

Advisory Paper On Power Sector Priorities For Government's Action



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Introduction

The efficient management of the power sector remains significant for Ghana's economic growth and development, and the recovery of the economy from the impact of the Covid-19 pandemic. The economy would require a stable, efficient and cost-effective power supply that would fuel economic development, support industrial growth, create jobs and anchor innovation, science and technology. To achieve these, there are significant opportunities and challenges that will require particular focus and attention of the government. To that extent, policy decisions will have to reflect an understanding of the opportunities and challenges in the power sector. In this advisory paper, ACEP reviews the sector, highlights the issues that require priority attention and proposes some critical actions that should not be missed in the policy direction of government. The issues raised in this paper will form a significant part of ACEP's framework for tracking government's performance in the sector over its four-year term.

1.0 Power Generation

Installed generation capacity significantly increased from 3,656MW in 2015 to 5,172MW in 2020. Dependable generation capacity also increased from 3,359MW to 4,695MW within the same period. This increase is accounted for by the addition of the following generation plants:

- 250MW from Ameri
- Additional 225MW from Karpowership to increase its capacity to 450MW.
- 370MW from AKSA
- 360 MW from Cenpower
- 360 MW from Asogli Phase II (180MW in 2016 and an additional 180MW in 2017)

In addition to these conventional power systems, two on-grid solar projects were commissioned. These are the 20MW BXC Solar and the 20MW Meinergy plants.

While both installed and dependable generation capacity increased significantly, peak demand did not increase proportionally to consume the generation capacity. The peak demand in 2019, for example was 2,804MW, leaving an excess capacity gap of 1,891MW on paper. Government indicates that it pays about US\$40 million a month for the excess capacity. ACEP is unable to independently verify this claim because excess capacity invoices are not available. Again, a monitoring of the generation system shows that periodic unavailability of some of the generating plants should significantly reduce the invoice for excess capacity charges.

The outlook for the next four years shows a further increase in installed capacity with the introduction of 203MW Amandi and Phase I of Bridge Power delivering 142MW. Bridge Power has a Power Purchase Agreement (PPA) to produce 400MW. However, government's position as of 2018 was for Bridge Power to defer the delivery of the second phase. It is unclear what the status of the final decision of the government is on the delivery of phase two of Bridge Power.

The government has consistently indicated that it is negotiating PPAs to relieve the country of excess capacity charges. However, there is no transparency around the negotiations of these PPAs. The recent US\$134 million¹ judgement debt against the government over the termination of the Emergency Power Agreement with Ghana Power Generation Company (GPGC) Limited is only an

¹ ACEP will soon publish a full analysis of the judgement and highlight the negligence that caused the judgement debt.

indication of the poor judgement that has characterized such negotiations, the result of opacity that paid limited attention to the contract terms. It is surprising that the President reiterated this same renegotiation of PPAs in his 2021 State of the Nation Address to Parliament on the 9th of March 2021 without reference to the significant waste that the negotiations and terminations have begun generating as in the case of GPGC.

Specific actions required:

- Government must provide information on the excess capacity based on the declared availability for each of the plants for which excess capacity charge is paid. This would improve the credibility of government's claims on how much is paid for excess capacity.
- Government should prioritize the conversion of single cycle plants, particularly the KTPP and Ameri plants which are still in the early stage of their lifecycle, to combined cycle plant to improve the production and cost efficiency of the plants to reduce consumer tariffs.
- Government should be transparent about the never-ending negotiations of PPAs and ensure that they are meticulous to avoid judgement debt for energy that is never consumed by the taxpayer.

1.1 Renewable Energy Generation

Government's action on renewable energy has been negatively impacted by the excess capacity burden faced by the government. As a result, the government has extended its suspension of renewable energy PPAs to licenses for embedded generation (private arrangements between renewable energy suppliers and consumers). This is aimed at sustaining demand for grid electricity to account for the excess capacity over time even though increasingly renewable energy is becoming a more competitive option for small businesses.

It is curious to note that while the directive to suspend issuance of licenses is in place against private businesses, government has issued another directive to ECG, the southern utility distributor, to conduct an auction for 100MW utility scale solar PV power capacity. This presents a clear case of government's policy inconsistency on renewable energy generation.

The policy inconsistency has implications for the entire renewable energy value chain, more specifically on suppliers, government's climate action and economic choices of consumers.

- **Suppliers** - Established non-utility scale renewable energy suppliers, who supply technologies to small scale power consumers, are unable to apply for and renew their licenses in spite of the investments made over time. These businesses are essentially being punished for no crime committed even though they are established businesses under law employing people and paying taxes.
- **Government's Climate Action** - There have been consistent defaults on the targets for renewable energy in the national energy supply mix. The Strategic National Energy Plan (2006 -2020) projected a target of 10 percent renewable energy in the national energy supply mix by 2020. By the end of 2020, renewable energy generation was less than one percent of the energy supply mix. As a result, the 2020 timeline to achieve the 10 percent target was revised to 2030. Policy decisions such as the above contribute significantly to exposing government's commitment to renewable energy penetration and climate action.

- **Consumers** - Power consumers, particularly small-scale businesses, are denied the opportunity to make economic choices between consuming power from the grid and embedded generation from renewable energy sources.

The directive to suspend the issuance of licenses for embedded generation is an addition to the excessive regulation of the renewable energy space, especially of embedded generation that ordinarily does not interfere with the national grid lines. The action questions the logic as to why diesel generations can run either as primary or backup generation without licenses, but renewable energy cannot.

Specific actions required:

- Government should immediately lift the suspension of the issuance of licenses for embedded generation. In the interest of climate action and the energy transition, government should be seen encouraging the penetration of renewable energy instead of impeding it.
- Government must be more focused on ensuring the regulation of standards for renewable energy technologies rather than the economic choices of businesses and power consumers.

1.2 Fuel Supply for Power Generation

Domestic gas production has increased with the delivery of TEN gas in 2016 and Offshore Cape Three Points (OCTP) in 2018. OCTP has a contractual volume of 180mmscfd but was delivering 60mmscfd until 2020 due to inadequate demand in the West, where the gas is located, and the delays in delivering the infrastructure to allow the reverse flow of gas from the West to the East of the power corridor. Nigeria gas delivery has also been relatively stable to complement domestic gas with an average flow rate of 60mmscfd in 2020. The increased domestic gas production and stable Nigerian gas has occasioned a significant shift from liquid fuels to natural gas for power generation by thermal plants. By the end of 2019, all thermal plants except AKSA were running on natural gas. This notwithstanding, the plants using natural gas remain dual fuel plants with the capacity to switch to Light Crude Oil (LCO) when the need arises. This has the potential to improve fuel supply security if stocks can be held to offset any gas supply challenges.

The fuel switch to natural gas for power generation has been enabled by a set of actions that took place after several delays:

- The OCTP partners financed the TTIP project to the tune of US\$184 million as a loan to GNPC to allow the reverse flow of gas from the West to the East of the country. This debt currently sits on the books of the Ghana National Petroleum Corporation (GNPC) with interest payments of US\$11.69 million in 2020.
- Again, Karpowership was relocated from Tema to Sekondi to allow the plant to consume up to 90 mmscfd of gas. This relocation was completed towards the end of 2019.

Fuel Supply Challenges:

The switch to gas provides a cheaper fuel option relative to liquid fuels for power generation. However, the challenge of non-payments in the power sector value chain still persists. The OCTP gas was not paid for on schedule from inception which warranted the drawdown of the entire US\$100 million escrow provided by GNPC for gas purchase. Subsequent defaults in payment also

led to the drawdown of the letters of credit to the tune of US\$200 million. The government of Ghana has since paid a significant part of the OCTP invoices from the consolidated fund and the cash waterfall mechanism. This notwithstanding, the OCTP partners are still owed four months invoices which amounts to about US\$200 million. As a result of a controversial clause in the Gas Sales Agreement for OCTP gas, Ghana is obliged to pay penalties for not prioritizing OCTP gas if it can be proven that the country could have done so. This penalty stood at about US\$40 million in August 2020. This presents a clear case of 'double jeopardy' for the country where Ghana has to pay the penalty as well as redeem the take-or-pay liabilities.

Furthermore, government has allocated the projected gas demands among the gas sources. The capacities of domestic sources have been suppressed to make way for the import of LNG. Gas from OCTP has been suppressed to the take-or-pay volume of 171mmscfd even though the US\$7.7 billion investment can deliver up to 240mmscfd without additional investments. Again, production of OCTP makeup gas² has been deferred to 2022 instead of 2021 to also make way for LNG. In the similar fashion, Jubilee and TEN gas has also been capped at 120mmscfd.

Beyond the domestic sources, there are also plans to suppress supply from Nigeria gas, which is cheaper than LNG, from 60mmscfd to 30mmscfd starting from 2021. Beyond the fact that the LNG is excess gas, it is also the most expensive gas, terminating at burner tip at about US\$11.1/mmbtu based on the pricing formula in the Gas Sales Agreement (GSA). This is about US\$3.0/mmbtu more than the cost of Nigeria gas. This makes it unreasonable to want to suppress Nigeria gas at a time when it has proven to be very stable.

Apart from GNPC, which is the off taker of the LNG, there is very little industry support for the pursuit of LNG as highlighted in previous research by ACEP.³ In their justification for LNG, the Corporation maintains they have market beyond Ghana for LNG. ACEP's scan of the regional dynamics in a three-year horizon does not show any optimistic demand for gas in the neighboring countries. ACEP can also confirm that there is no single binding contract between GNPC and any potential consumer of the LNG to warrant the Corporation taking the risks to contract the commodity. By July this year, a minimum of 75mmscfd will be delivered from the Floating Storage Regasification Unit (FSRU). This translates to about US\$300 million if the Brent price, which is the benchmark for the LNG, does not appreciate.

Beyond the financial risks associated with the LNG, the strategy is also a significant disincentive for investment in domestic oil and gas exploration and constrains the need to accelerate the development of existing gas discoveries. It further burdens the gas sector with multiple take-or-pay commitments from Nigeria Gas, OCTP and the Shell LNG.

Beyond these, GNPC has also struggled to honor its payment obligations for the capacity reserve cost for the reverse flow of gas through the West Africa Gas Pipeline (WAGP). This also led to the drawdown on the escrow provided by GNPC for guaranteeing capacity reserve through WAGP.

² This is gas that has been paid for by Ghana due to take-or-pay commitments. Ghana is required to consume that gas or lose it in five years, starting from 2018.

³ Smoothing the Gas Demand and Supply Scenario: The Case for Realistic Planning to Improve Confidence in Ghana's Gas Market and Reduce Risks on Public Finances (<https://bit.ly/30vag9b>)

The challenges in the gas sector are set to be compounded with the arrival of LNG. This will worsen the debt accumulation of the power sector and the financial situation of GNPC, which unlike other take-or-pay commitments guaranteed by government, is the sole risk taker of the LNG. This US\$300 million financial burden will be too much for the Corporation which in 2020 sought financial bailout from the state.

Specific actions required:

- The priority for Ghana must be the optimization of its domestic gas and the suspension of LNG importation plans. This will reduce the take-or-pay commitments, reduce pressure on the budget and provide incentives for investments in domestic gas resources.
- GNPC should be subjected to strict proof of the identified market that warrants the risks of importing LNG.
- Ghana should negotiate with Nigeria Gas to use the Floating Storage Regasification Unit (FSRU) which was delivered at the Tema Port last year as a buffer to smoothen gas supply through WAGP. The cost of the FSRU can be accommodated in the gas price which is less burdensome than adding the cost of the commodity (LNG) which in all likelihood is a surplus requirement.
- If by 2022, Ghana is unable to consume the OCTP makeup gas, some people should be held criminally liable for deliberately causing financial loss to the state.

2.0 Power Transmission Challenges

The problems with the transmission sub-sector have received less attention in the discussions around the power sector challenges faced by the country. It is important to bring these issues into a proper perspective to ensure they are addressed because of the threats they pose to the security of power supply in the country.

The National Interconnected Transmission System (NITS) transmits electricity at 69 kV, 161 kV, 225 kV and 330 kV voltage levels across the country. The 2020 Electricity Supply Plan indicates that the transmission system has been performing poorly on the basis of transmission losses and voltage violations. Transmission losses in particular has been a consistent and recurrent challenge of the transmission system over the years. In 2019 for example, the system lost 4.7 percent of the power generated, a 19.4 percent increase from 2018. Overall system losses by the end of the first half of 2020 increased to 5.28 percent of total power generated. The transmission losses are occasioned by the consistent overload of the transmission lines and major voltage violations in major substations due to the overaged and weak transmission infrastructure, and the inadequate available transfer capacity to meet the demand requirements of the major load centers (of Accra, Kumasi, Tarkwa, etc.) particularly at peak demand. These weaknesses in the transmission system have resulted in the inability of the grid to recover quickly during major system disturbances leading to persistent power cuts and low voltages as have been experienced for the past few months.

The national grid company, GRIDCo, has consistently called for investments in expansion, additions and upgrades of the transmission system to improve transmission reliability in the power sector. For example, GRIDCo reports in the mid-year review of the 2020 Electricity Supply Plan that:

“Out of the capacitor bank installed capacity of 944.7 MVAR, only 267.1 MVAR (28%) is currently in service. If the percentage of capacitor banks in service is improved to 70%, there is a savings of

35MW in losses at peak. Similarly, load flow studies indicate that if capacitor banks equivalent to 90% installed capacity are restored into operation, it will shave off 25% of the losses, about 38.15 MW in absolute terms. Consequently, it can be concluded that the restoration of capacitor banks will improve voltages significantly in the Southern section of the NITS.”

The above example presents a clear indication that the right investment in the transmission system can significantly improve the reliability of the system and strengthen the capacity of the grid to recover quickly during major system disturbances. This lack of investments has worsened the stability of the transmission grid resulting in frequent trips of substations. The recent nationwide system collapse is a wakeup call to the realization that it is urgent now than ever to make significant investments in the transmission system.

Specific actions required:

- The sustainability of GRIDCo depends on a reformed power sector that pays for the investments in the transmission of the power sector. The fiscal position of government makes it difficult for the budget to continue to sustain investments in the transmission system. In the short term, some parts of the ESLA proceeds should be made available for investment in critical equipment in the transmission system.
- Ongoing upgrade works should be expedited to relieve power consumers of the frequent outages and low voltage currently being experienced.

3.0 Power Distribution Challenges

The distribution challenges in Ghana's power sector are widely known and has been an area ACEP has written extensively on. These challenges are deeply rooted in the inefficiencies in the power distribution system. The inefficiencies in the system are attributable to obsolete distribution infrastructure and the weak revenue collection and management by the distributors. In the first quarter of 2020 for example, the mid-year review of the 2020 Electricity Supply Plan indicates a power distribution loss of 26.63 percent, about 3.43 percent higher than the regulatory benchmark of 23.2 percent.

The inefficiencies in the power distribution sector were enough to convince the government to opt to use the second compact of the Millennium Challenge Compact (MCC) funds for the transformation of the power sector by an Electricity Company of Ghana (ECG) Financial and Operational Turnaround Project through a Private Sector Participation (PSP) agreement.

The objective of investing the funds from the Power Compact to improve the efficiency of the power sector was however not realized as a result of a number of actions or inactions of the actors which resulted in suboptimal outcomes with the concession process. The actions or inactions of the actors include the lack of capacity of the concessionaire to provide the necessary guarantees; poor due diligence by the Millennium Development Authority (MiDA) – the government's implementing agency, and the Parliament of Ghana which approved the concession. Others include the disregard for ECG and its concerns with the process and the lack of transparency around the local content requirements of the deal. The concession agreement was eventually suspended after only three months of operation and thereafter terminated by the government of Ghana.

The government, while terminating the concession agreement with PDS, indicated its commitment to a concession restoration and restructuring plan to be executed within the existing timelines of the PSP process, and in any event before December 31, 2019. There has been no action to inject the needed investment, which was determined to be a minimum of US\$500 million in 2014.

Beyond the issues with the concession, it is important to highlight that the distribution sector is the most significant segment of the power sector value chain for the financial sustainability of the sector. It is almost a decade since the decision was made to attract private investment into the distribution sector. However, this goal is yet to be realized largely because of the political interference with the process.

The inefficiencies in the distribution sector contributes significantly to the power sector's consistent failure to honor its payments and debt obligations which subjects the sector to financial distress. The recently introduced cash waterfall mechanism has proven, as predicted by ACEP, to be an ineffective solution to the financial challenges in the sector. The mechanism only distributes what has been collected by ECG without any connection to addressing the germane inefficiency issues in the power value chain. So far, the mechanism could only honor about US\$592 million out of the US\$1.3 billion obligations accrued in 2020. Besides, the function of ensuring fair distribution of revenue can be and must be delivered by the Public Utilities Regulatory Commission (PURC), the commercial regulator that imposes the tariff, and not a separate bureaucratic enterprise to burden the system further.

In his 2021 State of the Nation Address to Parliament, the President mentioned that the government has settled all energy legacy debts in a bid to improve the financial sustainability of the sector. This is precisely what ESLA was set up to do. The challenge beyond ESLA and payment of legacy debt is strong policy commitment to halt debt accumulation in the sector. Regrettably, that has not happened.

Specific actions required:

- Government should immediately revert to a transparent process to attract private capital into the distribution sector. If this is not done in the short to medium term the entire power sector would be in serious distress unless government is willing to sacrifice other socio-economic investments to continue to unsustainably prop-up the power distribution sector.