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Assistance to CREE and CRSE for putting in place third-party access to the network

Report 2 : Implementation

January 2009



**CABINET
SERRES & ASSOCIATES**

LIST OF ABBREVIATIONS AND DEFINATIONS

BOT	Build-Operate and Transfer
DNM	Distribution Network Manager
TNM	Transmission Network Manager
CA	Commercial Agent of Public Utility
ICC	Information and Coordination Centre of the West African Power Pool (WAPP)- the organisation in charge of daily exchange of information between control centres
PPA	Power Purchase Agreement
IPP	Independent Power Producer
PTN	Public Transmission Network
LOS	Limited Open Service
PS	Public Services
PU	Public Utility
SO	System Operator
MO	Market Operator
CO2	Carbon dioxide
OSMP	Operation Safety Maintenance Plan
ECOWAS	Economic Community of West African States
CRSE	Commission de Régulation du Secteur de l'Électricité du Sénégal
CREE	Commission de Régulation de l'Électricité et de l'Eau du Mali
EDM SA	Energie du Mali
Sogem-Eskom	Société d'exploitation de Manantali, subsidiary of the South-African National Electricity Company
OMVS	Organisation pour la mise en valeur du fleuve Sénégal
OMVG	Organisation pour la mise en valeur du fleuve Gambie
SCADA	Supervisory Control And Data Acquisition
Sénélec	Société Nationale d'Électricité du Sénégal
Somélec	Société Mauritanienne d'Electricité
WAPP	West African Power Pool
Frequency-power regulation	Three successive regulations occur when there is disequilibrium between production and consumption
1.Primary Regulation	Each generation unit taking part in frequency regulation automatically adapts its power through its speed regulator, in response to deviations of frequency from the nominal frequency.
2.Secondary Regulation	To reabsorb the discrepancy in frequency, generation units taking part in secondary regulation and connected to the national control system automatically adjust their supplied power.
3. Tertiary Regulation	Tertiary regulation is started manually if the available power for regulation is insufficient. A set of contracts with producers (capacity obligations and response time) is required for this purpose. The reserve of tertiary energy is considered fast if it can be mobilised in less than 15 minutes or supplementary

	if it can be mobilised in less than 30 minutes.
N- 1 Criteria	This rule consists of guaranteeing good performance of the system even in the event of failure of a component of the transmission network or a generation unit through routing via another part of the network or by supply from other generation units.
System services	System services generally include frequency-capacity adjustments, voltage adjustments, black starting of the system and the market for discrepancy compensation

UNITS OF MEASUREMENT

kV	Kilo Volt
MFCFA	Million de FCFA
MW	Mega Watt
kWh	Kilo Watt hour
MWh	Mega Watt hour

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1 INTRODUCTION

1.1 BACKGROUND

During the electricity sector reforms of the 1990s, majority of ECOWAS countries incorporated the principle of Third Party Access to the Network for eligible customers into their respective national laws. In other words, this is the possibility for some consumers to buy all or part of their electricity requirements from a supplier of their choice. In 2003, this principle was adopted for the regional electricity market through article 6 of the ECOWAS Energy Protocol A/P4/1/03.

This new approach of management of the electricity sector translates into:

- capacity building in generation-transmission with emphasis on the creation of multinational thermal and hydro generation facilities ;
- interconnection of networks between zones A and B of WAPP,
- willingness to gradually set up a wholesale electricity market at the regional level.

A similar approach was developed for natural gas resources.

The organization of cross-border electricity exchanges within the sub-region is particularly interesting and appropriate. The absence of eligible customers in Mali is only as a result of the lack of means of supplying them. In fact, the first report on this subject showed that the total capacity demanded by industrial consumers is equal in magnitude to the total capacity delivered by EDM-SA. Mali could not supply these industrial consumers from only a single hydro-electric power station, which led these consumers to commence generation of their own electricity from diesel generators thus leading to a heavy dependence of mining output on the price of diesel fuel.

By 2012, Senegal will construct a 125 MW coal power station to meet its national electricity requirements, with the possibility of generating up to 250 MW if there is sufficient demand. A new 125 MW segment is then envisaged to supply other countries in the sub-region. This will necessitate close collaboration between the countries within the Control Zone and provide countries in the sub-region with access to cheaper thermal energy through the existing transmission infrastructure (OMVS, OMVG). This generation will relieve exports from Ivory Coast that have already undertaken some major external commitments whose fulfilment partially depends on natural gas that is at the final phase of exploitation.

On its part, Mauritania will be able to generate electricity from inevitable gas and, with a reasonable combined cycle capacity will also export electricity.

From these generation forecasts and the needs of each of these countries, it is apparent that there is need to construct an attractive market for private investors in electricity generation and a combination of fuels, which is the best means to stabilize generation costs and ensure sustainable supply.

The attractiveness of this market will be even greater if the countries concurrently remodel their electricity sectors in the ways described in this report, which is one of the intentions of the ECOWAS Energy Protocol. In 2009 Senegal will begin an institutional reform which will result in the separation of SENELEC into three entities, make provision for the participation of the private sector in the share-capital of these created enterprises, and the review of concession contracts.

It is therefore in the interest of countries in the sub-region to create a synchronised interconnected system and organize all energy exchanges according to a common approach.

1.2 RECAP OF THE TERMS OF REFERENCE

During the Forum on Regional Regulation held in Bamako in April 2007, the Chairmen of the electricity sector regulatory authorities of Senegal and Mali requested the assistance of the ECOWAS Regional Regulation Development Office in the preparation of the conditions to implement the opening up of their markets.

In Senegal, the law and concession agreement of SENELEC states that from 2009, customers requiring a subscribed capacity of 5 MW can purchase electricity from a producer of their choice. Implementation of this provision was however postponed by several years in paragraph 112 of the “Energy Sector Development Policy Paper” dated February 2007. It is also expected that this threshold will be lowered to 1 MW over a period of 10 years. There is a similar situation in Mali where after a moratorium of 10 years ending in 2010, the law authorises the Regulatory Commission to allow certain producers and categories of users or distribution network managers to enter into direct electricity supply agreements between themselves on the basis of a specific decree which is being drafted.

The terms of reference for this assistance was proposed by the RRDO and submitted for approval to the two regulatory commissions of both Member States and the ECOWAS Commission. The objectives of the assistance are as follows:

- draft a national strategy document on opening up the electricity sector for the two countries while taking into account regional perspectives ;
- draw up the list of actions to be implemented to prepare for open access to the network by eligible customers in Senegal and Mali in cognisance of the fact that during the first stage, suppliers will be exclusively national and possibly sub-regional but that the number of competing suppliers will increase rapidly ;
- propose the organisation of this opening up within the framework of a national or sub-regional wholesale market ;
- assist the regulatory authorities of the two countries (CREE and CRSE) as well as Senelec and EDM-SA in some necessary short-term actions.

This assistance was divided into two phases. The first phase was dedicated to an appraisal of the two markets, a strategy document and the identification of actions to be carried out to set up open markets which will be accessible to a limited number of eligible customers.

Report n°1 comprises of five chapters:

1. Legal and contractual frameworks,
2. Envisaged strategy for opening up the market
3. Demand and potential eligible customers,
4. Supply and equilibrium conditions for the envisaged open market,
5. Pre-requirements for opening up the market, recommendations for its operation and initial list of actions.

The second phase is dedicated to the development of certain actions. During the approval meeting held in Dakar on 4th and 5th June 2008 with the Regulatory Commissions of the two countries, OMVS, OMVG and the ECOWAS Commission, the four actions stated below were decided upon:

- Action 1: Prepare a plan of action describing the process for opening up the national markets.

- Action 2: Propose the sharing of new functions in the sector, especially between the System Operator and market operators allowing parallel operation of an open market limited to eligible customers in tandem with regulated supply to other consumers and integrating the process of acquisition, exchange and processing of new data from planning to billing.
- Action 3: Propose the main outline of a network code allowing for third party network access.
- Action 4: Organize a seminar for regulators to discuss the issue of opening up the markets and other regulatory actions (OSMP rules, contractual practices, Benchmarking, EREERA/National Regulators interfaces). The ECOWAS Commission will select the date and venue of this seminar.

1.3 STRUCTURE OF THE REPORT

Report n°2 is divided into four chapters, which define the three main actions and which will be presented at the Regulators Forum scheduled for December 2008.

1. Principles of organisation of a limited open market in tandem with a regulated market

Certain preliminary conditions are necessary to allow network access to a limited number of eligible customers, particularly a more extensive vertical unbundling of national electricity companies and the creation of an independent Transmission Network Manager (TNM).

This chapter highlights the recommended organisation of a central buyer next to an open market operator within the TNM. It defines the participants of both the open and regulated markets. It also presents the prerequisites for opening-up the market, the organisation of the TNM and the method of access to the transmission network of OMVS.

2. Organisation of the new functions of the Transmission Network Manager

This chapter presents the rules of organisation and operation of the various functions to be performed by the TNM:

1. Commercial Agent of Utility (CAPU)
2. Market Operator (MO)
3. System Operator (SO)
4. Billing and financial management of operations (Administrator)
5. Maintenance of the transmission network

3. Outline of a network code

This chapter describes the general framework of a network code for transmission of electricity and system services which is compatible with an open market coexisting with a regulated market. It also describes the relations between the TNM and other market operators including the transmission managers of neighbouring countries.

4. Description of the Plan of Action

The plan of action combines 5 sections:

R1 Preparation for the limited opening-up of the market (sensitization and support for the change, sectoral policy paper)

R2 Organisation and operations of the market (electricity laws and decrees, OMVS and OMVG legislations),

R3 Management of the transmission network (concession, network code, organisation of the transmission manager, procedures, information system, development programme),

R4 Management of generation and distribution (contracts),

R5 Setting tariffs for regulated services

1.4 ADDITIONS IN THE FINAL VERSION OF THE REPORT

During the approval meeting with the regulatory commissions of the two countries, OMVS, OMVG and the ECOWAS Commission held in Bamako on 20 and 21 November 2008, the RRDO was asked to include the following additions in the provisional version of report n°2 submitted in September 2008:

- What is the applicability of verdicts issued by the regulator on the TNMs with regards to interpretation of legislations? (paragraph 3.1.8.1)
- Clarify the headings of the table on system services on page 37 (chapter 4.7).
- Propose a variant to the plan of action leading to an effective vertical unbundling during the first phase and indicate the list of specific actions and the minimum timeframe required (chapter 1.6).

These three additions were incorporated into the corresponding chapters and paragraphs of this final version of report n°2.

1.5 DRAFT SCHEDULE OF THE ACTION PLAN

The targeted market structure described in these chapters may be attainable within a timeframe of 5 years, although some parts may be implemented more quickly. These parts particularly include the network code for WAPP, integration of national systems into the Control Zones, cross-border exchanges coexisting along with regulated national markets.

The diagram below presents a draft of the general schedule of the actions within three years, which may be extended according to the momentum of opening up of the market.

All expert services are estimated at 80 man-months spread over 55 missions to the countries. On the basis of an average unit cost of 20 000€ per month, their total costs may be provisionally estimated at 1.6 million Euros.

In order to reasonably avoid long periods of idleness of contracts, it will be preferable to combine the two steps possibly on the basis of the skills required, so as to invite various donor agencies to contribute to funding this assistance to the electricity sector of the two countries:

Stage 1 (18 months)

This stage takes place with actions R1 to R2-1 until the approval of the law (12 man-months): sensitization, support for change, sectoral policy paper and the electricity sector law.

Stage 2 (18 months)

This stage corresponds to the implementation of the law with actions R2-2, R3 to R5 (49 man-months) with the exception of action R3-7: application decrees, transmission concession, network code, organisation of the TNM, manuals of procedures, system information, and contracts for supply and distribution.

Actions R2-2 « Revision of legislations of OMVS and OMVG: (4 man-months) and R3-7 « Rehabilitation programme and network development » (18 man-months) may be treated independently of the other actions.

A global technical assistance contract is foreseeable for stage 2 with 3 equal full-time contracts during 18 months.

The skills required are: expertise in communication, engineering, economics and tariffs, public law and contract law.

The more or less common actions in the two countries are as follows:

R.2-3 Review of the legislation of OMVS and OMVG,

R.3-1 Concession contract of the TNM,

R.3-2 Network code,

R.3-3 Organisation of the TNM,

R.3-4 Manuals of procedure

R.3-5 Development of the routing and information system,

R.3-6 Creation of a users/consumers committee,

R.4-1 Electricity supply contract,

R.4-2 Distribution concession contract,

R.4-3 IPP Contract- eligible customer

The volume corresponding to these remuneration costs represent approximately half of the entire remuneration costs to be expended during the three years. A reduction of 25% of remuneration costs is possible if these activities could be synchronised between the two countries. However this assumes that each of the governments agrees to opening up their market at the same pace and during the same period, which seems highly unlikely given the present structure of the markets in the two countries (see report n°1).

Draft schedule of Action Plan to be inserted

1.6 «VERTICAL UNBUNDLING OF THE HISTORICAL OPERATOR »

This variant involves vertical un-bundling of the historical operator and opening up the market (third party access to the network) in two stages.

The plan of action to legally separate the activities of generation, transmission and distribution, and the minimum timeframe within which to implement these actions are presented in the table below.

However, some of the actions (R. 1-3, R 3.1, R.3-3, R.3-7, R.4-1 and R5) involve both stages. These are mentioned in the green sections. Their grouping is interesting for the following reasons:

- drafting the « sectoral policy paper » and preparation of the « programme for rehabilitation and development of transmission and distribution infrastructures » will allow potential investors to be informed about investment opportunities in the share capital of the companies of the former historical operator, based on the level of investment required and the conditions and timeframe for the opening up of the market;
- the final drafting of model contracts, the organisation of the TNM and the design of tariffs for eligible and non-eligible clients shall allow for the anticipation of future developments and avoid the need to revise certain provisions in the second stage. For instance, in the organisation of the TNM, the function of “Organiser of the open market” will be defined but not be implemented in the first stage. Also, the function of “Billing and financial management of transactions” will be rudimentary during the first stage and intensified in the second stage.

The Malian law already provides for unbundling. Consequently, revision of the law only relates to Senegal. This will primarily only concern article 19 and 28, in order to shorten the timeframe for approval by the Parliament. The period of assistance was therefore reduced by 1 man-month.

We have not included the on-going establishment of a Dispatch Center in Mali. It is assumed that the installation of a new Dispatching Center in Senegal will be accompanied by a revision of the manual of procedures.

This variant could be achieved within 18 months, considering that significant progress would have been made on the longest action namely “the programme for rehabilitation and development of transmission and distribution infrastructures” which is estimated to take 36 months.

The total duration of expert’s services are estimated at 54 man-months. The respective total costs may be provisionally estimated at 1.0 million euros.

To these actions and this budget is added those actions relating to the establishment of the three entities:

- Opening balance sheet
- Status
- New employment contracts for transferred personnel

Action	Duration (months)	Budgeted time
R.1-2 Change of management and discussions with the staff of the historical operator	6	2
R.1-3 Electricity sectoral policy paper	6	2
R.2-1 Electricity sector law (Senegal : article 19 SENELEC and article 28 Tariffs in law n° 98-29 of 14 April 1998 relating to the electricity sector Mali : Ruling n°00-019/P-RM of 15 March 2000 already provides for vertical unbundling	12 (reduced to 6 if there are only few articles to modify)	4 may be reduced to 1 if there are only the articles of the Senegalese law to modify
R.3-1 Concession contract for the TNM	6	3
R.3-2 Network code	4	3
R.3-3 Organisation of the TNM	12	10
R.3-7 Programme for rehabilitation and development of transmission and distribution infrastructures	36	18
R.4-1 Model of electricity supply contracts	12	5
R.4-2 Model of distribution concession contracts	4	2
R.5 Setting tariffs on transmission, system services not individually imputable and tariffs on distribution of electricity supply to eligible and non-eligible customers	18	8

2 ORGANISATION OF A LIMITED MARKET IN TANDEM WITH A REGULATED MARKET

2.1 RECOMMENDED STEPS FOR OPENING UP AND ORGANISATION

The existence of an open market limited to eligible customers alongside a regulated market is the first indispensable transition step in the gradual process of opening up the electricity market, whereby the regulated market will gradually disappear. Opening up the market requires a new organisation of the participants in the sector, including the continuation of supply to non-eligible customers. It requires the creation of new functions, generally performed by the manager of the transmission network.

Report n°1 presented three alternatives for market organisation.

Option 1: a central buyer for the entire regulated market adjacent to an open market organiser, the two bodies will play a complementary role in order to optimize the operations of the global generation-transmission system.

Option 2: the independent distribution network managers supply both regulated and eligible customers. On the one hand this option requires the historical transmission and distribution operator to entirely withdraw from its generation activities and on the other hand it also requires the establishment of a single market operator through which producers and buyers will pass their orders.

Option 3: separate the function of distribution network operation from that of supply to regulated customers. This step normally only occurs when the free choice of supply is planned for all customers.

Option 1 was implemented in several European Union countries during the gradual unbundling of state-owned companies, which was completed on 1st July 2007. It is a transition step in the liberalisation of operations. This option is further described below.

In the particular case of Senegal and Mali, the reorganisation of functions extends to the cross-border multinational operator OMVS-SOGEM (Senegal, Mali and Mauritania) which combines generation and transmission activities (see 2.5 below). By 2012, it will also include OMVG (Guinea Conakry, Guinea Bissau, Gambia and Senegal) in the same manner.

2.2 MARKET PARTICIPANTS

Market participants are classified according to the categories shown in the table below.

The participants mentioned in the first column constitute the Public Utility (PU). The IPPs which have exclusive long-term contracts (PPA) along with the entity responsible for public services are considered to belong to the Public Utility.

The other participants mentioned in the second column, constitute the open service.

Categories of market participants	Types of market	
	Regulated	Limited Open
Transmission and regulation of exchanges		
a) national transmission network manager which combines several functions : Commercial Agent of the public utility, market operator, System Operator, administration and operation of the transmission network.	X	X
Generation		
b) producers having a Take-Or-Pay contract (PPA) with the TNM	X	
c) Independent producers (IPP) connected to the national transmission network		X
d) external operators who wish to buy or sell electricity in the country via international interconnections		X
Distribution		
e) distribution network managers	X	
f) other independent electricity distributors registered by market operators		X
Users		
g) eligible customers		X
h) public utility customers	X	

The limited open market is restricted to eligible customers and independent producers, while the regulated market is exclusively for non-eligible customers and those eligible customers who wish to remain in a regulated service.

Independent operators of electricity generation from heat boiler and or renewable energy benefiting from special conditions or subsidies on their production are considered participants of the regulated market.

Managers of the public distribution network become participants of the open market when part of their electricity requirements are purchased in the open market, for example through the binding bidding controlled by the national regulator.

Finally, self-producers that are not concerned, whether they have access to the transmission or distribution network with the ability to buy or sell energy, are not included. In this case and based on their choice, they are connected to the Public service or to the Open Service.

2.3 PRE-REQUISITES FOR OPENING THE REGULATED MARKET

A set of provisions is required to open up the market.

2.3.1 General provisions

The functions of generation, transmission and distribution performed by the historical operator are legally independent (unbundling).

The eligibility conditions for the wholesale consumers are defined by decree.

2.3.2 Planning and transmission

The task of the public utility, in particular the drafting of the medium to long term development plan for the generation-transmission system is entrusted to the TNM under the supervision of the national regulator. It performs this duty within the framework of a concession contract.

The TNM is independent and autonomous from generation and distribution operators. To this effect, its revenues accrue exclusively from the user fees of the transmission utility network.

The existing PPAs are transferred to the TNM who is also the buyer by default of generation from renewable energy which benefits from guaranteed price subsidies.

2.3.3 Generation

Part of generation is provided by the independent producers not linked by PPAs or not committed for part of their output. If the number of eligible customers increases, new generation will be through IPP, but if the number remains stable it will be through PPAs with the TNM.

Overseas operators have access to eligible customers through interconnection lines and conversely national producers may export to overseas buyers.

2.3.4 Distribution

The distribution network managers must buy an increasing part of their electricity demands from the open market. This part may depend of the size of open access generation compared to total generation. The purchases of the distribution network managers from the open market may for example be conducted through periodic public auctions, in order to provide an incontestable reference (i.e. transparency) to the price fixed by the regulator for the non eligible customers.

There is a specific tariff set for use of the MV distribution network.

2.4 NEW FUNCTIONS OF THE TRANSMISSION NETWORK MANAGER

The development of the new functions must allow exchanges to be regulated in a coordinated, non-discriminatory and economically satisfactory manner.

The proposed organisation separates, within the TNM, the various activities necessary for the operation of a non-vertically integrated system. It has the advantage of being simple and not costly.

The activities are combined into five independent entities placed under the responsibility of Transmission Network Manager (TNM) and are detailed in Chapter 3 below. These entities are as follows:

1. Commercial Agent of Public Utility (CAPU)
2. Organiser of the free market/ Market Operator (MO)
3. System Operator (SO)
4. Billing and financial management of transactions (Administrator)

5. Maintenance of transmission network

The model also allows for the optimal operation of information and telecommunication systems connected to the generation and transmission control centres.

As the opening up of the access to the network progresses, the importance of the CAPU will diminish and then disappear when all the customers become eligible. On the other hand, the function of market operator which is elementary when physical bilateral contracts do not exist will become complex with the increase in the number of participants and the types of transactions possible, such that at a given moment, the MO will become a legally separated entity from the TNM. This will necessitate adjustments to the operations manual and if necessary the organisation, each time transaction opportunities arise.

2.5 CROSS-BORDER INTERCONNECTIONS

Senegal, Mali and Mauritania are interconnected via the OMVS transmission network.

The four main operators are EDM-SA (Mali), Senelec (Senegal), Somelec (Mauritania) and Sogem-Eskom Manantali. The last one is the operator of the Manantali hydroelectric power station situated in Mali and the joint transmission network of the three countries.

Access of independent producers to the network is governed by exclusive purchase contracts with each of the national operators.

Presently, Sogem-Eskom is the only operator which has a real-time supervision centre and the means to analyse system security. Senelec completes the installation of a supervision centre and EDM-SA expects the creation of its own centre in 2011 (drafting of the specifications is in progress).

The coordinated operation of the OMVS system between the four operators and access of the three countries to energy from Manantali are facilitated through diverse agreements committees. In the classical setup, the whole transmission utility network is placed under the sole responsibility of the System Operator and all connected power stations are coordinated by this operator. With OMVS and later OMVG, the situation is different because the responsibility for operation of the transmission network is shared between Sogem-Eskom and the national operator, while operation of the Manantali power station is not controlled by the Dispatching of the national operator (Mali).

In the medium term (2010), Mali, Senegal and Mauritania will be interconnected to Ivory Coast, which is already interconnected with Burkina Faso, Ghana, Togo, Benin and Nigeria.

The first three countries (Mali, Mauritania and Senegal) will however continue to constitute a single control zone within the WAPP framework. Each control centre will supervise in real-time the generation and transmission installations on a given territory.

To manage access to the transmission network of OMVS and much later to that of OMVG, the following two options are foreseeable:

- a) Entrust to Sogem-Eskom, then to the future operator of the OMVG system, a cross-border geographical responsibility covering its transmission network with management of its access, similar to that of EDM-SA, Senelec or Somelec.
- b) Entrust management of segments of the transmission network of Sogem-Eskom on their national territory to national managers. It will also continue to provide maintenance.

In scenario (a) logistically Sogem-Eskom will be able sell directly to at least the customers who will be connected to its network. This solution will require the revision of agreements between the three countries.

In scenario (b) the output of Manantali will continue to be purchased by the TNM. The three countries can decide to supply the open market with part of the output from Manantali or else each of the countries will even be able to increase the competition for its energy quota from Manantali by the number of the beneficiaries of this energy on its territory.

Scenario (b) is a more classical setup, which presents a single responsibility in the management of each national system, provided that the new provisions maintain the wheeling of energy across Senegalese territory to Mauritania.

We recommend scenario (b) subject to the revision of the roles, functionalities and hierarchical relations between the three national control centres in relation to the Manantali control centre.

A comparable scenario will need to be adopted for the OMVG system that is to become operational by 2014. The agreements presently being drafted should consequently integrate this solution.

3 FUNCTIONS OF THE TRANSMISSION NETWORK MANAGER

3.1 GENERAL PROVISIONS

This chapter describes the main functions which allow the TNM to organise the means of generation and transmission so as to satisfy consumer demand. These functions are grouped under five entities:

- a) Commercial Agent of the public utility(CAPU)
- b) Organiser of the free market/Market Operator (MO)
- c) Operator of the generation-transmission system/ System Operator(SO),
- d) Billing and financial management of operations (Administrator)
- e) Maintenance of the transmission network

In order to perform its duties in a non-discriminatory manner and guarantee the transparency of the decisions of the TNM, these major functions are independently organised between them.

3.1.1 Control Rules

The TNM is legally and functionally independent from all generation and distribution activities.

In the performance of its duties, it respects control rules based on the following principles:

- a) equal treatment of operators and customers
- b) respect of general/public interest
- c) coexistence of the PS and the PU, optimization of the gains resulting from the joint technical operation of the PS and the PU and interconnections
- d) Transparency of decisions through information and audit procedures

3.1.2 Rules of Confidentiality

The TNM prepares confidentiality rules for each of its assigned functions. These rules specify the principles of independence, impartiality, confidentiality and responsibility to be observed by the manager.

The TNM submits these rules for preliminary approval by the national regulator which approves the list of sensitive information to be obtained by the TNM from the operators.

It organises access and circulation of sensitive information among the staff that use it for their work, while putting in place internal control measures intended to prevent the risk of discriminatory practices in the access to the TN.

3.1.3 System security and quality of service

System security and quality of service are defined in an appendix to the concession contract of the TN and specified in the manual specifying the conditions of access to the TN and to interconnections, in accordance with existing regional and international rules (OSMP of WAPP).

These rules are set by the TNM and made available to all concerned parties.

3.1.4 Dispatching, information and communication system

The term « dispatching » covers the following three functions of the TNM

- a) Control of the generation-transmission system/ System Operator (SO)
- b) Commercial Agent of the public utility (CAPU)
- c) Organiser of the free market/ Market Operator (MO)

These three functions are developed according to appropriate specifications on security and quality of service which include acquisition, exchange and treatment of data from the planning to billing. Information on dispatching is shared between several departments responsible for this function within the TNM and with the generation and distribution managers, the control centres (OMVS and OMVG) and the control centre of interconnected countries via a telecommunication system with dedicated connection which can be rented to public operators.

The TNM provides the CAPU with the minimum information technology and telecommunication facilities required for the performance of its duties. Its information protection system includes the protection of data and information for the CAPU.

The TNM also provides the MO with the required information technology and telecommunication facilities.

3.1.5 Consultations with market participants

The TNM develops the manuals of procedure defined below after having consulted market participants. It then submits them to the national regulator for approval.

3.1.6 Tariffs on use of the TN and system services

A tariff will be levied on all the services supplied to the market participants by the TNM, to cover:

- a) The expenses of the TNM (CAPU, MO, SO, Administrator, operation of facilities) including financial expenses, depreciation of fixed assets and a dividends to shareholders,
- b) the expenses for the acquisition of system services, non-imputed to/under particular user.

The expenses are covered through tariffs and the methods of calculation of such tariffs are defined by decree. It includes the price paid for transmission on the OMVS and OMVG network.

The tariff is independent of distance travelled by the energy (postage-stamp) on the basis of several components.

A component called « management » or « marketing » include management of the access contract, billing (replacement and maintenance of equipments), invoicing and its recovery.

The tariff formula for usage of the network has two elements:

- a fixed component dependent on capacity and corresponding to the cost of capital, the main part of system service costs and operational and maintenance costs;
- a variable component covering estimated costs of transmission and distribution losses on the basis of network simulations and other expenses, such as guaranteed tariff on generation from renewable energy.

This formula allows the indexation of tariffs in relation to changes in costs.

Payment of the transmission tariff is shared between producers at points of injection and customers at the points of withdrawal, according to the variable costs, knowing that it will

finally be passed on to the final user. The tariff structure depends on connection voltage and subscribed capacity while respecting rules which allows more than one capacity at distinct withdrawal points.

Finally, if necessary, penalties will be imposed on excess capacity and excessive consumption of reactive energy.

The TNM submits proposals on adjustments to tariffs to the national regulator according to the provisions of the decree.

3.1.7 Supervision of the concession by the national regulator

The national regulator may at anytime conduct audits on the TNM in order to supervise the proper application of rules, particularly those concerning confidentiality and manuals of procedure.

The licensee of the transmission utility collaborates in the proper conduct of audits.

The national regulator submits provisional audit reports to the TNM for comments.

3.1.8 Complaints and dispute resolutions

3.1.8.1 Complaints

Market participants may present complaints against actions or omissions committed by the TNM to the national regulator.

Complaints relate to the performance of the duties of the TNM and respect of its obligations.

Market participants may ask the national regulator to give a ruling on the interpretation of regulations and on their application by the TNM.

However with regards to the two independent bodies, some countries have stipulated in their legislation that the TNM is not obliged to follow the rulings issued by the national regulator on certain issues.

Also, in order to avoid a dispute between the TNM and the national regulator, the role of the latter should be limited to approving rules and verifying that they are properly applied in cases of disputes between the TNM and one of the market participants.

The legislations will therefore specify the issues on which the national regulator will be able to give rulings.

3.1.8.2 Dispute resolution

Disputes which arise out of contracts concluded between market participants are resolved by arbitration first before recourse to appeals before the competent jurisdiction under the authority of the national regulator.

3.2 COMMERCIAL AGENT OF THE PUBLIC UTILITY (CAPU)

3.2.1 Missions

The CAPU performs the following activities of the public utility:

- a) elaboration and update of the operations programme of the public utility from long term purchase contracts (PPA), declarations of availability of producers and forecasts of consumption by customers ;

- b) exchanges with the open market : purchase and sale of electricity and system services with the MO and operators of the neighbouring countries via interconnection lines ;
- c) management of related contracts.

3.2.2 Manual of Procedures

A manual of procedures describes the following tasks:

- a) modalities for establishing operations programmes for the PS
- b) listing of necessary information for the establishment of the operations programme of the PS
- c) listing of information and criteria for the establishment of the annual programme of planned maintenance
- d) general conditions for granting relief contracts to the members of the ROAS,
- e) procedures for collection, storage and access to the collected information,
- f) functional specification of the information system used,
- g) provisions guaranteeing confidentiality of sensitive information

The national regulator approves the manual of procedures and its revisions.

This manual is public and applicable on all market participants cited therein, notably with respect to the supply of information relating to the operation and coordination of non-availability.

3.2.3 Management of contracts

The CAPU negotiates and manages the following categories of contracts:

- a) PPA (producers tied to the PS)
- b) Contracts for sales to the distribution network utility managers
- c) Contracts for purchases by special producers (renewable energy, co-generation, etc
- d) Contracts for voluntary interruption,
- e) Contracts for the supply of relief.

It manages the process until expiry of the production concession and BOT.

3.2.4 Operations programme of the PS

At different time horizons, the operation programme of the PS determines the value of energy and capacity to be produced by the various generation units, as well as the cross-border exchanges to satisfy demand while respecting the required safety and quality criteria at the lowest cost.

The CAPU defines the programme of operation from the following evaluations:

- a) cost of operations and output per year, month, week and day of the generation units under the supervision of the TNM,
- b) the classification by order of merit of the generation units for the next day,
- c) The needs for possible interruptions,
- d) the reserves to satisfy the relief contracts,
- e) the annual programme of maintenance programmed of the generation units,

- f) the forecasted fuel requirements of the generation units

The operations programme provides:

- a) a classification of generation units according to merit, taking into account primary and secondary regulation needs,
- b) the quantities and costs of energy available for the sale outside the PS,
- c) The volume of electricity of the PS that can be substituted based on attractive costs by the purchases to ROAS or of imports,
- d) the volume of interruption contracts to sign between the TNM (SO) and customers of the PS,
- e) the volume of contracts for the supply of relief to sign between the TNM (OS) and the PS customers,
- f) the useful elements to verify the calculation of the security system,
- g) the compliance to environmental or related measures (downstream of the dams, emissions of CO₂, etc)

3.2.5 Exchanges with the open market

From its operations programme for the public service, CAPU may present of bids for purchase and sale of energy and system services to the MO and registered operators in neighbouring interconnected countries.

These bids may either be daily bids or bilateral contracts of a determined maximum duration to incorporate into the programme of the MO after approval by the national regulator.

CAPU adapts its programme of generation and classification by order of merit based on the accepted tenders.

CAPU conforms to the manual of procedures of the MO in its commercial relations with the latter.

3.2.6 Relief Contracts

When the number of free producers is limited and the services offered on the open markets are reduced, it is better not to impose high guarantees for continuity of supply (high reserve rate) on each free producer, since the combination would be economically costly.

Thus the CAPU borrows part of the capacity provided by the PS to guarantee relief contracts of free producers who want it.

3.2.7 Maintenance and dissemination of information

The CAPU keeps information collected and produced during the performance of its duties for a minimum period of 5 years after their acquisition.

It provides any interested party with the following information:

- a) the annual plan of programmed maintenance,
- b) the daily programme of operation of the PS

3.3 ORGANISER OF THE FREE MARKET/ MARKET OPERATOR (MO)

3.3.1 Missions

The MO organises commercial relations between the public utility, independent producers, eligible customers and operators (producers and customers) of neighbouring interconnected countries. More particularly, it has the responsibility to:

- a) determine equilibrium conditions between bids for sale and purchase of energy and system services coming from the different operators of the open market;
- b) select proposals allowing exchanges (contracts) and communicate necessary elements to the SO, who incorporates them into its technical approval process of the generation-transmission programme;
- c) disseminate bids for short-term sale and purchase to all operators so as to facilitate the establishment of short-term contracts ;
- d) centralise and update physical information relating to bilateral contracts and submit this information to the SO.

3.3.2 Manual of procedures

The manual of procedures of the MO defines:

- a) The conditions for obtaining the status of market participant.
- b) Provisions for obtaining, suspension and termination of the contracts for access to the market,
- c) Products likely to be subject to contracts requiring network access,
- d) Modalities for presentation of purchase and sale tenders (timing of presentation, schedule of supply, etc)
- e) Specification of tenders for the purchase and sale of energy ,
- f) Method of adjustment of tenders to incorporate losses
- g) Frequency and method of calculation of the point of equilibrium for purchase-sale ,
- h) Communication/dissemination of the programme of exchange of the free market to the SO and other market participants,
- i) Communication with the MOs of interconnected countries,
- j) Guarantees to be provided by market participants including revision of their amounts,
- k) Schedule payment for the operations,
- l) Actions in special situations
- m) Information to supply/send/communicate to market participants
- n) Measures and guarantees on confidentiality of sensitive information,
- o) Functional specifications of the information system

These specifications mainly describe the circulation of information between the staff responsible for carrying out various functions of the TNM and specify the part of this information which is recorded and kept.

3.3.3 Registration of a participant of the open market

The MO registers an open market participant after having verified its membership conditions. It signs a contract of access with it.

It informs the national regulator of any refusal of the application for registration of a market participant.

3.3.4 Equilibrium of tenders for purchase and supply in the open market

3.3.4.1 Types of contract

Energy and system services may be exchanged on the open market according to two types of contracts:

- a) daily bids submitted to the MO which fulfil the conditions for equilibrium between purchases and sales.
- b) Bilateral contracts with physical delivery

3.3.4.2 Clearing Price

The Clearing Price is the maximum sale price less than or equal to the minimum purchase price for the maximum quantity of energy exchanges.

Bilateral contracts do not enter into the determination of the Clearing Price.

3.3.4.3 Cross-border exchanges¹

The modalities of transmission and consideration of offers for cross-border exchanges are decided through mutual agreement between the TNM and the TNM of the interconnected country or the body that is responsible for these functions. The SO of each country evaluates and communicates the net capacity available for commercial exchanges on interconnections. The evaluation methods must respect applicable international rules of access to interconnections and regulations.

Subject to these provisions, the MO registers bilateral cross-border contracts and treats them as national contracts.

¹ Short term cross-border contracts which require coupling between the markets of two interconnected countries leave the framework of the framework of the limited market.

3.3.4.4 Programme of daily contractual exchange

On the basis of its calculation of equilibrium per half-hour, the MO creates the daily programme for contractual exchanges and informs each participating operator of the acceptance of its bid for the next day.

3.3.4.5 Payments and guarantees

The MO calculates the amounts corresponding to the contractual programme on the basis of the contractual programme and prices supplied per half-hour and send the result to the operators involved.

Corresponding payments are effected within the time period stipulated in the manual of procedure of the MO. They are provisional until the approval for billing of energy is actually provided by the “Administrator” who accounts for transactions and controls their liquidation.

Buyers on the open market are required to provide the TNM with guarantees stated in the manual of procedures of the MO covering the operations in which they participate. The MO uses this guarantee in case of default in payment by a market operator for market transactions. Furthermore, the MO may suspend or terminate the contract in case of default in payment.

3.3.4.6 Treatment of discrepancies

Discrepancies are accounted for when the difference between contractual exchanges and those observed per half-hour are greater than the margin fixed in the manual of procedures of the SO.

The methods of valuation of discrepancies and possible associated penalties are described below (see section 3.5.5).

The MO is informed by the Administrator of the magnitude of the discrepancies observed for each open market participant.

3.3.4.7 Exceptional situations

Exceptional situations are those that prevent the execution of the bid acceptance process or the process of determining the Clearing Price.

It may result from absence of sales bids, a fault on the information system of the MO or its telecommunications or a force majeure.

3.3.5 Recording and dissemination of information

3.3.5.1 Recording information

The MO gradually records all information or data which guides decisions taken during the performance of its duty, allowing any other party to verify the conformity of its decisions to the principles stated in chapter 3.2 above. This information is kept for a minimum of 5 years.

For this purpose, the MO records:

- a) bids received for purchase and sale of electricity and system services with the name, date and hour of receipt,
- b) provisional results of calculations of equilibrium with the date and hour of their transmission to the SO,
- c) restrictions imposed by the SO,
- d) daily contractual programmes with their Clearing Price, date and hour of transmission to market operators,

- e) annual reports describing market activity,
- f) data required to quantify exchanges effected through bilateral contracts.

3.3.5.2 Information accessible by market participants

The MO transmits the following information on a daily basis to market participants:

- a) Confirmation of receipt of the bid
- b) Acceptance of the bid and its inclusion into the contractual programme.

It periodically gives market participants access to series of information in order to allow verification of the calculations for the determination of the Clearing Prices:

- a) Rejected bids for sales and purchases,
- b) Clearing Price,
- c) Market price,
- d) Programme of exchanges resulting from the market
- e) Possible restrictions imposed by the SO

Operators undertake not to divulge information they gather during this occasion. Any request for information or clarification which involves the devolution of information which is not accessible by the public must receive prior authorisation from the national regulator.

3.4 SYSTEM OPERATOR (SO)

3.4.1 Missions

The SO is the department of the TNM which coordinates the activities of all operators connected to the PTN in order to provide a service which is in conformity with the required standards of safety and quality.

These essential functions are as follows.

3.4.1.1 Coordination of the non-availability of facilities

The SO develops the coordinated programme of non-availabilities of generation and transmission facilities from requests by the CAPU, the MO and other TNMs of neighbouring interconnected countries. This is adjusted on the basis of events.

3.4.1.2 Operations Programme

From the daily programmes developed by the CAPU and the MO as well as physical bilateral contracts, the SO develops the programme for daily operations according to safety rules. This is adjusted on the basis of events.

3.4.1.3 Management of system services

The SO develops an annual programme for system services needs. It prepares contracts for the supply of system services with the operators of PS and the RAOSs selected through a transparent process.

It modifies the programme of operation by successive adjustments while mobilising one of the system services once it observes that the conditions of the safety of the system are unsatisfactory, for instance by temporarily mobilising quick reserves.

3.4.1.4 Real-time system operation

The SO continuously supervises the generation-transmission system, analyses its security, prepares orders resulting from this supervision and submits them to the operators for implementation in order to maintain the system according to the required safety and quality standards.

The SO orders operations and takes non-programmed measures to handle situations resulting from unforeseen incidents which occur on the system.

In particular, power outages, automatic or ordered by the SO, occur to maintain system operation during the occurrence of exceptional incidents not included in the normal analysis criteria for system safety.

3.4.2 Manual of procedures

The manual of procedures of the SO completes the provisions of the network code and includes provisions from the regional level (WAPP). It defines:

- a) the process of adjustment on technical reasons and validation of the generation programme developed by the CAPU and the MO,
- b) the procedures and method of acquisition of system services, mainly secondary reserve and voltage control,
- c) procedures and modalities for exchange of information with all national and foreign operators connected to the TNM,
- d) actions to be undertaken collectively and by each operator under its supervision in the event of occurrence of major faults on the system, including start-up operations for the service after a system breakdown,
- e) conditions under which automatic power outages must occur,
- f) exceptional situations for which an operator may not execute an order from the SO.

The manual is approved by the national regulator and made available to any interested party.

3.4.3 Information system

The TNM is responsible for the creation, adaptation and proper maintenance of equipments, software and means of telecommunication required for management and supervision of the operation of the information system as well as its internal and external protection against unauthorised access.

3.4.4 Access to installations of operators connected to the TNM

The SO may access the installations of operators connected to the TNM for the purpose of maintenance of equipments, verification of the characteristics of the installation, to modify adjustments and conduct tests.

3.4.5 Recording and dissemination of information

3.4.5.1 Recording of information

The SO progressively records all communications. It maintains an up-to-date register containing the following information relating to system operations which are kept for a minimum of 5 years:

- a) Daily operations report
- b) History of orders issued from the control centre,
- c) The declarations of availability,
- d) Declarations of available capacity per generator
- e) Declaration of unavailability and modification of unavailability,
- f) Annual plan non-availability,

- g) Detailed statistics on generation and off-take (energy and capacity),
- h) Detailed statistics on cross-border exchanges
- i) Annual hydraulic characteristics and their evolution

Upon request, the SO sends a detailed report to the national regulator justifying the measures taken during the occurrence of the following events:

- a) The activation of manual power cuts,
- b) The activation of load reduction for contracts with an interruptibility clause,
- c) Modification of declarations of non-availability,
- d) Repeated modifications of daily operations programmes and repeated alterations of bilateral contracts.

The SO publishes weekly and monthly reports on system operation.

3.4.5.2 Information accessible to market participants

The SO makes the following information available to market participants:

- a) Daily operations reports, including programmed and actual load curves,
- b) Technical restrictions affecting operations,
- c) Causes and consequences of incidents on the TNM,
- d) Entry into service of new generation and transmission equipments.

3.5 ADMINISTRATOR

3.5.1 Missions

The Administrator is a department of the TNM which:

- a) records and updates data on network users ;
- b) coordinates and approves metering and billing;
- c) valuates and manages financial flows from discrepancies between actual consumption and forecasts, as well as modifications to the programme for technical reasons,
- d) invoicing or collecting from the operators amounts arising from the application of the transmission tariffs,

3.5.2 Manual of procedures

The manual of procedures of the Administrator defines:

- a) documents required to apply for access to the TNM,
- b) information to submit to the Administrator to certify data on energy exchanges between users of the TNM,
- c) margin of tolerance for discrepancies without penalty,
- d) method of valuation of discrepancies,
- e) method of valuation of programme modifications for technical reasons and the timeframe for payment by the Administrator,
- f) timeframe for submission of information to the Administrator and from the Administrator to market participants.

3.5.3 Recording of information

The Administration progressively records all information sent by users of the TN. It keeps contracts of access to the TN. This information serves as evidence during dispute resolutions between market participants.

3.5.4 Coordination and approval of billings

Administrator validates the volume of exchanges per half-hour which serves as definitive breakdown between operators.

Administrator checks and validates the collection of measurements by telemetry and the automatic management of meters by the SCADA for the totality of worthwhile billings.

Administrator collects and handles the readings on meters not read remotely. When an eligible customer is connected to an MV distribution network, it convenes with the distribution network manager on the modalities of incorporating losses attributable to it.

In the absence of such a means of measurement, it approves the methods of calculation proposed by the SO.

It aggregates the billings from several sites relating to the same supply contract or several contracts for the same supplier in order to determine the discrepancy compared to the programme while taking into account the expansion of consumption.

It oversees the confidentiality of commercially sensitive information.

3.5.5 Treatment of discrepancies

The Administrator determines the rights and obligations of the actors of the market resulting from the differences between programmed and effective flows. It is based in particular on contracts signed by SO for secondary and tertiary regulation of the system.

Administrator carries out billing and management of financial flows from discrepancies.

It prepares a monthly summary report for each operator and manages related financial transactions.

To reduce financial risks, it puts in place a deposit of an amount calculated on the basis of the contract for access to the network.

The common provision for the treatment of discrepancies is applicable to the distribution network managers.

3.5.6 Adjustments to the operations programme for technical reasons

Over expenditures caused by adjustments to the operations programme are included in tariffs for a limited period of time. After which, the Administrator charges the defaulting operator (unavailability of a generator, transmission line etc).

3.5.7 Information accessible to market participants

With the exception of contracts of access, users of the TN have access to information recorded by the Administrator.

The Administrator publishes on a daily basis the sum of discrepancies observed on the open market and on the PS during the previous day.

3.6 OPERATION OF THE FACILITIES OF THE TNS

Operation of facilities is the duty of the TNM through which it ensures:

- a) Operation and maintenance of facilities of the TN from the delivery point of generation power stations and the interconnections with cross-border countries until the points of delivery to direct customers of the network and the public distribution network, including maintenance of mechanisms for billing of the control centre and telecommunication networks ;
- b) Planning of development of the TN in coordination with those of the distribution network
- c) The expertise for reinforcement and expansion of the TN.

The description of this task, the procedures of operation, recording and access to required information are defined by the TNM according to the standard rules of the profession.

4 GENERAL OUTLINES OF A NETWORK CODE

This chapter presents the main outline of a transmission network code applicable to Senegal and Mali. The aim is to provide a general framework for the preparation of a network code for each country which is compatible with the envisaged reform of a limited open market coexisting with a regulated market.

The chapter is organised as follows;

1. Applicable legislations and regulations
2. Definitions
3. Rights and obligations of the TNM
4. Network development plan
5. Connection to the network
6. Operations on the network
7. System services
8. Operation Programme
9. System control
10. Measurement and billings
11. Information
12. Relations between the TNM and distribution network managers
13. Cooperation between the TNMs of the control zone
14. Treatment of complaints and dispute resolution
15. Revision of the network code
16. Interim provisions

Appendix (model of connection contract, codification of equipment, model contract of each category of system services, standard information form)

4.1 RECAP OF THE REGULATION

This chapter will describe:

- applicable legislations and regulations including regional and sub-regional agreements (OMVS, OMVG, ECOWAS Protocol, WAPP regulation etc)
- the organs responsible for enforcement of the network code
- authorities responsible for interpretation and supervision of its implementation

The provisions on network access apply to all users of the public transmission network.

4.2 DEFINITIONS

Technical terms are to be defined. It will be useful for WAPP to publish a glossary in French and English so as to establish a uniform terminology in the region.

4.3 RIGHTS AND OBLIGATIONS OF THE TNM

The main obligations of the TNM are the following:

- obligation to connect operators subject to the approval of the national regulator except in special cases (to be justified)
- obligation of access by third parties according to the modalities determined by decree (eligibility thresholds etc)
- neutrality and impartiality of operations ;
- guarantee of stable and reliable operation of the generation-transmission system ;
- maintenance and adaptation of the network in a manner to preserve or improve the security of operations;
- planning network development while respecting the appropriate criteria for security and cost-effectiveness.

The performance objectives of the network are: to limit frequency spikes, dampening of voltage fluctuations, level of harmonic disturbances, level of capacity fluctuations (flicker), maximum interruption time for programmed maintenance of sites on which the n-1 rule is not applicable etc.

The TNM may check the equipments of users insofar as they can influence the functioning of the network, restrict practices of users such as prevent manoeuvres which endanger the system.

This chapter will include a section which presents the internal organisation of the TNM and specifies the obligations of impartiality and confidentiality associated with the performance of these diverse functions.

4.4 PLANNING NETWORK DEVELOPMENT

The TNM annually prepares and updates a development plan for the public transmission network based on the characteristics of observed demand and forecasted growth in demand.

The TNM may conduct inquiries on customers and applicants. The timeframe for supply of information may depend on the size of capacity demand.

The TNM submits the development plan to the relevant authorities for approval. It is responsible for implementing projects including obtaining funding within the expected timeframe. It prepares the development plan by applying the following important rules and studies:

- the choice of one or several security criteria : n-1 rule or all the rules adapted to regional system grid, rate of reserve generation etc;
- studies on security margins (« load flow »), voltage plan, short circuit in various network configurations;
- studies of reliability through simulation of the depth of incidents and evaluation of unsupplied energy estimated from simple and multiple incidents, whose frequency of occurrence is determined from the historical series of the System Operator. These simulations will also provide the framework of the codes of operation for abnormal situations of the system;
- studies on static and dynamic stability through simulation of the behaviour of all generation units located on the public wheeling network operating together in various system configurations

These studies evaluate static and dynamic stability and provide:

- the levels of short circuit capacity for studies on new connections,
- conditions for achieving synchronism for generators used for preventive decoupling of generators under certain circumstances (type of incidents),
- basic information for a selective and coordinated protection plan for the whole system.

In order to be able to include cross-border interconnections and obtain a complete analysis of the system at the regional level, it is necessary for the TNMs of neighbouring countries to exchange useful information, at least at the high voltage level.

4.5 CONNECTION TO THE NETWORK

The provisions for connection to the public transmission network must ensure that new demand is satisfied and guarantee that already connected customers retain at least an equivalent quality of service.

4.5.1 Administrative provisions

Administrative provisions describe the conditions needed to obtain and modify a connection and appoint the department of the TNM responsible for handling applications and signing of connection contract (a model of the contract is to be attached to the network code).

They describe necessary information and procedures of recording and updating the register of connections.

4.5.2 Technical prescriptions

The general technical prescriptions define the physical limit between the equipment of the user and those of the TNM. They describe the typical scheme for connection and information to be supplied to the TNM by the applicant. A model of codification of equipments to facilitate management of the cadastral register of connections is attached to the network code.

Additional technical prescriptions apply on the connection of loads which are likely to create disturbances on the system. They define disruptive loads.

Specific technical prescriptions describe the connection of a generator to equipment and the minimal performance to respect, possibly differentiated according to the types of units:

- protection in event of internal and external defaults;
- levels of guaranteed capacity during a certain time under abnormal conditions of operations (frequency deviations, abnormal voltages, etc)
- rate of change of injected capacity ;
- primary regulation of frequency : threshold capacity for participation or non-participation in the primary adjustment, dead band, primary adjustment band and speed of adjustment ;
- secondary regulation with minimal speed and rhythm of fluctuation ;
- absorption of reactive capacity ;
- conditions for disconnection from the network in case of an incident ;
- operational capacity under isolated network ;

- stand alone capacity (isolated operations on own auxiliaries) ;
- capacity to restart the network without assistance
- information to provide to the TNM in real time.

4.5.3 Modalities for connection

Connection of an applicant requires discussion between him and the TNM in order to define its organisational structure and specify the characteristics of standard and specific equipment as well as the modalities for carrying out the connection.

The modalities of connection define the types of trials to perform prior to the industrial commencement of service.

4.5.4 Supervision and modification of a connection

Provisions define the controls and modalities for trial and measures to be implemented by the TNM, the user or other users on the connections, associated installations and the nearby network.

4.5.5 Special modalities for connection of a sub-station intended for public distribution

Connection of a sub-station intended for public distribution causes load variations from existing ones towards the new. The manager of the distribution network must provide the TNM with information describing new demand in the distribution zone concerned.

4.5.6 Connection of generation units via a distribution network

A major part of the energy injected into the distribution networks physically goes back to the transmission network. The managers of the distribution networks and the TNM must therefore agree on the means which will enable the TNM to know the volume of injection in real time and dispatch instructions and information to the producer from distribution installations.

Managers of the distribution networks and the TNM must jointly carry out studies on the impact on the networks in order to decide on the scheme for connection.

4.6 OPERATIONS ON THE NETWORK

Provisions describe operations relating to the injection of a determined quantity of electricity at one or several points on a determined network and the simultaneous withdrawal of the same quantity, including losses at one or several points on the same network or an interconnected neighbouring network.

The level of sophistication of information exchanges between the TNM and the users (suppliers and customers) for preparation and supervision purposes depend on the number of users who reach the network as well as the nature of authorised operations.

The content of the sections presented below will therefore be adapted according to the categories of market participants and authorised operations on the public transmission network.

Section 1 : recalls the conditions for network access and specifies the administrative method of recording/registering an application for connection, particularly by distinguishing its ownership and usage, characterise access for injection, withdrawal or intermediation of the market assuring injection and withdrawal at the same time.

Section 2: recalls possible operations and obligations of users to be carried out:

- operations on the network of the TNM,
- exports to a neighbouring TNM ;
- imports from a neighbouring TNM ;
- wheeling

Section 3 defines the content of an application for operation and respective obligations of the applicant and the TNM, notably its registration.

Section 4 describes the circulation of an application for operation including several managers (distribution and transmission networks of country and neighbouring countries).

Section 5 defines the frequency of an application for operation and the timeframe for its presentation to the TNM, for example, annually with a notice of one or two months for a bilateral long-term contract and before 16h of the eve of an operation on the daily market.

Section 6 defines the modalities for approval or partial or total refusal by the SO of an application for operation.

The TNM analyses all applications for operation on a daily basis by differentiating those which it can not limit or prevent at a specific time except for reasons relating to the safety of the operation of the public transmission network.

The TNM, neighbouring TNMs and managers of the distribution network exchange and coordinate their analysis of applications for joint operations.

The TNM approves each operation prior to its implementation. A reasonable timeframe is given to the applicant whose operation is limited, to modify its application and get it approved by the TNM.

The criteria of selection of applications which are likely to be limited are determined, for example according to the rule of « first come, first serve ».

In order to simplify procedures, it is useful to approve long-term application for operations and short-term applications (timeframe, frequency etc) differently.

The procedure allowing the TNM to temporarily or definitively modify an already approved program of operation is defined.

Section 7 defines the powers of the TNM in the event of unexpected system congestion.

Section 8 defines the treatment of discrepancies related to the approved operation programme.

A duration of about one hour is generally provided within which discrepancies are authorised and developed under the conditions of system services.

The measures that the TNM takes in the event of prolonged discrepancies are described, in cognisance of the fact that it has an obligation to supply all consumers under acceptable safety conditions, by activating relief contracts, making the best of possible positive or negative discrepancies, utilising available system reserves and if necessary by imposing the return to equilibrium of operations in situation of prolonged discrepancies (load reduction).

Section 9 defines the treatment of losses:

- by apportioning responsibility subject to the number of contracts which are weak,
- or otherwise as a system service. The TNM therefore buys energy at the lowest price corresponding to the losses on the network and the bill through the tariff on use of the public transmission network.

The TNM must make the origin and cost of energy billed as losses transparent.

4.7 SYSTEM SERVICES

System services and their billing method are described by distinguishing between personalised and general services, individually billed or through tariff on the usage of the public transmission network.

The table below presents the different services and their users.

Type of service	Supplier of service	User producing	Attributable to a particular customer
Primary frequency control	Generation power stations	Yes	Billed through network use
Secondary and tertiary frequency control	Same as above	Yes	Same as above
Voltage stability	Same as above and the network	Partially	Partially (consumption of reactive energy)
System restart	Certain power stations and the network	Yes, to various degrees :market of isolated network, stand alone on auxiliaries, black start	Billed though network use
System control and network management	Network	Yes	Same as above

For each system service, the section specifies:

- the obligations of provision of system service ;
- the modalities for acquisition of the service by the TNM, in principle, a long term contract following an invitation to tender ;
- the payment of service on the basis of the capacity and energy supplied ;
- principles for use of services by the TNM through incremental costs;
- the principles for billing users with the threshold(Cos phi) for billing of consumed reactive energy;
- daily supervision of service availability

A sample contract for each type of system service is to be attached to the network code.

4.8 OPERATIONS PROGRAMME

The provisions designate the operators responsible for programming, the functions of the TNM and the conditions of independence required among the departments responsible for these functions.

The main operators are:

- Supplier of the open market, possibly through the Organiser of the open market,
- Commercial Agent of the public utility
- Owner-manager of the public transmission network

- Lessee-manager of a public transmission network belonging to a third party,
- System Operator,

In the space of time, four programming cycles are necessary: annually, monthly, weekly and daily

Annual programming consists of harmonising periods of periodic maintenance for the essential elements of the generation station and the public transmission network.

Monthly programming is a confirmation of annual programming with adaptation integrating unforeseen events which cause modifications of the programme of unavailability.

The provisions describe the information to be supplied by producers and network maintenance services and the iterative process through which the TNM disseminates programmes of unavailability of generation stations and the main elements of the network.

Weekly programming combines the unavailability of secondary elements of the network. The TNM simulates the operation of the system on the basis of a timetable before confirming the work program of the power-stations for energy and supply of system services.

The responsibility of operators in the daily programme takes into account the structure of the market.

In a predominantly regulated market with an open component having bilateral long-term contracts, the System Operator may be directed to prepare demand forecasts for public distribution since it has series of historical statistics on consumption and can analyse the influence of external factors on the daily load curve, such as seasonality, the profile of each days of the week, festivities and other events, temperature, rainfall.

The commercial agent of the public utility and the manager of the PPA contracts provide the System Operator with a supply plan/programme which in principle should be based on merit order.

Under these conditions, the variables to be transmitted to the System Operator on a daily basis for programming generation stations are therefore mainly the contracts of exchange between the open Market Operator and the Commercial Agent of the Public Utility.

Responsibility of the demand forecasts for public distribution is gradually transferred to managers of the distribution networks. Better demand forecasts will be obtained when a parallel short term market develops.

The procedure is however still as follows:

- the System Operator requests confirmation of the availability of the capacity mentioned by the available or functioning power stations;
- it confirms acceptance and feasibility of the volumes of programmed cross-border exchange with his partners;
- it simulates the market equilibrium per half-hour from the demand forecasts, the order of priority determined by the Commercial Agent of the Public Utility, the programme of exchange determined by the Organiser of the open market, the programmes of exchanges between these two entities and losses; it verifies the reliability of the system: criteria n-1 or equivalent, rate of reserves, respect of voltage plans, including at borders, compatibility of programmed generation with supply commitments of system services;
- in case of congestion of the generation or public transmission network (during cross-border interconnections), the System Operator proposes a low-cost alternative

operation programme to the Market Operator and the Commercial Agent of the Public Utility;

- After approval by the Market Operator and the Commercial Agent of the Public Utility, the System Operator publishes and disseminates:
 - the entire programme of generation and cross-border exchanges to the Market Operator and the Commercial Agent of the Public Utility,
 - to each power-station, the detailed programme of the market, active and reactive energy generation, the rhythm of capacity variation (load following) and supply of system services;

The time limits for mutual exchange of information are specified.

The standard information forms are attached to the network code or the manual of procedures of the System Operator.

4.9 SYSTEM CONTROL

The control of the generation-transmission system includes all the tasks carried out by the System Operator to coordinate the actions of producers and transmission network operator as well as operations using interconnections such as those programmed with neighbouring TNMs.

Daily control is based on the daily programme and consists of ensuring through constant monitoring of the safety measures of the system, that the effects of unforeseen events are immediately compensated or that they have only a limited impact as a result of coordination use of all or parts of the equipments and provisions available at the right time.

Section 1 defines control under normal situations.

Normal situation includes situations resulting from relatively minor incidents which do not cause a permanent deviation of system parameters beyond their limits.

In addition to programmed operations, the System Operator orders operations which make it possible to keep system-measured parameters within these limits in the event of unexpected occurrence of un-programmed and non-transient events.

If the control centre of the System Operator is specially equipped with an automatic device for optimum load flow which is able to induce relatively large and fast voltages changes, the System Operator coordinates voltage adjustment at "borders": with neighbouring TNMs and distribution network managers (step-down transformers towards distribution)

Section 2 defines control under abnormal situations

When, following an unforeseen event, one or more of the measured parameters on part or the entire system are permanently beyond acceptable limits, the System Operator orders technical actions to prevent propagation of the incident, restore a stable situation and return to normalcy.

For this purpose, the System Operator, develops, updates and publishes a plan of defence describing the measures to be taken in the event of occurrence of incidents, which have a significant impact on the system; these provisions include the list of information which the System Operator must receive in real-time, or within a very short period of time, on the installations of transmission network users and neighbouring inter-connected networks.

These actions may consist of:

- a manual remote-shedding of certain customers by the System Operator ;

- a fragmentation of the network into several sub-systems with the capacities required for an isolated operation and a black-start

They must specify:

- management of binomial voltage-reactive energy and conditions to maintain the optimal load flow
- codes of operation to “Black Start” a system after a general or regional collapse

The System Operator develops and maintains proper operation of the frequency-threshold automatic power tripping device and ensures the proper operation of installations (diagrams of auxiliaries, UPS etc) with the users involved (producers, managers of transmission network, transformation and telecommunication nodes)

It checks for coherence between the conclusions drawn from analysis of the incidents, specifications of equipments connected to the network, such as those stated in contracts for connection and actual performances.

The conclusions of these checks may lead to the improvement on certain system installation and modifications of the terms of contracts for connection.

4.10 MEASUREMENT AND BILLINGS

The measurement equipments are used for system operation, invoicing exchanges and use of the public transmission network.

4.10.1 Administrative provisions

Administrative provisions define measurement points, the location of meters, their number and ownership: simple and double, bidirectional etc, their installation, protection, and the maintenance by the TNM of the register for the measurement points.

The TNM has constant access to equipment and information in private buildings.

4.10.2 Technical criteria

Technical criteria specify the level of precision and overload of measurement transmitters and meters, between measurement and protection, ability of meters of store information, etc.

These provisions may be compiled into a document approved by the national regulator and made available to users of the TNM.

4.10.3 Control of equipment

The TNM checks measurement equipment before their installation and during their lifespan through periodic calibrations and at the request of users.

4.10.4 Measurements

The provisions define:

- frequency of measurements
- reading of measured values,

- approval of measurement values including the method of estimation in the event of faulty equipments, determination of values when the measurement point is not the point of exchange etc,
- provision of information relating to exchanges between users and of supplies to the TNM
- access of the user to meters in its installations,
- filing of measurement information

4.10.5 Other measurements and information

The TNM may require measurements and information other than from meters, such as instantaneous measurement of capacity, voltage, position of apparatus such as circuit-breakers, information on protections etc.

The provisions may refer to the contract of connection for details on required information and provisions for reading and communication of this information to the TNM.

4.11 INFORMATION

4.11.1 Communication of information

Provisions define procedures for handling information:

- technologies and protocols for the transmission of information ;
- procedures for assistance in the event of a breakdown or unavailability of normal means of transmission
- obligation of users to respond to any request for information issued by the TNM, particularly for the purpose of analysis of incidents.

4.11.2 Confidentiality of information

Confidentiality applies to any information received by the TNM from users of the public transmission network, except information which is publicly disseminated by users which may therefore be provided without restriction to third party by the TNM or when it results from an anonymous statistical treatment for the current needs for the TNM.

4.12 RELATIONS BETWEEN THE TNM AND DISTRIBUTION NETWORK MANAGERS

Relations between the TNM and distribution network managers are critically important at the beginning of the unbundling process insofar as these managers have the experience or tools to forecast demand and control the load on various components on the distribution networks (sub-stations). In practice, part of these tasks will be transferred from the national control centres to the regional distribution control centres.

The TNM and distribution network managers will jointly develop the following databases for the next year:

- annual diagram of the peak load by station, evolution of demand included
- evolution of demand by point,
- forecasts on delivery and injections above 2MW,
- dates of the industrial operation and stoppage of batteries of condensers directly connected to the stations
- carry-over of permanent loads on the distribution networks above 10% of the guaranteed capacity of a HV/MV station.

When it becomes necessary, the TNM and distribution network managers will jointly agree on the request for electricity generation units connected to distribution networks. These modalities may for instance include coordination of call for generation installations, management of congestions and the priority to be given to installations for electricity generation from renewable energy sources and co-generation.

The TNM and distribution network managers immediately inform one another of new authorisation and suspension of access to the transmission network by a distribution network.

The TNM and distribution network managers agree between themselves on the provisions and modalities for exchange of measurements and metering values. They send the values of energy exchanged per fifteen minutes and per producer and eligible customer connected to the distribution network for calculation of discrepancies.

In order to better evaluate energy flows, losses and voltage levels, the TNM and distribution network managers who have shared responsibility, put in place bi-directional meters and quality recorders according to jointly agreed methods.

4.13 COOPERATION BETWEEN TNMS OF THE CONTROL ZONE

Cooperation between the TNM of an interconnected group aims to achieve stable and reliable operation of this group. This depends on the definition of rules and their application, implementation of the corresponding technical requirements as well as supervision.

Within the control zone, the TNMs are responsible for the application of rules inside their territorial perimeter and a System Operator is appointed among them as the representative of the control zone to the ICC and the WAPP.

4.13.1 Obligation of the TNM to neighbouring TNMs and the regional interconnected group

Each TNM has the obligation to provide network access on condition that this does not endanger the whole interconnection system.

The TNMs of the control zones are interdependent with the regional system. It is their responsibility to act jointly when the safety of their control zone is threatened through abnormal transactions in neighbouring control zones, such as abnormal or variable flows injected from neighbouring zones.

Each TNM has the following obligations:

- adherence to the rate of reserve for instantaneous control and on the minute,
- coordination of programmes of exchanges between countries,
- coordination and respect of the objectives of voltages levels at borders,
- supply of necessary information on the exact determination of cross-border exchanges, and compensation of involuntary discrepancies according to regional rules,
- respect of safety criteria (n-1 or equivalent) without causing constraints on the transmission networks of neighbouring countries, subject to specific agreements taking into account of a weak grid in some systems ;
- in cross-border exchange programmes, limits on the maximum load of interconnection lines under normal situations, so as to guarantee the passage of mutual relief flows (flow corresponding to physical laws)

The main methods of cooperation to ensure responsible participation of the TNM form part of the following sections.

4.13.2 Participation in frequency-capacity adjustment

The prescriptions of WAPP apply to the modalities for participation in frequency-capacity adjustment. At any moment, the TNM constantly guarantee the availability of primary, secondary and tertiary reserves for operation on the system. It activates reserves in order to respect the general orders of frequency and programmes of exchanges as, soon as necessary and within the timeframe set by WAPP,

For this purpose, WAPP establishes the basic performance for the region and each control zone, in particular:

- Maximum values for abrupt variations of capacity and frequency,
- Sharing the response to any abrupt variation of capacity between the control zones
- Maximum width of useful frequency band,
- Maximum width of the dead band for frequency variation,
- Maximum time for mobilisation of the primary and secondary reserve,
- Maximum time for reestablishment of frequency and the level of exchanges,

The sharing of the capacity for the secondary and tertiary adjustment between each country in the control zone results forms an agreement between these countries.²

It is good practice to:

- Harmonize the mode of sharing secondary adjustment among the countries within a control zone (in practice, to choose between the hierarchical or pluralist mode)
- Appoint a control centre (System Operator) as the “secondary adjustment coordinator” of the region who will be responsible for the proper finalisation of compensation of secondary exchanges for the entire zone.

Inside the control zone, the TNM permanently exchanges data on capacity and position of secondary adjustment controllers with other TNMs. The System Operator, zone coordinator, is in charge of dialogue with the ICC.

The values measured during these incidents must show that the system possesses the required characteristics for primary frequency-capacity adjustments.

Analysis of behaviours during incident also makes it possible to evaluate, at least statistically, the quality of secondary control of each system operated by a TNM as well as for the whole adjustment zone.

4.13.3 Coordination of voltages at borders, control of flows of exchange of reactive power

The TNM coordinates with other TNMs:

² Capacity from the 125 MW charcoal station in Senegal will soon be the largest capacity unit in the zone,

- level of isolation;
- limits of voltage fluctuations at borders, if necessary according to off-peak and peak hours ;
- adequate tools for generation-absorption of reactive energy with their location allowing voltage adjustments at each border crossed;
- voltage and capacity measurements from a site close to the border, irrespective of the country,
- consideration of the possible effect of automatic systems of adjustment of reactive capacity and voltage on the voltage at borders.

4.13.4 Compensation for involuntary discrepancies

To account for cross-border exchanges, the TNM exchanges data and results of billing relating to all countries with which its users conducted transactions with the TNMs of other participating countries.

The manager of the control centre of the control zone coordinates the proper compensation between countries involved and with members of neighbouring control zones. WAPP instructions are applicable.

4.13.5 Planning development of public transmission networks

The TNM coordinates itself with other TNMs to synchronise periodic revision of the development plans of the public transmission networks so as to harmonise these plans at the level of the control zone and carry out a general analysis in accordance with the procedures stated in chapter 3 above.

The TNM informs other TNMs when it make an important change, such as starting large scale generation units, major extension of the public transmission network etc.

It coordinates itself with other TNMs for the installation and adjustment of protections on cross-border interconnection lines and major facilities located in the vicinity.

4.13.6 Operational planning and coordination of controls

Provisions concerning method of inclusion and acceptance by System Operators involved in the requests for cross-border transactions are specified in chapter 4.6 above.

In particular, the TNM adopts common rules and procedures of operation of incidents affecting interconnection lines and national incidents with repercussion on neighbouring countries, with other TNMs.

The TNM generally agrees with other TNMs on the minimum conditions for operational safety of interconnection lines: rule n-1 or equivalent, automatic disconnection of generation units in the event of a serious incident etc.

It exchanges programme of outages of important components of each system with other TNMs.

It develops with them the modalities for mutual assistance for resumption of service after serious incident affecting many countries.

4.13.7 Exchange of information

The TNM develops a common database with the TNMs in the control zone. This joint database would contain the following information:

- semi-permanent (offline) information in particular including equivalent network data, programmes of outages of important facilities, measurement of common reaction to serious failures,
- real-time (online) information, notably including : the condition of interconnection lines (position of apparatus, volume of exchanges, voltage level etc) of major facilities near these lines, primary and secondary adjustment reserves etc.
- information on cross-border exchanges with steps for verification and confirmation on a daily basis of requested exchanges (jointly identified), unavailability of facilities which lead or may lead to congestions etc.

4.14 TREATMENT OF COMPLAINTS, DISPUTE RESOLUTION

The TNM handles complaints from users of the network.

He may be consulted on conciliatory and arbitration procedures between network users.

The national regulator is the first instance for conciliation between the TNM and network users.

The regional regulator may be appointed by interested parties to arbitrate on disputes between the TNMs.

Resolutions of disputes with a commercial nature are submitted to the competent commercial courts.

The annual report of the TNM includes a list of disputes which occurred during the year and their resolution.

4.15 REVISION OF THE NETWORK CODE

The network code contains stable parts relating to technical aspects and other parts related to the organisation of the sector which is based on the stages of opening up the market (access to the public transmission network).

The appropriateness of operational procedures to needs will therefore have to be evaluated periodically in order to make additions and modifications each time they are required.

The revisions may be done through:

- analysis of complaints reported in the annual report of the TNM
- a petition by users
- a suggestion initiated by the TNM
- a new requirement of the national or regional regulator

The draft modification will be prepared by the TNM and submitted for approval to the national regulator.

A working group comprising of the TNM, representatives of producers, and consumers would be useful for the preparation of this draft.

4.16 INTERIM MEASURES

Interim measures allow the progressive movement from the present situation to the one anticipated by the network code. They will specify the timeframe for implementation of the provisions of this code, in particular the contracts for connection, contracts for access, network and billing registers.

4.17 ANNEXES

4.17.1 Standard connection contract

4.17.2 Coding of equipment

4.17.3 Format of contract for each category of system services

4.17.4 Standard information form

5 DESCRIPTION OF THE PLAN OF ACTION

The following plan of action describes the measures to be carried out to obtain partial opening up of the electricity market. Although the two countries have adopted a similar strategy, the timetable for implementation will probably be different.

Once these measures are implemented, its purpose will be to make it possible for an eligible customer in Senegal or Mali to enter into a contract of withdrawal on the network with a producer injecting the corresponding energy. In the first stage, the two countries fixed a threshold of 5MW for eligible customers but this threshold will probably be revised in accordance with the recommendations formulated in report n°1.

When the two countries open their market, cross-border exchanges between a Senegalese eligible customer and an independent Malian producer or vice-versa will therefore be possible.

The plan may apply indiscriminately in each country, irrespective of its date of commencement.

The entire preparation process should take a minimum of three or even five years, considering the complexity and duration of the implementation of certain actions, such as:

- obtaining a supply-demand equilibrium (energy and capacity), which depends on the entry into operation of new power stations ; this equilibrium may be attained in Senegal from 2011, and in Mali from 2010 in favour of a limited number of industrial customers who are presently self-producers ;
- financial restructuring of Senelec and unbundling of the segments of activity of Senelec and EDM-SA.

We have only considered actions related to market organisation. The process of restructuring or privatisation of certain activities of Senelec and unbundling the electricity and water related activities of EDM-SA may in fact develop concurrently, in cognisance of the fact that it is preferable that the conditions of market operations including the determination of a transmission tariff are defined in advance. The timeframes mentioned are indicative however they should not exceed a certain period which would nullify the previously implemented actions.

National regulators could be appointed by the authorities to define the conditions for network usage with the managers and define rules of accounting and legal separation.

Each of the actions described below, with its chronology and estimated time, applies to each of the two countries. Potential gains are possible if one pool of experts is made responsible for assistance to both countries. A common pool of experts would also bring a uniform approach, in particular in the treatment of issues related to OMVS and OMVG, and propose the draft standard documents for each country.

5.1 R.1 - PREPARATION FOR A LIMITED OPENING-UP OF THE MARKET

Before implementation of the limited opening-up of the market, it is important to evaluate the potential of eligible customers, supply-demand equilibrium and conditions for restructuring the historical operator.

R.1-1 Sensitization and public discussions

Timeframe: during 2009 (6 months)

Description:

Sensitization and public dialogue will be organised with producers and potential eligible customers in the two countries. This sensitization and discussion will enable confirmation of the potentials of the limited open market. It will also describe the stages and consequently organise the transmission network manager, particularly according to the consumption forecasts of the eligible customers wishing to change suppliers, the intentions of the IPP to revise the Take-or-Pay clause of existing contracts. A report will propose revisions of the eligibility threshold and calculation. It will evaluate the impact of this eligibility threshold on the average tariff of other clients.

Required resources:

The means of sensitization and mobilisation of participants are those normally undertaken within the framework of consultations organised with authorities: invitation of participants, meeting of information and debates, questionnaire and analysis of results, drafting of reports. If necessary, the series of consultations may lead to a half-day public hearing (evaluation report and presentation of recommendations, follow-up of questions-debates).

A consultant may be recruited to organise this sensitization and consultations. His services are estimated at 1.5 man-months spread over approximately 6 months.

Methodology:

Sensitization and consultations may be organised by the ministry responsible for the electricity sector and the national regulator. The consultant recruited will organise the various consultations (IPP, customers), organise meetings, prepare the minutes of the meeting and the evaluation report and organise the public hearing. A website will be opened to sensitize the public and receive comments.

R.1-2 Assistance for change and consultations with staff/personnel of the historical operator

Timeframe: during 2009 (6 months)

Description:

The transformations to be accomplished are considerable and must be accompanied by a change of culture and behaviour of the majority of the staff members who will see the structure of their work fundamentally modified.

In order to facilitate this change, from the beginning of the process the historical operator will obtain assistance on internal and external communication so as to promptly and conveniently disseminate necessary information to obtain reasonable commitment by the staff to the process of change.

Discussions will be organised with the staff of the historical operator of the public utility to define the social framework and change in the status of staff after the legal separation of the entities.

Required resources:

Recruitment of a communication and HR consultant to organise meetings-debates with staff, dialogue with the staff unions and organise an information campaign with the media.

His services are estimated at two man-months spread out over approximately 6 months.

Methodology:

A commission will be created within the historical operator to debate with the staff on social issues related to the creation of the entities and the change in the status of officers and their pension schemes. This commission may be extended to include representatives of the ministry of energy.

The consultant together with the Directorate will be responsible for organising these internal debates and communication campaign to the public.

R.1-3 Sectoral policy paper on electricity in addition to that of 2007 on the energy sector

Timeframe: end of 2009- beginning of 2010 (6 months)

Description:

On the basis of the results of the public hearing, a sectoral policy paper on electricity will be drafted to express the policy of opening-up of the market and increase of its volume in order to attract new investors. This opening-up may be obtained by:

- reduction of the eligibility threshold of 5 MW which was fixed without analysis of demand or the possibility of accumulating several sites (points of withdrawal);
- by legal means with the periodical organisation of auctions for the supply of an increasing part of energy needed by the regulated market.

The provisions applicable to the historical operator concern:

- unbundling and functional/operational independence of the activities of generation, transmission and distribution followed by the complete separation of transmission and hopefully thermal generation ;
- designation of an entity responsible for planning the requirements for generation and transmission.

For EDM-SA, unbundling of activities related to electricity and water is a preliminary condition.

The sectoral policy paper will state the objectives and strategy for opening-up and the principles of organisation of the limited open market and the regulated market.

Required resources:

A consultant will be recruited by the ministry of energy to prepare a draft paper under its supervision. The volume of services is evaluated at two man-months and a minimum of two site visits. Taking into account the interactive nature of the task, the consultant's services are estimated to be spread over a period of six months.

Methodology:

The consultant will review available studies and investigations carried out on the sector and the results of public discussions (see above). He will engage in in-depth interview with high-ranking officers of the ministry of energy, the national regulator, the historical operator, as well as the representatives of the "civil-society" in particular IPPs and eligible customers.

He will prepare a first draft of the policy paper of about ten pages, which he will present at a technical meeting to be organised by the ministry of energy and bringing together representatives of major private and public participants of the sector. The donors for the sector will also be consulted.

He will amend the first draft based on analysis and observations received at the technical meeting as well as opinions expressed by the consulted donors. The amended policy paper will be prepared in fashion that will allow it to be presented by the ministry of energy for the decision of the government within the framework of an inter-ministerial committee.

5.2 R.2 - ORGANISATION AND OPERATION OF THE FREE AND REGULATED MARKETS

R.2-1 Power sector law

Timeframe: beginning 2010 – end 2011 (12 months)

Description:

A new law will be drafted to define the conditions for eligibility and general principles of organisation and operation of the limited open market and regulated market. In particular this law will define:

- status, laws and obligations of the different market participants and managers of transmission and distribution networks,
- issuance of licenses and authorisations,
- connection to the transmission and distribution networks and access to services is under non-discriminatory conditions,
- objectives of rational service by the public transmission and distribution networks,
- environmental principles,
- principles of interconnection with cross-border countries and inter-state organisations (OMVS and OMVG),
- ownership of transmission and distribution facilities
- principles of pricing transmission and system services (imputable expenses and recovery method),
- controls to be exercised by the national regulator,
- necessary information,

It will guarantee the autonomy and independence of the transmission network in relation to all generation and distribution operators and in relation to the different functions it performs.

It will organize the conditions for dismissal of the managerial staff of this manager.

Required resources:

A consultant will be recruited by the ministry to assist in drafting the draft law. The volume of services is evaluated to 4 man-months and a minimum of three site visits. Considering the interactive nature of the task, the consultant's services are estimated to be spread over a period of 12 months.

Methodology:

The law will repeal some provisions presently in force in Senegal (law n°1998-29 and n°2002-2) and Mali (law n°00-78 on the ratification of ordinance n°00-019/P-RM and ordinance n°00-021/P-RM).

Preparation of the drafts will be supervised by a review committee bringing together the representatives of the different ministries involved and the national regulator.

The main outlines could be presented during a seminar where representatives of the authorities, the historical operator, IPPs and users are present.

Once the final version of the draft law is written, a follow-up may be obtained through extensive discussions and parliamentary debate, as additional justifications to the proposed provisions and comments on corrections and responses to the issues.

R.2-2 Decrees of application

Timeframe: end of 2010-beginning of 2011 (concurrently with the law) (12 months)

Description:

A first decree will create legally independent entities (unbundling) within the historical operator of the public utility to perform the activities of generation, transmission and distribution³.

A second decree will fix the conditions of application for eligible customers. For these customers, the supply price will be freely negotiated with the suppliers, the method of calculation of the tariff on access to the transmission network being fixed by decree (see below).

A third decree will define the status of the TNM to guarantee independence of the persons managing the public transmission network.

A fourth decree will define the method of calculation of tariffs of transmission and system services.

A fifth decree will define the method of calculation of the tariffs on usage of the distribution network by distinguishing MV distribution from LV distribution and from trade tariffs.

Required resources:

A consultant⁴ will be recruited by the ministry to assist with the preparation of the drafts decrees of application. The volume of services is evaluated to 4 man-months and a minimum of three site visits. Considering the interactive nature of the task, the consultant's services are estimated to spread over a period of 12 months.

Methodology:

Preparation of the draft decree will be supervised by the same review committee bringing together representatives of the various ministries involved and the national regulator.

R.2-3 Revision of the laws of OMVS and OMVG

Timeframe: end of 2008 (recommendations)- 2010 (revision)

Description:

The legislations of creation of OMVS (CTPI and SOGEM) and OMVG which were designed based on the structure of a monopoly entrusted to the national operator are to be revised to include the creation of an open market. The subjects to treat are notably the following:

- transfer of contracts to the TNM (instead of the SNE),
- separation of generation and transmission activities,
- direct sales of a part of the output to eligible customer,
- modalities for the use of transmission infrastructure for cross-border exchanges,
- procedures and exchanges with the TNM: programmes of generation and exchanges, drawing up delivery orders, interface between dispatching and national

³ The policy paper in February 2007 on the development of the energy sector of Senegal already provided for this separation

⁴ If possible the same consultant used for the draft law

control centres, supply of system services, billing at the off-take points and breakdown of the flows,

- differentiate between the generation component of the tariff and the transmission component, including the treatment of losses.

Required resources:

A consultant was already recruited by the ECOWAS Commission to assist OMVS and national regulators in the revision of the laws. A period of 3 man-months is anticipated for the preparation of a diagnostic report and recommendations and to define the necessary measures for their implementation.

Methodology:

The methodology for revisions is defined in the terms of reference of the assistance to OMVS, financed under the project for assistance to ECOWAS on regional regulation of the electricity sector.

The consultant's recommendations will then be negotiated between the concerned parties, the laws will consequently be revised and the measures will be implemented with the appropriate means.

Negotiations will be conducted concurrently with the preparation of the draft laws.

5.1 R.3 - MANAGEMENT OF THE TRANSMISSION NETWORK

R.3-1 Concession contract of the TNM

Timeframe: end of 2010- beginning of 2011 (6 months)

Description:

A concession contract will entrust the role of the public utility to the TNM under the control of the national regulator. This contract will define its laws and obligations.

The different missions which will be entrusted to it are the following:

- management and planning of the transmission network,
- implementation of extensions and network strengthening, management of connection to the public transmission network ;
- planning and programming of exchanges,
- control and safety of the system, management of breaks in equilibrium and its reestablishment,
- cross-border exchanges,
- billing,
- pricing of exchanges and discrepancies according to the programme of operation,
- information to share with market participants,
- protection of the information system

The concession contract will authorise the TNM to completely recover its costs through charges on network use (see 16 and 17 below). The principles for calculation and revision of tariffs will be defined by decree. The level of tariffs and formula for revisions will be attached to the concession contract.

An appendix will define the safety of the system and the quality of service.

Chapter 3 « Functions of the TNM » and 4 « Network code » below detail out the contents of the missions.

Required resources:

Recruitment of a consultant by the national regulator to assist in drafting the concession contract and its appendices. The duration of service is evaluated at three man-months and a minimum of two site visits. Considering the interactive nature of the task, the consultant's services are estimated to be spread over a period of six months.

Methodology:

The consultant will examine available studies and investigations on the sector and medium and long term development projects. He will select some models of concession contracts on transmission networks and adapt the provisions to Senegal and Mali. He will also conduct in-depth interviews with high ranking officials of the ministry and the national regulator particularly for the correct interpretation of the legal framework of the electricity sector. He will analyse the organisation and abilities of the departments in charge of transmission.

He will develop financial forecasts of the concession (see regulated tariffs below).

He will prepare a draft of the concession and the terms and conditions, which will be presented to a technical meeting to be organised by the national regulator and ministry of energy. The funding agencies of the sector are also to be consulted on the project.

This draft will be revised according to the analysis and observations received by the national regulator in order to be presented to the ministry of energy, by virtue of its authority to grant concession.

R.3-2 Network code

Timeframe: 2010 (4 months)

Description:

A transmission network code will be developed either by the TNM and approved by the national regulator or developed by the national regulator after consultation with market participants.

Chapter 4 « Network code » below, presents the essential contents of this document, including its appendices.

Required resources:

Recruitment of a consultant to assist in drafting of the network code by a working group comprising representatives of those responsible for transmission services. The volume of services is estimated at three man-months and a minimum of two site visits and a mission to WAPP in Cotonou. Considering the interactive nature of the task, the consultant's services are estimated to be spread over a period of six months.

Methodology:

The working group will comprise specialists in transmission and distribution networks, generation machines and control systems. The consultant will propose a means of sharing the task of drafting the different chapters between members of the working group and will make reference documents available to them. He will advise the various writers and oversee the coherence of the whole document.

Dialogue with experts from WAPP who developed the OSMP and the PPIAF consultant who evaluated the OSMP for the regional regulator is desirable.

The draft document will be presented to WAPP to ensure conformity to the OSMP.

It will then be presented to the national regulator for approval.

R.3-3 Organisation of the TNM

Timeframe: mid-2010 – mid-2011 (12 months)

Description:

The new entity responsible for management of the public transmission network and development of new market operations/functions will have an organigram, profiles of positions and profiles of qualification to select staff from the historical operator and recruit qualified personnel from outside.

A draft budget is to be prepared on the basis of this organisation and maintenance activities of the transmission network and the information system (dispatching and system information).

Procedures of financial, commercial and human resource management will also be developed according to the information management system which will be developed.

Required resources:

Recruitment of a consultant to assist in the organisation of the TNM. The volume of services is evaluated at ten man-months of a site-based expert to supervise the installation of the information systems.

Methodology :

The services will include the following tasks:

- elaboration of a detailed organigram in uniform groups constituting clear areas of responsibility by function (CAPU, MO, SO, administrator, maintenance),
- evaluation of corresponding assets and activities which may be externalised,
- preparation of internal regulation, possibly the status of personnel and associated salary scale if different from those of the historical operator.
- evaluation of skills and selection of internal staff, recruitment of staff from outside (including identification of the need for additional technical assistance to perform new operations),
- evaluation of training needs and implementation of the training programme based on the functions to be performed ;
- specifications and acquisitions of equipment and computer systems;
- drafting the procedures for HR, accounting, financial, commercial management and internal audit,
- establishment of a detailed provisional 3 year budget providing financial autonomy according to the development of operations on the open market.

The consultant's proposals will be discussed during workshops organised by the consultant. They will be amended from the recommendations of the workshops and the decisions of the senior management.

R.3-4 Manual of procedures

Timeframe: mid 2010 – mid 2011 (12 months)

Description:

The manuals of procedures will be written by the TNM and approved by the national regulator.

The content of these manuals are described in chapter 3 above: CAPU, Market Organiser, System Organiser, Administrator and Operation of facilities.

Required resources:

A consultant (see previous action) will organise and coordinate the working groups to be created within the transmission department of the historical operator.

He will provide staff with the reference documents.

The total work time of the expert may be estimated at 5 man-months of the duration of assistance to the organisation, which is 12 months.

Methodology:

Together with the head of each of the departments in charge of the various functions, the expert will compile existing documentation (re-usable procedures and instructions) and complete where necessary.

A working group will be created to write each manual, the composition of each group will be determined according to the organisation recommended above.

The expert will provide a format and advise the various writers. He will oversee:

- the uniformity of all the documents ;
- proper adaptation of the documents to the organisation and sharing of tasks, including clarity of interfaces and rules of transparency and confidentiality ;
- coherence of the whole document by avoiding repetitions and contradictions between the procedures and in relation to the network code and the concession contract.

The draft manuals will be sent to the director of the TNM before submission to the national regulator for approval.

R.3-5 Dispatching and information system

Timeframe: 2011 (8 months)

Description:

The networks and associated generation will be guided by modern and efficient control centres which offer flexible functions and are adapted to the needs of a dynamic and fast market. A national control centre is presently being developed in Senegal and another is being designed in Mali. The dispatching and information system will be developed in accordance with requirements which arise from the coexistence of the two markets.

Required resources:

An expert in the field of control centres within a market in the process of liberalisation will be recruited to carry out a diagnosis of the whole and joint specifications with high-ranking officers from the three control centres.

The duration of the consultant's services is estimated at four man-months. Considering the interactive nature of the work, the consultant's services are expected to be spread over a period of 8 months.

Methodology:

This task should involve both of the two national control centres and that of Manantali. The specifications should therefore be approved by the heads of the three control centres.

A diagnostic report on existing functions is to be carried out and specifications for the new function to be developed will be drafted to implement the new organisation of operations at the national and regional levels. The diagnostic will take into account the new equilibrium between the national control centre and the Manantali control centre based on the decisions arising from action 6 above (OMVS-OMVG).

Terms and obligations (software) and specifications (equipments) will be written for the development of new functions and telecommunication systems including the function of system security (restrictions of access and traceability) by the administrator.

Contracts on development and deployment of IT applications, training and extension of telecommunication facilities will be negotiated with suppliers of the respective centres.

The diagnostic and specifications report will be sent to the head of OMVG in order for necessary adaptations to be incorporated into the control centre which would then be at the design stage.

R.3-6 Committee of transmission network users

Timeframe: 2012 (3 months)

Description:

The committee of public transmission network users will be created at the initiative of the national regulator to obtain the opinions of users in order to improve the operation of the two markets.

Required resources:

Means are to be made available by the national regulator or ministry of energy (meeting rooms, secretariat).

Assistance for the duration of one man-month is estimated to provide support for the creation of this committee.

Methodology:

The national regulator will:

- bring together a core group of five to six persons : identify the qualities of these people and invite them ;
- Invite the first members for a meeting in order to set the objectives of this committee and if necessary develop a regulation on its operations and funding;
- together with these members define a work programme and a plan to develop the committee through membership by new members.

R.3-7 Programme of rehabilitation and development of transmission and distribution infrastructures

Timeframe: 2009-2012 (36 months)

Description:

The HV and MV networks must be rehabilitated and strengthened in order to guarantee stable supply and attain the performance objectives defined in the concessions.

The development plan must include regional generation and transmission within 10 to 15 years.

Required resources:

Funds raised by the TNM and distribution network managers from internal resources and external funding.

Capacity building: recruitment, training and assistance on facility control, design of facility control.

Technical assistance needs are provisionally estimated at 18 man-months spread over 24 months.

Methodology:

The TNM and distribution network managers will:

- carry out an examination of existing infrastructures ;
- develop demand forecasts ;
- evaluate high-priority and coordinated investment programmes so as to attain the technical aspects of service objectives, demand and quality of service defined in the respective concession contracts, including at the regional level.
- put new network meters and install modern meters and provisions for remote reading for the most important customers. These meters will be used for the management of contracts (billing) and measuring discrepancies from the delivery programme.
- prepare the documents for discussions and procure the services of research firms to prepare detailed drafts and tenders based on the funding obtained;
- implement projects : awards and contracts for the control of works
- accept and commission completed facilities.

5.2 R.4 - MANAGEMENT OF GENERATION AND DISTRIBUTION

R.4-1 Electricity supply contracts

Timeframe: 2011-2012 (12 months)

Description:

Transfer of existing PPAs to the TNM with renegotiation of the conditions of supply of only one part of generation, the other being intended for sale to eligible customers.

Drafting of new models for concession contracts on generation without an exclusivity clause for purchase by the CAPU. New generation could in fact also be carried out totally or partially with the IPPs, according to the rate of development of the free market.

Determination of reasonably attractive tariffs for purchase of power generated from renewable energies which enjoy fixed prices at least for a given duration subject to conditions to be specified.

Preparation of the format of the contracts:

- bilateral contract with the necessary provisions if national eligible customers import from foreign producers through interconnection lines or the reverse, if national producers export to foreign customers;
- short term contracts through the open market ;
- purchase contracts by distribution network managers ;
- contract of participation in system services.

Required resources :

The staff of the TNM assisted by a technical and legal adviser for renegotiation of IPP contracts and the drafting of models of other contracts.

The duration of the services of the technical and legal adviser is estimated for 5 man-months, of which 2 months are for contracts of participation in system services and 3 months for other contracts. Considering the interactive nature of the task, the consultant's services are estimated to be spread over a period of 12 months.

Methodology:

Revision of IPP contracts. Revision of exclusivity clauses and payment to PPAs by bank order will require several months of negotiation with the IPP, to take into account of their impact on guarantee and remuneration clauses. These revisions will also treat the conditions for adaptation of installations in order to:

- the renovation of the installations, according to the requirements of the network code;
- provide additional information, particularly to the System Operator and the Organiser of the open market.

Success in the revision of exclusivity clauses will depend largely on the clarity and credibility of the reorganisation envisaged for the sector and the objectives (volume and timeframe) of market liberalisation.

Participation in system services. The technical and legal adviser will provide reference documents which will serve as models for drafting the model contract and will assist in the drafting process: contribution to primary and secondary frequency adjustment, contribution to voltage adjustment, supervision and notification of failures, remuneration, synchronised operations and compensation and other provisions.

Other electricity supply contracts. The technical and legal adviser will provide reference documents which will serve as the models/samples for drafting other contract models and

will assist in the drafting process from his experience in the implementation of such contracts.

R.4-2 Concession contract on distribution

Timeframe: 2011 (4 months)

Description:

The activities of the distribution network managers will be defined in a concession contract of public distribution.

This concession contract will be drafted on the basis of the following obligations:

- service obligations explaining the objectives defined in the sectoral policy paper,
- planning corresponding extensions,
- network maintenance,
- realisation of injection points and connections,
- output objectives,
- network access and provision of required services to eligible customers,
- network access of producers who inject into the distribution network,
- wholesale purchase and retail sale to non eligible customers,
- commercial/trade relations with eligible and non eligible customers,
- tariffs and taxation

An obligation to purchase an increasing part of energy requirements on the open market will be fixed. This part will be adjusted according to the total volume/magnitude of free generation. Purchases by the distribution manager on the open market will be organised through periodic public auctions.

Managers will be remunerated through tariffs levied on usage of the distribution networks, differentiated according to the voltage level (MV, LV), but identical for eligible customers and customers who opted for the public utility and who present comparable consumption profiles (see action 18 below). The contract will state the modalities for determination and revision of tariffs.

The terms and conditions will determine the performance objectives of the licensee.

Required resources:

Staff of the national regulator assisted by an expert with close collaboration from high ranking officers of the distribution network. The volume of services of the expert is estimated at two man-months and a minimum of two site visits. Considering the interactive nature of the task, the consultant's services are estimated to be spread over a period of four months.

Methodology:

The consultant will provide the reference documents.

The composition of the contract will be determined after a review of existing documents and reference documents by the official of the national regulator who is in charge of drafting contracts with assistance from the experts and distribution network managers.

The distribution network managers will supply information on the performance attained and their forecasts on the evolution of demand, which will be used to set distribution tariffs (see below).

Draft contracts will be submitted to obtain the opinion of the national regulator once simulations of financial concessions are conducted (see regulated tariffs below) before submission to the granting authority.

R.4-3 Contract IPP - eligible customers

Timeframe: 2011 (4 months)

Description:

A bilateral IPP contract type– prepared by the eligible customer and approved by the national regulator.

Technical specifications related to metering are defined knowing that the objective is for consumption to be gradually remotely-read and treated automatically by the SCADA of the System Operator.

The contract will specify the electronic systems for measurement of requested capacities in the different sites of the eligible customers in order to acquire synchronous requested capacity and evaluate expansion to make a profit.

The contract will also anticipate cross-border operations.

Required resources:

The staff of the national regulator assisted by an expert. The volume of services of this expert is estimated at two man-months and a minimum of two site visits. Considering the interactive nature of the task, the consultant's services are estimated to be spread over a period of four months.

It would be beneficial for this service to be combined with those proposed for drafting other contracts. (see 14 above).

Methodology:

The contract type will be inspired by existing electricity purchase contracts in other countries.

The national regulator will approve the contract format before it is made available to interested parties.

5.3 R.5 - PRICING OF REGULATED SERVICES

R.5.1 Pricing of transmission, non-individually imputable system services and distribution of electricity supply to eligible and non-eligible customers

Timeframe: 2010 (18 months)

Description:

iii) Transport Transmission

A study of the tariffs for access to transmission and system services was conducted from the cost accounts of the historical operator and Sogem-Eskom.

The tariff on access on the public transmission network will be set to ensure financial autonomy and independence of the TNM.

The tariff will cover (i) expenses of the TNM (CAPU, MO, SO, Administrator, operation of facilities), including financial expenses, amortization of fixed assets and remuneration of its own funds (ii) expenses on the acquisition of system services not imputed to a particular user.

According to the initial decisions of the WAPP⁵ working group on transmission tariffs, these will be determined independently of the distance travelled by energy (postage-stamp).

It is to include a management or trading component that permits the recovery of costs for the management of access contracts, billing (reading, location and maintenance of equipment), invoicing and the recovery of invoices.

The tariff on usage of the transmission network will comprise of:

- a fixed component dependent on capacity and which enables the recovery of capital costs and part of the costs of system services and operational and maintenance expenses which are quasi-constant and other expenses, such as subsidies on generation from renewable energy.
- a component proportional to the energy supplied which mainly represents the cost of transmission losses estimated from simulations.

The tariff structure of transmission will be a function of the connection voltage and subscribed capacity. It will allow or prevent more than one capacity for distinct points of withdrawal for the same customer.

⁵ « Workshop of transmission pricing », Final report , Bamako 25-27 June 2008

This structure will allow an easy and realistic indexing of tariffs on different categories of costs.

The best formula will be sought to guarantee the financial equilibrium and stability of transmission tariffs either with medium term incremental costs covered by the fixed component and determined from the amounts of investment or with average costs.

The incidence of the tariff will be shared according to variable proportions, between producers (points of injection), eligible customers connected by HV (withdrawal points) including distribution networks, given that in the end the aggregate shall be borne by the final customer.

The transmission tariff will also include penalties for exceeding capacity and the excessive consumption of the reactive energy.

This study will specify the mechanism for updating tariffs: formula, limit on the validity of the formula.

The tariffs on connection to the public transmission network will be approved by the regulator on the basis of a specific contract between the TNM and the customer.

iii) Distribution

If non-eligible customers are supplied through a distribution network (MV network at the beginning of the opening-up of the market) the distribution network manager will organise its services and cost accounting to distinguish between costs and revenues related to the use of its distribution network on the one hand and the supply of electricity to different categories of customers (MV and LV) on the other.

The determination of the tariff on usage of the distribution networks is similar to that of transmission discussed above, in cognisance of the fact that customers connected by MV can only bear the part of the electricity load related to this network, while clients connected by LV can bear all costs relative to the MV and LV networks.

Tariffs will comprise of:

- a fixed component which is a function of capacity and will allow the recovery of the capital costs and part of the operational, maintenance as well as commercial management expenses ;
- a variable component on the supplied energy which mainly represents the cost of distribution losses estimated from network simulations and remaining expenses.

The structure of distribution pricing will depend on the voltage of connection and subscribed capacity, while allowing or prohibiting more than one capacity for distinct withdrawal points.

It would allow an easy and realistic indexation of tariffs on costs.

In the case of Senegal and in particular Dakar, the tariff charged on usage of the MV network will further distinguish between the 30 KV and 6.6KV network.

The MV connection tariff, similar to the transmission tariff, depends on special contracts between the DNM and the customer which are approved by the national regulator. The tariffs on LV connection are catalogue tariffs which depend on demanded capacity and the length of the connection.

Even if all the eligible customers are connected to the HV network, the national regulator will need to analyse the treatment by the distribution network manager of its internal (trading and operations of the MV and LV networks) and external (purchase of electricity from CAPU) costs.

iii) **Non-eligible customers**

The ceiling tariff to be set by the national regulator will need to reflect total costs: usage of the transmission network, MV distribution networks, LV distribution networks and supply of energy in order to ensure financial stability of the TNM, distribution network managers and producers.

The total tariff will comprise of three components:

- a supply component which will reflect the delivery price from the CAPU to distribution network managers,
- a transmissions and system services component (see i) above),
- a component of usage of the distribution network (see ii) above)

The transmission and distribution components will be identical for both eligible and non-eligible customers who present similar consumption profiles and they will be connected at the same voltage level.

Each of these components will vary independently. The national regulator will have to be attentive to ensure that each component reasonably and efficiently remunerates the corresponding operator.

The different components could be grouped in a consolidated tariff or, appear on the bill, which would clearly increase transparency for the customer and the national regulator who will then be able to better determine the variable factors.

Subsidies provided by the government must be transparent and targeted to a user category, for example tax exemptions on fuel intended for use in public electricity generation and subsidies which will be used to finance only the social tariff (first LV consumer bracket). Tax exemptions on fuels will be shared equitably and efficiently from an economic perspective; in particular it will exclude eligible customers. The subsidies will also exclude the transmission and distribution network usage components.

Subsidies across different categories of customers will no longer be permissible, in order to prevent them from being bias against competitively priced bids for the eligible customers.

Required resources:

The staff members of the national regulator assisted by a tariffs expert. The services of this expert are estimated at 8 man-months and a minimum of six site visits. Taking into account on the interactive nature of the work, the consultant's services are estimated to be spread over a period of 18 months. Two week per year over a period of two years is estimated for updating the financial forecasting model and training.

Methodology

A study on tariff covering the whole electricity sector will be conducted to determine the equilibrium level of tariffs for each segment of activity: generation, transmission, system services and distribution based on the development needs over a 10 year period.

Description of the main methods of allocation of investment and operation costs by segment of activities, development of a financial forecasting model from these principles and determination of long-term economic costs.

Proposal of a tariff structure by segment

The consultant's services will include the organisation of several training workshops for the staff of the national regulator, the TNM and the distribution network managers in accordance with their respective missions.

They will also include updating the model and training of the staff of the national regulator and the TNM in charge of tariff issues for a minimum of two years.