



## Africa Energy Futures: Botswana

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By: Terence Dambe

### Over the last 5 years, how has the energy mix changed, and what have been the key drivers?

In Botswana, there has not been a significant change in the energy mix over the last five years. With 212 billion tons of coal resources, coal-fired plants remain the foundation of the country's energy framework and current peak demand of approximately 600 MW. Two coal power plants at Morupule (A and B) near Palapye, about 200 km north of Gaborone, supply the vast majority of the country's electricity. Morupule B's current capacity is 600 MW, but it has faced technical challenges and at times has been closed for repairs or operated at partial capacity.

Morupule A provides 132 MW of power to the national supply. The Botswana Power Corporation continues to embark on remedial works on Morupule B but continues to import the bulk of its power from the South African utility Eskom to make up for any production shortfalls. A medium-scale 1.3 MW project solar facility was developed outside of Gaborone, but solar applications in Botswana are primarily used for water heating and small-scale electricity generation using PV technology, the latter mainly for rural applications.

### What is the outlook for the energy and natural resources sector in the next 5 years? In particular:

#### Key policy decisions

The country is planning to add renewable energy and natural gas power generation to its portfolio through independent power producer (IPP) projects. Power generation in Botswana for export by an IPP is permitted by the 2007 Amendment to the Electricity Supply Act. To create a more enabling environment, the government set up an energy regulator, the Botswana Energy Regulatory Authority (BERA), which began operating in September 2017. Energy Feed-In Tariffs (EFT) guidelines were issued by the Ministry of Mineral Resources, Green Technology and Energy Security in 2020.

Botswana has tremendous potential for solar energy, with an annual direct normal irradiation equivalent of 3,000 kWh/m<sup>2</sup>/a in most parts of the country, and an average insolation on a horizontal surface of 21 MJ/m<sup>2</sup>.

The energy sector was allocated a significant amount of the 2020/2021 budget for investment in power generation, ongoing transmission and distribution projects, Morupule B remedial works and transmission.

In December 2020, the ministry launched the Integrated Resource Plan (IRP), which is seen to be the driving force behind meeting local energy demand and exporting excess energy. The IRP outlines the least cost development plan for a period of 20 years (2020 to 2040). It considers various scenarios of energy demand and supply and identifies the least-cost development paths by simultaneously looking at (i) demand side measures; (ii) energy efficiency improvements; and (iii) electricity supply options from domestic and regional sources. The power projects that are being planned for

implementation during the first seven years of the IRP as follows:

- 100 MW solar photovoltaic and total of 35 MW grid tied solar photovoltaic by 2022 (currently under procurement). These projects will be implemented through IPPs;
- 10 – 100 MW coal-based methane by 2025 (currently under procurement);
- 200 MW concentrated solar plant (CSP) by 2026 (procurement to start in 2021);
- 300 MW coal by 2026 (currently under procurement);
- 50 MW wind by the year 2027 (procurement to start in 2024 after wind resource mapping is complete); and
- 100 MW solar photovoltaic by the year 2027 (procurement to start in 2025).

The plan is for the projects to be developed through private sector investment as IPPs or government joint venture investments.

### **Main policy challenges**

The major challenge will be with implementation of the various projects, including ensuring the procurement processes are duly completed and that the awards to the successful bidders are duly made and followed through. A further challenge is the fact that one of the major projects being planned is a 300 MW coal project. Botswana's commitments to the Paris Agreement and the aversion of funders to finance fossil fuel projects will undoubtedly present a challenge for that particular project.

### **The anticipated role that renewables and/or new technologies will play**

As mentioned above, Botswana boasts of some of the highest solar radiation levels in the world. The generation of electricity using solar power has significant potential, and will not only meet the country's goal of being self-sufficient but could result in Botswana becoming a net exporter of power. This enthusiasm is evidenced by the fact that the bulk of the power planned to be generated in the first seven years of the IRP will come from renewable projects.

## **What are the key investment opportunities in the energy and natural resources sectors over the next 5 to 10 years?**

In the immediate term, the projects in the IRP provide an opportunity for investment by IPPs. In addition to the that, other projects that give an indication of the investment opportunities are as follows:

- The Botswana energy regulator has granted a generation license for a 100 MW solar project to a local firm, which, if it proceeds, will make it the first independent power producer to set up a large-scale solar plant in the country.
- In 2021, the US administration announced the signing of a historic memorandum of intent to create a 2 to 5 GW Mega Solar project in Botswana and Namibia. The US Government is collaborating with the Government of the Republic of Botswana, the Government of the Republic of Namibia, the African Development Bank, the International Bank for Reconstruction and Development, and the International Finance Corporation to make Mega Solar a reality.
- In November 2020, the Ministry of Mineral Resources, Green Technology and Energy Security launched a net metering scheme for rooftop PV systems. Dubbed Rooftop Solar Programme, the scheme is being supported by the US Agency for International Development and is expected to allocate 10 MW of installed PV power in the first 12 months.

## **With particular focus on sustainability, and on reducing carbon emissions, how will the energy and natural resources landscape change over the next 5 to 10 years?**

Botswana's power system has been characterized by unreliable power supply, lack of investment, poor maintenance and high service costs. To meet its peak power demand, Botswana imports power from the Southern Africa Power Pool – mainly from South Africa – and when imports are not available, resorts to the use of costly backup diesel power plants.

The country is in the unique position of having abundant coal reserves and ideal solar radiation levels for the generation of power. The local energy landscape is dominated by coal powered electricity generation. However, with Botswana's commitments under the Paris Agreement and the increasing aversion by lenders to fund coal projects, this presents an opportunity for the increased use of renewables in the energy mix.

The country's Vision 2036 calls for a 50% renewable energy contribution to the energy mix by 2036. However, in the IRP,

it was announced that renewable energy should account for at least 15% of the energy mix by 2030. Based on the IRP, it is unlikely that the 50% target in Vision 2036 will be met. However, if the proposed 2 to 5 GW Mega Solar project in Botswana and Namibia becomes a reality, the target will be easily achieved.

Botswana aims at an overall emissions reduction of 15% by 2030, taking 2010 as the base year. The emissions reduction will be achieved domestically through strategies and measures which are relevant for the implementation of the target.

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