briefing paper

The energy crisis and its impact on the economy

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Abstract

Not unlike many other countries across the continent, Zambia is in the middle of a crippling energy crisis as the country grapples with a huge power deficit. Unfortunately, unless measures are taken to address this problem the situation is likely to worsen as the demand for electricity continues to grow by an estimated 200MW annually. This paper provides a brief analysis of the current energy situation in Zambia, and seeks to address the information asymmetry that exists between the public and the government on the causes of the energy crisis, its impact on the economy, and the measures that the government is currently taking to alleviate the current situation.

Background and Context

Across Africa, more than 30 countries, including Zambia, are now experiencing power shortages and regular interruptions in service. Zambia's crippling energy crisis is primarily due to the low level of investment in a sector that has failed to keep pace with the country's high growth. While measures are being taken by the government to address the situation, it is unclear on the extent to which these measures are ameliorating the damage caused to consumers as demand for electricity continues to grow by an estimated 200MW annually.

In Zambia energy sources include renewable sources such as: water, solar, wind and biomass; as well as fossil fuels such as petroleum. Given the substantial

Table 1: Installed Generation Capacity in Zambia

No	Power Station	Installed Capacity	Type of Generation	Operator
1	Kafue Gorge	990	Hydro	ZESCO
2	Kariba North Bank	1080	Hydro	
3	Victoria Falls	108	Hydro	
4	Lusemfwa and Mulungushi	56	Hydro	Lusemfwa Hydro Corp.
5	Small Hydros – combined	25	Hydro	ZESCO
6	Isolated Generation	8	Diesel	
7	Gas Turbine (stand by)	80	Diesel	Copperbelt Energy Corp.
	Total	**2177**		

unexploited reserves of renewable sources, Zambia has the potential to be self-sufficient in energy, with the exception of petroleum that is wholly imported into the country. In spite of the diversity of these energy sources, however, water remains the main energy source in Zambia and although there have been efforts at investment in recent years, there has been no major addition to the country's generation capacity in the last 20 to 30 years despite the huge potential in hydro resources. It is estimated that Zambia possesses 40 percent of the water resources in the SADC region and has about 6,000 MW unexploited hydropower potential however only about 2,177 MW has been developed (Zambia Development Agency, 2014).

Zambia's energy sector is dominated by the Zambia Electricity Supply Corporation (ZESCO). ZESCO is the vertically integrated national utility that generates, transmits, distributes and supplies electricity to national and regional markets. There are two other major players, namely: the Copperbelt Energy Corporation (CEC) which is a transmission company that purchases electricity from ZESCO at high voltage and distributes it to the mining industry in the Copperbelt region; and the Lunsemfwa Hydro Power Company. There are also two rural concessions: Zenagamina Hydro Power Company (ZHPC) that runs a remote rural network in the Northern Province and North West Energy Corporation that distributes electricity to a rural mining community that is not on the ZESCO grid.

The regulation of the sector is undertaken by the Energy Regulation Board (ERB). The ERB was created under the Energy Regulation Act of 1995 Chapter 436 of the Laws of Zambia following the issuance of Statutory Instrument number 6 of 1997, the Energy Regulation Act (Commencement Order) of 27th January 1997.

Current Scenario

With an average growth rate of above five percent over the past 15 years, Zambia's economic progress has substantially increased the demand for electricity in Zambia. The country's dependency on hydroelectricity, however, has left it vulnerable to climate-related issues. And as a result, the growing shortfall in the electricity supply has been further exacerbated by a reduction in hydroelectric generation due to low water levels at the country's main reservoirs.

According to the Ministry of Energy and Water Development (MEWD), the country's continued low rainfall in the current rain season has exacerbated electricity generation reductions due to low water inflows into the reservoirs of the three main hydro power stations, namely: Kafue Gorge, Kariba North Bank, Victoria Falls; and the newly commissioned Itezhi Tezhi Power Station. These power stations account for more than 95 per cent of the total electricity supply.

The Zambia River Authority is mandated to monitor the water levels in the Kariba Dam, and revise water allocation for hydropower generation to the two utilities, namely: ZESCO and the Zimbabwe Electricity Supply Authority (ZESA) as Zimbabwe and Zambia share this resource for electricity generation.

Reductions in the water allocation to these two utilities was undertaken recently to ensure that the generation of power was kept at reduced levels to avoid depleting the water in the dam which would could potentially damage the power infrastructure leading to a complete shutdown of the power stations. The reduced water allocation for Kariba North Bank Power Station by the ZRA has, therefore, resulted in a further reduction of 300MW in power generation in Zambia.

Table 2: Emergency Power PPAs Negotiated

Source	Type	Capacity in MW	Contract Period	Tariff (USc/kWh)
EDM	Hybrid	80-150	Jan 2016- Dec 2017	14.00
Aggreko	LNG	148	Sept - Dec 2015	18.86
Aggreko	LNG	40	Jan 2016 - Dec 2016	18.86
Kapowership	HFO	100	Jan 2016- Dec 2017	16.73
ESKOM	Hybrid	50-300	Jan 2016 - Dec 2016	6 to 19

(Ministry of Energy, 2016)

As a result, this has given rise to power deficit that stands at about 1,000MW this year.

At present, the government through ZESCO has embarked on both power imports as well as power rationing interventions as short term measures to mitigate the power deficit. The country is now relying on the importation of power to cushion the current electricity shortage that has hit the country. By the close of 2015, ZESCO had successfully negotiated Power Purchase Agreements (PPAs) with various Independent Power Producers (IPPs) and utilities in the Southern African Power Pool (SAPP).

While the government has continued to spend huge resources on the importation of power, it serves as a short-term solution and is not sustainable in the long term. As such, the government has also embarked on a number of projects that are currently being developed such as Kafue Gorge lower (750 MW) and Kariba North Extension (360 MW) in order to meet the growing national and regional demand.

The Itezhi-Tezhi (120MW) power station is another project that the government commissioned in March, 2016 and entered into commercial operation in an effort to meet the growing national and regional demand. Despite these investments, significant new generation capacity will still be needed to bridge the long-term demand-supply gap.

Other long-term measures that the Zambian government plans on implementing from 2017-2025 are:

1) 200MW from the Renewable Energy Feed in Tariff (REFiT) strategy. This will comprise of solar, mini hydro and other renewable technologies
2) Batoka project - 1,200MW (total for Batoka is 2,400MW). The two governments (Zimbabwe and Zambia) are considering the framework to be used for developing the project
3) Kafue Gorge Lower - 750MW at a cost of $2bilion
4) The Luapula river hydropower scheme consists of the Mambilima and Mombututa Falls sites with a combined capacity of 1,000MW (shared with DRC).
5)EMCO coal fired power plant-340MW based in Sinazongwe
6) Ngonye Falls power station-80MW in Sioma district, to be developed by Western Power Company
7) Upgrading of the already existing ZESCO small hydro plants such as Lusiwasi (12MW to 86MW), Chishimba falls (6MW to 14.5MW) and Musonda falls (5MW to 10MW)
9) Kabompo power project - 40MW to be developed by Copperbelt Energy Cooperation (CEC).

The total for envisaged long-term project is a minimum of 3,000MW to be developed by year 2024.

More immediate measures that the government has taken to reduce the power demand on the system have included a ban on the importation and local manufacturing of incandescent bulbs that are energy inefficient. In December 2015 the Cabinet approved the ban on the importation and manufacturing of incandescent bulbs from 1 January 2016 and the ban on selling of incandescent bulbs effective from 30 June 2016. The phasing out of incandescent bulbs in the country will result in the saving of about 200MW of power on the electricity grid network.

According to the MEWD, the government is also embarking on a massive public sensitization exercise to use power. The ministry is also concluding a strategy for the procurement and distribution of 4 million LEDs aimed at cushioning low income households from the relatively high cost of LEDs during the phase out period of incandescent bulbs. Additionally, the MEWD with the Ministry of Commerce Trade and Industry is expected to issue a Statutory Instrument to support the migration from incandescent bulbs through fiscal and non-fiscal measures.

Impact of energy crisis on the economy

In 2008 the government launched the National Energy Policy to align the sector's development objectives with the country's Vision 2030. The vision commits the government to ensure: 'universal access to clean, reliable and affordable energy at the lowest economic, financial, environmental and social cost, consistent with national development goals.' This crisis has affected the government's ability to adhere to this commitment.

The crisis in the energy sector has resulted in a surge of electricity blackouts in the country to the detriment of ordinary consumers as ZESCO has embarked on a countrywide power rationing mechanism in order to preserve the limited water available for power generation. These power outages have had an impact on all aspects of the economy contributing to slower economic growth in 2015 and higher production costs.

Since July 2015, ZESCO has increased the extent of power cuts to a minimum of eight hours per day on a rotational basis for the majority of its household, commercial and industrial consumers. Many consumers however feel that these cuts are being implemented with impunity and without a sense of the consumer welfare, as often they do not align to the schedules that have been communicated by the power supply

company. Unfortunately, the situation is unlikely to improve soon for consumers as the Energy Permanent Secretary recently stated that power cuts may increase from August 2016 - contrary to the indication power would start normalizing by the middle of 2016.

Although the mining sector is not subject to rotational load shedding, ZESCO had requested that the mining industry curtail its load by 30 per cent. This was in order to manage a power deficit of around 591 MW each month (September to December 2015), representing approximately 34% of demand (World Bank Group, 2015). As a result this has led to reduced production levels in the sector, reduced investment in expansion programmes and job losses.

The energy crisis is exacerbated by the fact that it coincides with the country's toughest economic challenges in years, compounding the economic slowdown. Large businesses, with installed generators, have seen production costs rise while smaller businesses have cut production or operate at night when the power is on. High production costs are also compounded by overtime payments when employees have to work beyond the usual time due to availability of power later in the day. Machine repair costs are also not uncommon. Power cuts come with damage to machinery in some cases, forcing businesses to spend on unplanned maintenance costs to keep the machines running. Additionally, the use of alternative sources of energy increases production cost by an average of 15% per month thereby impacting negatively on productivity (Kawesha, 2015).

The industry is no longer able to reach sales volume targets as estimated, indicating that production has declined between 10 and 50 percent for industrial players using conventional sources of energy, and seven percent to 20 percent for companies using alternative sources of energy (Economics Association of Zambia, 2015). Profits have been reduced, resulting in lower government revenue and consequently reduced spending on government economic and social programs.

Investment in the Energy Sector

The need for further investment in the energy sector has been a cry from various actors in the economy such as Zambia Development Agency; however, the low tariff structure and the need for transparency in policy implementation have both been key issues that have hindered progress in this area.

The existence of PPAs by ZESCO with various local power suppliers governing the sale and purchase of power, act as an entry barrier for private platers vis-à-vis investement in the energy sector (due to low electricity tariffs in Zambia). The Lunsemfwa Hydro Power Company is an independent power producer generating about 48 MW of hydropower that is sold to ZESCO under a Power Purchase Agreement (PPA).

There have been discussions around the need for electricity tariffs to be raised significantly to: make investment profitable, attract private interest; and support the financing for the investment needed for expanding generation, transmission, and distribution capacity. As a result, over the past two years, electricity prices have been on the rise. The Energy Regulation Board approved electricity hikes of 24.63 per cent, 15.38 per cent and 15.38 per cent for residential, commercial and social services respectively towards the end of 2014 prior to the January 2015 presidential by-elections.

More recently, following a pronouncement by the president that all economic sectors should have cost reflective tariffs, the Energy Regulation Board approved an increment in tariffs by over 200%. The reason for this increment was that the sector needed to be viable for it to attract more investments. However, not long after implementing the increased tariffs, government ordered a reversal of the increment based on the outcry by the consumers. While, this was a great move to cushion consumers, the development has been seen as one of the policy inconsistency moves that stakeholders have criticized of government.

Conclusion

Future efforts need to focus on growing and diversifying generation capacity to keep pace with Zambia's economic growth. A solution to the crisis requires both steps to mitigate immediate effects and longer-term policies to tackle the fundamental vulnerabilities of the country's power sector.

The success of both sets of actions fundamentally hinge on implementing a tariff strategy that seeks to both incentivize investment as well as maintain access and affordability of electricity to consumers. This is essential to limit pressures on public finances, attract greater private investment into the sector so that the 6,000 MW unexploited hydro power potential can be exploited by giving them more incentives to invest in the sector. Equally importantly, the government has to ensure that all measures taken to alleviate to energy crisises translate into accessible and available electricity for consumers.

In the long-term, alleviating the power crisis will require continuously growing capacity, diversifying generation and better management of water resources and providing incentives to encourage Independent Power Producers. The government should also seek to unbundle, however, implementing these measures may necessitate fundamental restructuring of the sector aimed at improving planning, procurement, financial sustainability and encouraging participation by the private sector.

Lastly, there is also need for increased accountability for spending, budget implementation and performance. Doing so will result in ensuring that the measures that are being taken to address the current energy crisis result in tangible results for both the ordinary citizens in Zambia as well as the industries which serve as the backbone of the Zambian economy.

References

Economics Association of Zambia (2015), Report on the Economic Cost of Load Shedding, Lusaka.
Energy Regulation Board (2014), Energy Sector Report, Lusaka.
International Growth Centre (2016), Lights out: Zambia's electricity crisis.
Ministry of Energy (2016), Ministerial Statement on Power Situation in the Country, Lusaka.
World Bank Group (2015), Economic Brief; Powering the Zambia Economy, Lusaka.
Development Agency (2014), Zambia Energy Sector Profile, Lusaka.

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