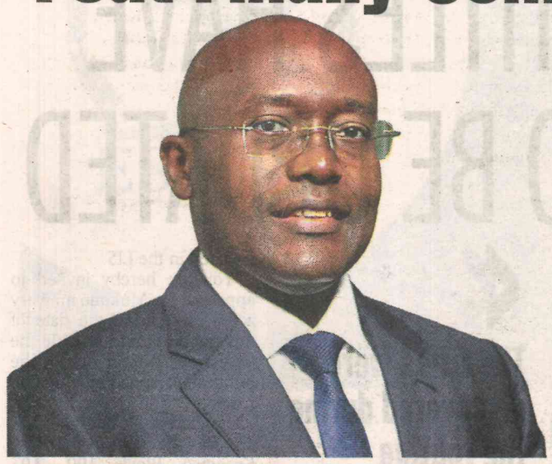
Karuma Hydropower Plant– An Engineering Feat Finally Commissioned



Dr. Eng. Mutikanga says UEGCL has built a wealth of capacity, experience, and lessons from managing flagship projects like Karuma and Isimba.

The 600 MW Karuma Hydropower plant has now been commissioned. Benon Ojiambo asked **Dr. Eng. Harrison Mutikanga, the Chief Executive Officer of Uganda Electricity Generation Company Limited (UEGCL)**, the company mandated to run the plant, about its benefits to the economy and improving the quality of life for Ugandans among other issues. Below are the excerpts.

Q 1. How does the commissioning of the 600 MW Karuma Hydropower plant align with UEGCL's strategic plan 2023-2028?

The overarching objectives of the UEGCL Strategic Plan 2023- 2028, are to meet the national generation targets as set out by Government (**52,480 MW by 2040**), carry out efficient operations and maintenance with a bearing on ensuring reliable, quality and cost reflective Tariffs, as well as the continued quest for financial sustainability. The commissioning of Karuma is, therefore, aligned to UEGCL's strategy as it addresses each of the above objectives as; it will **add more power** to the grid (**600 MW**), **increase the O&M foot print** of UEGCL in line with the company purpose "to make electricity safely available for supply at all times from all our power plants", and finally, Karuma adds a **new revenue stream** which contributes to UEGCL's financial sustainability.

2. **Since the Commercial Operation Date (COD) on June 12th, 2024, what has UEGCL's experience been in operating the Karuma Hydropower Plant? Could you share the challenges encountered during this period?**

The operational performance of the Karuma Hydropower Plant, for the past three months can be assessed based on two key plant operational indicators: the Plant Capacity Factor and the Plant Utilization Factor.

The **Plant Capacity Factor** indicates how effectively Karuma has been dispatched over time, comparing the average energy produced to its maximum possible output. Similarly, the **Plant Utilization Factor** measures the maximum energy the plant actually produced compared to its maximum possible output i.e. the maximum power generated within a given period relative to the plant's capacity. Together, these parameters provide insight into the plant's operational efficiency and its ability to generate the revenue necessary for fulfilling financial obligations.

Currently, the plant has registered a maximum Capacity Factor of approximately **16%**, significantly below the anticipated **67%**, and a maximum Utilization Factor slightly below **50%**. These figures suggest that the power plant is operating well below its designed capacity, largely due to two primary challenges: **low system demand** for generated power and the presence of **high levels of water weed**, including floating islands and submerged debris, which choke the intake screens, disrupting and limiting generation capacity.

At the projected Capacity Factor of **67%**, UEGCL would ideally generate sufficient revenue to cover operational and maintenance (O&M) costs within a month and have surplus funds for debt servicing. Therefore, there is urgent need to address these two challenges to ensure reliable supply and adequate revenues.

Operationally, the low Capacity and Utilization Factors also impact UEGCL's ability to effectively identify and address **latent defects** during the Defects Liability Period (DLP). Furthermore, the frequent start-and-stop cycles of the turbine-generators is not good for plant health.

Despite these challenges, we remain optimistic that the issue of low system demand will be addressed. The Energy Policy 2023 projects the country's demand for electricity to grow at about **10% per annum**, and several industries are interested in purchasing power directly from the Karuma Hydropower Plant.

We would also like to express our gratitude to His Excellency, the President of the Republic of Uganda, for his commitment to addressing the water weed challenge through the Ministry of Agriculture, Animal Industry and Fisheries to harvest the weeds, floating islands, and submerged debris upstream before they reach the plant. This, however, also requires the EPC contractor to complete the installation of the new Trash Rack Cleaning Machine (TRCM) and an appropriate log boom to ensure the efficient and effective functionality of the water weed and debris management system.

3. **What strategies has UEGCL implemented to guarantee the long-term availability, reliability, and efficiency of the 600MW Karuma Hydropower Plant, ensuring sustainable benefits for Ugandans?**

UEGCL has been operating the 183 MW Isimba hydropower plant since 2019. The company has since taken over the operations and maintenance of the 50 MW Namanve thermal power plant and the 380 MW Nalubaale and Kiira complex. As such, we have over the years amassed the experience, expertise and skills required for the efficient operation of power plants. This expertise will be used to support the proper maintenance of the Karuma hydropower plant and ensure the long-term availability of this asset.

4. **In her speech, Hon. Dr. Ruth Nankabirwa Ssentamu, the Minister of Energy and Mineral Development, mentioned that while we are commissioning the Karuma Power Plant, Uganda should already be breaking ground for a new hydropower project. What are your thoughts on the need for future projects, and how is UEGCL preparing to meet this demand?**

The Government of Uganda has set a target of achieving an installed capacity of 52,480 MW by 2040. With the commissioning of the 600 MW Karuma Hydropower Plant, the country's installed capacity has now risen to approximately 2,000 MW, significantly contributing to meeting the growing demands of our economy and improving the quality of life for Ugandans. However, to reach the 2040 target, we still need to add 50,480 MW within the next 16 years, which translates to approximately 3,155 MW annually.

This means that, first and foremost, we must ensure the **maintenance and optimal performance** of the existing generation infrastructure while continuing to pursue **new power generation projects** to meet this target. In fact, we should already be implementing the next hydropower project.

The Ministry of Energy and Mineral Development has several power generation projects in the pipeline. As the government's implementing agency, UEGCL has built a wealth of capacity, experience, and lessons from managing flagship projects like Karuma and Isimba. We are fully prepared to take on new projects, positively contribute to the country's energy goals and increase the per capita Electricity consumption of all Ugandans from 215 to 3,668 kWh per capita by 2040.

However, if no new projects are initiated soon, there is a significant risk that the sector and the country will lose the **technical skills and expertise** we have developed. Retaining and utilizing this skilled workforce is crucial to Uganda's ability to continue delivering complex power projects and achieve long-term energy security.

5. **The 600 MW Karuma Hydropower Project cost Uganda approximately $1.7 billion USD. With the nation aiming to address a 50,480 MW energy deficit, what strategies or potential avenues could Uganda explore to secure the necessary funding for future energy projects?**

For Uganda to realise an additional 50,480 MW of installed generation capacity over the next sixteen years, it will require close to $245 billion in new investments. The challenge for the Government will be how to mobilise these funds amid public debt ceiling constraints and requirements from other priority public sectors such as health and education.

Uganda will certainly need support from development partners, foreign and domestic private investments, international financial institutions, among others. However, UEGCL's ability to contribute towards this national target is currently limited by challenges that affect her financial sustainability and hinder her ability to secure financial support from development partners or even undertake investments with the private sector.

For example, the company's balance sheet is 80% comprised of debt with no retained earnings due to historical losses. With such an unhealthy balance sheet, the company is not attractive to potential private investors, who would have been very beneficial in attaining the target of 52,480 MW by 2040.

Government should, therefore, support UEGCL to be financially sustainable and viable so that the company can partner with private investors to attain the support required to enable the country attain 52,480 MW without burdening the national treasury. This is the same approach was undertaken in Kenya where the Government of Kenya (GoK) supported KENGEN to be financially sustainable. Consequently, KenGen is now a public limited company trading on the Nairobi Securities Exchange (NSE), with the government holding a 70% share.

6. **Do you have any other thoughts you would like to share with our readers?**

I would like to take this opportunity to express my gratitude to His Excellency, the President of the Republic of Uganda, for his visionary leadership, which has been instrumental in achieving the significant milestone of commissioning the Karuma Hydropower Project.

This success reflects the dedication and collaboration of many stakeholders, and I extend my sincere thanks to everyone involved in bringing this project to completion.

President Yoweri Museveni on a guided tour of Karuma Dam. Left is UEGCL's Chief Operations Officer Eng. George Tusingwire Mutetweka. The President commissioned the 600MW Karuma Hydropower project and the Karuma interconnection project in Kiryandongo district on Thursday 26th September 2024