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Ad Hoc Expert Group Meeting on Assessment of
Power Pooling Arrangements in Africa

Addis Ababa, Ethiopia
24-26 June 2003

Report of the
Ad hoc Expert Group Meeting on
Assessment of Power Pooling Arrangements in
Africa

I. ATTENDANCE AND ORGANIZATION

1. The Ad Hoc Expert Group Meeting on Assessment of Power Pooling Arrangements in Africa was held at the Headquarters of Economic Commission for Africa (ECA) in the United Nations Conference Centre (UNCC), Addis Ababa, Ethiopia, from 24 to 26 June 2003. The Meeting was formally opened by Mr. Josué Dioné, Director of the Sustainable Development Division after brief welcome remarks by Mr. Pancrace Niyimbona, Coordinator of the Meeting.

2. The Meeting was attended by experts from the power pools and utilities involved in cross-border electricity trade operating in Africa such as the Southern African Power Pool (SAPP), West African Power Pool (WAPP), Communauté Electrique du Benin (CEB), Compagnie Ivoirienne d'Electricité (CIE), Volta River Authority (VRA), Uganda Electricity Transmission Company Limited (UETCL) and Ethiopian Electric Power Corporation (EEPCO) as well as the African Energy Commission (AFREC), the African Development Bank (ADB), the World Energy Council (WEC). The Meeting was also attended by an expert from the ECA's Office for Southern Africa as well as by staff of SDD. The list of participants is provided in Annex 1.

II. ACCOUNT OF PROCEEDINGS

A. OPENING OF THE MEETING (Agenda Item (i))

3. The meeting was formally opened by Mr. Josue Dione, Director of the Sustainable Development Division (SDD), on behalf of the Executive Secretary of the Economic Commission on Africa (ECA). He welcomed all experts invited to the ad hoc meeting, and expressed appreciation for offering to share their experiences in finding solutions to improving the security and reliability of energy supply in African. He stressed the need for a reliable and affordable energy to drive productive activities to sustain the 6% growth recommended under the NEPAD initiative. He touched on very disturbing statistics on the state of Africa's energy situation that needed to be reversed with pragmatic strategies.

4. These include the fact that:

- Africa is known to be rich in commercial energy resources that are unevenly distributed within and among regions normally located at considerable distances from each other.
- Despite the abundance of these commercial energy resources, Africa accounts for only 3% of the world's commercial energy consumption, because many people on the continent cannot afford commercial energy due to poverty.
- Most people in Africa rely on biomass energy to meet their daily energy needs, despite its attendant environmental consequences, and it is known that over 90% of final energy consumption in some sub-Saharan African countries derives from biomass.
- Due to the inefficient use of commercial energy resources, Africa uses by far more energy to create \$1 of wealth (as reflected by "units of energy consumed per \$ GDP") compared with other developing countries.
- Barely 10% of Africa's 800 million populations have access to grid electricity.
- Vast hydro potential of the Continent remains undeveloped, whilst more than 80% of electricity generation is based on thermal sources.

- Lack of energy transportation channels, such pipelines and transmission lines, to move energy from abundant commercial energy sources to deficient areas, is resulting in energy being wasted.

5. He observed that in view of the above, efforts are being made to promote inter-country energy cooperation and contribute to the development of infrastructure that will help in the redistribution of Africa's energy resource for the development of the continent. He intimated that one of the immediate areas where energy can be redistributed is by the use of Power Pooling method, to promote the sharing of electrical energy within various regions on the continent.

6. He informed the delegates that the Economic Commission on Africa (ECA) had initiated a study on the existing arrangements in power pooling in Africa and had documented the experiences of the Southern African Power Pool (SAAP), the West African Power Pool (WAPP) and other cross-border electricity trade in Africa in a report titled "Assessment of Power Pooling Arrangements in Africa".

7. In order to ensure that the study was complete and comprehensive, he urged the invited experts in the electricity sector from the various African Regions to review the study and comment accordingly. The experts were specifically tasked to:

- Share expertise and experiences on the challenges facing the major institutions in the power pooling arrangements.
- Review the status and effectiveness of the existing arrangements governing cross-border electricity trade in Africa, to support growth.

8. In conclusion, he urged experts to come up with recommendations that would improve development and operation of power pools and related cross-border electricity trade in the continent.

B. ORGANISATIONAL MATTERS (Agenda Item (ii))

B.1 Election of the Officers

9. The meeting elected the following members to administer deliberations:

Mr. Libere Buzingo	-African Energy Commission (Algeria)	-	Chairman
Mr. Kofi Ellis	-Volta River Authority (Ghana)	-	Secretary

B.2 Adoption of the Agenda and Programme of Work

10. The meeting adopted the following agenda

- (i) Presentation by ECA Secretariat of the Report on "Assessment of power pooling arrangements in Africa"
- (ii) Presentation on experiences of development and operation of regional power pools by
 - Southern African Power Pool (SAAP)
 - West African Power Pool (WAPP)
- (iii) Presentation on energy projects/programmes of international and regional institutions
 - WEC Africa Energy Integration Study
 - Prospects for implementing the Nile Basin Regional Power Trade Project

- Programme of the African Energy Commission (AFREC)
- (iv) Presentation on experiences and prospects of cross-border electricity trading in selected regions by:
 - Compagnie Ivoirienne d'Electricité (CIE) in West Africa
 - Volta River Authority (VRA) in West Africa
 - Communauté Electrique du Benin (CEB) in West Africa
 - Uganda Electricity Transmission Company Limited (UETCL) in East Africa
 - Ethiopian Electric Power Corporation (EEPCO) in East Africa
- (v) General discussion on “Arrangements for improved development and operation of power pools and related cross-border electricity trade”:
 - Terms and conditions governing cross-border electricity exchanges and mechanisms for dispute resolutions
 - Rules and regulations for operation of the interconnected transmission systems, including wheeling
 - Establishment and operating regional power pools, including coordination of pool operations and transmission congestion management.
- (vi) Conclusions and Recommendations
- (vii) Adoption of conclusions and recommendations

11. With regard to the programme of work, the meeting agreed to work in plenary session, and between 09.30 am and 17.30 pm.

C ACCOUNT OF PROCEEDINGS

C.1 Presentation of the Report on “Assessment of power pooling arrangements in Africa”

12. The report on “Assessment of power pooling arrangements in Africa” was presented by Mr. Pancrace Niyimbona, Energy Affairs Officer in the Sustainable Development Division (SDD). In his presentation, Mr. Niyimbona pointed out that in Africa, interconnections and cross-border electricity exchanges have been in existence for nearly half a century. He observed that most of these interconnections originated from the development of some of the major hydroelectric power projects, including Owen Falls hydropower station in Uganda (1950s), Kariba North hydropower station on the Zambia-Zimbabwe border (1960s), Akosombo hydroelectric dam in Ghana (1960s), Inga 1 hydropower station in the Democratic Republic of Congo (1972), Cahora Bassa hydroelectric dam in Mozambique (1974), and Inga 2 hydropower station in the Democratic Republic of Congo (1982).

13. He further observed that the search for more reliability and security of electricity supply had been the determining factor in the decision to develop most of power system interconnections and to enter into inter-utility electricity exchange agreements between neighboring countries. Through the sharing of operational reserves and installed capacity, interconnected power systems were able to avoid additional investment in generation infrastructure. Thus, power pooling among electric power utilities aims at effectively harnessing savings in operating costs and reliability benefits through coordinated interchange of power, energy and related services.

14. He noted that experiences of development and operation of selected power pools in Europe and the United States showed that power pooling arrangements had for the most part evolved from simple interconnections between neighboring utilities to support each other in case of emergencies, into more sophisticated formal legal entities with differing responsibilities in system operation and power market regulation. Most of these power pools were formed following the restructuring of the

electric power industry dominated by vertically integrated utilities in order to introduce more competition at the generation level, with subsequent third party access to transmission grid system.

15. He further noted that there were two types of power pooling arrangements: (i) mandatory or pool arrangement where output of all power generating facilities were pooled together and dispatched centrally and where no physical dispatch was allowed outside the pool (U.S. "tight" power pools and Electricity Pool of England and Wales), and (ii) flexible or loose pool arrangements where power trading outside the pool was allowed (Nord Pool). However, while traditional U.S. tight power pools were created to improve reliability, to minimize operating costs through cost-based dispatch, and to accommodate control of decision making by large, vertically integrated companies, competitive power pools in Europe (Nord Pool and NETA) were created to maximize competition in generation (subject to accepted reliability standards), to compete on price, not on cost and to be open to all market participants. The latter are termed "new style" power pools and are organized markets for trading in electricity commodities and services and open to all participants.

16. He indicated that establishment of regional power pools in Africa was a recent phenomenon although the sub-regional economic groupings had been considering power pooling as the appropriate mechanism and framework for addressing the question of regional electricity cooperation and integration. Most of existing arrangements for inter-utility and other cross-border electricity exchange have thus been taking the form of bilateral trading agreements between vertically integrated power utilities.

17. He further indicated that the terms and conditions provided for in the power purchase agreements (PPAs) governing inter-utility electricity exchanges had not changed over time, while there was no coordinated planning of power system expansion. This resulted in lack of reliability of supply due to power generation capacity constraints for exporting utilities in connection with their export obligations. However, despite this problem of adequacy and reliability of supply, inter-utility system interconnections and related cross-border electricity exchange arrangements have proved to constitute building blocks for the formation of potential power pools within the same regional economic communities (RECs).

18. In this regard, he gave the example of the Southern African Power Pool (SAPP), which was initially created as an "association of vertically integrated electric power utilities" representing twelve SADC member countries. Most of these utilities were already interconnected and had been involved in cross-border electricity exchange for decades. Pooling arrangements within the SAPP, the first and only operational regional power pool in Africa, have been evolving from loose pool arrangements dominated by long term bilateral contracts among vertically integrated utilities to competitive pool in which bilateral contracts are complemented by the short-term energy market (STEM).

19. He noted that, while the performance of the SAPP operation and effectiveness of related pooling arrangements could be considered satisfactory, there was need to invest in high-capacity tie lines on the interconnected grid system in order to allow for increased transactions on the STEM, thereby accelerating the transition to the regional spot market. A regional regulatory body should be created as a matter of urgency to deal with such challenging issues as rules for access to transmission grid and transmission pricing, stimulation of regional trade and incentives for the development of the regional transmission grid system.

20. With regard to the West African Power Pool (WAPP), which is being formed taking advantage of lessons learned from the establishment and development of the SAPP, he observed that one of the major challenges facing ECOWAS countries and WAPP members in the operationalization of the new power pool would be to adequately address the issue of lack of an integrated regional transmission grid system. According to the regional power master plan adopted by ECOWAS Energy Ministers in September 2001, investment of US\$ 10 billion would be required for the construction of new power generation plants and upgrading and building new high voltage transmission lines over the next 15 years.

21. He indicated that prospects of establishing other power pools in Africa were encouraging. He gave the example of the development of East African Power Pool, which was being given a boost with the launching of the Study on an East African Community (EAC) Power Master Plan, with financing from SIDA through the Trust Fund managed by the World Bank. The East African Power Pool was likely to be interconnected with the SAPP following implementation of the planned Kenya-Tanzania-Zambia interconnection.

22. In conclusion, he indicated that the establishment and operation of the Southern African Power Pool (SAPP) could be considered as a major achievement of successful regional electricity cooperation and integration. He underscored that SAPP was serving as a model for the establishment of other regional power pools in Africa in general, and the West African Power Pool in particular.

C.2 Presentation on Experiences of Development and Operation of regional power pools

C.2.1 Presentation on the Southern African Power Pool (SAAP)

23. The experience of development and operation of the Southern African Power Pool (SAPP) was presented by Dr. Lawrence Musaba, SAPP Co-ordination Centre Manager.

24. Dr. Musaba introduced the SAPP as a regional body that was formed in 1995 through a Southern African Development Community (SADC) treaty to optimise the use of available energy resources in the region and support one another during emergencies. The power pool is comprised of twelve SADC member countries represented by their respective electric power utilities and its Co-ordination Centre is located in Harare, Zimbabwe.

25. The salient points of Dr. Musaba's presentation are summarized below.

❖ *Experience of SAPP include:*

- ***Interconnection and trading*** - SAPP interconnections and regional bilateral trading started in the 1950s with the line connecting the DRC and Zambia. This was followed by the interconnection of Zambia and Zimbabwe in the 1960s following the construction of Kariba Dam. In 1975 South Africa was connected to Mozambique via a DC line from Cahora Bassa to Apollo. In 1995, South Africa was connected to Zimbabwe by a 400kV line. After these interconnections, the region has seen the flow of energy from the DRC to South Africa and vice versa in the form of bilateral contracts.
- ***Completed studies:*** SAPP has completed a number of studies including: the SAPP Pool Plan (2001), the SAPP Telecommunications Study (2001), and the SAPP Transmission Wheeling Study (2001).

- Coordinated planning - SAPP has the capacity to co-ordinate the planning and operation of the SAPP network while maintaining reliability and autonomy of the participants. SAPP has experienced personnel to run the power pool and to formulate the concepts and operational principles for the anticipated regional spot market.
- Dispute resolution - SAPP has gained the experience of resolving inter-utility disputes and conflicts. SAPP members are now more confident to use SAPP as a referee in resolving their disputes.
- Technical expertise - SAPP has built the reputation for developing and proposing acceptable technical solutions to its members. The governments of the SADC countries use SAPP as an example of a successful regional co-operation. This is because SAPP has the experience to run its affairs effectively.

❖ ***Benefits of operating SAPP include:***

- Reduction in capital & operating costs - There has been a reduction in both capital and operating costs through coordination. Also members have been able to fully recover their costs and share equitably in the resulting benefits, including reductions in required generating capacity, reductions in fuel costs and improved use of hydroelectric energy.
- Reduction in operating reserve requirement – before the pool, members carried a 30% reserve margin. At the moment, SAPP requires members to carry only 10.2% for hydro and 7.6% for thermal.
- Reliability and security of supply - there has been an increase in system reliability and security of supply through emergency support when required.
- Regional forum - The power pool has provided a forum for regional solutions to electric energy problems.

❖ ***Other benefits of operating SAPP, as for any other power pool, include:*** Optimization of generation resources
Improved diversity in fuel use

- Increase in volume of electricity trade
- Seasonal and load diversity
- Energy cost differentials

❖ ***Problems encountered in the development and operation of SAPP include:***

(i) **Startup problems**

- Policy of self-sufficiency - The chief constraint to increased regional trade in electricity was the policy of self-sufficiency pursued by individual countries.
- Lack of trust and commitment – The lack of mutual trust and openness among member countries prevented meaningful collaboration.
- Underdeveloped Legal framework - The general lack of cost reflective pricing for electricity and weak or underdeveloped regulatory frameworks created uncertainty.
- Official language – debate on the language of communication from a choice of three; English, French and Portuguese.
- Dispute resolution - Lack of proper and acceptable mechanism for dispute resolution.

(ii) **Operational problems**

- Size of the utility: The larger and bigger utilities tend to dominate at the expense of the smaller utilities.

- Differing Bilateral contracts: The lack of a common policy on bilateral contracts has resulted in a wide variation contracts within the pool. Usually smaller utilities are at a mess of the larger and capable utilities when it comes to negotiating contracts.
- Lack of investment funds: The unavailability of funds to finance new investments means that the pool is not in a position to do and complete the projects according to the plan set out in the SAPP Pool Plan.
- Other problems include: Transmission bottlenecks, agreement on energy and wheeling tariffs, and inadequate telecommunication to support the operations.

❖ **Challenges facing SAPP include:**

- Competition versus co-operation – The SAPP is faced with the challenge of moving from a co-operative pool to a competitive pool and eventually into a spot market. For fair and effective competition, participants must be equal in terms of capacity to trade and access to the grid and this is not the case in SAPP.
- Power sector reforms & restructuring – because of the power sector reforms and restructuring taking place in member states, member utilities may cease to exist in their present form. This will call for a new governance and structure. The governance and membership of SAPP was derived from the desire for economic co-operation. The environment under which SAPP operates has significantly changed.
- SAPP Interconnections – some members of SAPP are still not interconnected to the grid. For such members to commit themselves and participate fully in SAPP, the SAPP grid would need to be extended to include them.
- Generation capacity – The SAPP generation capacity is expected to run out from 2008/9. Massive investment in the generation sector is required now to avoid future blackouts.

C.2.2 Presentation on the West African Power Pool (WAPP)

26. The presentation on the experience of the ECOWAS Secretariat in the implementation of the West African Power Pool (WAPP) Project was made by Mr. Issa M. Diaw, Technical Adviser for the WAPP Project.

27. Mr. Diaw introduced his presentation by observing that ECOWAS member States adopted an Energy Policy and Energy Programme as their framework for regional cooperation in the energy sector through the Decision A/DEC.3/5/82 of the ECOWAS Heads of State and Government. This was in accordance with ECOWAS objectives of promoting economic cooperation and integration in West Africa.

28. He indicated that the ECOWAS energy sector could be characterized by:
- Abundant but unevenly distributed primary energy resources;
 - Low level of exploitation of these resources;
 - Low performance of the electric power sector;
 - Difficulties for mobilizing financing of investments in the sector due to the small-size of national energy markets;
 - Installed power generating capacity totaling 10222 MW (42% hydro; 58% thermal), and
 - A long experience of bilateral electricity exchange established between Côte d'Ivoire, Ghana, Togo and Benin, while Mali, Mauritania and Senegal started sharing electricity generated by the long-awaited Manantali hydropower station in 2002.

29. He also indicated that ECOWAS Secretariat had been performing studies to quantify the potential benefits of pooling resources and developing power exchanges within the West Africa region. These included simulations with the WAPP optimisation model showing that, for a period from 2002 to 2012, substantial gains could be expected from free trade. The establishment of the West African Power Pool (WAPP) could be considered as a follow up to the Decision A/DEC.5/12/99 signed by the Heads of State and Government in December 1999.

30. The salient points of Mr. Diaw's presentation are summarized below.

❖ ***Strategy to implement the WAPP Master Plan consists of the following:***

- Develop power systems interconnections and power exchange between member states;
- Promote and protect private investments in energy projects;
- Harmonize legislations and standards of operation in the power sector; and
- Create an open and competitive regional electricity market.

❖ ***Three main Agreements govern the implementation of the WAPP Master Plan:***

- The Inter-Governmental Memorandum of Understanding (Accord Cadre) signed by ECOWAS Energy Ministers in September 2000
- The Protocol of Cooperation between the Transmission System Operators in member States adopted by the Chief Executives of power utilities in March 2001; and
- The Decision A/DEC.8/121/01 of the Heads of States and Government on financing mechanisms of the WAPP project.

❖ ***Priority projects being implemented within the WAPP Master Plan are:***

- ***Power generation component:***
 - Rehabilitation of existing thermal power plants
 - Construction of new combined cycle power plants (8,879 MW)
 - Estimated total investments: US\$ 8.3 billion
 - Development of new hydroelectric power plants by year 2005 (1010 MW)
 - Estimated total investments in hydropower plants: US\$ 1.7 billion.
- ***Transmission system component:***
 - Interconnecting ECOWAS countries through different transmission lines
 - Estimated total investments in transmission lines projects: US\$ 590.25 million.

❖ ***The WAPP Implementation structure is as follows:***

- ***Steering Committee:*** Consists of Ministers of Energy of member States. It endorses recommendations of the Implementation Committee, and adopts implementation plans for all countries
- ***Project Implementation Committee:*** Consists of the Chief Executives of electric power utilities. It analyses findings and recommendations of the Working Groups, reports and submits recommendations to the Steering Committee.
- ***Institutional and Technical Working Groups:*** Comprised of experts from member States and national utilities. The Working Groups develop institutional and technical aspects of the WAPP Implementation, and report their findings to the WAPP Implementation Committee
- ***Project Teams:*** Composed of experts from member States and national power utilities. The Project teams coordinate the studies and project works.
- ***Donors' Coordination Committee:*** Consists of Representatives of the Aid agencies, Donors, Development Partners of the Energy Sector and Members of the WAPP Steering Committee.

- ❖ ***Other arrangements for the smooth operation of the WAPP consist of the following:***
 - ***Institutional design and governance of WAPP:*** The Governance of WAPP would include: the General Membership, the Executive Board, the Technical Committee, the Planning Committee, the Dispute Resolution Commission, as well as the General Management Group. The Independent Regional Regulatory Agency will be a 5-member decisional body at the highest level of expertise operational by 2005.
 - ***ECOWAS Energy Protocol:*** Signed by the Heads of States and Government in January 2003, it will be an appendix of the ECOWAS Revised Treaty after its adoption and signature by the Heads of State and Government and ratification by the national parliaments. Its provisions include the following:
 - Ensure free trade of energy, equipment and products related to energy between Member States;
 - Define non –discriminatory rules for trade and dispute resolution;
 - Attract and protect private investments; and
 - Ensure the protection of environment and promote energy efficiency.
- ❖ ***Next steps in the implementation of the WAPP consist of the following:***
 - Ratification of the Energy Protocol and harmonization of national electricity laws;
 - Establishment of the Energy Observatory - Information and Coordination Centre;
 - Developing priority interconnections project to complete interconnectivity in the region;
 - Establishment of the regional regulation body;
 - Study and establishment of a Fund for Financial Security of Power Transactions;

C.2.3 Discussions and issues arising from the presentations by SAPP and WAPP

31. There is no fixed approach procedure for the establishment of a power pool, but this is largely determined by the historical context. While in Southern Africa, power pooling was initiated by utilities and later on endorsed by governments due to the fact that inter-utility power exchanges were well established even before most of the states in the sub-region gained their independence, in West Africa, the situation was quite different and power pooling was initiated by governments which subsequently involved their national utilities. However, irrespective of the history and development pattern of countries involved, there is a need to put in place an enabling institutional, legal and regulatory framework to ensure effective establishment and operation of power pools.

32. Good communication facilities within a power pool, such as Internet connectivity and email, are essential for the effective power trading and exchange of information on network condition, bids and offers, etc. The SAPP Coordination Centre has three separate control areas, which can be monitored via the Internet. A project is currently in the pipeline to link all the three control areas via telecom V Sat.

33. The Grand Inga hydropower project in the Democratic Republic of Congo (DRC) has been identified as one of the major projects to be implemented with the New Partnership for Africa's Development (NEPAD) and is considered as key to solving the power problems of Africa. Successful implementation of Grand Inga project could contribute to integrating the various power pools to be established in the different regions. In this regard, it was disclosed that WAPP was currently in the process of drafting the terms of reference (TOR) for the interconnection between DRC and Nigeria as part of its medium-term power development plan.

C.3 Presentation on Energy Projects/Programmes of International/Regional Institutions

C.3.1 Presentation on the World Energy Council (WEC) Africa Energy Integration Study

34. The presentation on the main findings of the WEC Africa Energy Integration Study was made by Mr. Wale Shasanya, WEC Regional Coordinator for Africa.

35. In his presentation, Mr. Shasanya indicated that, with regard to the above study, the WEC Africa members had decided to:

- Prepare a discussion document to increase awareness and understanding of the potential benefits of energy cooperation and integration
- Analyse the factors that have affected cooperation and integration in Africa in the past
- Use the WEC Africa network of Committees and outside resources –ECA, ESMAP, US Department of Energy (DOE), Energy Research Institute of the University of Cape Town (South Africa), etc

36. He further indicated that all of the above were to ensure that issues involved were put into wider arena beyond, in some cases African energy experts. He provided relevant information on the study, such as the study team and its funding (50:50; CIDA and BP Southern Africa).

37. The salient points of Mr. Shasanya's presentation could be summarized as follows

❖ ***Factors affecting cooperation and integration include***

- Markets
- International Development Policy
- International Pressures
- Economic Development Pressures
- Geography and Population Distribution
- Safety and Security
- Governance
- Human and Financial Capacity
- Standards & Specification Compatibility

❖ ***With regard to markets, the following are worth considering:***

- Existence of well developed markets / anchor (foundation) customer is crucial
- Energy is not a precursor not a concomitant to development
- Existence of markets and purchasing power is positively correlated to economic development (GNP/GDP) and also urbanisation
- WAGP gas marketed for electricity generating and industrial uses in Benin, Togo, Ghana & Ivory Coast – all members of WAPP*
- Important implication for security of supply (Ghana hydro problems) and viability of WAGP project
- Role to be played by distributed power options as pooling will solve energy access problem in Africa

❖ ***With regard to international pressure, the following are of some importance:***

- Project development in Africa (hydro) opposed by international pressure groups due to negative effects on local environment and displaced people

- Seen as capital-intensive absorbing scarce national funds better allocated on health, education etc.
 - Priorities in Africa are different than in Developed Countries – pressure for economic development and increased energy supply is greater in LDCs
 - General decline in funding from the International Monetary Fund (IMF), World Bank, ODA and foreign direct investment (FDI) particularly from US independent power producers (IPP) – how will increased generating reserve capacity be raised?
- ❖ ***With regard to safety and security, the following are worth considering:***
- Instability and war a serious barrier to cooperation and integration – HV power lines vulnerable to damage
 - Lack of safety and security reinforces the risk premium attached to investment in Africa
 - But evidence that progress is still possible even with tension and war
- ❖ ***With regard to human and financial capacity, the following could apply:***
- Policy implementation requires human and financial capacity
 - Lack of human capacity results in centralisation of technical expertise in order to derive greatest value from scarce resources
 - The ability to retain human capital within energy industry is fundamental
 - Financial competencies (corruption, mismanagement etc) add to risk premium and poor credit rating
 - Risk, perceived or real, are affected by
 - ✓ Lack of clear energy laws, policies and regulations
 - ✓ Lack of capacity to enforce them if they exist
 - ✓ Insecure purchasing power of power utilities
 - ✓ Breach of contracts or concession agreements
 - Institutional, legal and regulatory frameworks are needed for energy infrastructure, power trading and dispute resolution
 - Maintenance culture important and related to human and financial capacity
- ❖ ***With regard to standards and product compatibility, the following could apply:***
- Electrical networks in African countries follow colonial standards
 - For electricity trading harmonisation goes beyond technical standards and includes wheeling charges and other terms of trade
 - Petroleum products similarly affected
 - ✓ Affected by efficiencies in refining process and crude qualities.
 - ✓ e.g. East and West Africa disparity in petrol and diesel specification (RON and Sulphur contents) could limit trade.
38. He concluded his presentation by observing that:
- Energy cooperation and integration is under way in Africa, but full integration through power pools and pipeline distribution networks still constitutes a long-term task as evidenced by the us,(Nordic, UK pools);
 - Peace and stability are important but not always essential;
 - The “demonstration effect”; and
 - Energy projects (pools, pipelines) should be geared to ensure they contribute to socio-economic development – revenue management, links to other sectors, rural population and energy access.

C.3.2 Presentation on the Nile Basin Regional Power Trade Project

39. The presentation on “Prospects for implementing the Nile Basin Regional Power Trade Project” was made by Mr. Mengesha Shiferaw, Director in the Ethiopian Electric Power Corporation (EEPCO and member of the Ethiopian National Technical Committee for the Nile Basin Initiative (NBI).

40. The salient points of Mr. Mengesha’s presentation relate to the objectives, the components, and the status of the project, as presented below:

❖ ***Objectives of the project:***

The long-term goal is to improve access to reliable low-cost power in the Nile Basin in an environmentally sustainable manner. The specific objective is to establish institutional means to coordinate the development of regional power markets among the Nile basin countries.

❖ ***Components of the project:***

The project consist of three main components:

- The management of the project.
- Undertaking various basin wide power studies.
- Establishment of the power forum.

❖ ***Status of project***

“Scoping” study has been completed and several recommendations have been made for further studies. Major findings of the study were that:

- Development plans of basin countries are based on traditional way.
- Basin countries assume that balances between demand and supply are covered by indigenous generating facilities.
- No major interconnection has been given serious thought.
- Apart from Democratic Republic of Congo, four other countries, Uganda, Tanzania, Sudan and Ethiopia have considerable indigenous hydropower well above domestic needs. In addition, the hydrologies between the different parts of the Nile Basin were complementary.
- Basin-wide trade is unlikely in the near future.
- The Eastern Nile and the Nile Equatorial Lakes have been identified as short-term possibilities. In the long-term, the two regions will be tied.

41. He observed that, in the Eastern Nile region of Ethiopia, Eritrea, Sudan and Egypt, there were no interconnections and cross-border power trade; power sources were predominantly hydro and low-cost thermal; and long transmission lines would be required if regional electricity trade had to take place.

42. He further observed that in the Nile Equatorial Lakes Region of Burundi, Rwanda, Eastern region of the Democratic Republic of Congo (DRC-East), Kenya, Tanzania and Uganda, hydropower was an important basis for the regional trade, and trading was occasional non-firm power from utility-to-utility; there were exports from DRC-East to Rwanda and Burundi; and the sub-region had consideration hydro potential.

C.3.3 Presentation on the African Energy Commission (AFREC)

43. The presentation on the “Programme of the African Energy Commission (AFREC)” was made by Mr. Libère Buzingo, Responsible of the Interim Structure of AFREC.

44. In his presentation, Mr. Buzingo first gave an historical background of the establishment of AFREC. He recalled that, at an Extraordinary Summit of Heads of State and Government of the Organization of African Unity (OAU) held in Lagos in 1980, the creation of an African Energy Commission was recommended with the sole aim of implementing the provisions of the Lagos Plan of Action in the energy sector.

45. He pointed out that the OAU now the African Union (AU) had been given the mandate to coordinate the activities of AFREC and work closely with all the parties in the realisation of the objectives of the Commission. The Commission consulted other energy partners such as the United Nations system agencies and other African Institutions, and made proposals for the formation of AFREC in a meeting in Cairo in May 2000. The African Energy Ministers later met in Algiers to approve the recommendation for the formation of AFREC before its adoption by the Heads of State and Government at their Summit held in Lusaka, Zambia, in July 2001.

46. The salient points of Mr. Buzingo’s presentation relate to the main priority areas of the programme of the African Energy Commission (AFREC), as well as to the challenges that AFREC is facing, as summarized below.

❖ ***The main priority areas of AFREC’s programme include:***

- *Energy information System and the creation of an Africa Energy Database.* The idea is not to implement any ambitious project but just to create a database that could serve as a reference for all stakeholders
- *Development of human resources in the energy sector.* It has been noted that Africa lacked human resources in the planning, development, management, implementation, operating and maintenance of projects. AFREC is looking at setting up training programmes in various African countries in close cooperation with its Energy Commission counterpart in Latin America (Olade).
- *Identification and promotion of multi-country energy projects* thereby fostering regional cooperation and integration in Africa
- *Development of rural areas* through the promotion of renewable energy resources, especially solar energy

❖ ***The challenges facing AFREC include the following:***

- Presently only twelve (12) countries have signed the Convention creating AFREC, and out of these only three countries: Libya, Algeria and Niger have ratified the convention. The Convention cannot come into force unless fifteen (15) countries ratify it.
- There is lack of political will on the part of countries to implement what has been decided.
- Most African countries are worrying about their financial commitments to the Commission due to financial constraints.

C.3.4 Discussions and issues arising from the presentation on NBI and AFREC

47. The Nile Basin Regional Power Trade “scoping” study provides the basis for conducting a basin-wide study. The latter will carry out an in-depth analysis of all relevant issues including the

determination of the level of demand and supply in the respective countries. The ADB and World Bank will jointly finance a market study to assess the demand and supply situation in the region. The TOR for the study is expected to be finalized in May 2003.

48. AFREC is intended to be an independent self-financing institution. It will provide services to energy entities and coordinate the commissioning of investment projects and studies.

C.4 Presentation on experiences of cross-border electricity trade in selected regions

C.4.1 Presentation on Compagnie Ivoirienne d'Electricite (CIE) in West Africa

49. The presentation on the experience of the Compagnie Ivoirienne d'Electricité (CIE) in cross-border electricity exchanges was made by Mr. KONAN Hubert Justin, Directeur des Mouvements d'Energie (Directorate for Energy Flows).

50. In his presentation, Mr. KONAN observed that Côte d'Ivoire and its national power utility has almost twenty (20) of experience of cross-border electricity trade with neighboring Ghana and its Volta River Authority (VRA). Electricity grids of Côte d'Ivoire and Ghana were interconnected in November 1983 following an Inter Governmental Protocol signed in January 1975.

51. He further observed that, from 1984 to 2002, VRA had supplied to Compagnie Ivoirienne d'Electricité (CIE) and its predecessor Energie Electrique de la Côte d'Ivoire (EECI) a combined amount of 2573 GWh. During the same period, CIE had supplied 5741 GWh to VRA. This has resulted in a positive balance of 3168 GWh in favor of CIE.

52. The salient points of Mr. Konan's presentation are summarized below.

❖ Experience of bilateral exchanges between Côte d'Ivoire and Ghana

- Bilateral power exchanges have been going on since almost 20 years.
- Interconnection between the two countries is in existence since November 1983.
- Bilateral exchanges have been based on different types of arrangements:
 - Supply of guaranteed energy;
 - Supply of guaranteed power;
 - Storage; and
 - Emergency supply and opportunity exchanges.
- The tie line is managed by a Technical Committee and a Technical Sub-Committee.
- Cross-border electricity supply has been extended to the Communauté Electrique du Benin (CEB), comprised of Togo-Benin through the Ghana's transmission system since 1995, and to southwestern Burkina Faso (Bobo Dioulasso) since April 2001.
- Limited electricity supply to the border communities of Kadiolo and Zégoua in Mali through a 33 kV line is in existence since 1996.

❖ Benefits gained from cross-border electricity exchanges are as follows:

- From 1984 to 1992, Côte d'Ivoire was able to substitute its expensive thermal-based electricity for cheaper hydro-based power from Ghana. During that period, important storages with restitution were made.
- From 1995 up to now, VRA and CEB benefit from excess generating capacity in Côte d'Ivoire at a cheap price, thanks to excess power generation capacity arising from early authorization of independent power producers (IPPs) in Côte d'Ivoire.

- Burkina Faso was able to develop quickly its southwestern region of Bobo-Dioulasso through the provision of more reliable and cheaper electricity from Côte d'Ivoire. SONABEL, the national power utility, was able to supply its industrial consumers without being obliged to run its high cost diesel generating units in the region.
- Isolated people from the cities of Kadiolo and Zegoua in Mali were able to have access to electricity despite their remoteness from the national grid. Electricité du Mali (EDM) is now considering to double the initial agreed guaranteed power of 300 kW.

❖ **Problems faced include:**

- Many system disturbances that propagate across the tied systems, leading to major incidents.
- Problems for some utilities in paying import energy bills.

53. Mr. Konan concluded his presentation by proposing some recommendations aimed at improving cross-border electricity exchanges between CIE and its partners in West Africa region. These include the following:

- Find good mechanisms to secure regular payment of bills by all parties
- Coordination of development policies for generation and transmission lines including stability studies.
- Set up precise rules for transmission wheeling charges.

C.4.2 Presentation on Volta River Authority (VRA) in West Africa

54. The presentation on the experience of cross-border electricity exchange of Volta River Authority (VRA) with other neighboring utilities was made by Mr. Eric Asare, System Operation Manager within VRA.

55. The salient points of Mr. Asare's presentation relate to the VRA's experience of cross-border electricity exchanges, benefits derived from these exchanges and issues affecting pooling agreements, as summarized below.

❖ **Experience of VRA in cross-border electricity exchanges**

- There are two main interconnections currently in operation between Ghana and Togo/Benin represented by the Communauté Electrique du Benin (CEB) on one hand and between Ghana and Côte d'Ivoire on the other hand. The VRA/CEB Interconnection, which link Ghana with Togo and Benin was commissioned in 1972. The other is the VRA/CIE link between Ghana and Côte d'Ivoire and which was commissioned in 1984.
- The first power exchange agreement between VRA and CEB was for a period of 25 years and VRA contracted to supply to CEB an average continuous power of 50 MW. This agreement ended in 1997 and a new one, for the period 1997 to 2007 has been signed. This provides for supply of a minimum of 300GWh energy to CEB.
- The power exchange agreement between Ghana and Côte d'Ivoire had been operated on the basis of the energy requirements in each country and depending on the availability of surplus energy within the region. Until 1999, agreements were limited to one-year duration. However, since 1999, the VRA and Côte d'Ivoire have committed to longer-term energy supply agreements.

- Another area of cooperation was the wheeling of power from Côte d'Ivoire to Togo and Benin, using the transmission network of Ghana. This arrangement has been in place since 1995. CEB has been negotiating for supply from Côte d'Ivoire and paying a wheeling charge to Ghana.
- ❖ ***Benefits derived from power exchange agreements and pooling arrangements include:***
 - Optimizing the use of and sharing available energy resources in the region;
 - Reduction in cost of energy supply;
 - Sharing of spinning reserves and reduction in operating reserves;
 - Increased access to electricity;
 - Improved reliability and security of operation;
 - Improved coordination in expansion of network;
 - Improved operational and technical performance; and
 - Mutual support in emergency situations.
- ❖ ***Issues affecting power pooling agreements include the following:***
 - *Inadequate Generating Capacity*
Due to the reliance on hydro energy and the unpredictable nature of rainfall, there are instances where a supplier is unable to meet its obligations. This situation could result in power supply curtailment, with its attendant costs, to the importing party.
 - *Bottlenecks in the Transmission Network*
The inability of utilities within the region to expand their transmission networks to match growing demand for power. This has, under some conditions, created bottlenecks militating against evacuation of power from utilities with cheaper sources of energy.
 - *Adherence to Provisions of Agreement*
Power exchange agreements must include provisions for enforcing rules and commitments.
 - *Overdue receivables for power supplied.*
All the utilities have, at one time or the other, been unable to settle bills for power supplied. This is an issue that needs to be resolved and long term solution found.
 - *Communication*
The countries involved in the present pooling arrangement use two languages and this could be a impediment to smooth cooperation.
 - *Regulation of the sector by Government*
In the past, tariff setting was by governments and there were difficulties for the utilities to recover their cost. At the moment, regulatory bodies have been set up with responsibilities for tariff setting and it is expected that this will bring transparency into the tariff setting process and provide the utilities with the necessary financial support for improved operation.

C.4.3 Presentation on the Communauté Electrique du Benin (CEB) in West Africa

56. The presentation on the experience of the Communauté Electrique du Benin (CEB) in the area of cross-border electricity trade was made by Mr. Yawo Blu, Directeur des Etudes et du Développement (Directorate for Studies and Planning) within CEB.

57. Mr. Blu started his presentation by giving a brief historical background of CEB. He indicated that the Republic of Togo and the Republic of Benin had been experiencing since 1968

very fruitful cooperation in the field of electricity. The two countries have therefore decided to adopt a common legislation for the provision and supply of electricity, and to put together their electrical energy resources. This resulted in the creation of the Communauté Electrique du Benin (CEB) and was given the monopoly of generation, transmission, importation, exportation and regulation of electricity in the two countries.

58. The rest of Mr. Blu's presentation can be summarized as follows:

❖ ***Experience and problems:***

- CEB has been experiencing electricity trade relations with VRA (Ghana) since 1972.
- CEB started importing electricity from CIE in Cote d'Ivoire in 1997.
- CEB has significantly been benefiting from the interconnection and related inter-utility power exchanges with Volta River Authority (VRA) and Compagnie Ivoirienne d'Electricité (CIE).

❖ ***The main projects for future development of cross-border electricity exchanges include:***

- CEB-NEPA interconnection project aimed at linking the power systems of CEB and Nigerian Electric Power Authority (NEPA) through a 330 kV, 70km long transmission line, which is being financed by the West African Development Bank (BOAD) and the African Development Bank (ADB) and whose construction could start soon;
- North Togo - North Benin interconnection project, which is at the evaluation stage by donors and whose funding could be secured partially from bond issues and partially from traditional sources of finance;
- Adjarala hydropower project, whose technical design has been completed but whose financing is still to be sought particularly from Arabic countries which have promised to fund 70% of the project cost since 1998; and
- Participation in other regional projects such as the West African Power Pool (WAPP) and the West African Gas Pipeline (WAGP), which would contribute to promoting cross-border electricity trade in most of West Africa region.

C.4.4 Uganda Electricity Transmission Company Limited (UETCL) in East Africa

59. The presentation on the experience of the Uganda power utilities, including the Uganda Electricity Transmission Company Limited (UETCL) in cross-border electricity exchanges was made by Mr. Gerald Muganga, Chief Manager, Engineering Services with UETCL.

60. Mr. Muganga started his presentation by giving a brief historical background of the organization of the power sector in Uganda.

61. The salient points of Mr. Muganga's presentation relate to the experiences of the UEB and its successor the UETCL in cross-border electricity exchanges, the on-going studies for projects aimed at promoting cross-border electricity trade and power pooling in East Africa region, planned expansion and/or strengthening the transmission grid system, benefits derived from cross-border electricity exchanges and problems faced the Uganda's utilities, and are summarized below.

❖ ***Experience of UEB and UETCL***

(i) ***Experience of UEB is as follows:***

- Prior to the introduction of power sector reforms, the Uganda Power Sector was dominated by a public vertically integrated utility, the Uganda Electricity Board (UEB).

UEB was responsible for the generation, transmission, distribution and export of electricity.

- In this regard, UEB signed an agreement with Kenya Power Company (KPC) in 1955 for the supply of 30 MW of electricity to KPC for a period of 50 years. The implementation of the agreement resulted into the interconnection of the Uganda and Kenya Grids with a 132 KV Transmission line.
- In 1993, UEB entered into an agreement with the Tanzania Electric Supply Co. Ltd (TANESCO) for the supply of up to 16MW to Kagera Region of Tanzania. This saw the extension of 132 KV Transmission line from Masaka in Uganda some 160 Km across the Tanzania border to Bukoba.
- In 1995, UEB signed agreements with Electrogaz for the export of 5MW at 33KV level to Rwanda via Katuna border post and import of 2MW at 30KV level at Kisoro (Uganda) via the Chanika border post.
- In 1994, a Memorandum of Understanding (MOU) was signed between Uganda and Rwanda for power exchanges and this resulted in the implementation of the above-mentioned projects.
- Also mentioned in the MOU is the requirement to increase power exports to Rwanda to a level of 20 MW. In this regard a pre-feasibility study was conducted and recommended the construction of a 132/130 KV transmission line (230Km) from Mbarara (Uganda) to Gikondo (Rwanda) with a 132/130 KV substation at Mirama Hills near Gakitumba to interconnect the two Grids.

(ii) Experience of UETCL is as follows:

- Following the unbundling of UEB on 31st March 2001 into successor companies, Uganda Electricity Transmission Co. Ltd (UETCL) took over the responsibilities of owning and operating the transmission infrastructure above 33KV.
- It is also responsible for the purchase of power in bulk from generators and sells it to the Uganda Electricity Distribution Co. Ltd (UEDCL) as well as power exports and imports and system coordination.
- In view of the above developments, all export commitments that had been entered into by UEB, were vested into UETCL.
- In January 2002, UETCL signed a new agreement with KPLC for the supply of 50MW of firm capacity starting February 2006.

❖ ***On-going studies for projects aimed at promoting cross-border electricity trade and power pooling in East Africa region, include:***

- ***Transmission and sub-transmission study:*** The study funded by NDF and conducted by SWECO is intended to determine the transmission and sub transmission infrastructure to meet the present and future domestic demand and exports.
- ***East African Power Master Plan:*** The study funded by SIDA and the World Bank is intended to develop plans to transfer power supplies in the East African Community (EAC) region, Kenya, Tanzania and Uganda, including the requirements for the establishment of the East Africa Power Pool and the possibility of connecting the EAPP to SAPP.
- ***Feasibility study - 220kV Kawanda (Kampala) – Masaka Transmission line:*** The study funded by NORAD is intended for the construction of 220kV transmission line with the aim of extending the proposed line from Bujagali HPS in order to meet future demands in the Southern Region as well as exports to Northern Tanzania and Rwanda.

- ❖ ***Expansion and/or strengthening of the interconnected transmission system involve the following:***
 - 220kV transmission line from Uganda to Kenya.
 - 220kV transmission line from Uganda to Tanzania (Geita and Kabanga)
 - 132/130kV transmission line from Uganda to Rwanda (Gikondo)
 - 132kV transmission line from Uganda (Nkenda) to East DRC (Beni, Bunia and Mambasa).

- ❖ ***Benefits gained and problems faced by the Uganda's utility in connection with cross-border electricity trade are as follows:***
 - ***Benefits include:***
 - Promotion of regional cooperation through sharing resources, and
 - Generation of revenue i.e. foreign exchange.
 - ***Problems are related to:***
 - Delayed payments by KPLC and TANESCO, and
 - Generation capacity constraints during peak-period.

C.4.5 Ethiopian Electric Power Corporation (EEPCO) in East Africa

62. A written submission on “Regional Interconnection Projects”, which are being implemented by the Ethiopian Electric Power Corporation (EEPCO), was made by Mr. Wondimu Bogale, Deputy General Manager of EEPCO.

63. The salient points of the above submission are as follows:
- Ethiopia has economically exploitable potential of 30,000 MW.
 - In 1982 a master plan for electrification of the country was undertaken. This study, besides confirming the available potential, indicated the possible regional power systems interconnection to enhance exploit and utilize this potential.
 - The study further recommended the power systems interconnection between Ethiopia and Sudan and Ethiopia and Djibouti.
 - The utility companies agreed to interconnect their systems and approached donor agencies and financiers.
 - As a result IVO of Finland and ACRES of Canada made studies for the interconnection between Ethiopia-Djibouti and Ethiopia-Sudan in 1985.
 - The finance for the feasibility study update design and supervision was allocated by ADB for the Ethio-Sudan transmission time interconnection project in 1994. The work was started and the update was completed and at this stage the consequent activities were suspended due to political reasons.
 - Both interconnection studies were reinitiated and currently finance is being sought for the feasibility study update, design and supervision during implementations.

C.5 General discussions on “Arrangements for improved development and operation of power pools and related cross-border electricity trade”

64. During their presentations, experts were requested to highlight issues related to the experience of their institutions with regard to agreements governing cross-border electricity trade and other power pooling arrangements, the problems encountered and measures taken to solve

them. The meeting was able to debate on the relevance of the concrete proposals made by the participants during their presentations.

C.6 Conclusions and recommendations: The Way Forward

65. The meeting decided to consider the Agenda Item on “General discussions” together with that on “Conclusions and recommendations: The Way Forward”. It was anticipated that the two Agenda items would lead to deriving action-oriented recommendations on ways and means of promoting regional power trade in Africa through “Arrangements for improved development and operation of power pools and related cross-border electricity trade”. These recommendations were grouped into six (6) categories, as indicated below.

66. With regard to “Terms and conditions governing cross-border electricity exchanges”, it was agreed that for a power pool to operate effectively, the following needs to be put in place:

- Legal Agreement & Dispute Resolution – An acceptable legal framework or a bidding legal agreement between members should be put in place. Within the legal agreement, a mechanism to resolve disputes should be clearly spelled out. Arbitration procedures in the agreement should also be included. Members should be encouraged to abide by the agreements.
- Decision-making – decision-making should be reached by consensus where possible rather than a vote. The process is slow, but takes everybody on board and makes it possible for all members to support and commit to the final decision.
- Government involvement – the government or government officials should always be involved when major policy issues are discussed. It is always better to solicit for the government support as early as possible.
- Need to explore the regulation and policy implications of power pooling.
- Adapt National regulations and laws to achieve regional objectives.

67. With regard to the “Rules and regulations for operation of the interconnected transmission systems, including wheeling”, the meeting agreed on the following:

- Guidelines on how to operate the power pool and the procedures to follow in all situations, including emergency should be put in place. Separate guidelines should be put in place to guide members when trading, i.e. *trading rules*, and when settling accounts, i.e. *financial settlement rules*. The *penalties* associated with the violation of the operating guidelines should also be made clear in the Grid Code.
- Ensure that the rules and regulations are realistic and workable.
- Ensure that all members agree to the rules and regulations to guarantee maximum cooperation
- Harmonization of Operational Rules
- Set up precise rules for transmission wheeling charges.

68. With regard to “Establishment and operating regional power pools, including coordination of pool operations and transmission congestion management”, the meeting proposed that there should be coordination of development policies for generation and transmission lines including stability studies.

69. The Experts participating in the meeting were of the opinion that issues related to the settlement of electricity import bills, mobilization of financial resources for the development of

power generation and transmission projects, and capacity building were of utmost importance in the development and operation of power pools and related cross-border electricity trade.

70. As a result, the meeting recommended the following:

- **Fulfillment of Financial Obligations:**
 - Find good mechanisms to secure regular payment of bills by all parties
 - Ensure that all power transactions are covered by a well-structured power purchase agreement that takes into consideration future conditions.
 - Include appropriate provisions or clauses in the power purchase agreement that addresses delays in payments.
 - Governments should see electricity as an important commodity that should be properly priced to ensure cost recovery.
 - If possible an escrow account can be created to facilitate regular payment.
- **Mobilization of Financial Resources:**
 - Necessary agreements should be put in place such as the power purchase agreement and the construction agreement
 - A joint request should be submitted.
 - An MOU for feasibility study and a joint request.
- **Capacity Building:**
 - Need to train and develop human resources to manage and operate the power pools. ECA, ADB and AFREC can assist in this regard.
 - Institution capacity building.
 - Capacity for contract negotiations and planning.
 - Language training.

D. Adoption of conclusions and recommendations of the meeting and the Way Forward

71. The meeting adopted the above recommendations, which were extracted from the main report and compiled into a separate document attached as Annex 2.

72. The meeting also discussed the issue of what should be done by ECA as follow up action to the above recommendations. The meeting proposed that follow up action to the recommendations should consist in the following:

- (i) Economic Commission for Africa (ECA) to ***review progress on power pooling*** and report in two years time, preferably at a meeting in a power pool region; and
- (ii) ECA to ***establish an electronic discussion list*** for interaction on the subject.

E. Closure of the meeting

73. The meeting was officially closed by Mr. Josué Dioné, Director of the Sustainable Development Division of ECA. He appreciated that the meeting was indeed aimed at energizing the continent for development, while others are usually concerned with its mere survival.

74. He commended the Experts for their dedicated and focused work, which had moved the concept of power pooling in Africa forward.

75. He noted that the participants had reviewed and improved the ECA report, and made challenging recommendations targeted at several players including the experts themselves. ECA would do its part to follow up the recommendations. Mr. Dioné asked the other players also to play their parts.

76. With regard to the recommendation on establishing an electronic discussion list on power pooling, Mr. Dioné revealed that ECA was already setting up electronic networks on Land Tenure and Water Resources Management, so it would be easy to set up one on power pooling as recommended.

77. He promised that ECA would follow up to see how the energy sector was being supported by the UN, ADB and NEPAD clusters for Africa. He also announced that ECA would continue to work with the newly established AFREC, with which good relations already exist.

78. Mr. Dioné commended the initiative of power pooling which may help countries like Ethiopia eliminate power shortages, such as those experienced by the experts during the week. He urged more countries to join power pools until the whole of Africa is connected.

79. He encouraged the experts to keep in touch with each other and with ECA. He concurred with the recommendation of holding the next meeting in a power pool region, and promised to mobilize an ECA sub-regional office for the organization of such a meeting.

80. Mr. Dioné once again thanked the participants for their sacrifice in giving time to the meeting. He declared the Ad hoc Expert Group Meeting on Assessment of Power Pooling Arrangements in Africa officially closed.

Annex I

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Annex II

ASSESSMENT OF POWER POOLING ARRANGEMENTS IN AFRICA

AD HOC EXPERT GROUP RECOMMENDATIONS

1. INTRODUCTION

The ad hoc meeting held in Addis Ababa from 24 to 26 June 2003 brought together experts from the power pools and utilities operating in Africa such as the Southern African Power Pool (SAPP), the West African Power Pool (WAPP), Communauté Electrique du Bénin (CEB), Compagnie Ivoirienne d'Electricité (CIE), Volta River Authority (VRA), Uganda Electricity Transmission Company Limited (UETCL) and Ethiopian Electric Power Corporation (EEPCO) as well as African Energy Commission (AFREC), African Development Bank (ADB) and World Energy Council (WEC). The idea was to share their experiences in finding solutions to improving the security and reliability of energy supply in Africa. The following points were noted:

- (i.) Africa is known to be rich in commercial energy resources that are unevenly distributed within and among regions normally located at considerable distances from each other.
- (ii.) Despite the abundance of these commercial energy resources, Africa accounts for only 3% of the world's commercial energy consumption, because many people on the continent cannot afford commercial energy due to poverty.
- (iii.) Most people in Africa rely on biomass energy to meet their daily energy needs, despite its attendant environmental consequences, and it is known that up to 90% of final energy consumption in most sub-Saharan African countries derives from biomass.
- (iv.) Due to the inefficient use of commercial energy resources, Africa uses by far more energy to create \$1 of wealth (as reflected by units of energy consumed per \$ GDP) compared with other developing regions.
- (v.) It is on record that barely 10% of Africa's 800 million population have access to grid electricity.
- (vi.) The vast hydro potential of the Continent remains undeveloped, whilst more than 80% of electricity generation is based on thermal sources.
- (vii.) Due to the lack of energy transportation channels, such as pipelines and transmission lines, to move energy from abundant commercial energy sources to deficient areas, energy is sometimes wasted.

2. TERMS OF REFERENCE

Based on the above findings, efforts are being made to promote inter-country energy cooperation and contribute to the development of infrastructure that will help in the redistribution of Africa's energy resource for the development of the continent. One of the immediate methods by which energy can be redistributed is by the use of Power Pooling to share electrical energy within various regions on the continent.

The Economic Commission for Africa has initiated a study into the existing arrangements in power pooling in Africa by studying the SAPP, WAPP and other cross-border electricity trade in Africa. The findings are documented in a report titled "Assessment of Power Pooling Arrangements in Africa". To ensure that the study was practically complete and comprehensive, ECA decided to invite experts in the electricity sector from the various African Regions to undertake the following tasks:

1. Review the status and effectiveness of the existing arrangements governing cross-border electricity trade in Africa, to support growth.
2. Share expertise and experiences on the challenges facing the major institutions in the power pooling arrangements.
3. Help improve the study on "Assessment of Power Pooling arrangements in Africa", by making recommendations that would improve development and operation of power pools and related cross-border electricity trade. The recommendations should cover the following:
 - i.) Terms and conditions governing cross-border electricity exchanges.
 - ii.) Rules and regulations for operation of the interconnected transmission systems, including wheeling.
 - iii.) Establishment and operating regional power pools, including coordination of pool operations and transmission congestion management.
 - iv.) Fulfilment of financial obligations.
 - v.) Mobilisation of financial resources.
 - vi.) Capacity building.
 - vii.) Follow up on the recommendations

3. RECOMMENDATIONS

3.1. *Terms and conditions governing cross-border electricity exchanges*

For a power pool to operate effectively, the following needs to be put in place:

- Legal Agreement & Dispute Resolution – An acceptable legal framework or a binding legal agreement between members should be put in place. Within the legal agreement, a mechanism to resolve disputes should be clearly spelled out. Arbitration procedures in the agreement should also be included. Members should be encouraged to abide by the agreements.
- Decision-making – decision-making should be reached by consensus where possible rather than a vote. The process is slow, but takes everybody on board and makes it possible for all members to support and commit to the final decision.
- Government involvement – the government or government officials should always be involved when major policy issues are discussed. It is always better to solicit for the government support as early as possible.
- Institutional Regulation - Need to explore the regulation and policy implications of power pooling and adapt national regulations and laws to achieve regional objectives.

3.2 *Rules and regulations for operation of the interconnected transmission systems, including wheeling*

- Guidelines on how to operate the power pool and the procedures to follow in all situations, including emergencies should be put in place. Separate guidelines should be put in place to guide members when trading, i.e. *trading rules*, and when settling accounts, i.e. *financial settlement rules*. The *penalties* associated with the violation of the operating guidelines should also be made clear in the Grid Code.
- Ensure that the rules and regulations are realistic and workable.
- Ensure that all members agree to the rules and regulations to guarantee maximum cooperation.
- Harmonization of grid codes.
- Set up precise rules for transmission wheeling charges.
- Viable telecommunication infrastructure.

3.3 *Establishment and operating regional power pools, including coordination of pool operations and transmission congestion management.*

- Coordination of development policies for generation and transmission lines including stability studies.
- Promote harmonisation of standards in power pools.

3.4 Fulfilment of financial obligations

- Find good mechanisms to secure regular payment of bills by all parties.
- Ensure that all power transactions are covered by a well-structured power purchase agreement that takes into consideration future conditions.
- Include appropriate provisions or clauses in the power purchase agreement that addresses delays in payments.
- Governments should see electricity as an important commodity that should be appropriately priced to ensure cost recovery.
- If possible an escrow account should be considered to facilitate regular payment.

3.5 Mobilisation of financial resources

- Necessary agreements should be put in place such as the power purchase agreement and the construction agreement.
- A joint request should be submitted.
- An MOU for feasibility study and a joint request.

3.6 Capacity Building

- Need to train and develop human resources to manage and operate the power pools. ECA, ADB and AFREC can assist in this regard.
- Institution capacity building.
- Capacity for contract negotiations and planning
- Language training

3.7 Follow up on recommendations

- Economic Commission for Africa (ECA) to **review progress on power pooling** and report in two years time, preferably at a meeting in a power pool region.
- ECA to **establish an electronic discussion list** for interaction on the subject.

Signed

Mr. Libère Buzingo (Chairman)