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Opportunities and Challenges in the Efficient Exploiting of Land, Energy and Water Resources within the Volta and Tana Basins in Africa

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The design of strategic investments in water, energy and food (WEF) infrastructures is challenging because the size, location, technology mix and pace of development is made uncertain by multiple factors. For example, the return on investment, which comes long after building a hydropower dam, is made uncertain by local, regional and global climate and socio-economic factors. This is exacerbated by the challenges associated with the impacts of climate change, especially in sub-Saharan Africa (SSA) where it is difficult to model these impacts, hence leading to high levels of uncertainty in future scenarios (2050 and beyond).

Long-term investment planning and system operations for energy, depend on and compete with other sectors for, the availability of water (for hydropower and cooling thermal plants) and land resources (e.g. for biofuel production and arability). The efficient exploitation of land, energy and water resources and their synergised use for economic development therefore require an multidimensional integrated optimisation approach co-created with stakeholders in dialogue. This starts with planning followed by prioritised investments based on local, national and regional needs in the energy, agricultural and water sectors. This is mostly lacking in SSA at the moment. We gathered a selected group of experts in Accra, Ghana in November 2022 with a broad mix of experiences and expertise in the energy, water and agricultural sectors, who shared deeper insights and values of the need for integrated WEF planning to begin tackling challenges and opportunities identified in the Volta Basin in West Africa (starting with Ghana) and the Tana basin in Kenya. The main challenge identified was the disjointed planning of WEF infrastructures due to different financing mechanisms and siloed sectoral thinking; and participants raised emerging opportunities for planning infrastructure through transnational and regional cooperation as well as the need to build on existing and new initiatives devoid of entrenched political goals.

In this contribution, we will present some of the main findings from the meeting in Accra and share knowledge on how transparent WEF modelling can be contextualised for local operational relevance, and through co-creation, how interactive engagement tools can be used for planning, policy- and decision-making.

Keywords: *WEF modelling, sub-Saharan Africa, WEF Infrastructures, Investment Planning, Optimisation*

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