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African Regional Implementation Review for the 14th Session of the Commission on Sustainable Development (CSD-14)

Report on "Energy for Sustainable Development"

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1. Introduction

1. Africa is endowed with diverse energy resources, including important reserves of oil, gas and coal that account for 9.4%, 7.9% and 5.54% respectively of the world's total[1]. The hydropower potential of the continent amounts to 13% of the world. However, energy resources are unevenly regionally located in Africa. Most of the hydropower potential lies in central and western Africa; oil and gas resources are located in the western and northern parts of the continent; coal reserves are concentrated almost exclusively in Southern Africa, and geothermal is only being developed in eastern Africa. Sixty eight percent of all proved natural gas reserves of the continent are located in Nigeria and Algeria, while more than 74% of proved oil reserves is found in Nigeria and Libya.

2. In Africa, energy is produced mainly from biomass (47%), oil (24.8%), coal (16.5%), gas (10.4%), and other renewable sources, such as large and small hydro damps, solar, and geothermal sources (1.3%)[2]. The continent has abundant solar irradiation ranging from 5 to 7 kWh/m^2, all year round, and it enjoys a relatively strong wind power potential in Northern, Southern and Eastern Africa. Finally, the continent has an estimated geothermal energy potential of 9,000 MW in the Rift Valley area in East Africa[3].

3. Electricity is generated mainly from coal (46%), gas (23%), hydro (18%), oil (11%) and nuclear (2%). Other renewable sources such as solar, geothermal, wind, etc. play an insignificant role so far. On the continent, there are strong disparities among countries: South Africa alone generates close to half of the total African electricity. Many African countries, mostly in Sub-Saharan Africa (SSA), with the exception of South Africa, rely heavily on hydropower (70% to 80%) for their electricity generation.

4. Energy consumption in Africa is largely dominated by combustible renewable resources (biomass, animal wastes, municipal and industrial wastes). Energy from biomass accounts for more than 30% of the energy consumed in Africa and more than 80% in many countries in SSA. Biomass constitutes the main energy resource for the large majority of African households mainly for cooking, drying and space heating. While data on electricity access vary widely depending on the reporting sources, International Energy Agency (IEA) reports average rates ranging from 70% to over 94% in Northern Africa, and 23% in SSA, with large disparities between countries (for instance less than 4% in Uganda compared to 66% in South Africa or 100% in Mauritius), and between urban and rural areas, where in the latter, rates can be as low as 1%[4].

[1] BP energy statistics 2005, www.bp.com
[2] IEA key energy statistics, 2002
[3] NASA Solar Map, and WEC energy analysis
[4] WEC, IEA 2002

Review of goals, targets and commitments made at A21, PFIA21, CSD-9 and WSSD

5. Agenda 21 (A21), the Programme for Further Implementation of A21 (PFIA21), the Commission on Sustainable Development (CSD-9), and the World Summit on Sustainable Development (WSSD), all call for prioritization of energy issues by policy-makers, financial institutions, regional organizations, development actors, and all stakeholders in order to achieve the MDGs and sustainable development in Africa. Energy considerations should be appropriately integrated into socioeconomic programmes and into the planning, operation and maintenance of long-lived energy consuming infrastructures.

6. The WSSD calls upon the international community to reinvigorate its commitment to address the special challenges facing Africa, and mobilize support for other initiatives on energy on the continent.

7. Specifically, the Johannesburg Plan of Implementation (JPOI) for WSSD implementation plan calls for actions at all levels to deal effectively with energy problems in Africa, including through initiatives to:

- Establish and promote programmes, partnerships and initiatives to support Africa's efforts to implement NEPAD objectives on energy, which seek to secure access for at least 35 per cent of Africa's population within 20 years, *especially in rural areas.*

- Provide support to implement other initiatives on energy, including the promotion of cleaner, more efficient and renewable energy and the improvement of energy efficiency and access to advanced energy technologies, including cleaner fossil fuel technologies, particularly in rural and peri-urban areas.

8. Commitments, targets and goals made by the various actors during the above-mentioned fora, can be clustered into the four issue-based categories discussed below.

Assessment of accomplishments and gaps

Issue 1: Energy accessibility for poverty alleviation

9. An analysis of Africans' accessibility rate to modern energy reveals its critical importance to development. Current levels of access to modern energy services and resources fail to meet the needs of most Africans particularly the rural and urban poor population in SSA. Much greater access is, therefore, required to achieve the MDGs and sustainable development.

10. To address the problem of energy accessibility, various organizations undertook a large array of measures, including energy access scale-up initiatives (UN-Habitat, UNIDO, UNDP, UNEP, IEPF); Productive use of rural/renewable Energy (UNIDO); Capacity development and investment in mini-hydro power systems (UNDP, IEPF, UNIDO); and Development of an African regional rural electrification programme (ECOWAS, UNDP).

11. The issue of accessibility to modern energy was linked to poverty alleviation efforts in some cases, but unfortunately not always. The need for more generation capacity has stumbled upon chronic lack of public funding and little interest of investors and financial institutions in the African energy market, due to the numerous disincentive measures built into national institutional, policy, legal and regulatory frameworks. Still, with close to two-thirds of Africans lacking access to modern energy and trapped in economic poverty, much more needs to be done at all levels.

Issue 2: Changing patterns of energy consumption and production

12. Energy and development experts recognize that the current production and consumption patterns of energy are not sustainable. More emphasis must be put into improving the production resource mix, through increased use of RE sources such as photovoltaic, wind, geothermal and hydro; promoting energy efficiency and conservation practices; and increasing the use of cleaner fuels, such as biofuels.

13. Clean air and an efficient transport system are essential to sustain urban development, but urban transport's heavy dependence on fossil fuels causes high pollution, particularly in Africa, due to the age, quality and condition of its rolling stock. Emissions from transport vehicles contribute as much as 70% of air pollution and the larger the city, the larger its percentage contribution to the problem. Cars, trucks, motorcycles, scooters, buses and other public transport vehicles (both in the formal and informal sectors) emit significant quantities of carbon monoxide, hydrocarbons, nitrogen oxides and fine particulate matter. Where leaded gasoline is used (as it is in most of Africa except in South Africa, Cote d'Ivoire, Swaziland, Lesotho, Botswana and Mozambique) vehicles remain a significant source of lead in urban air with its attendant health effects.

14. Activities undertaken by various actors on this issue include: Sustainable Transport Action Network for Africa (SUSTRAN-Africa) (UN-Habitat); Wood Energy Information System (WEIS) (FAO); Improving Energy Efficiency (EE) in small industries and in cities; Developing EE and Energy Service Companies (ESCO) (UNIDO, UNEP, IEPF, World Bank); Development of Renewable Energy (UNEP, UNDP, UNIDO, ADB); Development of rural energy enterprises (UNEP, UNIDO); and removing barriers for the development of renewable energy (RE) (UNDP, UNEP). These diverse actions have not succeeded in increasing the share of RE in the energy mix, generating substantial energy savings, protecting forests and increasing access to modern energy.

15. Initiatives taken to change consumption and production patterns for sustainable development have essentially lacked strong political support from national governments that they require, and the minimum critical scale of projects that can create a momentum of change. Activities are much too localized, not promoted enough and often too controversial to be intuitively understood by African people and adopted by most governments.

Issue 3: Development of advanced and cleaner energy technologies

16. This issue was not viewed as a priority for the continent, though advanced energy technologies may provide answers to the problems of decentralized rural energy development and energy efficiency. Consequently, few actions were carried out with the exception of some capacity building and networking initiatives. A lot more could be done especially in providing support to local research centers and universities, and in promoting innovative local energy enterprise ideas, based on indigenous material and locally available resources.

Issue 4: General and crosscutting issues

Support to NEPAD energy programmes

17. In its resolution 57/2 of 16 September 2002, the General Assembly of the United Nations welcomed NEPAD as an African Union led, owned and managed initiative and urged the international community and the United Nations system to organize support to African countries in accordance with the principles, objectives and priorities of NEPAD. Considerable efforts were deployed by the international and African communities to promote NEPAD and support its energy initiatives. The United Nations, within the existing programming and coordination mechanisms, developed an operational framework to support NEPAD. Actions include:

- The establishment of the Office of the Special Adviser on Africa, in May 2003, whose mandate includes, *inter alia*, coordinating global advocacy in support of NEPAD, coordinating all reports to the General Assembly and ECOSOC on NEPAD;
- UN system-wide coordination in support of NEPAD by the Secretary-General in collaboration with the Office of the Special Advisor and ECA;
- Advocacy and awareness-raising in order to popularize NEPAD programmes;
- The annual regional consultation of UN agencies working in Africa convened by ECA to serve as a platform for achieving system-wide coherence and effectiveness in support of NEPAD;

- UN-Energy/Africa, a UN system-wide collaboration with the participation of selected non-UN organizations working on energy issues in Africa. UN Energy-Africa serves as the sub-cluster on energy in support of NEPAD;
- More than US$ 3 billion was committed and invested in NEPAD projects by various organizations including ADB, Development Bank of Southern Africa (DBSA), EU, World Bank, several European governments, and the Japanese government.

18. Despite this goodwill and indicated actions, support to the NEPAD energy initiatives was not sufficient to induce the anticipated progress and many expectations of African people remain unmet. Some of the factors that hindered progress include:

- Evolving institutional status of the NEPAD with respect to the African Union and regional organizations;
- Insufficient human and institutional capacity at the NEPAD secretariat and its technical Divisions;
- Slow progress in the design and formulation of priority energy projects of NEPAD;
- Unclear procedure and framework on how best development partners can assist NEPAD; and
- Regional Economic Communities (RECs) generally do not have the human, technical, financial and institutional capacities to carry out the implementation of NEPAD projects as they are expected to in the NEPAD implementation plan.

Financial issues

19. Like any other development sectors in Africa, the energy sector suffers from meager funding and reduced financial options. Funding levels remain very low and have not increased significantly for many years. Overall, financial flows in this sector are far below the needs. The uneven regional distribution of energy resources calls for a rapid development of sub-regional oil and gas pipelines, and inter-country power lines. The high level of poverty and generally low technical capacity on the continent call for the development and use of innovative financial instruments and mechanisms that promote favorable terms that are commensurate with the needs and priorities of African countries.

20. Programmes such as the ADB FINESSE and various UNEP Finance initiatives dealt with the problem of capacity-building within financial institutions in order to raise awareness and increase the share of energy investments in their portfolio. The sector received investments from various sources including regional and international financial institutions, as well as multilateral organizations. Analysis, however, shows that the sector is still under-funded and run the risks of collapsing further unless business-as usual approaches are changed.

Capacity-building and networking for sustainable development

21. Overall, the energy sector in Africa suffers from poor planning and decision-making tools due to inadequate human and technical capacity, and insufficient scientific capacity to provide decision-makers with well-informed technical data and policy options. Thus, capacity-building and training at regional or country level, as well as awareness raising programmes are considered of high importance for the development of the continent. Networking on thematic energy issues is pertinent to achieving knowledge dissemination.

22. Several actions were implemented with the aim of strengthening the capacity of energy planners and developers (IAEA), education, research institutions and centers of excellence (IEPF). Formal training and networking schemes were used. Paradoxically, African human capacity in energy is viewed by most African policy-makers as adequate to make progress. However, national and sub-regional institutions are often severely under-equipped in communication and information management tools.

23. During WSSD, the UN received some 32 partnership submissions for energy projects with substantial committed resources. These include:

- EU Energy $700 million partnership Initiative for Poverty Reduction and Sustainable Development, with the European Commission, as a leading partner;
- Global Network on Energy for Sustainable Development (GNESD) led by UNEP;
- Global Energy Partnership, with UNDP and the World Bank as leading partners;
- The Renewable Energy and Energy Efficiency Partnership (REEEP) led by the UK Government;
- Clean Fuels and Vehicles Partnership with the US Environmental Protection Agency (EPA), UNDESA and UNEP as leading partners;
- Indicators for Sustainable Energy Development (ISED) with IAEA as a leading partner;
- The South African energy utility (ESKOM) partnership to extend modern energy services to neighbouring countries; and
- The nine major electricity companies of the E7 agreements with the UN to facilitate technical cooperation for sustainable energy projects in developing countries.

24. Overall, networks initiatives have achieved mixed results. Few African Centers of Excellence were identified and strengthened to assume the role initially intended for them.

25. Gaps in actions implemented proceed from the small number of capacity enhancement programmes aimed at addressing the needs of sub-regional organizations such as the RECs, Power Pools, etc. Therefore, they remain a weak link when it comes to designing and implementing regional integration projects that normally fall under their leadership.

African regional energy integration

26. All energy Divisions of the RECs aim at ensuring the availability of a sufficient, integrated, efficient and cost effective infrastructure system that will support and sustain regional economic development, trade and investment for poverty alleviation. They are all committed to supporting NEPAD energy initiatives and to undertake joint development or use of hydropower generating facilities, expand sub-regional power pools and interconnection of electricity grids, as well as develop, where cost effective, cross-border gas and oil pipeline projects.

27. In West Africa, the establishment of a regional electricity market through the West African Power Pool (WAPP), and the provision of natural gas from Nigeria to Benin, Togo and Ghana for electricity generation and industrial use through the West Africa Natural Gas Pipeline (WAGP) and the ECOWAS Energy Observatory are among the current priority actions. Some progress was made, with the launching of the Nigeria-Benin interconnection, the completion of studies for several priority projects[5], the drafting of the regional electricity master plan, and the signing/ratification by several countries of the regional energy protocol.

28. The core of ongoing efforts in Southern Africa include Facilitating the implementation of the Southern African Power Pool (SAPP) plan; Establishing and maintaining a regional energy-planning database; Facilitating the creation of an information exchange system in all SADC member States; Developing a regional capacity-building programme for the creation of national electricity regulatory authorities in the SADC member States; and Establishing and operationalizing the Western Corridor Project (Westcor).

29. Progress was made in the SAPP, with the expansion of the market to eight power utilities and banks in eight countries, a significant increase in the energy and volume of trade in the short term energy market, and the signing of the Inter-Governmental Memorandum of Understanding (IGMOU) and Inter-Utility Memorandum of Understanding (IUMOU) of the Westcor project in South Africa on 22 October 2004. The estimated $7 billion Westcor project will comprise the construction of a 3,900 MW hydroelectric dam at Inga, a transmission line and a telecommunications line that will connect five SADC countries[6].

[5] Interconnection between Mali and Cote d'Ivoire; Ghana-Togo-Benin; the Sambagalou hydroelectric project and interconnection between Guinea Bissau-Ghana-Senegal; Interconnection between Cote d'Ivoire-Burkina Faso, and Nigeria-Benin.

[6] Botswana, Angola, Namibia, South Africa and DRC

30. In the other sub-regions of Africa, such as Central and Eastern Africa, efforts to develop an energy programme are being pursued. The Central Africa Power Pool (PEAC) was established in April 2003, in Brazzaville. It is to cover the 11 countries of the Economic Community of Central Africa States (ECCAS). The latest of the power pool arrangements, the Eastern Africa Power Pool (EEAP), was launched in March 2005.

African energy information management

31. Progress was made in the collection, management and dissemination of energy information in Africa by several actors: The World Energy council (WEC), the International Energy Agency (IEA) and the UN Statistics Section of UNDESA have developed databases of statistics for the African energy sector. Other institutions active in this area at the regional level are FAO, IEPF, UNDP, US-EIA and UNEP. The African Energy Commission (AFREC), an AU technical organ, launched in May 2005 the African Energy Information System (AIES). These advances will assist Africa in the collection and management of key energy information and assist decision-makers in formulating sound energy policies, based on best practices and up-to date technology options.

Constraints and challenges

32. Analysis of the African energy sector reveals a continent that is undersupplied in modern energy. When energy is available, it is supplied in a form that is usually inappropriate for the needs of the majority of people and economically unaffordable by most of those who have access to it. Some specific challenges in the sector can be identified as: Low energy production due to largely untapped energy resource potential; Uneven regional distribution of energy resources; Weak share of RE in the energy mix; Low oil refinery capacity; Underdeveloped transport, transmission and distribution infrastructure for oil, gas and electricity; Low private sector participation and investment in the energy sector; Very low access to energy in rural Africa; Non-efficient utilization of energy; and Inadequate policy, regulatory and institutional framework.

Lessons learned

33. The African energy sector has still a long way to go to meet the needs of most Africans, especially the urban and rural poor. Progress is slow due to many factors including: i) Low investments (manifested mostly through largely untapped energy potential and underdeveloped infrastructure and energy transport networks); ii) Inefficient management and planning that results in sub-optimal financial performance of the electricity sector; iii) Inadequate institutional framework including policy and regulatory measures that deter a larger participation of the private sector; and iv) Low technical capacity leading to premature failing of many existing equipment.

34. The following lessons could be distilled from the responses to the review surveys:

- To achieve targets and commitments made by stakeholders, African countries must take full account of the specific human, economic and environmental

constraints of the African energy challenge. For instance, effectiveness can only occur in rural energy when the specificities of the African rural areas are integrated in the design of solutions.

- There is great opportunity to share experiences between rural and urban poor areas so as to test innovative approaches to rural energy access (electrification and modern energy sources for household cooking fuel) within a peri-urban setting (Habitat report).

- Unless commitments of African governments are translated into stronger support for capacity-building projects, they have little chance to achieve their goals and targets (IAEA report). Governments must therefore be involved, at the earliest stage possible, in the design of the commitments to be implemented.

- There is a need to provide more opportunities for sharing innovative approaches between Asia, Latin America and Africa to address many problems related to energy for development, particularly energy access to the poor and for urban transport infrastructure investment patterns tied to air-quality management (Habitat report).

- The generation of information and the adoption of wood energy policies and programmes aimed at developing sustainable wood energy systems are vital for the contribution of wood fuels and their derived energy for food security, poverty alleviation, economic development, sustainable forestry management and climate change mitigation through carbon substitution and sequestration (FAO report).

- When building sustainable energy investment capacity within a financing organization, the approach needs to be flexible as different institutions follow different 'product development' paths. Changing the way a financial organization considers new investments therefore requires better information to combine social and environmental factors – both risks and returns - as integral measures of economic performance. To enter a new sector, for instance, some banks may first focus on creating the right policies while others focus on training personnel (UNEP).

- Training in energy analysis and modeling using specific national, regional data and contexts are requested by many African decision-makers (IAEA).

- Regional financial institutions, such as ADB, have determined that internal capacity-building programmes such as FINESSE, help in understanding the risks related to investments in projects using new technologies like renewable energy and energy efficiency systems. This, ultimately, will lead to more renewable and EE projects within the Bank's investment portfolio and create awareness within the Bank on the pressing energy needs for poverty reduction.

Recommendations

35. Efforts undertaken by various actors must be pursued with dedication to improve the institutional, legal and regulatory environment; attract more investors and private sector participants to the energy sector; hasten the pace of regional integration projects; promote environmentally-safe energy technologies such as renewable energies, and increase access to modern energy to the rural and urban poor to reduce poverty and achieve the MDGs. Major initiatives must be taken and scaled up to make progress, in particular to:

Prioritize efficient institutional, regulatory and policy framework

36. In order to address issues such as the lack of funding, low private sector participation and overall low performance of the energy sector, African policy-makers are urged to pay special considerations to policy measures that clarify the role of various stakeholders (public and private); improve national investments climate for both domestic and foreign investors, in general through putting in place more favorable legal and regulatory reforms; strengthen the role of independent energy regulatory bodies; and lift barriers to the realization of regional integration projects in energy.

Increase financial flows into the African energy sector

37. International development partners, including the UN should enhance their role to support African countries in undertaking the necessary reforms conducive to a coherent, transparent and attractive investment framework and increase their advocacy and funding to mobilize and significantly increase the financial flow towards Africa for investment in energy projects. Commitments made to set the NEPAD energy initiative as priority for the continent should be reinforced.

Promote energy regional integration as a catalyst for development

38. The RECs, with the support of international partners, must pursue with dedication, their efforts to promote regional energy trade as an efficient means to reduce the uneven distribution of energy resources on the continent, reduce energy import cost burdens on most national economies, and increase the supply of secure and environmentally sustainable energy.

39. AFREC should receive more assistance to accelerate the achievement of energy integration between all African regions, through up-to-date energy information, as well as regional and national capacity development of pertinent energy-decisions tools.

Improve the share of RE in the African energy mix

40. To achieve significant progress in the development of renewable energy on the continent, African governments should put in place coherent regulatory and policy frameworks that support the development of thriving markets for renewable energy technologies and recognize the important role of the private sector. This includes removing barriers and allowing for fair competition in energy markets and taking into account the concept of internalizing external costs for all energy sources. Such frameworks are essential to realizing the potentials of renewable energy technologies in an effective and efficient manner; creating favourable conditions for public and private investments in renewable energies, and extending modern energy services to populations currently without access. African decision-makers are then urged to fulfil their commitments made at forums such as the World Conference on Renewable Energy (Renewables 2004) held in Bonn, in April 2004, with regards to the development of RE.

Link rural energy development programmes to poverty reduction strategies and the achievement of the MDG

41. Energy access for the poor, particularly in rural areas should be given a priority consideration in any development policy and programme. National governments, international development partners, regional, sub-regional decision-makers should pay particular attention to problem of access to modern energy in rural areas, and view it as inseparable from poverty reduction efforts and economic growth strategies. They should, therefore, be willing to drastically increase their financial participation in the sector and assist in the development of key infrastructure that can sustain the minimum economic growth required to break the cycle of poverty and achieve the MDG.

Promote coordination and coherence among all international partners

42. Given the number and diversity of international development partners in the energy sector, more efforts must be made by all energy stakeholders, especially UN organizations, to create coherence, complementarities and effectiveness. This can be achieved in the framework of a collaborative mechanism such as UN-Energy/Africa among UN agencies, UN programmes and Funds and key non-UN organizations working on energy issues in Africa, in collaboration with regional organizations such as the AU and AU/NEPAD.