Ghana energy storage for grid stability

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In April 2016 in his State of the Nation address then-President John Dramani Mahama said, "If you take the eastern generating area, which is Tema, we have almost 600 MW of gas-based generation, but are not getting gas through the West African Gas Pipeline to be able to run them. One reason is because Nigeria"s demand for gas is increasing and there is regular destruction of gas infrastructure, and so we get a certain volume today, tomorrow it drops, so you cannot predict how you are running those assets."

Local production of gas is increasing and should provide long-term relief to this issue, although technical problems and construction delays with the Western Corridor Gas Infrastructure Development Project have meant that current domestic supply is unable to make up the shortfall. Many of these problems are likely to ease somewhat as current plans for improving efficiency and capacity - many of which involve substantial changes to tariffs - pick up speed.

The VRA operates 83% of the country"s power plants, with IPPs managing the other 17%. The authority was established in 1961 to oversee Ghana"s power generation, transmission and distribution. In 2005 the firm"s operations were unbundled - with transmission responsibilities passed to GRIDCo and distribution to Northern Electric Distribution Company (NEDCo) - and its role was streamlined to focus on electricity generation. This adjustment was made in an attempt to increase competition and private investment in the sector.

Peak demand for electricity increased from 1658 MW in 2012 to 1853 MW in 2014, before falling to 1757 MW in 2015. There are roughly 2m residential and 1150 industrial consumers of electricity. To keep pace with demand, it is predicted that Ghana will need a capacity of between 16,398 and 17,350 GWh, or an additional 4000-4200 MW.

Those figures are straining existing supply. According to the Energy Commission and the VRA, Ghana has a total installed capacity of between 3174 MW and 3644 MW, at least a 12% increase from 2014. Roughly 2434 MW is overseen by the VRA and 1210 MW is controlled by IPPs. Due to power outages and significant load-shedding Ghana"s actual total power available for transmission only reached about 11,692 GWh, a significant decrease from the 13,071 GWh available in 2014 and 12,927 GWh in 2013, according to the Energy Commission.

In the long term Ghana"s energy deficit should recede as domestic gas production increases and processing infrastructure expands, and as new generating plants, including coal and hydro, are built. However, those projects will take years to finalise - a delay Ghana cannot afford as it looks to stoke higher growth. As a result,

with demand increasing 10-15% per year, according to the Energy Commission, the country has taken a number of measures to better manage the shortfall.

In July 2016 ECG and Karpower had announced they were on track to add the second barge and potentially expand Karpower"s power generation by over 150% to 675 MW by the end of 2016. A 450-MW consolidated power barge is currently being built in Turkey and is expected to arrive in Ghana by the end of 2016.

The government is also working on a number of projects to alleviate the country"s power crisis in the long term. The VRA has initiated feasibility studies for the construction of hydro dams with a capacity of 140 MW at Pwalugu and Juale in Ghana"s Northern Region. Additionally, the provider has entered into contracts with a number of Chinese companies for energy projects like the SAPP project. This plant, located at Kpone, is being constructed by the Shenzhen Energy Group and when completed is expected to generate 20% of Ghana"s energy supply.

Shenzhen, with funding from the China-Africa Development Fund, will also be working with the VRA to build a coal plant starting in April 2017. "Coal is important for us because it allows us to diversify our fuel sources. As we diversify, we are buying ourselves more reliability. We are hoping coal could replace hydropower eventually," Badger told OBG. This project will be located in the Ekumfi District of Ghana"s Central Region. The first phase of the project will attempt to deliver 700 MW of capacity, while the second phase aims to deliver 2000 MW.