ENTRO

EASTERN NILE POWER TRADE PROGRAM STUDY

AfDB

POWER TRADE

STRATEGY REPORT

EXECUTIVE SUMMARY

FINAL REPORT

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EXECUTIVE SUMMARY

Recognizing their common concerns and interests, the Nile riparian countries have taken a historic step towards cooperation with the establishment in 1999 of the Nile Basin Initiative (NBI). The NBI seeks to develop the river in a cooperative manner, share substantial socio-economic benefits, and promote regional peace and security. The Initiative is guided by a Shared Vision "to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources." To translate this shared vision into action, the NBI has launched a Strategic Action Program, which includes two complementary components: (1) a basin-wide Shared Vision Program (SVP), and (2) Subsidiary Action Programs (SAPs). The NBI is led by a Council of Ministers in charge of Water Affairs from the member states (Nile-COM) with the support of a Technical Advisory Committee (Nile-TAC) and a Secretariat (Nile-SEC), located in Entebbe, Uganda.

The Shared Vision Program (SVP) is designed to establish a foundation for transboundary regional cooperation, promote exchange of experiences, enhance capacity, and create an enabling environment for investments on the ground, within an agreed upon framework. The SVP comprises seven thematic projects focusing on water resources, environment, power trade, agriculture, applied training, communication and stakeholder involvement, and macro-economics benefit sharing. The SVP projects were identified and prepared by the Nile riparians based on a complex participatory, multi-country process involving the NBI institutions and national experts from the Nile countries. These projects address the priority water-related sectors and cross-cutting themes identified by the Nile riparians to ensure an integrated and comprehensive approach to water resources development and management. Cooperative water resources management serve as a catalyst for broader socioeconomic development and regional cooperation, with benefits far exceeding those derived from the river itself. The SVP portfolio also includes an eighth "project," which will strengthen the capacity of NBI institutions to execute and coordinate cooperative basin wide projects.

Following the Shared Vision of the Nile Basin Initiative adopted by the Nile Council of Ministers in Dar es Salaam on 22 February 1999, the Ministers responsible for electricity affairs in the countries of Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda, adopted, on May 20-21, 2003, the long-term vision for the Nile Basin Power Forum and approved the Regional Power Trade Project Implementation Plan, including the establishment of a Nile Basin Power Forum.

Technically and economically viable interconnection projects may be faced with political, institutional, and financial barriers. Conversely, the institutional structure of the interconnection project should be designed in such a way that the stakeholders are incited to capture most of the economic and technical benefits of the interconnection project.

As a start-up in the integration process, interconnection projects may, finally, induce changes in the structure of the national electricity supply industry; pooling the power generation capacity is likely to foster true bulk power competition at both the regional and national levels.

The foremost barriers to regional integration are political ones. Politicians are concerned about self-sufficiency, energy security issues, possible asymmetries in the cross border trade of electricity, and by the impact of regional exchanges on the price of the commodity in domestic markets.

Once these political barriers are properly addressed, the rules and standards of operation have to be harmonized, and an efficient coordination between national power markets – or a regional operator – shall be devised in such a way as to recover most of the potential surplus accruing from regional integration.

Once a sound political and institutional framework for regional integration has been set, the financial barrier to developing interconnections should be overcome, and the perceived risks usually linked with such projects in developing countries will be significantly mitigated.

Regional integration will consist of :

- the creation, under the governance of the governments of the region, of a regional organization responsible, partly or entirely, for the coordination of the actors of the electric power industry, the harmonization of the planning and operating rules, and for the minimization of the overall cost of supply;
- the management of power generation and transmission projects that are justified from the perspective of sustainable regional development.

Within this context, the Eastern Nile Power Trade Program Study is fully funded by the African Development Bank and has the general objective :

to promote regional power trade between Egypt, Ethiopia and Sudan through creation of an enabling environment, coordinated regional investment planning of power generation and transmission interconnection projects.

The Project is carried out in close contact and co-operation with the three countries Utilities: Egyptian Electric Holding Company (EEHC), Ethiopian Electric Power Corporation (EEPCO), Sudan National Electricity Company (NEC). In addition, other relevant institutions, in particular the Nile Basin Initiative, the Ministry of Water Resources and Irrigation of Egypt, the Ministry of Water Resources of Ethiopia, the Ministry of Irrigation & Water Resources of Sudan are intensively involved in the project, with strong support of the local team experts in the three countries.

The Eastern Nile Power Trade Program Study is divided in 2 phases :

Phase 1: Cooperative Regional Assessment of Power Trade Opportunities between Ethiopia, Egypt and Sudan.

Phase 2 : Feasibility Study of the Power Interconnection between Ethiopia, Egypt and Sudan.

The decision to proceed to Phase 2 will be taken by ENTRO on the basis of the findings of Phase1.

Within this general framework of the project, the present report focuses on Module 7: **Power Trade Strategy**.

Regional electricity cooperation and integration is a long-term process which may be implemented in a stepwise manner, from an exchange of expertise and information on the operation and development of the electric power system, to joint-venture, asynchronous interconnection, interconnection limited at sharing emergency reserve, to the full integration of the electricity markets. Prior to market integration, the European system (UCPTE) was at a level of integration in between sharing emergency reserve and full integration. In some regions, the integration process could stop in its early steps.

In developing countries, the situation is quite different. Economies of scale have not been captured, the hydroelectric potential is not harnessed, and the demand for electricity is expected to double or triple over the next 25 years. There is an urgent need for organizing the expansion of the energy system at a regional level. The corresponding investment to be made in the electric sector is generally out of reach of the governments' financial capability. The experience of developed countries shows that the development of trans-national electricity trade (a key component of the least-cost process for developing the electricity sector) will not be "naturally" favoured by state-owned and controlled electricity utilities. If a high level of regional integration is to be achieved, a strong political push needs to be given, either through political regional organizations or by international institutions.

The financial, political and institutional features of the countries of the region will mostly determine the challenges faced when integrating the region's electric power system.

For developing countries, the primary incentive to follow international organizations' calls for better cooperation between countries is, obviously, the lack of money for economic development. The commitment of a region is a better guarantee for investors than the commitment of isolated countries; the country's risks will be reduced, and it will be impossible (or more difficult) for a given country in the region to cancel an agreement if the neighbouring countries are part of the same agreement. To attract investments, the regional organization will have to devise an institutional framework that will consider international participation, primarily, and, as such, will depend on laws, protocols, charters, and codes of conduct that are recognized at an international level. To sum up, the mere fact that countries meet to devise a regional organization will reduce the risk perceived by potential investors.

Regional integration will be facilitated, obviously, if the countries of the region have similar political and institutional structure for their electric power industry.

When the structure of the national electricity supply industry is already significantly liberalized (up to the Third Party Access model) the emphasis has to be put on the development of new investments rather than on trade matters. When this structure is still vertically integrated with at most a Single Buyer model, on the contrary, countries will surely recognize the benefits of

coordination and planning, but they will also be more reluctant to liberalize trade. To sum up, the steps taken by the countries towards liberalization of their national electricity supply industry will impact on the initial mandate (and the challenges) of the regional organization.

In February 2005, the Ministers in charge of Electricity Affairs signed the Inter-Governmental Memorandum of Understanding which enables the establishment of the East African Power Pool.

At the same time, the General Managers of the Electricity Utilities of the same countries signed the Inter-Utility Memorandum of Understanding, which establishes EAPP's basic management and operating principles.

These two MOUs represent a major political recognition and endorsement of the necessity to establish a Regional Electricity Market in Eastern Africa, with the view to improve the competitiveness and the economic efficiency of the electric systems in the region.

It is also obvious that any further development towards the integration of the national electricity power systems should be integrated in the Regional Strategy for the implementation of the East African Power Pool.

To establish the Power Trade Strategy, a phased approach has been adopted through 4 tasks. The work team collected and analysed data about the institutional and legal framework of the power sector of the region and prepared recommendations concerning the design and set-up of the Regional Electricity Market (REM).

Task 1 concerned the investigation of the **commercial aspects** of the electricity market. In particular, the trends and obstacles expected in such a formation have been identified and analysed. In general, a competitive electricity market can deliver benefits to all countries and final customers in the form of lower prices and improved products and services. The essential conditions that must be satisfied for development of an effective REM require: electricity trade and prices in the region to be set by supply and demand, clear commercial separation of generation, transmission and distribution functions and a division of the network operations from the power trade functions.

The study has identified the existing barriers to REM development, such as lack of information on kinds of transactions and the corresponding risks, the lack of standard contracts, the lack of dispute settlement procedures, the need to develop a legal and regulatory basis for commercial transactions in the region, the need for further development of the banking system.

Pricing and tariff issues were examined in the context of **Task 1**. The average applied tariffs in the region are not up to commercial levels, often being below the operating costs of the corresponding power systems.

The study includes an analysis of tariff setting principles, and design options, focussing especially on bulk generation and transmission pricing. As far as the latter is concerned, the various

transmission pricing methods are analysed with respect to the conditions of the REM, concluding that the Cost Component Method satisfies the basic requirements.

Task 1 provided also an overview of the **contractual framework** requirements and **commercial contracts** that could be implemented.

As a result of the absence of inter-country electricity trade, the commercial contract framework has not developed. The creation of a specially designed contractual framework along the rules of operation of the REM is among the most important prerequisites to the establishment of the Market, within which participants can freely negotiate electricity trades. The development of this contractual framework must take into account the future environment, the possible evolution of the market and the direction of individual countries' electricity markets.

Further more, the study also includes an outline of both, the basic principles of commercial contracts in the context of the REM, and the process of building such a new contractual framework.

Task 2 dealt with the **legislative and regulatory aspects** of the development of the REM. It is understood that the progress in developing the REM will depend on progress in developing new market forms within the individual markets. Progress towards more liberal international market structures cannot, in general go faster than the development of more liberal structures at national level. The analysis considers the existing state and trends of national legal and regulatory frameworks in the REM countries, and examines the implications of international and national law for the development of the Market. Furthermore, the study determines and proposes the general rules for the operation of the REM, with reference to the Energy Protocol which is proposed to be adopted by the member countries to:

- ensure free flow of energy and energy materials and products between ECOWAS member states, and protection for international investors;
- attract national and international private investments for the financing of power projects in the region; and to
- establish the Third Party Access principle.

The aim of **Task 3** was to make a preliminary proposal on the form and **institutional structure** of the Regional Electricity Market. Volume 3 includes a presentation of other, operating regional and national electricity markets, and the experience gained thereof. A fundamental idea in the development of the REM institutional structure, is that the Market should be flexible enough to accommodate the approaches taken in each country in restructuring their electric systems and in the design of their own markets. To that effect, the volume reviews the possible options and makes an assessment of the key factors influencing the design of the market. Reference is made to the technical and commercial requirements necessary as well as to the barriers in developing a highly integrated market.

In summary, the design of the Market is based on a staged implementation of the following principles:

- Participants in the market are designated traders. It is desirable to reach a multiple trade (multiple buyers and sellers) market as soon as possible, for competition to develop.

- Technical operation and responsibility for system reliability and security remains with each country's system operator (SO). It is proposed that operation will be consistent with UCTE rules.
- There is a regional market co-ordinator (RMC) who proposes the market rules to the Management Committee and monitors compliance of traders and SOs with the rules.
- Traders sign a market operations agreement to adhere to the market rules.
- An obligation for installed capacity for reliability can be fulfilled with own generation or bilateral contracts with traders in other systems.
- Medium and long term trades are handled through flexible bilateral contracts freely negotiated between traders, but subject to a minimum set of market rules.
- The RMC assists with information exchange through a bulletin board and notifies national SOs of contracted trades to enable them to fulfil their system reliability obligations.
- Transmission charges should be set to by a fair method to avoid barriers to trade and encourage investment in new regional transmission capacity. It is anticipated that the methodology adopted will follow that of the European Union of TSOs.
- Most transfers will be done through bilateral contracts but a regional energy broker (REB) schedules short term energy through a bulletin board, or matching of buyers and sellers.
- The REB may match buyers and sellers on a cost based or price based method. The cost based method could be the initial step but the aim would be to move to a price based method.
- The REB provides settlement information for short term trades. The settlement mechanism will need further examination but may be built upon existing institutions and practice.

Volume 3 also includes information regarding Public – Private Financing mechanism for the financing of hydropower plants, the reasons of their development, how to reduce the risks related to these projects, the crucial role of the Multilateral Financing Institutions and how it eases the financial burden.

Task 4 provided recommendations regarding the implementation of the proposed market design. Volume 4 proposes a timetable for the implementation of the various steps required for the building of the Market, taking into consideration both, the analysis performed in the context of this study, as well as the political decisions regarding the development of the Market. The proposed phased development of the Regional Electricity Market, summarises the major steps required to implement the REM.

A number of specific milestones are shown, such as the start of Regional Market Co-ordinator (RMC) operations, the establishment of RMC subcommittees, and the establishment of the Regional Electricity Broker (REB). In addition, the chart shows a transition from the present type of bilateral trade towards bilateral trade under new market rules with single and multiple buyers and sellers.