¢5/kWh for legacy hydro such as Akosombo, whereas the generation costs for thermal ranges between US¢9/kWh (gas-fired combined-cycle gas turbine) and US¢27/kWh (LCO-fired, open-cycle gas turbines). It is projected by the Energy Commission that the economic cost of thermal power delivered to end users in Ghana will be more than US¢12–15/kWh for the foreseeable future.

The Public Utilities Regulatory Commission's (PURC) sets tariffs, i.e., determines electricity prices. In 2011 the PURC introduced a quarterly automatic tariff adjustment formula which incorporates fluctuations in crude/gas prices, foreign exchange rates, the hydrothermal generation mix and changes in the consumer price index. But the formula has not been allowed to adjust automatically due to government interference in the market price setting mechanism to ensure some subsidization of prices.

The subsidized tariffs make it difficult for producers, particularly the IPPs, to achieve full cost recovery. This distorted tariff regime is what forces IPPs to request sovereign guarantees in

⁶ <http://thebftonline.com/content/%E2%80%98dumsor%E2%80%99-deepens-ecg%E2%80%99s-cash-woes>

⁷ ibid

⁸ https://www.mitsui.com/jp/en/release/2012/1198382_3607.html

⁹ See page 17

<https://openknowledge.worldbank.org/bitstream/handle/10986/16264/796560WP0P13140Box0377384B00PUBLIC0.pdf?sequence=1>

PPAs. The distortion of tariffs has thus been a great disincentive for investment in the power sector, especially in the generation and transmission sub-sectors.

The IPPs, who generate most of the thermal power in Ghana, on 11 February 2013 cited underpricing of utilities as one of their major concerns and the cause of their inability to meet set performance standards.¹⁰ The persistent under-recoveries have drastically affected their cash flows and undermined future capital budgeting and investment programmes to maintain and/or upgrade generation capacity.

In short, the distorted tariffs set by the PURC are the major contributory factor to the under-recoveries by the IPPs, as they do not allow full cover of operational costs, including a capital recovery factor.

C. Impact of 'Dumsor' on Economic Activity

The inadequate supply of natural gas does not enable energy to be produced adequately and cost-competitively to support economic growth, thus reducing the country's economic growth rate.

According to the Ghana Statistical Service, real GDP growth rate for 2014 was 4.2%, compared to 7.3 percent recorded in 2013.¹¹ The decrease in the rate of growth in 2014 was broadly attributed to energy supply constraints and rising input costs that reduced economic activity. As stated in Part 1, inadequate power supply makes Ghana lose an estimated to lose 2-6% of GDP annually.

Inadequate and unreliable power supply increases the cost of doing business as businesses – including those in the SME sector such as welders, tailors and seamstresses, restaurants and chop bars, and guest houses and motels – are forced to use expensive alternative fuel options such as buying diesel and petrol to run and service generators sets.

On 3 February 2015, The Association of Ghana Industries (AGI) signalled that several companies would be forced to lay off thousands of workers if the current energy crisis continues.¹² It has been reported that Ghana will soon experience acute cement shortage due to the worsening power crisis.

The closing down of businesses will decrease government revenue, decrease export revenue, weaken the Cedi, and decrease the rate of growth of the economy. It will also increase unemployment, and contribute to an increase in the crime rate. All these effects will make Ghana less competitive as an investment destination in the sub region.

D. Conclusion

The major causes of the 'dumsor' are:

1. Lack of gas and shortages of fuel to power the thermal plants.
2. The difficulties the VRA has been experiencing in financing purchase of fuel due primarily to the ECG not paying its debt to the VRA.
3. Maintenance and upgrade ongoing concurrently at the thermal plants due to poor infrastructure planning and lack of system redundancy, so that even with gas and fuel they wouldn't be producing at their normal operating levels.

¹⁰ <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=264671>

¹¹ See page 3 Feb 2015 MPC Report:
http://www.bog.gov.gh/privatecontent/MPC_Press_Releases/MPC%20Press%20Release%20-%20Feb.%202015.pdf

¹² <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=345145>

4. Low water level in the reservoirs that feed the hydro plants, thus making them produce at lower levels than they could be producing currently.

A major problem in the sector is the distorted tariff regime that is making it difficult for IPPs to operate profitably. This has deprived the sector of essential funds needed to undertake key upgrades and hence contributed to the low reliability of the plants.

As stated in Part 1, our installed capacity of about 2,900 MW exceeds our peak demand level of about 2,000 MW but the current level of production is about 1,500 MW, meaning that there is a shortfall of about 500 MW.

Therefore, it should be clear that the current acute power shortage is the result of much deeper issues than the impression that has been created that it is due to a shortfall in generation capacity. And these deeper issues are the government's precarious finances, poor maintenance of thermal plants, weather effects, and policy inertia on the part of the government.

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