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Energy**Energy as an enabler to achieve the Sustainable Development Goals and Agenda 2063 in Africa****Note by the secretariat****I. Introduction**

1. Affordable, reliable, sustainable and modern energy services are a critical development enabler for Africa, because they create solutions to the climate crisis and are essential for implementing, in general, the global Sustainable Development Goals of the 2030 Agenda for Sustainable Development and, in particular, “Agenda 2063: The Africa We Want” of the African Union. Specifically, energy is an enabler and a pathway towards addressing social, environmental and economic challenges through an integrated approach by providing equal energy access and consumption levels; leapfrogging the dirty fuels of the past with a future of clean renewable energy development; and balancing the demand and supply of energy, notably through programmes such as energy efficiency, to enhance economic growth.

2. The present note provides a summary of the current energy situation: efforts, initiatives and measures being undertaken; challenges as well as opportunities to accelerate renewable energy development in Africa; key recommendations and messages as a way forward in terms of providing an enabling environment; access to finance affordability; technology; and capacity-building, in terms of knowledge transfer and skills development. This is with a view towards implementing the Paris Agreement and achieving the global Sustainable Development Goals and Agenda 2063, through an integrated approach with innovative solutions.

II. Background

3. Africa faces an enormous energy challenge owing to significant growth in population and a sustained period of economic growth and transformation. With the average annual gross domestic product growth rate of 6.2 per cent,¹ predicted three-fold growth in gross domestic product by 2030 and seven-fold growth by 2050, this entails a much larger energy demand and calls for a better-performing energy sector. Energy poverty remains a serious obstacle to economic and human development in most parts of the continent. As a region, Africa continues to face critical challenges related to its energy sector, which is characterized by a lack of access to modern energy services (especially in rural areas), poor infrastructure, low purchasing power, low investments and overdependence on traditional biomass to meet basic energy needs.

4. The continent’s energy supplies are not meeting the needs and aspirations of its people. About 600 million people in Africa do not have access to electricity and approximately 730 million people

* AMCEN/16/EGM/1.

¹ African Development Bank Group, “Programme for Infrastructure Development in Africa (PIDA)”. Available from <https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/programme-for-infrastructure-development-in-africa-pida/>.

rely on traditional uses of biomass.² A better system would promote economic diversification, raise productivity, and improve the health and well-being of citizens. Africa requires between \$60 billion and \$90 billion annually to address its energy shortfall, roughly quadruple 2014 investment levels.³ While fossil fuels – notably coal, oil and gas – continue to provide a significant quantity of energy, especially in South Africa, renewables need to play a greater role.

5. Africa has plentiful renewable energy resources, from hydropower and geothermal power in the East Africa Rift System, while solar and wind are especially promising, thanks to falling costs and resource abundance. From solar-powered hospitals in Lagos, Nigeria, to wind farms at Lake Turkana, Kenya, renewable energy use is now a reality. The vast and diversified renewable energy resources across the continent can be classified as follows:⁴

- (a) 1,850 terawatt hours per year of hydropower;
- (b) More than 120 terawatt hours per year of geothermal;
- (c) 155,000–170,000 terawatt hours per year of solar;
- (d) Biomass 3–13.6.

6. Renewables can increase energy security, reduce energy import bills, and diversify and de-risk the energy mix. Renewable energy is therefore, in many cases, the optimal solution for modern energy access. Tackling today's energy challenges in the continent requires a firm commitment by Governments, multilateral organizations, and national, regional and continental energy initiatives, to promote the accelerated use of renewable energy sources for sustainable development in Africa. The ambitions are there.

7. The African Renewable Energy Initiative, led by African countries and institutions, including the African Union and the African Development Bank (AfDB), has set a goal of 300 gigawatts of renewable energy capacity by 2030. This requires, however, a 680 per cent increase in current deployment rates. According to the International Renewable Energy Agency's latest data, the installed renewable power generation capacity in sub-Saharan Africa currently stands slightly below 30 gigawatts, roughly 25–30 per cent of the installed power base, but this is dominated largely by hydropower, with other renewables collectively accounting for just 4–5 per cent of power generation. Can the investment goals be achieved? Who are the current players and how is the market evolving? Which strategies are most successful, and what challenges do developers face?

8. The combination of the adoption of the Paris Agreement and Sustainable Development Goal 7 of the 2030 Agenda for Sustainable Development (Ensure access to affordable, reliable, sustainable and modern energy for all), and the designation of 2014–2024 as the “United Nations Decade of Sustainable Energy for All” provides a confluence of frameworks to promote sustainable energy globally, particularly in African countries. Though there have been improvements and progress made in the last decade in terms of sustainable energy development, the speed on energy access and renewable energy development falls far short of achieving universal energy access for Africa by 2030.

III. Current initiatives

9. Major global, continental, regional and national energy initiatives have emerged during the last decade to serve as vehicles to accelerate sustainable energy development in Africa. These include:

(a) Programme for Infrastructure Development in Africa (PIDA): this is an African Union programme dedicated to facilitating continental integration through improved regional infrastructure. It builds on the master plans and priorities of the regional economic communities in three phases: short-term (2012–2020), medium-term (2020–2030) and long-term (2030–2040). PIDA covers four sectors: energy, transport, information and communications technologies, and water (transboundary);

(b) Sustainable Energy for All African Hub: this initiative has three targets: renewable energy mix, energy efficiency and universal access by 2030. Africa is at the forefront in implementation of the Sustainable Energy for All initiative. AfDB has hosted the Sustainable Energy for All African Hub since May 2013, in partnership with the African Union Commission, the New

² Organization for Economic Cooperation and Development and the International Energy Agency, *International Energy Agency Annual Report 2014* (Paris, 2015).

³ The Economist Intelligence Unit, *Power Up: Delivering Renewable Energy in Africa* (2016).

⁴ International Renewable Energy Agency-IRENA 2011: IRENA 2011: Renewable Energy Country Profile. www.irena.org

Partnership for Africa's Development Planning and Coordinating Agency, and the United Nations Environment Programme (UNEP). Nineteen African countries have completed the Sustainable Energy for All Action Agenda, while nine countries are currently working on it. Similarly, 4 countries have developed an "investment prospectus", while 21 others are working on it. The challenge now is to look for access to finance to start implementation at the country level;

(c) Africa–European Union Energy Partnership: this deals with energy access, energy security and renewable energy development, with clear targets of:

- (i) 10,000 megawatts of new hydropower;
- (ii) At least 5,000 megawatts of wind energy;
- (iii) 500 megawatts for all forms of solar energy; and
- (iv) Tripling other renewables, such as geothermal, and biomass.

This initiative is currently working on policy dialogue and mapping of existing energy initiatives in Africa;

(d) African Renewable Energy Initiative: this is a transformative African-led effort. Its overall goal is to increase the contribution of new and additional renewable energy generation capacity by 10 gigawatts by 2020, and 300 gigawatts by 2030, for poverty alleviation, economic growth and sustainable development. The Independent Delivery Unit of this initiative is hosted by AfDB, and its clear modality of implementation is to be defined by its board of directors in the near future;

(e) United States Agency for International Development Power Africa: this initiative embraces a model of partnership where public and private resources are matched with projects. The United States has committed \$7 billion in government support. Six priority countries are Kenya, the United Republic of Tanzania, Ethiopia, Nigeria, Liberia and Ghana. Examples of African projects being technically supported by Power Africa are Lake Turkana (Kenya), Corbetti geothermal project (Ethiopia), Kiwira River hydropower project (United Republic of Tanzania), and Power Privatization (Nigeria);

(f) African Union Commission–German Development Bank Geothermal Risk Mitigation Facility: a total of \$150 million is funded by the German Federal Ministry for Economic Development Cooperation, the European Union Infrastructure Trust Fund, and the United Kingdom Department for International Development. The main objective of the Facility is to encourage public and private investors to mobilize financing for development of geothermal power plants in East Africa;

(g) UNEP: the Programme is undertaking other energy programmes and projects that contribute to the three goals of Sustainable Energy for All: renewables, e.g., African Rift Geothermal Development Facility Project; energy efficiency, e.g., Enlighten and the Global Fuel Economy Initiative; and energy finance, e.g., Seed Capital Assistance Facility and the Mediterranean Investment Facility.

10. There are a number of examples of innovative solutions where existing initiatives have contributed to sustainable energy development in the region.

A. Financing and business models to maximize clean energy development

11. These include the following:

(a) Leapfrog strategies are emerging in rural regions, where electricity is delivered without heavy, clunky infrastructures. In recent years, millions of Africans have been provided with basic access to energy by commercially minded "start-ups" driven by innovative business models, such as "pay-as-you-go" contracts;

(b) Affordable technologies such as pico-scale and microscale solar photovoltaic, mobile money, and cloud-connected wireless communications technologies are some smart alternatives to the conventional "grid approach";

(c) Combined with falling solar panel and battery costs, a new breed of energy companies is increasing energy access across Africa faster, more cheaply and more widely than conventional grid extension.

12. In rural regions, off-grid power generation could create an entirely new type of "bottom-up" network as "island grids" gradually become interconnected. As with mobile phones in Africa, the key will be smart business models, not just a reliance on cheapening technology.

B. Building capacities of young African graduates in clean energy (geothermal)

13. The Africa Geothermal Centre of Excellence, which is being established in Kenya through the technical and financial support of UNEP (in collaboration with the African Union Commission, African countries and other development partners) could be a good example of an innovative solution. The Africa Geothermal Centre of Excellence will create a critical mass of young geothermal scientists, engineers, drillers, technicians and financiers, among others, to ensure secured and sustainable geothermal development in Africa. The Centre will thereby provide young Africans with the skills needed to add value to the continent's natural resources (geothermal) and enhance its competitiveness and sustainable growth. This initiative also enhances regional cooperation and integration in training and research in geothermal science and technology, in addition to ensuring gender diversity for social inclusion.

14. Following from the UNEP "skills gap" analysis conducted in the East Africa region, the Africa Geothermal Centre of Excellence is targeted to train a total of about 12,000 young African university graduates (both women and men) for the development of 10 gigawatts of power from geothermal energy by 2030. The Centre will provide both theory and hands-on experience (including research and development) to improve the skills and knowledge of these African youths for the needs of the geothermal energy development job market.

C. Targeted energy policy reform to upscale clean energy use

15. Another useful example is the Renewable Energy Feed-In Tariff (REFIT), which has been taken up by a number of countries in Africa. For example, Kenya adopted REFIT in 2008 (revised and enhanced in 2010). REFIT aims to stimulate market penetration for renewable energy technologies by making it mandatory for energy companies or utilities to purchase electricity from renewable energy sources at a predetermined price. This price is set at a level high enough to stimulate new investments in the renewable sector. This, in turn, ensures that those who produce electricity from renewable energy sources have a guaranteed market and an attractive return on investment. Kenya's REFIT covers electricity generated from wind, biomass, small hydropower, geothermal and biogas, with a total electricity generation capacity of 1,300 megawatts.

D. Avail necessary integrated energy data and information to planners and decision makers in Africa

16. The UNEP Africa office (in collaboration with AfDB and the African Union Commission) has developed an Atlas of African Energy Resources, which strengthens the knowledge base of renewable energy in the region, existing opportunities and current challenges for their development. The International Renewable Energy Agency 2015 Global Atlas for Renewable Energy is also a good example, in this context.

IV. Challenges and opportunities

17. Though there have been improvements and progress made in the last decade in terms of sustainable energy development, the speed on energy access and renewable energy development falls far short of achieving universal energy access for Africa by 2030. This is due to major challenges, including lack of a clear and coherent policy, regulatory and institutional framework; inadequate information and technical capacity; inadequate financing and investment, technology transfer and skill; and lack of well-organized renewable energy resource data.

18. Among others, some examples of challenges to speeding up sustainable energy development, from electrification down to cooking stoves at the household level, include the following:

(a) Deploying large-scale renewable energy projects in networks with poor transmission and distribution infrastructure: Grid extension and power pooling takes time, and with 645 million people in sub-Saharan Africa lacking energy access today, decentralized solutions will be required, notably in rural areas, where stand-alone and mini-grid solutions are expected to meet 70 per cent of the demand of newly connected customers over the next 25 years (according to the International Energy Agency). Increasingly, developers are seeing the beauty of smaller developments;

(b) Inadequate and harmonized enabling environment for accelerating development of "biomass energy such as sustainable charcoal production and consumption value chain": An enabling environment should be a set of harmonized regional policies and strategies across multiple ministries of environment and forestry, energy, transport, trade and industry, etc. Inter-agency/interministerial laws and regulations are required across the whole value chain (comprising cutting trees and wood, producing charcoal, transporting, marketing and utilization). Governments need to invest in liquid

petroleum gas infrastructure, both upstream and downstream, to ensure its sustainable availability, accessibility and affordability.

Opportunities

19. The sun is shining on African renewables:
 - (a) Falling technology costs, ambitious targets;
 - (b) Resource abundance;
 - (c) Pipeline of high-quality projects;
 - (d) The existence of international donor partners and financing mechanisms (Scaling Up Renewable Energy Program, Climate Investment Facility, Green Climate Fund, Global Environment Facility, African Development Fund, etc.), and emerging financiers (e.g., BRICS countries (Brazil, Russian Federation, India, China and South Africa);
 - (e) Various global, continental and regional energy initiatives (Sustainable Energy for All, PIDA, African Renewable Energy Initiative, Power Africa, Geothermal Risk Mitigation Facility, etc.).
20. In addition, regional considerations in harmonizing the common African position on Agenda 2063 of the Africa Union and the 2030 Agenda for Sustainable Development are driving the rollout of renewable power in Africa. Countries can look to positive experiences in lead markets such as South Africa and Kenya for strategies and best practices.

V. Recommendations

21. The case for renewable energy infrastructure in Africa is strong. The price of wind and solar technologies is falling. Political will is there, with nearly 40 countries writing renewables targets. Also, the continent has abundant resources. However, the continent must “level up” to meet the ambitious energy access goals it has set for itself, and address the challenges.
22. The new integrated approach of decentralized, decarbonized, de-risk investment and democratized energy paradigm services (indicated above) will enable Africa to reach universal modern energy access by 2030 in pursuit of the global agenda of the Sustainable Development Goals and Agenda 2063. However, implementation of each paradigm service requires innovative solutions in terms of enabling environment policy, access to finance, capacity-building in terms of knowledge management and skill, and technology.

A. Enabling environment policy

23. Adequate political will (and the change in perception by regulators of the “off-grid” sector) and Governments’ desire to implement cost-reflective tariffs based on publicly available “cost-of-service” studies are necessary. To attract infrastructure investment, power tariffs must reflect costs. Targeted subsidies to protect the poor can help improve access to power without deterring the private sector from investment.
24. Incentives should be established, such as the exemption of import duties and simplification of importation processes
25. Transparency and harmonization are essential for investors. Governments should publish key planning documents, such as integrated resource plans, and introduce bankable and harmonized legal documentation, including power purchase agreements, government support agreements and connection agreements.
26. Countries should design competitive renewable procurement programmes, rather than rely on one-off investments. While investors occasionally pursue one-off projects, government-backed renewable procurement programmes are more likely to attract long-term investment. Long-term integrated planning (both off-grid and on-grid) is necessary to provide clarity to stakeholders and developers.
27. Countries should position clean energy as an enabler of income generation, increased productivity, more jobs and ultimately economic growth, as with agro-industrialization. Clean energy should be linked to sustainable, ecosystems-based adaptation agriculture to unlock Africa’s potential for sustainable agro-industrialization. This is crucial to unlocking jobs along both the renewable energy value chain as well as along the agro-value chain. This is preferable to looking at energy as stand-alone.

28. It is necessary to look at energy policy in a more holistic perspective, balancing economics, geopolitics and technology accessibility. This is crucial to addressing barriers to clean energy uptake in Africa. For example, on economics, countries offer huge subsidies for fossil fuel use, and this is automatically a disincentive for clean energy uptake. How can this trend be reversed so there are subsidies for green energy uptake? In another example, on geopolitics, countries with fossil fuel resources consider this a strategic resource to enhance their energy independence and economic development. This automatically translates to a disincentive for clean energy development. How can clean energy policies overcome this barrier?

29. Regional policies and strategies should be harmonized across multiple ministries of environment and forestry, energy, transport, trade and industry, etc., for “sustainable biomass energy (charcoal) production and consumption”.

B. Access to finance

30. There should be collaboration with local microfinance institutions. Innovative business models should be developed to enable customers to purchase solar home-based systems, for example, with subsidiary and three-year concessional loans to enable people to own them after three years. Partnerships should be created with local suppliers, for example, of batteries and produce recycling. New climate finance opportunities should be used, for example, the Green Climate Fund, Global Environment Facility, and Climate Investment Facility, among others.

C. Capacity-building

31. Capacity should be developed in renewable energy procurement programmes. Ambitious targets are not enough. Investors are also looking at whether Governments have the technical capacity to deliver. The majority of sub-Saharan African countries have the ingredients to make renewable energy infrastructure viable, and more than half have explicit renewables targets. But those moving fastest also have the technical capacity to make it happen.

32. Capacity-building should be increased in “off-grid” electrification, such as, for example, M-KOPA Solar’s pay-as-you-go plan.

33. Capacity should be built for local manufacturers, producers, assemblers and recycling capacities for solar technologies. Technical training of local experts to improve quality of services should be improved.

34. The knowledge base on renewable energy in the region should be strengthened, as well as the existing opportunities and current challenges for their development, through preparation of the Atlas of African Energy Resources.

D. Technology

35. Accessibility to technology and innovation is a major determinant of the extent to which given energy resources can be utilized. For instance, the United States leveraged its expertise in tracking to use unconventional natural gas/fossil fuel reserves. The same also applies to clean energy technology. The level to which Africa can utilize its clean energy resources is based on the extent to which relevant technology can be accessible. Therefore, energy policy should take into account the need for Africa to develop local capacity for developing applicable technology and innovations to utilize its clean energy resources economically.

36. Standards should be built for the quality of imported and locally produced products.

37. Environmentally friendly waste management practices (e.g., handling batteries) should be ensured.

VI. Conclusion

38. The transformative actions that are required to foster environmental solutions at the continental, regional and national levels are the new energy paradigm of “decentralized, decarbonized, de-risked and democratized” energy services that will enable Africa to reach universal energy access by 2030 in pursuit of the Sustainable Development Goals and Agenda 2063. This is the rationale of the need for joint interventions of African ministers for environment and energy during the African Ministerial Conference on the Environment, and for providing policy and strategic guidance to implement innovative environmental solutions to accelerate the development of clean energies to contribute significantly to sustainable development in Africa.