



6th PIDA Week

DEVELOPMENT OF CONTINENTAL POWER SYSTEMS MASTERPLAN (GENERATION AND TRANSMISSION)

18 -21 January

Introduction AUDA NEPAD

○ Who are We

- At the 31st Ordinary Session of the Assembly of African Union Heads of State and Government in Nouakchott, Mauritania, June 2018, a decision was taken to transform the NEPAD Planning and Coordination Agency into the African Union Development Agency-NEPAD (AUDA-NEPAD). The establishment of AUDA-NEPAD is part of the global reforms geared at improving the Union's impact and operational efficiency.

○ AUDA Mandate

- a) Coordinate and Execute priority regional and continental projects to promote regional integration towards the accelerated realisation of Agenda 2063;
- b) Strengthen capacity of African Union Member States and regional bodies,
- c) Advance knowledge-based advisory support,
- d) Undertake the full range of resource mobilisation and serve as the continent's technical interface with all Africa's development stakeholders and development partners.

Introduction AUDA NEPAD

○ **How we deliver**

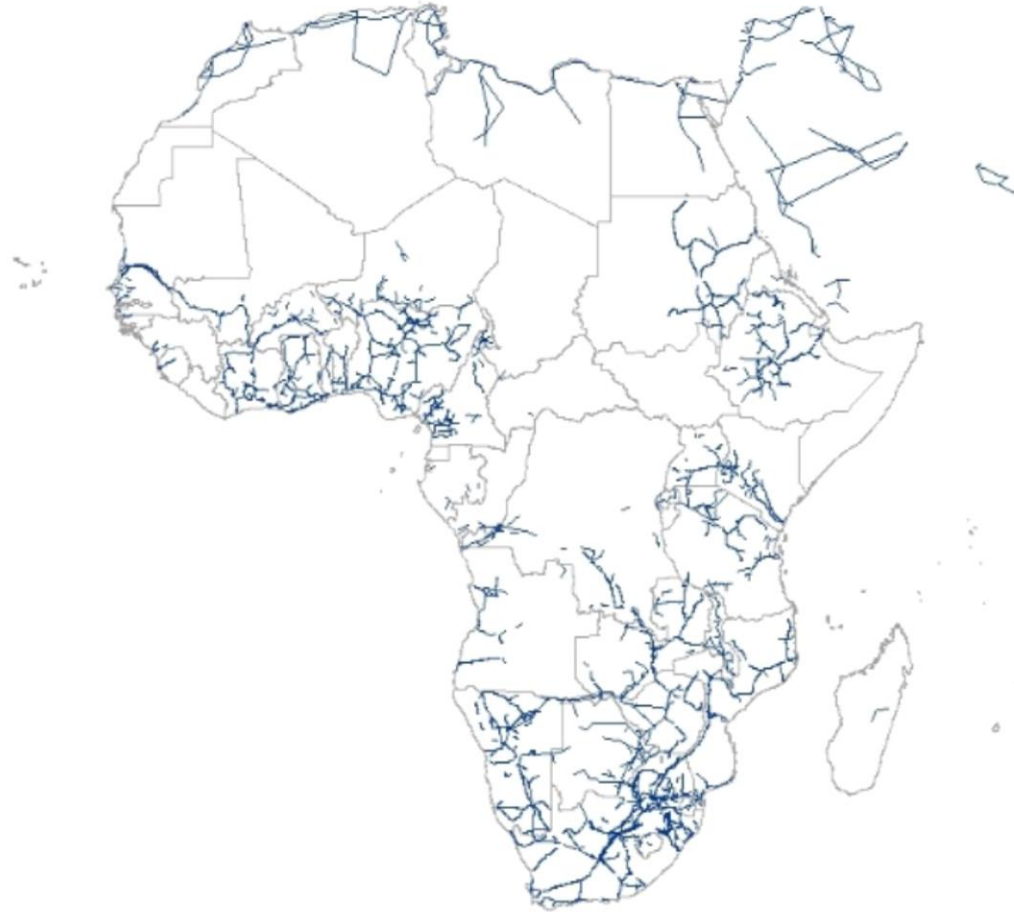
The Agency implements its mandate through six broad thematic areas, namely:

- a) Economic integration;
- b) Industrialisation;
- c) Environmental Sustainability;
- d) Technology, Innovation and Digitisation;
- e) Knowledge Management; and
- f) Human Capital and Institutions Development.

Africa Energy Ministers Directive

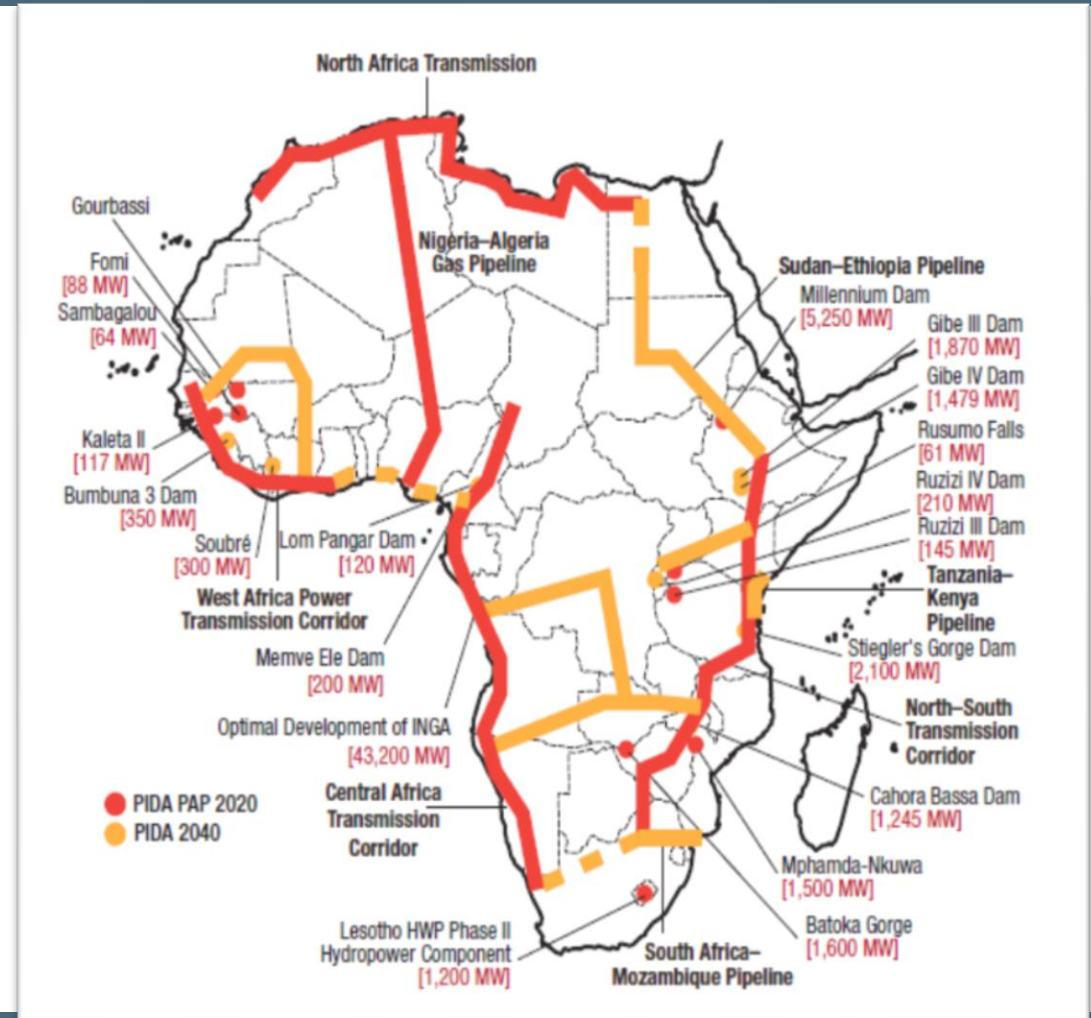
- The development of a Continental Transmission Masterplan during the AU Specialised Technical Committee meeting on Infrastructure (Transport, Energy and Tourism) held in Nouakchott and Cairo in 2018 and 2019 respectively.
- Confirmed and re-emphasised by the Executive Council Decision of the AU Summit which was held in Niamey in 2019.
- Collaboration between AUC, AUDA-NEPAD, AfDB, UNECA and Development Partners

Africa Current Situation



Transmission MasterPlan focus

- Will be based on current PIDA four transmission corridors and power pool masterplans
- Promote intra-regional power trade
- Promote inter-regional power trade
- Promote trade between Africa, Europe, the Gulf States and Asia



The Initial Continental Master Plan (CMP) Objectives

- **identify priority power generation and transmission hard infrastructure** key for the establishment and operationalisation of a Continental Power Systems Network (CPSN); **Base line - Phase 1**
- assess and develop an equitable **commercial market framework for electricity trade** in an interconnected continental electricity market
- develop **harmonised Policy, Legal and Regulatory Framework** for the ICTN for the operation/control of regional/continental electricity market,
- examine the commercial potential of **Digitalisation and ICT communication infrastructure** of existing and planned integrated power system on the continent as well as the contingent Cyber Security requirements.

Baseline Key Findings

- **State of Pool Masterplans:**

- Up to date Masterplan
 - WAPP and SAPP have updated Masterplans
- Masterplan Being Updated
 - EAPP updating their Masterplan
- Masterplans Status requiring more information or support
 - CAPP Masterplan outdated and requested for assistance to mobilise resources to update the Masterplan
 - COMELEC has no Masterplan and needs institutional strengthening to bring it a par with other power pools

Approach Towards the development of the CMP – Phase 2

Component/Lot	Priority	Lot Description	Budget	2020				2021				2022			
			in Million Euros	Nov-Jan	Feb-Apr	May-Jul	Aug-Oct	Nov-Jan	Feb-Apr	May-Jul	Aug-Oct	Nov-Jan	Feb-Apr	May-Jul	Aug-Oct
Lot 1	Prior- 1	Lot 1a. Energy Planning and Modelling	4												
		Lot 1b. Capacity Building	2.5												
Lot 2	Prior- 2	CAPP Master Plan	4												
Lot 3	Prior- 2	COMELEC Master Plan	4												
Lot 4	Prior- 2	Lot 4a. Acceleration of Energy Projects of PIDA PAP 2 and Regional Priority Projects	100												
	Prior- 2	Lot 4b. Mechanism for funding CMP projects	1												
Lot 5	Prior- 3	ICT Infrastructure and Cyber Security Support Study	0.5												
Lot 6	Prior- 3	Regulatory/Institutional Gap and Impact on Establishment of the AfSEM	0.8												
Lot 7	Prior- 3	Role of Distributed Power Systems in Universal Access to Electricity and future Integration to National, Regional, Continental Electricity Markets	0.5												
Lot 8	Prior- 3	Specific Support Study - Energy Efficiency (generation and transmission)	1												
Lot 9	Prior- 3	SAPP, WAPP & EAPP Master Plans' Update	1.5												
Lot 10		Specific Support Study – Link between CMP, Africa Industrialisation, Integrated Economic Corridor Development and AfCTA	1												
Energy Storage															
Lot 11	Prior- 3	Lot 11a. Specific Support Study - Green Hydrogen	0.4												
	Prior- 3	Lot 11b. Specific Support Study - Battery Energy Storage Systems	0.4												
	Prior- 3	Lot 11c. Specific Support Study - Hydro Reservoir & Pump Storage Plants	0.4												
	Prior- 3	Lot 11d. Specific Support Study - Electricity Supply and Storage Technologies	0.4												
Renewable Energy															
Lot 12	Prior- 3	Lot 12a. Specific Support Study - Wind Power Plants	0.4												
	Prior- 3	Lot 12b. Specific Support Study - Solar Power Plants	0.4												
Lot 13	Prior- 3	Cross-cutting component-AUDA NEPAD activities related to the CMP	1												
Grand Total			124.2												

Lot 1 a: Electricity Planning and Modeling

- ToRs will be implemented using a participatory and a bottom up approach
- Strong involvement of Power Pools, AUC, AfDB and Modelling Partner under the leadership of AUDA NEPAD
- Guiding Principles
 - Transfer of know-how, on-the-job training and building capacities for long term sustainability of the Continental Masterplan development as well as that of the Power Pool Masterplans;
 - Establish a permanent Modelling Team in AUDA and within the Power Pools backed by a strong Technical Assistance Team, instead of adopting a consultant led one-off planning and modelling support approach;
 - Ensure cooperation with a modelling partner for high-level services;
 - Adopt a Common Modelling Tool for the development of one (1) CMP and five (5) regional Power Pools Master Plans ;
 - Adopt a participatory, collaborative and consultative process towards the development of the baseline scenario analysis and on the modelling for the CMP;
 - Ensure synchronization and alignment of inputs with African Single Electricity Market (Af-SEM);
 - Enable coherence and ensure consistency of the Continental Masterplan with Africa's sustainable development objectives
 - Allow for coherence between the PIDA (in particular PAP 2) and Continental Masterplan priority projects, as well as with the AfSEM processes.

Lot 1 a: Electricity Planning and Modeling

- Modelling and planning tasks will cover the following three main areas:
 - **Generation and transmission expansion planning;**
 - Demand Forecasting: Demand Forecasts and Scenarios
 1. **Benchmark Scenarios:** Based on the existing regional generation and transmission masterplans.
 2. **Inter-regional Planning Scenario “ENV”:** assumes a degree of coordination between adjacent regional power pools in investment planning and electricity trading
 3. **Optimal transmission planning scenario:-** optimization of the combined power pool masterplans by identifying the optimal investments in generation and associated transmission capacity expansion, by assuming a fully integrated inter-regional and continental system, as well as inter-regional and continental coordination of investments.
 - **Dispatch simulation;**
 - CMP Model Development
 - **Network Studies.**
- Assessment of Results, Sensitivity Analysis and Cost Benefit Analysis (CBA), Network Studies
- The design of transmission and interconnection lines will follow three main principles:
 - Target network Planning: this ensures that investments in the short term are still useful in the long term
 - Corridors and hubs: lines can be grouped and power plants of a same area can evacuate to the same “hub” substation
 - Least-Cost Planning: As a consequence, transmission from on large distances should be in HVDC or with a higher voltage level like 750 kV as already used in South Africa
 - Secondary assessment could also look at the potential impact or dynamic stability issues of inter-connection between Africa-Europe-Asia interconnected grid (for example: WAPP interconnection to COMELEC and then to Europe)

Lot 1 a: Electricity Planning and Modeling

Synthesis of Results

- Includes review and agreement of 'robust' and priority projects list, as well as presentation of the results so as to highlight the major trends that will emerge in the short term (2023-2027), the medium term (2028-2032) and the long term (beyond 2033-2040).
- The results should include existing power generation plants, transmission lines, planned infrastructure, AfSEM transmission corridors etc.
- The results should also include a **continental ten-year transmission network** development plan (TYTNDP) that will culminate in the establishment of a continental interconnection targets for the short-, medium- and long-terms.
- The outcome of this should be synchronised with the AfSEM Policy, Strategy and Roadmap;
- **The Advisory Group (AG) to review and present its opinion on the synthesis of results**
- **with Technical Steering Committee for reviewing synthesis of results.**
- Mapping results in GIS
- Visualisation of data, information and results. Selection, organization, presentation, distribution of the CMP content to the selected audience via different communication channels.

Lot 1 a: Electricity Planning and Modeling - Timetable and Deliverables

Deliverables	Indicative Timing
Deliverable 1: Inception Report	+3 month after the commencement of activities
Deliverable 2: Report on Demand forecasts	+6 months after the commencement of activities
Deliverable 3: Report on techno-economic data and assumptions as well as on Resource Assessment	+7 months after the commencement of activities
Deliverable 4: Report on planning Scenarios	+9 after the commencement of activities
Deliverable 5: CMP and PPs Master Plans platform and databases	+10 months after the commencement of activities
Deliverable 6: CMP Model and data (in CMP platform)	+11 months after the commencement of activities
Deliverable 7: Report on Planning scenarios results	+17 months after the commencement of activities
Deliverable 8: Report on sensitivity scenarios results	+19 months after the commencement of activities
Deliverable 9: Report on Cost Benefit Analysis	+20 months after the commencement of activities
Deliverable 10: Report on Network Studies	+23 months after the commencement of activities
Deliverable 11: Synthesis of Results Report;	+26 months after the commencement of activities
Deliverable 12: Continental Masterplan Models Documentation Report.	+29 months after the commencement of activities
Deliverable 13: Digital Visualisation of CMP content and further dissemination of info	+29 months after the commencement of activities

Thank you

Tichakunda Simbini

Energy Infrastructure Expert

AUDA-NEPAD

Midrand

South African

simbinit@nepad.org