

Electricity Sub-Sector Brief

Industry Fact File

| | |
|--|----------------------------------|
| Electricity Industry growth (2014): | 2.7 % |
| Electricity Industry share of GDP (2014): | 1.8 % |
| Electricity, Gas & Steam Share of FDI inflows (2013): | (2.2) % |
| Return on Equity of FDI in Electricity, Gas & Steam (2013): | 19.1 % |
| Major energy source: | Water |
| Alternative energy sources: | Solar, Wind, Geothermal, Biomass |
| Number of employed persons in Electricity, Gas, Steam & Air Conditioning Supply: | 12, 211 |
| Electricity, Gas, Steam...industry Share of Labour Force: | 0.2 % |
| Average wages in Industry (2012): | ZMW 3,433.6 (USD 660) |
| Total Domestic Electricity Consumption in GWh (2014): | 10, 720.5 |
| Energy Status 2014/15 season:- | |
| Forecasted (GWh): | 12,900 |
| Available (GWh): | 10,800 |
| Shortfall (GWh): | 2,100 |

Brief Overview

This ZIPAR Quarterly pull-out presents quick insights on Zambia's power crisis and the firm-level costs and provides a synopsis of the Electricity Sub-Sector Industry in Zambia.

Load Shedding and Associated Firm-Level Costs

From June 2015, Zambia has experienced an unprecedented increase in power cuts from the state-owned power utility company - ZESCO. The heightened power cuts - popularly termed as load shedding - come in the wake of low water levels in the Kariba Dam reservoir following the poor rainfall recorded in the 2014/2015 rain season. The current state of affairs amplifies the power deficit that the country faces now estimated at 560 Megawatts. It also reiterates the risks associated with relying solely on one source of energy - hydro - which is susceptible

to climate change.

While load shedding is not new to Zambia, the increased power cuts to key economic industries is negatively impacting the output of firms to the extent that firms cannot mitigate the interruption in production with generators or other sources of energy. For business entities, there is the direct negative impact on output, productivity, operating costs, revenues and business goodwill. This exacerbates the cost of doing business in Zambia which is already estimated to be high.

Weakening Business Environment

The current circumstances underscore the importance of infrastructure development particularly electricity, in economic growth. It is a requisite input in the basic production of goods and services in various industries. A simple illustration of this assertion is the use of electricity by business firms to power motors, machinery, lighting and other equipment such as computers, printers, etc. Electricity



Ease of Doing Business Rank in Zambia (out of 189 economies), 2014 and 2015

| Topics | DB 2015 Rank | DB 2014 Rank | Change in Rank |
|-----------------------------------|--------------|--------------|----------------|
| Starting a Business | 68 | 72 | ↑4 |
| Dealing with Construction Permits | 99 | 102 | ↑3 |
| Getting Electricity | 126 | 126 | No change |
| Registering Property X | 152 | 106 | ↓46 |
| ✓Getting Credit | 23 | 30 | ↑7 |
| Protecting Minority Investors | 83 | 81 | ↓2 |
| ✓Paying Taxes | 78 | 80 | ↑2 |
| Trading Across Borders | 177 | 177 | No change |
| Enforcing Contracts | 98 | 98 | No change |
| Resolving Insolvency | 95 | 95 | No change |
| Doing Business Rank | 111 | 107 | ↓4 |

✓ = Doing Business reform making it easier to do business. X = Change making it more difficult to do business. Source: World Bank

Cost of Power Outages in Zambia and Sub-Saharan Africa, 2013

| | Firm Size | Zambia | Sub-Saharan Africa |
|--|-----------|-------------|--------------------|
| Number of electrical outages in a typical month | Small | 4.8 | 7.9 |
| | Medium | 5.4 | 8.9 |
| | Large | 8.7 | 11.7 |
| | | 5.2 | 8.3 |
| Average duration of a typical electrical outage (hours) | Small | 2.3 | 6.4 |
| | Medium | 3.9 | 6.4 |
| | Large | 4 | 6.4 |
| | | 2.8 | 6.3 |
| Average losses due to electrical outages (% of annual sales) | Small | 6.5 | 7.5 |
| | Medium | 11.7 | 6.9 |
| | Large | 6.2 | 7.1 |
| | | 7.5 | 7.3 |
| Percent of firms owning or sharing a generator | Small | 23.9 | 39.3 |
| | Medium | 28.5 | 58.4 |
| | Large | 68.3 | 75.9 |
| | | 27.3 | 48 |
| Percent of firms identifying electricity as a major constraint | Small | 28.2 | 42.7 |
| | Medium | 22.7 | 45.4 |
| | Large | 32.1 | 46.6 |
| | | 27.1 | 43.6 |



is also an essential commodity for cold storage facilities particularly for perishable goods. Zambia's current power deficit therefore affects the ability of businesses, large and small to effectively function.

The most recent World Bank Enterprise survey, which predates the current load shedding, quantifies firms' average annual losses attributable to power outages. This data offers some intuition on the economic costs of electrical outages on firms' turnover. On average, firms were estimated to lose 7.5% of their annual turnover.

The losses were highest for medium sized firms estimated at 11.7% of their annual sales. Conversely, large firms recorded the lowest losses and correspondingly, 68.3% of these firms owned or shared a generator. It goes without saying that the current daily outages lasting for as

long as 8 hours will cost businesses much more.

Firms are at risk of producing even less output and consequently recording lower profit margins which will translate into reduced revenue collection for Government. In addition, not only do the power cuts reduce productivity, but may increase labour costs as a result of overtime pay for employees required to work during hours of power supply not coinciding with their standard work hours. Firms could also incur costs of raw materials that go to waste and damage to equipment resulting from sudden power outages.

In the long run, workers deemed redundant will be laid off if firms cannot operate at their optimum capacity (we have already witnessed many announcements to this effect). This will increase the number

of citizens deprived of income to acquire basic needs and increase the poverty levels in the country. Lastly but certainly not the least, firms stand to lose credibility and potentially business contracts if they are unable to meet their business obligations.

Linked to the output of firms is the impact on the overall performance of the economy. Nyamazana estimates that the current unsupplied power to economic agents could cost Zambia as much as 15.92% of GDP in 2015 (about US\$ 378 million). At best, load shedding will only slow Zambia's economic growth and at worst, send the economy into a recession.

Zambia's real economic growth is already showing signs of a slowdown. Growth reduced to 6% in 2014 from 6.7% realised in 2013 and the country's growth prospects

for 2015 - although expected to remain positive - have been revised downwards on account of both domestic and international drawbacks.

By the same token, the quality of life for households has been reduced significantly. Households not only face the costs of perishable foods which cannot be preserved but also lost leisure time which could have been spent watching the Premier League for instance. The latter could in turn affect the demand for DSTV services and consequently, revenues of the broadcasting company.

Equally of importance is the environmental impact of load shedding. There has been increased demand for charcoal as a source of energy for cooking, a development likely to increase the rate of deforestation in Zambia and the adverse effects of climate change.

Mitigation Measures by ZESCO



Short-Term

- Daily Load Rationing
- Power Imports
- Itezhi-Tezhi hydro power plant - 120MW expected in November 2015
- Maamba coal fired power station 300MW expected in January & March 2016.
- Demand Side Management



Medium-Term

- Diversify Generation Mix:
 - Solar PV (300 MW) - by Quarter 4 of 2016
 - Ndola HFO expansion (50 MW) - by Quarter 4 of 2016
 - Thermal Plants EMCO coal fired power plant (600 MW) - by 2018



Long-Term

- Spread hydrological Risk:- Small hydro power plants (HPP) in northern part of Zambia - Luapula River basin Hydro Power Plants (1,200 MW) - by 2019
- Increased Generation Capacity by 2019 :- 750MW Kafue Gorge Lower HPP, 2400MW Batoka HPP - IPPS :- Kalungwishi.

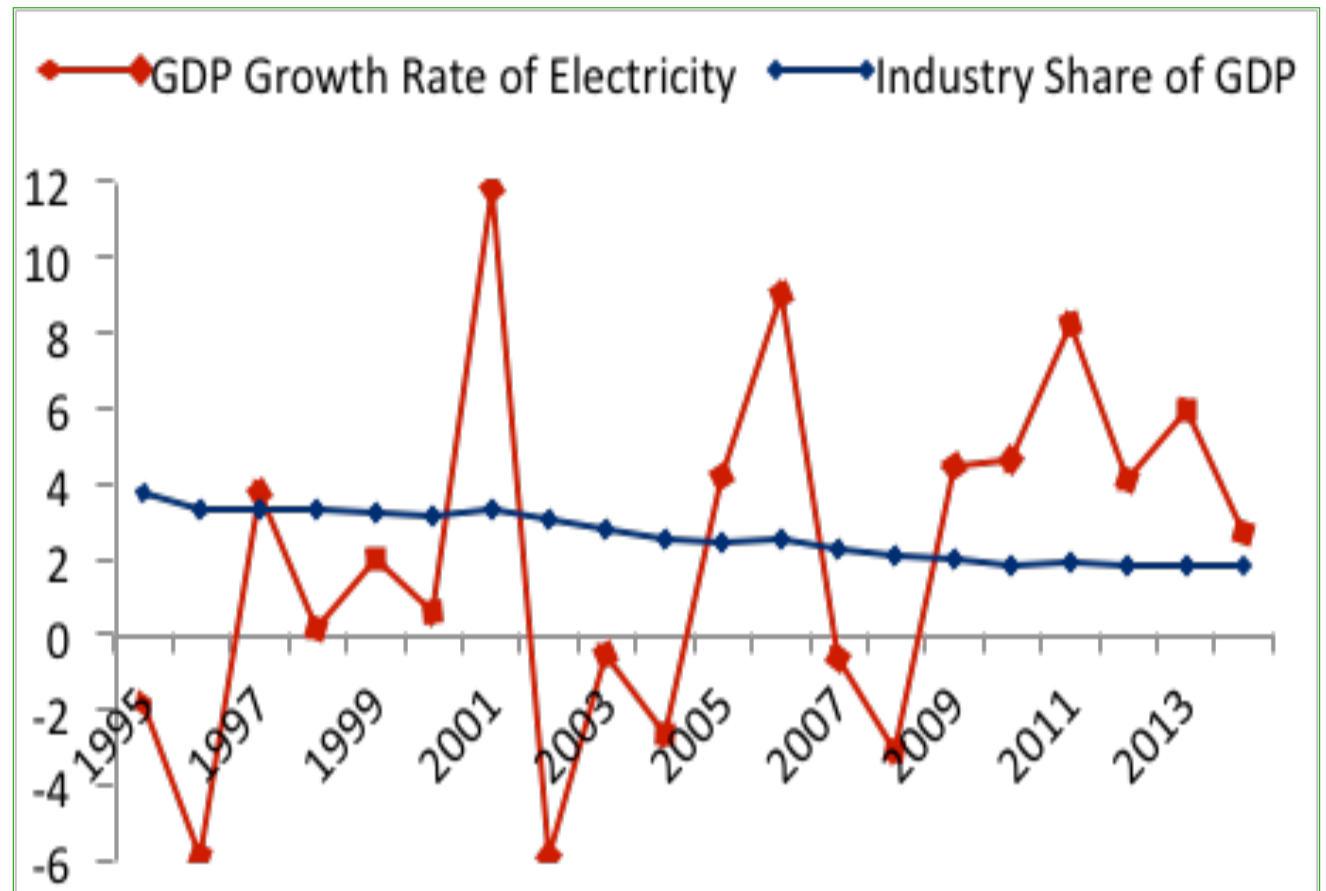
Source: ZESCO

Evolution of the Electricity Industry

Prior to the liberalisation of the energy sector, the electricity supply industry in Zambia was predominantly a monopoly market, run by a single state owned company - the Zambia Electricity Supply Corporation Limited (ZESCO). Through an Act of Parliament in 1995, the sector was liberalised to attract private sector participation. To promote this policy, the Energy Regulation Board (ERB) and the Office for the Promotion of Private Power Investors (OPPI) under the Ministry of Mines Energy and Water Development were set up. These regulate operations and pricing, and promote the entry of new players into the electricity market respectively.

Real growth in the Electricity sub-sector has been positive, averaging 2% over the last two decades but this growth has been marred by high volatility. The sub-sector contracted markedly in 1996 and 2002 by 5.9% and rebounded in later years. The industry grew sharply in 2006 and remained positive after the contraction during the financial crisis. This was largely driven by developments in agriculture, manufacturing, construction, transport and financial sectors.

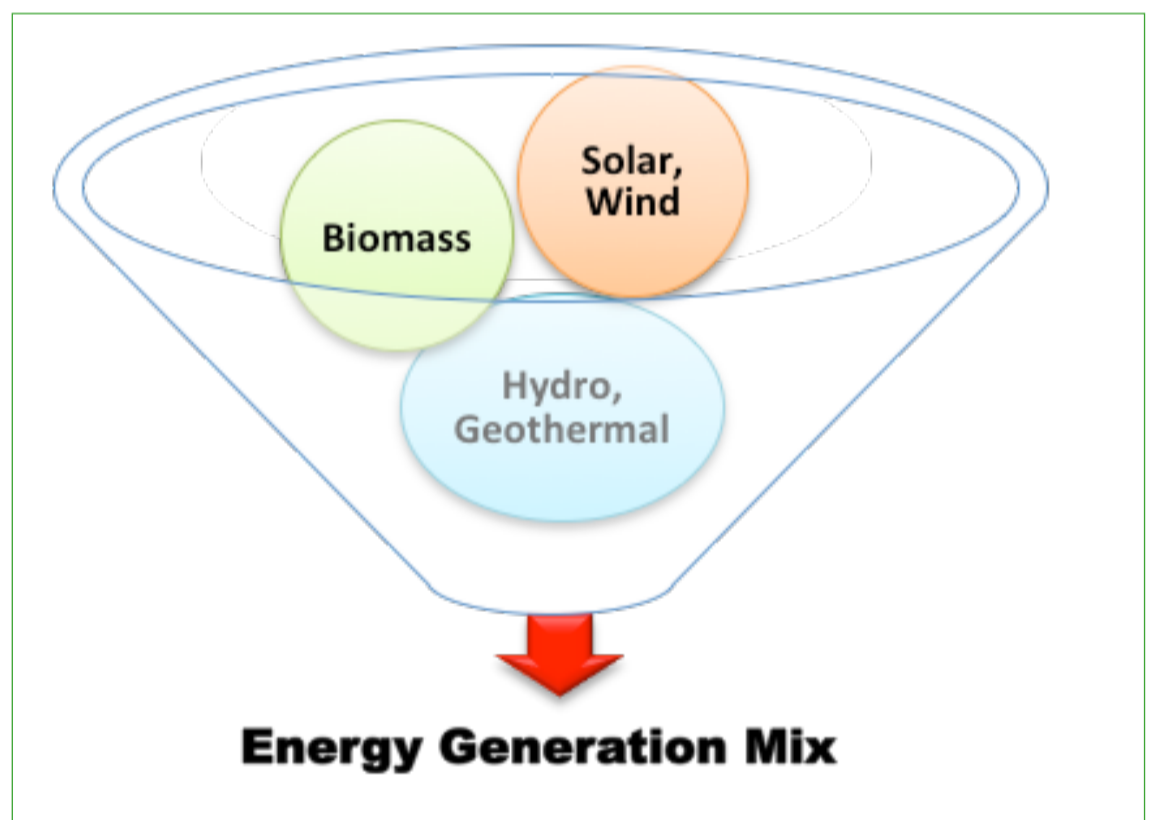
Performance of the Electricity Industry



Source: Central Statistical Office

Opportunities for Alternative Energy Investments

The current power crisis presents investment opportunities in the energy subsector. Zambia has both the comparative and competitive advantage to venture into a generation mix using various energy sources. The country has abundant sunshine for solar energy; more than 80 identified hot springs for geothermal energy; small rivers in the Northern and the North-Western provinces for mini hydro plants; climate and arable land suitable for cultivating bio fuel crops such as maize corn and sugar cane; and potential for energy from wind at high altitudes.



Bio Fuel Success Story: The Case of Zambia Sugar

Zambia Sugar Plc is Zambia's leading sugar producer. The company cultivates sugar cane and manufactures Vitamin A-enriched raw and refined sugar under the Whitespoon brand name for local consumer markets and industrial customers. Following a major agricultural and factory expansion project completed in 2009, total annual sugar production capacity increased from around 200 000 tons to 450 000 tons. In addition to sugar production, the company undertakes internal electricity generation. A low-pressure combustion system is employed at Nakambala sugar plantation in Mazabuka. The system uses 400,000 tonnes of bagasse (the fibrous matter that remains after sugarcane or sorghum stalks are crushed to extract their juice) from sugar cane production to produce an average of 17 MW of electricity.



Southern African Power Pool Statistics 2013/2014

| Country | Utility Company | % of Utility Generation using Hydro | Installed Capacity MW | Maximum Demand MW | Sales GWh | Average Electricity Tariff, USc/kWh | Revenue US\$ million | Rate of Return (%) | Net Income US\$ Million |
|------------|-----------------|-------------------------------------|-----------------------|-------------------|-----------|-------------------------------------|----------------------|--------------------|-------------------------|
| DRC | SNEL | 100% | 2,442 | 1 166 | 7,584 | 4.8 | 309.6 | n/a | n/a |
| ZAMBIA | ZESCO | 100% | 2,128 | 1,681 | 10,688 | 5.7 | 350 | 9 | 60 |
| LESOTHO | LEC | 100% | 72 | 129 | 488 | 5.9 | 31.5 | 5.2 | 5.1 |
| MALAWI | ESCOM | 100% | 351 | 278 | 1,476 | 6.8 | 90 | 15 | 38 |
| MOZAMBIQUE | EDM | 93% | 2,308 | 706 | 2,380 | 7.5 | n/a | n/a | n/a |

Source: Southern African Power Pool 2014 Annual Report



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