

## IRENA 13<sup>th</sup> Assembly Side Event

### African Continental Power System Master Plan (CMP) – Establishing continent wide planning process

10:30 – 12:45, Friday, January 13, 2023

#### Event Proceedings

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#### Event summary

Around 80 delegates to the IRENA’s General Assembly attended the event. The presentations and the interventions from the delegates showcased champions of the energy planning process in Africa at the national, regional and the continental levels. The discussion highlighted the importance of creating a strong, nationally owned process for designing long-term energy scenarios as a means to meet national and pan -African energy milestones affordably and in a climate-friendly manner. The Continental Power System masterplan efforts led by the African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD) was highly commended, and delegates discussed the need for continuous efforts to align national and regional planning processes

with the continental planning process. The event encouraged AUDA-NEPAD and partner organizations to take a leading role in this alignment process.

### Introduction from the moderator



**Mark Howells** (Loughborough University and Imperial College, London & Programme Director of Climate Compatible Growth (CCG))- Noted that without clear scenarios of what to invest in, when, where to invest and how those investments will operate and associated trade dynamics, it is impossible to put together clear policy pictures, regulatory frameworks, empower institutions, build capacity and mobilize the finance necessary to invest in the future. It was noted that the session shall look at Africa's first continental master plan formulation processes and how to harmonize planning across the continent. This session will focus on the following: (i) sharing experiences from regional, sub-regional and national champions developing long term energy plans; (ii) the importance of developing robust national strategies that can be incorporated in planning, policy and institutional processes; (iii) present high-level insight from the continental master planning process and hear feedback from organisations and member states to understand what value could be derived and what value member states can add; (iv) hear from a distinguished panel composed of various experts.

### Opening Remarks



**Francesco La Camera** (International Renewable Energy Agency)- Noted IRENA's commitment to promoting renewable energy in Africa. IRENA has worked with members in Africa to enhance local capacity for long-term energy planning. The Agency has worked on several energy planning programs with Eswatini and Cameroon and with the West African Power Pool (WAPP) and Central Africa Power Pool (CAPP).

It was noted that the development of clean energy plans requires complex planning structures. In 2022 IRENA convened 9 countries to produce a webinar series on energy planning, governance and implementation. Consequently, IRENA is launching the '*Scenarios for the energy transition: Experience and good practices in Africa*' synthesis report which showcases the expertise and procedures used to develop energy planning scenarios in Africa.



Figure 1: *Scenarios for the energy transition: Experience and good practices in Africa* (insert better link <https://www.irena.org/Publications/2023/Jan/Scenarios-for-the-energy-transition-Experience-and-good-practices-in-Africa>)

It was noted that Africa is at an advanced stage of developing cross-border energy cooperation mechanisms as evidenced by: (i) the increased regional planning and coordination of regional power systems of the four power pools; (ii) Africa's single electricity market which when completed will be the world's largest energy trading program; (iii) the continent-wide planning process under the African Union Development Agency (AUDA- NEPAD) which will produce the African Continental Power System Master Plan.

It was noted that the CMP initiative allows countries to align their energy planning process thereby accelerating investment in cross-border transmission infrastructure and deepen the electricity trade. More intercountry grid interconnections will improve the region's renewable energy prospect by unlocking flexibility in power grids. IRENA and the International Atomic Energy Agency (IAEA) are supporting CMP as modelling partners and have developed power system models for all parts of African continent. IRENA has also published a series of reports titled '*Planning and prospects for renewable power: Africa*' (<https://www.irena.org/Energy-Transition/Planning/SPLAT-Models-for-Africa/Prospects-for-Renewable-Power-in-Africa>). The '*Planning and prospects for renewable power: North Africa*' report, being launched today, is the sixth report in the series.



Figure 2: *Planning and prospects for renewable power: North Africa*

<https://www.irena.org/Publications/2023/Jan/Planning-and-prospects-for-renewable-power-North-Africa>

It was noted that the side event would highlight the importance of robust country planning processes and allow for discussion on the benefits of continental planning while increasing African ownership of the process.



**Cristina Duarte** (Special Advisor on Africa to the UN Secretary-General) - Noted that the United Nations (UN), in 2022, initiated a campaign in Africa that aims to ensure increased energy access on the continent. Given that Africa is home to 70% of the world's population but represents only 3.3% percent of primary global energy consumption, it is vital to ensure proper electricity distribution on the continent. Given the current trajectory of population growth in Africa, there ought to be more energy generation and distribution to cater to the ongoing economic transformation. In responding to the climate crisis, it is vital that Africa's contextual reality is accounted for; otherwise the continent shall experience an energy crisis in its industrialisation and infrastructural expansion projects. Energy is important in ensuring peace and security, upholding human rights and for humanitarian reasons. Proper energy access will ensure the provision of social services and facilitate the provision of public goods in remote areas.

The UN Taskforce on African Affairs in 2021 and 2022, during the high-level open dialogue, concluded that energy is a key driver for socio-economic recovery and is an entry point for post-

covid recovery. Africa must design its energy mix to support its industrialisation and growth, and to ensure equitable electrification.

The CMP planning process is a key tool in addressing the following critical challenges: (i) creating and implementing contextually relevant climate policies that ensure an efficient trade-off between the continent's right to energy access and its climate change commitments; (ii) unlocking Africa's need for energy financing - without proper planning, there would exist no target energy mix, and without this, the financing cannot be facilitated efficiently; (iii) the energy technological divide; (iv) establishing a pan-African angle to energy scenarios while accounting for the unique timelines and economic realities to ensure a balanced energy mix and a just transition.

In conclusion it was noted that countries should leverage on the strong political will, investment and institutions. Lessons can be taken from recent initiatives taken to support existing school feeding programs in rural areas to ensure energy access by developing off-grid solutions.

**Mark Howells**- Highlighted the importance of establishing a pan-African vision, energy planning and establishment of policy to ensure properly financed and climate-compatible programs.

### Keynote Address



**Simbini Tichakunda** (African Union Development Agency (AUDA-NEPAD))-

Noted that the decision to develop a continental master plan was made in 2018 by Africa Energy Ministers and confirmed at the 2019 African Union (AU) summit through an Executive Council decision. The African Union Development

Agency (AUDA-NEPAD) was instructed to work on a CMP by first identifying key infrastructure that will enable trade between power pools and subsequently between the continent, Europe and Asia. The main goal is interconnecting the 55 African union member states and creating a unitary electricity trading bloc.

To ensure ownership by the member states, a governance structure composed of a Steering Committee with working groups composed of power pools and their technical planning committees was constituted. Currently, there is a funding, amounting to 10 Million US dollars (in cash and in-kind) from key partners including the African Development Bank (AfDB), European Union (EU), USAID- Power Africa, IRENA, IAEA, Africa- EU Energy Partnership (AEEP) and Get.Transform.

It was noted that IRENA and IAEA are modelling partners and there are regular consultation meetings with regional regulators and centers of excellence for renewable energy. The program has a strong capacity building component. Additional components include energy planning and modelling, renewable energy technologies and storage, and the development of regional master plans. Currently, the stakeholders are developing the Central African Power Pool (CAPP) master plan.

The energy planning component of the work includes demand forecasting, generation planning studies and modelling. AUDA-NEPAD provided tools (with the support of Get.Transform and the Africa EU-Energy Partnership – AEEP) to power pools to strengthen their planning processes; the demand forecasting component shall be concluded in February 2023 as illustrated.

Critical success factors in the CMP development include:

1. **Establishing a proper governance structure** - currently, power pools and utilities are collaborating; the collaboration shall be scaled up and formalized to involve regional collaboration between ministries of energy.

2. **Building capacity within power pools** - the African Union Commission (AUC) plans to work with ministries of energy to build their capacity and ensure the adoption of compatible methodologies.
3. **Ensuring data quality** - it is vital to have proper data to ensure effective and accurate models. AUC is consulting with partners and working to develop a proper data collection and verification methodology.

**Mark Howells**- Reiterated that the presentation highlighted the following key points. (i) the importance of technical underpinning and ensuring world class data and information; (ii) the importance of partnership; and (iii) the importance of building national capacity to ensure the realisation of the vision of building the largest electricity market while properly managing and harnessing Africa's minerals and resources to ensure a stable supply of low carbon electricity.

### Scene Setting



**Asami Miketa** (International Renewable Energy Agency): Reiterated that the *Scenarios for the energy transition: Experience and good practices in Africa* report is a summary of webinar series where 9 African countries and 3 technical partners who shared good practice and examples of energy planning. The experiences are structured in 3 pillars: (i) how long-term scenarios are developed; (ii) how scenarios are used for energy planning; and (iii) strengthening institutional capacity for

planning. The Africa unions' vision of a single electricity market builds on the Program for Infrastructure Development in Africa (PIDA).

It was noted that Africa has a lot of renewable energy potential which can be leveraged to bring affordable energy to all and contribute to economic prosperity. Continental level planning is vital as it ensures cross border trade which will minimise energy costs while contributing to regional integration. The Continental plan serves as a blue-print for Africa Single Electricity Market (AfSEM), by bringing together institutions to develop scenario-based master plans and ensure power pools jointly develop long-term scenarios. The robust CMP governance structure seeks to ensure that planning is centred around experts from African institutions rather than external consultant firms.

The System Planning Test (SPLAT) CMP model will be developed based on the SPLAT Africa model using the IAEA Model for Energy Supply System Alternatives and their General Environmental Impacts (MESSAGE) model. To ensure proper coordination several training courses and weekly check in calls are conducted.

IRENA supports national and regional level planning and planning under 3 pillars, first institutional support, secondly the dissemination of tools and data and finally the peer-to-peer learning component.

IRENA is running a 2-year program in Cameroon to build institutional capacity on the use of the SPLAT model and development of a master plan supported by the Government of Denmark. Additionally, IRENA is currently supporting the development of the Central Africa Power Pool (CAPP) master plan together with 7 counties (power pool members) with funding by the Government of Walloon.

## Panel Discussion

*\*Perspectives shared by the speakers concerning specifically to CMP are in bold texts to stand prominent*



**Stephen Dihwa** (Southern African Power Pool (SAPP)) - Noted that Africa should be electrically connected and reiterated that the Southern Africa Power Pool (SAPP) supports the formation of the Continental plan. Given that it is vital to fill the energy gap there should be efforts to develop grid connectivity and off-grid plans at the national level. It is also important to evaluate how regional connectivity accounts for the diversity of resources and countries must optimize their resources by strengthening interconnectivity. **The continental power plan should optimise regional power pool plans** and help countries achieve their climate commitments by ensuring sufficient clean energy to balance their electricity imports.



**Oscar Kojo Amonoo-Neizer** (Energy Commission Ghana)- Noted that reliable energy supply is necessary for economic growth and expansion. Africa's energy requirements have increased over the last decade and will continue increasing to ensure the uplifting of living standards. Africa has diverse resources including oil, gas, hydropower, solar and wind and the continental planning will ensure the leveraging of these resources. It was noted that the African Union Vision 2063 identified energy as a defining infrastructure pillar that will connect Africa.

**The potential benefits of the CMP to Africa include:** (i) Lower cost of energy given the shared energy resources and a larger market; (ii) Energy security as cross-border energy market options promote diversification; (iii) The establishment of a transparent and harmonised continent-wide tariff-setting regime; (iv) Enhanced energy planning, coordination and implementation; (v) Better management of environmental challenges; (vi) Development of frameworks to ensure effective participation in developing energy systems; (vii) Enhanced investment given the larger integration capacity a single market brings. The implementation of the CMP will result in a sustainable power supply system and the creation of new jobs.



**Abel Didier Tella** (Association of Power Utilities of Africa (APUA))- Stated that the Africa Single Electricity Market (AfSEM) project was launched in June 2021. The project was included into the 2009 Action Plan of the Forum of African Power Pools, where African power pools started discussions on integrating regional electricity markets into a single market. After 10 years there was work on harmonising the grid code and market while integrating the network. To illustrate the importance of a single market and **the potential of intercontinental electricity trading**, it was noted that in 2018, 25 percent of energy consumption in Spain was from solar energy imported from Morocco.

He finished by emphasizing that the AfSEM will enhance the penetration of clean energy into the African grid as it will allow countries that rely predominantly on fossil fuel for energy generation to import renewable energy thereby reducing their carbon footprint.



**Rashid Abdallah** (African Energy Commission (AFREC))- Noted that the Africa Single Electricity Market (AfSEM) and the CMP are **important in attaining the African Union Agenda 2063.**

Electricity represents 20 percent of global energy supply and is projected to increase to 50 percent of global energy supply by 2050 due to the advance in technology and projected population growth. To meet the growing electricity demand it is important to harness all available resources in Africa including geothermal in East Africa, hydro power, wind, and solar energy. Regional and continental planning will ensure proper sharing of resources.

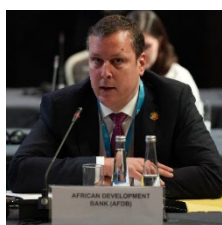
It is vital to develop proper policy and legislation to enable cross-border trading and regulate renewable investment. Additionally, national planning should be based on the outcome of the CMP. While the CMP shall act as an umbrella plan, states must transform their energy sectors through proper planning, build partnerships and leverage on capacity building programs.



**Stefano Signore** (European Commission)- Noted that **an interconnected grid will ensure a solid and reliable energy system in Africa which ensures the resilience of the energy system.** The work on the CMP is vital as it demonstrates that renewable energy solutions can be deployed at a higher scale. The CMP serves as a positive signal to investors as it demonstrates the technical and economic feasibility of large-scale renewable energy projects. It was reiterated that the country ownership is vital and it is important to ensure adequate capacity

building. Further, the need for accurate and timely data must be met and the constraints posed by data confidentiality should be resolved.

### Interventions from CMP partners



**Daniel Schroth** (African Development Bank (AfDB))- Noted that **physical integration of continental power systems will enable efficient resource utilisation as this will integrate variable renewable energy to the grid and reduce country investment requirements,** thereby, creating a cost-effective supply system. The CMP will increase electricity trade between Africa and Europe, Asia and the Middle East. It was noted that the AfDB plays a key role in Program

for Infrastructure Development in Africa (PIDA) and supports the CMP by leading resource mobilisation efforts and through technical assistance. Through AUDA- NEPAD, the AfDB supports energy planning and modelling; the integration of regional energy plans into the continental plan; and the creation of the Central African Power Pool master plan. While the CMP is important, stakeholders should work to finance critical projects such as those identified by the African Working group in line with the Global Grid Initiative. IEA has noted that by 2030, Africa shall need 10 billion US Dollars per annum in investment to ensure a sustainable power system, therefore it is **vital to commence resource mobilisation efforts** as soon as possible.



**Mario Tot** (International Atomic Energy Agency (IAEA))- Noted that they support the CMP process and are glad that African institutions have taken the lead in the process, while being supported by IRENA and the IAEA at the back end as modelling partners. It was noted that the **energy planning capacity building program of the modelling partners is accessible to all member states and will allow for the training of national teams** on the use of the modelling platform, common with CMP. In conclusion, it was noted that when providing country support, the IAEA first offers support on energy planning before supporting the development of nuclear energy programs.



**Thyrsos Hadjicostas** (European Union Global Technical Assistance Facility (EU GETAF))- Noted that the European Union is contributing to capacity-building initiatives; has seconded an expert to the African Union; four experts to the AUDA-NEPAD; and five additional experts have been seconded through the AfDB to the regional power pools. It was noted that the outcomes of the CMP include the operationalization and consensus building for the selected PIDA projects.

Additionally, as part of the CMP support through AUDA-NEPAD, the 'Mwanga' (means 'light' in Swahili) energy information platform was launched which will ensure the **proper collection and dissemination of all data necessary for energy planning** by the African power pools. It was highlighted that the CMP will ultimately **result in lower carbon dioxide emissions per capita by 2040**, thanks to the integration of more renewable energy in a continentally interconnected grid.

## Interventions from the Audience

*\*Perspectives shared by the speakers concerning specifically to CMP are in bold texts to stand prominent*



**Kenya**- It was noted that the outcomes of the CMP include enhanced energy security and the harmonisation of policy and energy legislation in the continent. A key contribution of the CMP is the leveraging of diverse resources, and diverse experience and technical capacity, thereby creating economies of scale. Through national and regional energy planning, **countries will identify existing gaps and put in place the relevant response actions**. It was noted that Kenya conducts least cost power development planning nationally and is planning to integrate its different energy sources in its energy planning system.



**Germany**- Noted that the success of decarbonisation initiatives is based on sustainable development and that the CMP will be a key enabler given Africa's vast renewable resource base. While there are multiple barriers; key advantages exist in sub-Saharan Africa - including the low level of incumbent fossil fuel architecture, the availability of renewable energy and an interconnected grid as envisioned through the CMP. The following are essential to the success of the

African energy transition: (i) Access to energy; (ii) Risk reduction and investment promotion; (iii) An extended and modernised grid; (iv) Support for systemic innovation. Proper energy planning is vital in achieving the objectives of the Paris Agreement and a net zero future.





**Portugal-** Noted that Africa has a lot of renewable energy potential and there must be adequate development of energy transmission and distribution infrastructure and proper continental integration to address the current energy access issues. In support of the CMP process, it was noted that Portugal has signed a 400 million euro agreement with AfDB to support work in Angola, Mozambique, Cape Verde, Equatorial Guinea, Guinea Bissau and

Sao Tome & Principe.



**Mali-** It was noted that the **CMP coincides with Mali's 2020 to 2040 Energy Master Plan** which aims to define investment in the short, medium and long term while envisioning an interconnected grid which draws on key thermal centres nationally. The Energy Plan will ensure adequate investment to meet national energy needs while emphasizing the importance of an interconnected grid and the management



**Eswatini-** It was noted that Eswatini is keen to collaborate and share experiences on the long-term energy planning process. In 2018, there was a capacity-building program organized by IRENA and IAEA, which included data analysis, training courses and the importation of skills to Eswatini's planning team which is composed of multi-sectoral experts. Subsequently, this program contributed to

the formulation of Eswatini's energy master plan, which outlines sector-specific development pathways until 2034. This plan informs the country's short-term generation plan, which has resulted in the development of a 10 Mega Watt solar photovoltaic power plant. The country is grateful for the support from IRENA and the IAEA and looks forward to the finalisation of the African Continental Power Systems Master Plan, which is **necessary for the continental growth**.



**Mauritania-** Noted that the **CMP is vital for Africa's energy transition** and in addition to the consolidation of national programs, it should leverage on the continent's resources and promote interconnectivity. Given that Mauritania has a long coastline and has access to major wind and solar resources, there should be ample investment in energy storage solutions and stability of the national grids.

Given its position, Mauritania is an intermediary between north and sub-Saharan Africa and will be a key route for energy trade between Africa and Europe. It was suggested that the **CMP should consider the development of green hydrogen** and its use in the green steel industry to ensure that Africa leverages on its competitive advantages to push forward the energy transition.



**India-** Highlighted that **Africa's power sector is currently at the same stage that India's sector was a decade ago, as such there are important lessons that can be shared** as stated: (i) Interconnection is vital - initially India had 5 grids with little interconnection but managed to build the largest synchronised grids which has been instrumental in the country's growth; (ii) Designing the transparent and non-

discriminatory competitive markets is crucial in attracting investment. Currently, 100 giga watts of India's electricity is almost fully funded through foreign investment which allows the government to focus on other priorities aside from the energy sector.



**African Renewable Energy Initiative (AREI)**- The importance of cooperation and coordination amongst stakeholders was emphasised. AREI seeks to achieve the generation of 300 Giga Watts of energy by 2030 and support the achievement of SDG 7 on the continent. **The expansion of the regional and intercontinental grid will ensure the achievement of AREI’s targets** and promote the availability and affordability of electricity in Africa. The importance of proper regulation to attract the private sector was

reemphasised. Finally, based on Egypt’s experience in interconnection between Jordan, Libya and Sudan; the country is willing to share their experience in the achievement of the CMP continental integration targets.



**Denmark**- Noted that they are glad to support the CMP process. Given that the power pools in Northern Europe have enabled countries to upscale renewable energy in their energy mixes, three key lessons can be shared with Africa. First, it is important to focus on the first mile and not the last mile, when building renewable energy systems. The focus on the first mile

is vital because in the initial stages, the issues of intermittency and storage will not pose a major challenge to the energy system. Secondly, it is important to consider the cost of capital and engage the private sector. Finally, to achieve the CMP’s vision, it is necessary to build power systems, enhance technical capacity and create an enabling environment that allows for the de-risking of capital and crowding in of private investment.



**Ghana**- Noted that the CMP is vital as it will help in unlocking investment, accelerate the path to universal electrification and contribute to addressing key social and economic issues. It was noted that Ghana plans to increase the contribution of renewable energy and diversify its energy mix to ensure continued access and security of supply. It was noted that when developing the continental plan, the modelling must be technology neutral and account for

any challenges that renewable energy poses to ensure a sustainable plan. Countries should draw lessons from Europe’s master plan.

### Panelists Final Interventions

**Stefano Signore** - Given the time pressure on delivering on the investment agenda related to the green energy transition, CMP interim results can already start informing investment efforts. Countries must plan for long term projects while concurrently addressing short term challenges.

**Oscar Kojo Amonoo-Neizer** – The CMP shall allow for the identification of energy resources on the continent and, with proper planning will result in increased investment and sustainable economic development.

**Stephen Dihwa** - It is necessary to ensure proper technical expertise to develop and revise the CMP. This approach will ensure sustainability as it will attract foreign investment.

**Abel Didier Tella** - The CMP is necessary for the achievement of PIDA. It is vital to ensure proper capacity building and adequate resourcing.

**Rashid Abdallah** - It was noted that (i) the quality of energy data must be improved; (ii) countries must concentrate on energy planning at the national level; (iii) finance is vital; and (iv) countries must start work immediately and focus on the first mile rather than the last mile.

## Closing Remarks



**Roland Roesch** (International Renewable Energy Agency)- Thanked the panelists and audience for their contribution. It was noted that IRENA looks forward to the conclusion of the CMP milestone. The insights generated during the event serve as crucial guidance in enhancing IRENA's future programs on energy planning. All stakeholders were invited to coordinate their efforts in strengthening the national, regional and continental energy planning mechanisms.

