

RESPONSE TO ARM ENGINEERING LIMITED QUESTIONS REGARDING THE PROPOSED DESIGN, FINANCE, CONSTRUCTION, OPERATIONS AND MAINTENANCE OF TWO (2) PROJECTS BY CONSORTIUM OF AFRICA50 AND POWERGRID CORPORATION OF INDIA.

General	
The A50 & PowerGrid India PIP documents is not available for sharing at the moment. The relevant sections of the documentation will be published in strict adherence with available legislation once the project agreement is signed. The public is and will be adequately sensitised in the on-going SEPP.	
Part A	
1	The current projects are being implemented via privately initiated proposal and is compliant with the PPP Act Cap 430. Kenyan citizens are and remain eligible to express interest and register their intention to finance and develop transmission lines through PIPs. KETRACO, through PPPD, is in the process of seeking support from development partners in procurement of transaction advisor to assist KETRACO screen the projects in the transmission plan and develop a PPP Projects roadmap. Citizens meeting the minimum requirements are encouraged to participate once the roadmap is published. The participation can be through expression of interest for PIP or responding to request for proposals from KETRACO/PPPD for solicited PPP.
2	In the PPP Act cap 430, there is provision for local content requirement. This being a PIP, KETRACO with support from the PPPD and the Office of Attorney General will ensure that local content is enhanced in the project as required in this Act and other legislations (NCA Act, Energy Act, PPDA etc); without affecting the bankability of the project and efficiencies of the private party in timely delivery of the projects. Once again, citizens are allowed to participate and express interest in development.

3	The USD 273 Million stated as EPC is wrong, misleading and a glaring misunderstanding. It is important to note that this amount (USD 273 Million) includes the cost of wayleave acquisition/implementation of RAP and purchase of substation land. The EPC costs have been determined from offers received from bidders in India through a competitive process. KETRACO has reviewed the cost and find them satisfactory. The Costs are reflective and compare well with rates received from recent competitive EPC for similar projects in Kenya and in the region.
4	Finance experts from KETRACO and PPP directorate have analysed the proposal from Africa 50, the projects and offer, as at PDR, was confirmed to have achieved both qualitative and quantitative value for money. A project and financial risk assessment report will be prepared upon completion of the negotiations. This report will be forwarded to the PPP Committee for consideration/determination and approval. In addition, the finance experts will subject the project to further value for money analysis at financial close once the finance terms are firmed and having included the project's contingent liability as drawn from the project agreement.
5	Refer to response on item 1 and 2
6	Refer to response on item 1,2 and 3
7	From the KETRACO master plan 2024-2043, KETRACO requires about USD 5Billion to be able to actualise the plan and ensure that the national grid is reliable, adequate and efficient towards enabling access to affordable electricity and facilitate regional power trade while achieving the set carbon emission goals by increasing penetration and contribution of clean renewable sources of energy in the energy mix. KETRACO, to bridge this gap, requires both public and private finance and has in the recent past allowed privately initiated proposals from

	private parties that expressed interest to assist KETRAO develop transmission lines using the provision of the PPP Act.
Part B	
8	The project to Western Kenya is required. The project is expected to cater for the power needs of the project area for the next 20 plus years and continue to meet the set objectives. The demand provided are short of the current demand in the region considering the load shedding amount. KETRACO's mandate includes planning and developing the grid to meet both current and future transmission needs of the country. To date, KETRACO has successfully completed over 30 transmission lines projects translating over 5000km in circuit length and over 35 substations. The benefits are of which are being enjoyed by the citizens in the project areas and the country at large. The project's (220kV Kibos-Kakamega-Musaga transmission lines Project) main objective is to extend high voltage network to Kakamega and reinforce existing 132kV system in Musaga area by linking to the existing 132kV Lessos-Tororo transmission lines currently connecting Kenya and Uganda power systems. The project will extend the major evacuation line from Olkaria geothermal complex (the 400/220kV Olkaria-Lessos-Kisumu) from Kibos to Kakamega and ensure adequacy and security of power supply.

ANNEXES

1. ARM Engineering Project Price

[illegible]

1	Power Tx 400/220 200MVA		1		5,500,000					5,500,000	8,250,000
2	Circuit Breakers 400kV		4		90,000					360,000	540,000
3	Current transformers 400kV		12		20,000					240,000	360,000
4	Disconnectors		4		20,000					80,000	120,000
5	Civil Works										2,000,000
D	220kV Substation Musaga										
1	Power Tx 220/132 100MVA		2		4,000,000					8,000,000	12,000,000
2	Circuit Breakers 220kV		4		50,000					200,000	300,000
3	Current transformers 220kV		12		10,000					120,000	180,000
4	Disconnectors		4		10,000					40,000	60,000
	Civil Works										2,000,000
E	Kakamega 132/33										
	220kV Substation Musaga										

2.

	Power Tx 132/33 100MVA		2		2,000,000					4,000,000	6,000,000
	Circuit Breakers 132kV		4		40,000					160,000	240,000
	Current transformers 400kV		12		7,000					84,000	126,000
	Disconnectors		4		7,000					28,000	42,000

	Civil Works										2,000,000
	Grans Total										82,283,192
	Installation										10,000,000
											92,283,192
	Markup	1.4									129,196,469.23
	TOTAL Cost of PROJECT MUUS\$										
	US\$ rate		130								
	Civil Works KShs		3,000,000								
	Civil Works US\$		23077								
	Duty Steel		35.00%								
	Fittings		1,200,000								
	Landed		1.5								

Summary:

1 Cost of Project US\$

129,196,469

3.

	Notes										
	Tower Costs are variable depending on the Terrain, Single or Double Circuit, Number of Conductors etc										
1	400kV Transmission Line Towers can range from 5 tons to 26 Tons for suspension Towers and 18 Tons to 56 Tons for Terminal and Angle Towers										
	For a 400kV Double Circuit line (basic body + 9 Metre Height extension total) for wind speed 47m/sec and Quad Conductor ACSR Moose										
	a. Suspension tower 26 Tons										
	b. Terminal Tower 56 tons										
	The 9m Body extension can be about 9 tons										
	For Single Circuit, 16 Tons is a good estimation.										
2	220kV Transmission Line Towers can range from 5 tons to 10Tons for suspension Towers and 10Tons to 20 Tons for Terminal and Angle Towers										
	For a 220kV Double Circuit line (basic body + 9 Metre Height extension total) for wind speed 47m/sec and Quad Conductor ACSR Moose										
	a. Suspension tower 9 Tons										
	b. Terminal Tower 20 tons										
	The 9m Body extension can be about 6 tons										
	For Single Circuit, 16 Tons is a good estimation.										

2. KETRACO ARM A50 SUBMISSIONS

Date: 20.03.2025

PUBLIC PARTICIPATION AFRICA50:

PIP KETRACO Charter Hall Nairobi:

Rodgers Adai of ARM Engineering Co. Ltd as a Professional Stakeholder in the Industry.

The full Document of the AFRICA50 Public Initiated Project of 400kV/220kV Powerlines and associated Substations was not shared. The comments are based only on the PowerPoint presentation of 19th March 2025.

The comments will be in Two parts :

A: Analysis of Value for Money of Africa50 Projects

B: Is Africa50 Project to Western Required?

Part A: Analysis of Value for Money of Africa50 Projects

1. AFRICA50, TRANSGRID and PPPs:

From presentation, PPPs (Public Private Partnerships) are being promoted as alternatives to obtaining Loans from Bilateral and Multilateral Lenders. Countries given as examples are Mexico, Brazil, Peru, India, Europe. And that Africa has very little PPPs Comments:

If you check those Countries, PPPs are done by Citizens. PPPs tend to be very expensive long term Loans lasting almost the entire viable timeline of the Project.

For instance India does not accept Foreign Companies for job. It only spends Forex if it is a must.

Citizens keep Money within the Country. A Foreign PPP will take out Money even for components that do not have to be done by outsiders like Design, Project Management, Maintenance.

2. TRANSGRID AS TECHNICAL ADVISOR:

This Project is Lines and Substations. The projects consist of the following approximate monetary percentage values as follows:

	Materials	60%
	Design, Project Management, Maintenance	30%
	Construction	10%

In a PPP, 90% will remain in India with Transgrid and Partners. Only 10% of the Money will actually be brought to Kenya.

But the 100% still has to be paid. Transgrid will deliver Steel Structures, Transformers etc. No real money but a facility.

In effect it means 90% will have to be repaid over the entire PPP period, maybe 25 Years.

The 100% will have to come from Treasury on an annual basis. Forex will have to be purchased from the Local Market. And Electricity Consumers. Not earned from Electricity exports.

Note that the project will not be earning Forex. So it becomes a Loan just any other US Dollar denominated Loan. It will be pressure on the Forex reserves.

But this will not be the case if it a Citizen Contractor. And ALL countries want to retain Forex as much as possible.

3. Africa50 Project Financials: From the presentation,

	Ketraco EPC Cost			Remarks
Item	Description	MUSD	KShs Billions	
1	EPC + SafeGuard Costs	273.92	35.61	Detail not clear
2	Non EPC and Non Safeguard Costs	73.19	9.51	Detail not clear
3	Total Project Cost	347.71	45.20	
4	Annual Revenue Requirement	60.3	7.84	
	US\$ rate	130		

The basic EPC Cost is US\$ 273,92 MUSD

Additionally the Annual repayment for the EPC is US\$ 60.3 MUSD. This is KShs 7.84 Billion per year.

The payment will have to be sent to the EPC in India by purchasing US\$ form the Kenyan market putting pressure on the Kenya Shilling.

This money will be raised annually from a Tariff adjustment. Remember only 10% of actual Money came into Kenya's Economy.

Now from calculations,and attached pdf is excessive.

The most expensive part is the 400kV line. Towers can range from 8 tons to 26 Tons for the Suspension Towers and from 15 Tons to 56 tons for the Terminal Towers. I have explained in the PDF the basis of the calculations.

The Price, as per attached PDF is US\$ 129 Million.

4. AFIRCA50 Value for Money:

The Annual repayment is US\$ 60 Milion. The actual cost is just US\$ 129M including 40% Margin.

This is just Double the Annual Repayment.

Note that once the PIP finishes construction in 2 Years, Kenya will have to start paying US\$ 60. So, why not start the EPRA Tariff increase the year before and do the Project 50% Local because we still have to import most of the components form India, China?

Then you only need 2 years to do that scope, regardless of whether it is required or not and by Kenya

5. Technology Transfer:

We have enough knowledge since the 1980s on Substations and Transmission lines to do this Project.

Engineers, Technicians KPLC and later KENGEN, KETRACO, Kenya Power have undergone numerous trainings. Techniology Transfer cannot be forever.

It is time to also Practice.

6. 40% LOCAL CONTENT

It has nont been clearly shown how 40% Local Content will be done. Loss making Civil Works, Installation, Supply of Sand CANNOT be called 40% Local Content. Local Content is such that the next Project is done at 70% Locally.

We have the skills BUT NOT the Opportunity.

7. Conclusion:
The Africa50 Loan IS NOT REQUIRED

PART B: Is Africa50 Project to Western Required?

8. The table below shows the current consumption:

ARM Western Region Data						
Substation	Voltage	Transformers	Total	Max. Load	Percentage Usage	Remarks
			MVA			
Mamboleo	132kV/33kV	2 x 45 MVA	90	50	56%	Real daily load much lower
Rangala	132kV/33kV	2 x 23 MVA	46	23	50%	
Musaga	132kV/33kV	2 x 23 MVA	46	18	39%	
Mumias	132kV/33kV	23 MVA	23	1.8	8%	
Kakamega	33kV/11kV	2 x 7.5MVA	15	4.7	31%	
Chavakali	33kV/11kV	2 x 7.5MVA	15	2	13%	
Butere	33kV/11kV	2 x 2.5MVA	5	1	20%	
				100.5		

The Load growth in Western is very small.

Kakamega, which received Electricity in 1955 has only 4MVA Demand after 70 Years. Total Demand Westren alone is less than 30MVA.

Adding 200MVA is NOT justified. There is no need for the Project.

What is perceived as unreliable Supply is on the maintained 33kV Network.

About the Writer: About the Writer:

Eng. Rodgers Mudegu Adai is a Commissioning Engineer in Power Systems encompassing Generation, Transmission and Distribution. He has Commissioned Power Systems and Power Plants in Kenya, Tanzania, Uganda, Zambia, Malawi, Mozambique, Eritrea. Worked for KPLC (1986-96) and ABB (1997 – 2003)

In 2003, he started ARM Engineering Co. Ltd a company undertaking Turnkey Engineering Procurement Construction and Commissioning (EPC) Works in the Energy sector in Eastern Africa. ARM Engineering Co. Ltd is a Local Engineering company 100% Citizen owned undertaking EPC and Subcontracting work form Design, Procurement, Construction and Commissioning with a turnover of approximately Ksh 300M-500M depending on the year and with a permanent workforce of 30 Employees and more contract employees. It has undertaken works in Kenya, Uganda, Tanzania, Mozambique, Zambia, Rwanda, Djibouti and even far afield as Iraq.

As both Managing Director and Commissioning Engineer, he has experienced firsthand the problems and challenges hindering the Local Engineering Industry and Africa at large from developing to compete with companies from 1st World Countries. His aim is to bring to the fore the mistakes we have made as 3rd World Countries.

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