OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

22677

C. 2001/054

République du Sénégal
Un Peuple - Un but -Une foi

MINISTERE DE LA JEUNESSE, DE L'ENVIRONNEMENT ET DE L'HYGIENE PUBLIQUE

Direction de l'Environnement et des Etablissements Classés

National Capacity-building for the Implementation of Industrial Projects in Six Selected African Countries Under the Clean Development Mechanism (CDM)
UNDO Project YA/RAF/01/405

PHASE II

FINAL REPORT

ACKNOWLEDGEMENTS

This work has been made possible thanks to UNIDO's initiative of involving African states at a very early stage in the Clean Development Mechanism under negotiation within the framework of the Kyoto Protocol and the UNFCCC. Such an agency provided a technical and financial support at a time when little was decided on this mechanism. Through UNIDO, and particularly Mr. Peter Pembleton, who ensured an unwavering support to the countries in the management of the project, and also through the technical advisors, Mr. Pim KIESKAMP of ETC Energy of Netherlands, this project has been successfully carried out within reasonable time frames.

At the national level, the National Directorates, the industrial sector, SMEs and SMIs, NGOs, associations and institutes, have brought their input and guidance, when necessary, in a bid to improve the perception of the project. All the National Climate Change Committee members have also contributed to all activities of this project and in particular, to the final meeting of the phase 2 held at Saly Portudal, from 08 to 10 October 2001.

Finally, the DEEC technical team has been able to carry out the activities through involvement of a large number of stakeholders likely to find an interest in the implementation of CDM for their organisation or enterprise, more globally, as well as a further interest in the effective involvement of Senegal in the climate change negotiation process.

To all above institutions and persons to whom we owe the implementation of all the activities planned under this UNDO project covering six African pilot countries, we extend our deep appreciation.

Also, we would be grateful to the readers for sending in their comments and contributions for the future editing of this report.

Fatima Dia TOURE
Directeur de l'Environnement et des Etablissements Classés

***For all contacts** : Ndiaye Cheikh SYLLA*
Coordonnateur du Projet ONUDI
Tel : 221 22 62 11
Fax : 221 22 62 12
Email : **denv@sentoo.sn**

ABBREVIATIONS AND ACRONYMS

UNFCCC : United Nations Framework Convention on Climate Change
DEEC : Direction de l'Environnement et des Etablissements Classés

CDM :	Clean Development Mechanism
ECOWAS :	Economic Community for West African States
CC :	Climate Change
TT :	Technology Transfer
SC :	Select Committee

SUMMARY

Following an initial phase which lasted from 1999 to 2000, this phase 2 reviews the various activities carried out since the beginning of the programme.

The purpose throughout this phase was to involve a target audience whose potentialities must be reinforced by working with a select group of stakeholders who are very conversant with issues being discussed.

It was launched through the two meetings of the Senegalese partners and UNIDO in Dakar.

This phase enabled to identify barriers to the transfers of technologies, the utilisation of energy in the industrial sector, finance and investments, regulation and information system.

A comprehensive reflection ensued on the solutions on how to remove the barriers identified. In this regard, concrete proposals have been made. Then, a capacity-building programme has been proposed including a large- scale sub-regional co-operation with consistent budgets for the implementation of CDM.

By way of example, SONACOS and SENELEC, two major energy consumers have been selected to host CDM projects. A comprehensive study of energy potentialities has been carried out in a bid to measure exchangeable credits of greenhouse gas emissions reduction. Hence, the involvement of technicians made it possible to stick to reality and to tap the opportunities which may present themselves to the Senegalese industry as a whole.

Today, such a UNIDO approach which consisted in setting up a co-ordinating mechanism at the African regional level covering the six countries, must help meet the UNFCCC requirements and its Kyoto Protocol.

INTRODUCTION

This final report of the UNIDO Programme on national capacity-building for the implementation of CDM projects reviews the various activities carried out since the inception of the programme.

The programme includes :

- the various activities of the select group and target audience ;
- the review of the barriers identified in the studies carried out by experts ;
- the strategy to be developed for the removal of such barriers ;
- the national capacity-building programme ;
- the potential project portfolio and ;
- the annexes (different meetings and lists of attendance).

By implementing all such activities, the project has made it possible for all the stakeholder to have a better and common understanding of CDM and the advantages thereof accruing to countries. Hence, this report reviews the work done at the national level and determines what remains to be done for the Phase 3 which must be a phase of actions and concrete achievements.

Such a UNIDO approach which consists in setting up an African regional co-ordinating mechanism across the six countries, must help meet the UNFCCC requirements and its Kyoto Protocol.

CHAPTER 1

TEAM ACTIVITIES AND DISCUSSION WITH THE TARGET AUDIENCE

I. Inception meeting of Phase II - 5 and 6 April 2001

I. 1 Introduction

As part of the UNIDO project, Peter Pembleton (SES/IEC UNIDO Vienna) and Pim Kieskamp (ETC, Senior Technical Advisor) met with the technical team in charge of implementing the project on 5th April 2001 and on 6th April 2001, and with members of the extended committee representing the target audience, with the view to presenting the project objectives and plan.

I.2 Opening Ceremony

The 5th April 2000 meeting was opened by Mr. Sylla, the National Project Co-ordinator. He introduced the UNIDO experts and explained the purpose of their mission in Senegal.

Mr. Fall, the UNIDO representative in Senegal, presented the national activities carried out by his institution as part of an integrated industrial capacity-building programme.

The 6th April 2000 meeting was introduced by Mr. Sylla who recalled the importance of this project for Senegal the industrial sector of which is expected to soon host the CDM. The objective is to get ready for and acquainted with such a new mechanism, as well as to involve all the economic sectors in this process.

The meeting was opened and presided over by the Chairperson of the NCCC, Colonel Mbareck Diop and was attended by the UNIDO Country Representative, Mr. François d'Adesky, who reiterated in his address the importance for UNIDO of the approach which, in its initial phase, made it possible to identify two industries as major energy consumers : SONACOS and SENELEC. He then assured the full participation of UNIDO in the future phases.

I. 3 Presentations on UNIDO Programme

During the two days of the meeting, Mr. Peter Pembleton, Senior Co-ordinator for UNIDO, presented the rationale behind the setting up of the project.

I.4 The Project Plan

It includes three phases :

- Phase I : relates to existing capacities ;
- Phase II : is about identification of barriers and how to remove them, capacity-building programme development, a proposed project portfolio and information dissemination ;
- Phase III : consists of the implementation of projects selected, including SONACOS and SENELEC projects.

I. 5 Activities

The initial activity was carried out by national experts in 1999, who drafted the country implementation report based on the country paper and a review of the multilateral and bilateral activities pertaining to climate change.

The second activity started in 2001, following a presentation of the programme, the reports of the six countries selected for the pilot phase of the African group during the meeting in Lyon (France). The group requested a continuation of the programme and the need for UNIDO to extend such processes to other developing countries. The involvement of sub-regional organisations like ECOWAS and COMESA in the development of such a programme at the African level could be contemplated by the UNIDO experts.

During the two days, M. KiesKamp, Senior Programme Technical Advisor, focused on the constitutive elements of the programme and on the need to establish a continued interactive process in the programme in order to mobilise the different stakeholders.

He identified the possible stakeholders likely to intervene in this programme. These will intervene in :

- industrial development ;
- finance/investments ;
- technical maintenance ;
- associations/civil societies/NGOs ;
- government structures and;
- international organisations.

As regards the TT-related issues, it would be useful to know about the industrial processes, to assess the national capacities for adoption, adaptation of transferred technologies, as well as the national expertise for negotiating such transfers and ensuring technology monitoring and follow up.

Issues relative to information and information dissemination are essential, as they are the very basis for a permanent and constructive dialogue between actors and partners identified by this UNIDO programme.

Mr. Sylla the National Programme Co-ordinator, presented the division of labour among the national experts and the future operation of this group. Studies are developed according to technical skills of the experts. Regular meetings will be held within the group of experts in order to exchange on the terms of reference of studies to be carried out and to ensure the follow up of studies already carried out by the national experts. Studies will have to be carried out in the following sectors : technology transfer, energy utilisation in the industrial sector, finance and investments, regulations and information systems.

However, in order to disseminate information and validate reports from consultants, plans are to organise three workshops with the national committee, particularly with the industrialists.

Mr. El Hadj Mbaye Diagne of SONACOS presented the characteristics of the Senegalese industry and indicated what opportunities are offered by the UNIDO programme for the Senegalese private sector. The expectations of the Senegalese industry from this project have also been underlined.

I.6 General Discussions

During the two days the discussions focused on :

- the type of industries likely to be explored by the programme, those to be proposed by the country based on national realities and priorities ;
- the possible training under the UNIDO programme, which will be defined by the experts based on national requirements ;
- the possible correlations between the UNIDO project and the SUSAC project will be explored for an optimal realisation of the ONUDI programme objectives ;
- the reports to be supplied to UNIDO by the national experts group are four in number and the last report will be submitted prior to COP7 for completion of the final regional report ;
- donors and strategic project partners would be targeted and presented in a funding programme to be used during Phase 3 of the UNIDO programme ;
- Industries, namely SONEPI, welcome the project and rely on the flow of information to actively participate in this programme which will assist all the small and medium size enterprises to negotiate their technology requirements ;
- the involvement of NGOs and industrial associations and trade unions in the dissemination of information and as a pressure group with policy-makers, was strongly requested ;
- the need for a rapid start of projects in the industrial sector has also been raised in a bid to further sensitise industrialists on the benefits accruing to them from the programme, namely in the field of technology transfer.

I.7 Activities and Calendar

All the activities to be carried out, the 5 reports to be edited, as well as the group to be involved, were defined during the two-day meeting.

II. Activities of the Select Team - The Meeting of 23rd May 2001

Such a meeting made it possible to develop the terms of reference for submission to the various programme consultants, to exchange views on the content of the terms of reference in order to have a common vision on the consultation to be carried out and to establish a calendar of regular meetings with members of the NCCC for the validation of the various studies.

The calendar adopted for such studies is as follows :

- submission of draft studies is scheduled for 07 June 01 ;

- the meeting of the select group is planned for 14 June at 10 am at the DEEC for collecting comments and observations from members of the select group on each report ;
- Each member of the group has also received information for access to and participation in the discussions on the UNIDO website.

III. Meeting of 14th April 2001

It was convened in order to allow discussions around the consultants reports.

The purpose of the meeting is to stimulate interactive exchanges with the various members of the select group on draft study reports presented and on the methodology used by the consultant. Advice and suggestions are made to each consultant in order to improve the quality of their individual reports.

Hence, a certain number of concerns have been registered which point to the need to refocus and bridge some of the gaps.

The meeting has been a major step in refocusing the task requested.

A discussion on the sub-regional meeting planned in October in Senegal, its organisation and the participation of members of the NCCC and a few partners, was addressed. Mr. Sylla expressed the need to find sponsors at the level of the industrial sector and of the Government in order to assist Senegal in making it a successful event. This is very important for Senegal , in particular, for the national industrial sector.

In this respect, contacts have been made with director generals of large industries, namely SAR, SENELEC and SONACOS, and with the Government of Senegal, through the Minister of Youth, Environment and Public Hygiene, in order to assist in the organisation of this meeting.

A visit was made to the venue of the regional meeting at Saly Portudal, to make the necessary hotel arrangements.

Such contacts enabled and will enable to present the UNDO programme to potential donors (national and international) as well as to policy-makers, which represents a real marketing for the UNIDO programme in Senegal.

A close collaboration was suggested between the ministries in charge of environment, industry and SMEs and SMIs, and the Senegal Investments Board for a successful organisation of the event.

Such an international meeting will, thus, represent a unique moment for building the capacities of project partners, enable Senegalese and non Senegalese investors to have relevant information on the convention and on climate changes, the Kyoto Protocol, the CDM, etc.

The meeting informed the select group about the format of the final report as an additional element to justify the work requested from consultants and about :

- the existence of the regional meeting agenda to be e-mailed to all members was

addressed in a bid to register proposed amendments ;

- the need to fill in the form for UNIDO and CTI, an important partner in the technology transfer process, was underscored ;
- each member of the group received the UNIDO document (2000) on Phase I of the on-going programme ;
- The difficulties for some of the group members in accessing the Internet on a regular basis was pointed out. This limits their participation in the debate on the website and should, therefore, be taken into account by the programme. The need to review the time allocated to the project was also mentioned ; an initial appraisal of this time must be made.

IV. Discussion with the Target Audience and with the NCCC

A meeting of the NCCC was held on 03 July 2001 under the chairmanship of Colonel Mbareck Diop, the Chairperson of the NCCC, with the following agenda :

- Defining the position of Senegal for COP6-bis following a presentation by Mr. Ndiaye Cheikh Sylla of the new proposals of President Pronk for COP6-bis.
- Presenting the status of the reports from the various consultants. The terms of reference have first been specified and the following reports have been presented :

  ⇒ the study on finance and investments ;
  ⇒ the study on technology transfer ;
  ⇒ the study on regulation ;
  ⇒ the study on information systems and ;
  ⇒ the study on the utilisation of energy in the industrial sector.

All the studies presented required to be amended and deepened in light of the observations from participants in this meeting.

CHAPTER II : REVIEW OF THE BARRIERS

I. INTRODUCTION

The following studies have been carried out : technology transfer requirements, energy utilisation in the industrial sector, finance and investments and information systems.

II. STUDY ON FINANCE AND INVESTMENTS

Such a study has identified the following barriers :

⇒ high level of business tax levies ;
⇒ differential tax treatment of enterprises ;
⇒ unclear definition of elements constituting tax levies ;
⇒ a still cumbersome taxation imposed at the establishment and start-up phase ;
⇒ compulsory public levies undermining enterprises and putting a brake on the development of economic activity and on investment ;
⇒ global rates (customs duties, tax duties, VAT, customs stamp and equalisation tax) are higher than those in force in the non-UEMOA countries of the sub-region ;
⇒ heavy taxes on salaries leads to the erosion in the consumer purchasing power (brake on production, limited market).

III. STUDY ON THE REGULATION

The study reveals the following barriers :

⇒ Lack of regulation or energy efficiency codes and thermal comfort ;
⇒ Promotion of energy efficiency in industry is still inadequate ;
⇒ The non enforcement at a larger scale of recommendations from studies on the potential industrial energy savings ;
⇒ The non-existence of norms of industrial emissions ;
⇒ The inadequate means of control of the state services in charge of inspection.

IV. STUDY ON TECHNOLOGY TRANSFER

The following barriers have been noted :

⇒ Complex administrative procedures ;
⇒ Inappropriate consulting system, namely for SMEs or SMIs ;
⇒ Inadequate tax incentives to stimulate investments in cleaner technologies ;
⇒ Non-operationality of the body in charge of regulating the sale of energy by private operators ;
⇒ Distribution monopoly by a local operator ;
⇒ Lack of competitive productive factors compared to other competing countries (water, electricity, transport, manpower) ;
⇒ Inadequate technical and managerial capacities of enterprises ;
⇒ Complexity of some of the technologies ;
⇒ Lack of a data bank on the new technologies ;
⇒ Inadequate mastery of the new technologies, methods and tools for the management of the industrial units ;
⇒ Inadequate financial instruments tailored to the needs of the various economic operators.

V. STUDY ON THE UTILISATION OF ENERGY IN THE INDUSTRIAL SECTOR

The study has identified the following barriers :

⇒ Lack of a genuine policy for harnessing energy ;
⇒ Lack of information on clean technologies ;
⇒ Lack of capitals as a result of high production costs ;
⇒ Lack of clean fossil energy resources ;
⇒ Run-down facilities (over 50% of installations).

CHAPTER III : BARRIER REMOVAL STRATEGY

Following the study on barriers, proposals for removing them have been made :

I. FINANCE AND INVESTMENTS

◊ Enforcement of taxes scheduled within UEMOA by January 2002 in the sub-region ;
◊ Proposed ceiling of the total amount of taxes to be paid to the public treasury on each import operation ;
◊ Creation of an open environment with a claim for compensatory rights ;
◊ Healthy and fair competition to promote a rapid transformation of the productive system ;
◊ Rapid global costs cutting;
◊ Elucidation of incentives provisions enshrined in the investments code and in all the legislative, fiscal and regulatory body.

II. REGULATION

◊ Development of an adequate CDM-sensitive regulation ;
◊ Assistance in the development of energy efficient projects ;
◊ Adoption and enforcement of the updated environment code ;
◊ Existence of environmental norms for industrial wastes.

III. TECHNOLOGY TRANSFER

◊ Need for an improved legal and judiciary framework for economic activities ;
◊ Opening of the technology distribution market ;
◊ Harmonised sub-regional taxes ;
◊ Training of technicians on new technologies ;
◊ Transfer of adapted technologies ;
◊ Sharing of information and experience on current technologies ;
◊ Setting up a data bank ;
◊ Developing a financial instrument to assist enterprises in implementing their energy saving programme.

IV. UTILISATION OF ENERGY IN THE INDUSTRIAL SECTOR

- ◊ Information on energy policy, through training and participation in meetings relative to energy and environment ;
- ◊ Existence of environmental norms for industrial discharges ;
- ◊ Enforcement of tax exemptions for clean technologies (Environment Code) ;
- ◊ Promotion of new and renewable energies ;
- ◊ Appropriate training in TT and in R&D.

CHAPTER IV : NATIONAL CAPACITY-BUILDING PROGRAMME

ASSESSMENT OF THE NEEDS OF PARTNERS IN THE

IMPLEMENTATION OF CDM

Such different categories of stakeholders must have access to information on CDM opportunities :

◊ Policy-makers and funding agencies : legislators, civil service, donors, bankers ;
◊ Economic operators : industry leaders and experts ;
◊ Researchers and independent experts ;
◊ Social partners and civil society.

II. CDM INFORMATION MANAGEMENT SYSTEM

In order to bridge the information gaps, the following activities should be undertaken :

◊ Identification of sources of information on CDM ;
◊ Data collection on CDM ;
◊ Setting up a CDM Unit ;
◊ Setting up an information flow system on CDM via the Internet and through written and audio-visual media ;
◊ Communication and ads relative to CDM ;
◊ Setting up a CDM network of partners.

III. INVOLVEMENT OF STAKEHOLDERS IN THE VARIOUS ACTIVITIES

Through :

◊ Learning by doing ;
◊ A higher turnover in national and international meetings ;
◊ Training, information and sensitisation sessions.

IV. BUDGET AND THE WAY FORWARD

In all the countries, a unit of the Vienna Convention and Montreal Protocol type of Ozone Office on ozone depleting substances (ODS), must be institutionalised and set up. Its role will be to facilitate any activities on CDM, to develop CDM projects and to follow them up throughout the project cycle as determined by the Executive Council on CDM, as well as the creation and maintenance of a documentation centre...

A substantial budget must be prepared to cover all such activities, one which allows for sub-regional co-operation and which integrates the work time of the different CDM stakeholders. The following elements - they are not exhaustive - are some of the budgetary lines. These mainly include consultant services, office equipment, multimedia hardware and use of the already existing services and network... A detailed explanation of each activity must be provided.

Budget line items :

- ◊ Identification of sources of information on CDM ;
- ◊ Data collection on CDM ;
- ◊ Setting up a CDM Unit ;
- ◊ Setting up an information flow system on CDM via the Internet and through written and audio-visual media ;
- ◊ Creation of a journal and/or publication on climate change and CDM ;
- ◊ Communication and spots relative to CDM ;
- ◊ Setting up a CDM partner network at the national and international level ;
- ◊ Participation of potential partners in national and international meetings ;
- ◊ Organisation of training sessions.

CHAPTER V : PORTFOLIO OF POTENTIAL PROJECTS

Projects identified include : the SENELEC project and the SONACOS project

I. SENELEC PROJECT

⇒ The near totality of electricity is generated in thermal power stations ;
⇒ The oil products are totally imported, only a small quantity of natural gas is produced locally (31 million cubic meters from 1992 to 1997) ;
⇒ The quantities of fuel and gas-oil consumed represent about 280 000 tons par annum, or about 40% of the total volume of the imported oil products ;
⇒ The SENELEC production equipment : Power : 296,4 MW made up of 251,4 MW in the Dakar Region (189,5 MW at Cap des Biches and in Rufisque and 62,9 at Bel Air ;
⇒ A total of 37,7 MW in the 5 regional stations ;
⇒ A total of 7,3 MW in the 23 small size power stations scattered across the country.
⇒ Forecast scenarios of the growth in the global demand for electricity :
3,6 % up to 2000 ; 4,4% from 2000 to 2005 and 5,4% from 2005 to 2015.

I.I THE POWER STATION AT CAP DES BICHES

There are 3 steam generators for a nominal power of 87,5 MW :

- the 301 dates back to 1966 ;
- the 302 dates back to 1972 and ;
- the 303 dates back to 1978.

Their fuel consumption is 179.000 tons while their diesel intake is 22 ;494 tons. Such three generators ensure the basic production of power ;

I1.1. DIFFICULTIES :

A high demand on and an intense use of the generators is noted against an inadequate energy supply.

There is an obvious need for a minimum of maintenance of a largely run-down equipment.

The performance of the generators is to the tune of 70% of their yield.

I1.2. SOLUTION

These include :

- rehabilitating the steam generators ;
- installing new generators and ;

- installing gas turbines.

Options developed

- **Option 1 :** rehabilitation of Boiler 301 ; the fuel saved is 2826 tons, for a cost of CFA 1.000.000.000.
- **Option 2** : rehabilitation of Boiler 302 ; the fuel saved per annum is 3368 tons, for a cost of CFA 1.500.000.000.

Cap des Biche Station

Total cost : CFA 2.500.000.000 with a quantity of 6194 tons of fuel saved.

Energy saved : (1997-2015) : 111 492 tons of fuel ; 340 000 tons of CO2, or 12,2 tons of CO2 avoided.

III. SONACOS PROJECT

1. INTRODUCTION

SONACOS EID is one of the four production units of the National Oil Refinery. In addition to Dakar, SONACOS has other production units in Diourbel, Kaolack and Ziguinchor.

2. OBJECTIVES

These will include :

- to improve the energy efficiency of SONACOS EID plant ;
- to reduce greenhouse gas emissions and ;
- to acquire new efficient and cost-effective technologies.

Scenario

- an assumed annual agricultural growth proportionate to the population growth of 2.6% as of 2000. ;
- Improved level of groundnut trituration by SONACOS EID ;
- Forthcoming opening of the UEMOA market (trade prospects) ;

Production

	1997	2015
Groundnut Plant	100 000 t	1 325 000 t
Level of trituration	25 000 t	265 000 t

Forecast energy consumption

Trituration (t)	25 000	265 000
SENELEC (KWH)	4 891 600	1 580 418
Gasoil (t)	8 811	5 790
Fuel (t)	2 866	3 777
Empty groundnut hull (t)	17 052	113 1567
Bales of rice (t)	1 728	0

Measures

- Recycling of papers, carton boxes from household garbage, with the purchase of boiler and a counter pressure turbo alternator ;
- Streamlining the control system of the DUQUENNE boiler ;
- Reclamation of the dissipated steam by the compressors' radiators to 1 ;
- Repairing the insulation in the steam network of the plant (process) ;
- Automation and streamlining of the lighting network of the plant and installation of high yield lamps ;
- Insulation of the carriers at the pressing and detoxication machine ;
- Repairing the plant's steam network and;
- Re-designing and reconfigurating the installation for the reclamation of condensates in the boiler room.

Global savings and cost of the ton of CO2

Emission gain :	1378 050 t of CO2
Base investments :	CFA 5 294 000 000
The ton of CO2 saved :	CFA 3842, or US$ 6, 40

CHAPTER VI : ENABLING ACTIVITIES

Objectives Output and Activities

OBJECTIVES		BARRIERS	ACTIVITIES
Enabling activities through professional organisations, national committee	Press	Fund to conduct activities	Seminary national Exchanges and with others countries Website creation
	Private sector	Lack of communication	
	Politics	Local Expertise	
	Research	Political Willingness	
	NGO		

CDM PROJECTS

OBJECTIVES	BARRIERS	ACTIVITIES
Set up CDM UNIT	No CDM structure	Set up CDM unit within DEEC with specialists
Set up Operational Entities (O.E.)	Lack of capacities for formation	Involvement of Bancs Cabinets of studies as O.E
Set up data and ban of projects	Actualisation of data	Data base within CDM

ENABLING ENVIRONMENT

OBJECTIVES		BARRIERS	ACTIVITIES
Improvement of frame work	Politics	Not priorities lack of information and communication political willingness Improve in sector	Set up framework for concertation, training, formulation of policy and adequate reglements
	Institutional	Lack of participation of sub regional institutions	Implications of regional institutions

TRANSFERTS DE TECHNOLOGIES

OBJECTIVES	BARRIERS	ACTIVITIES
Access to adapted technologies	Cost of investment	
Spread of technologies	No banc of data	Information /Sensibilisation
	Documentations and in English	Formation
	Lack of fiscal (incitation)	

	Restricted market	

ANNEXES

ANNEX 1 : REPORT OF THE INCEPTION MEETING OF PHASE II

ANNEXE 2 : LISTE DE PRESENCE DE L'EQUIPE RESTREINTE

ANNEXE 3 : LISTE DE PRESENCE DU GROUPE CIBLE

ANNEXE 4 : REPARTITION DES MEMBRES DE L'EQUIPE RESTREINTE

ANNEXE 5 : ACTIVITES ET CHRONOGRAMME

ANNEX 6 : DEFINITION OF ACTIVITIES INCLUDED IN THE TERMS OF REFERENCE FOR THE UNIDO PROJECT

ANNEX 7 : TRANSFER OF INDUSTRIAL TECHNOLOGIES IN SENEGAL

ANNEX 8 : UTLISATION DE L'ENERGIE DANS L'INDUSTRIE

ANNEXE 9 : STATUTORY AND LEGISLATIVE ASPECTS

ANNEXE 10 : CMD INFORMATION AND COMMUNICATION STRATEGY

ANNEXE 11 : MEETING OF 23 MAY 2001

ANNEX 12 : MEETING OF 14TH JUNE 2001

ANNEX 13 : LIST OF PARTICIPANTS

ANNEX 14 : DICUSSION WITH TARGET AUDIENCE MEETING OF THE NATIONAL COMMITTEE

ANNEX 1 :

REPORT OF THE INCEPTION MEETING OF PHASE II

Dakar, 12 April 2001

I. INTRODUCTION

As part of the UNIDO project, Peter Pembleton (SES/IEC UNIDO Vienna) and Pim Kieskamp (ETC, Senior Technical Advisor) met with the technical team in charge of implementing the project on 5th April 2001 and on 6th April 2001, and with members of the extended committee representing the target audience, with the view to presenting the project objectives and plan.

II. OPENING CEREMONY

The 5th April 2000 meeting was opened by Mr. Sylla, the National Project Co-ordinator. He introduced the UNIDO experts and explained the purpose of their mission in Senegal.

Mr. Fall, the UNIDO representative in Senegal, presented the national activities carried out by his institution as part of an integrated industrial capacity-building programme.

The 6th April 2000 meeting was introduced by Mr. Sylla who recalled the importance of this project for Senegal the industrial sector of which is expected to soon host the CDM. The objective is to get ready for and acquainted with such a new mechanism, as well as to involve all the economic sectors in this process.

The meeting was opened and presided over by the Chairperson of the NCCC, Colonel Mbareck Diop and was attended by the UNIDO Country Representative, Mr. François d'Adesky, who reiterated in his address the importance for UNIDO of the approach which, in its initial phase, made it possible to identify two industries as major energy consumers :

SONACOS and SENELEC. He then assured the full participation of UNIDO in the future phases.

III. PRESENTATIONS ON UNIDO PROGRAMME

During the two days of the meeting, Mr. Peter Pembleton, Senior Co-ordinator for UNIDO, presented the rationale behind the setting up of the project :

- article 4.5 of the UNFCCC referring to the technology transfer to developing countries ;
- decision 10 of COP5 relative to the request for capacity-building by developing countries ;
- The Kyoto Protocol (COP3) with CDM the enforcement of which requires an appropriate environment and capacities to be sustained ;
- The Arusha (Tanzania) meeting on TT.

IV. THE PROJECT PLAN

It includes three phases :

- Phase I : relates to existing capacities ;
- Phase II : consists in :
  - ⇒ the development of an industrial project, with studies of barriers and how to remove them in relation to the regulation, investments and technology transfers ;
  - ⇒ identification of capacity-building needs ;
  - ⇒ involvement of all stakeholders concerned ;
  - ⇒ information dissemination.

- Phase III : concerns the implementation of projects selected, including SONACOS and SENLEC projects

V. ACTIVITIES

The initial activity was carried out by national experts in 1999, who drafted the country implementation report based on the country paper and a review of the multilateral and bilateral activities pertaining to climate change. The two industries heavy consumers of energy, the relevant partners, the barriers and capacity requirements have been identified beforehand during this Phase I.

The second activity started in 2001, following a presentation of the programme, the reports of the six countries selected for the pilot phase of the African group during the meeting in Lyon (France). The group requested a continuation of the programme and the need for UNIDO to extend such processes to other developing countries. The involvement of sub-regional organisations like ECOWAS and COMESA in the development of such a programme at the African level could be contemplated by the UNIDO experts.

The setting up of a virtual centre and of a discussion forum (use of on-line conference) specific to this programme would allow to have a permanent dialogue between national stakeholders and regional experts to share their experiences.

During the two days, M. KiesKamp, Senior Programme Technical Advisor, focused on the constitutive elements of the programme and on the need to establish a continued interactive process in the programme in order to mobilise the different stakeholders, and hierarchise the options for the exhaustion of GHGs with a view to creating an efficient national and regional capacity for the implementation of CDM projects.

He identified the possible stakeholders likely to intervene in this programme. These will intervene in :

- industrial development ;

- finance/investments ;
- technical maintenance ;
- associations/civil societies/NGOs ;
- government structures and;
- international organisations.

Hence, the identification of barriers is essential for the implementation of technology transfer (TT) in the countries selected by the programme. Such barriers are related to the implementation of CDM. Also, the legal framework needs to be explored, i.e. the statutory structure for the TT, the incorporation of the international treaties in the national legal system and conflict management the TT.

As regards the TT-related issues, it would be useful to know about the industrial processes, to assess the national capacities for adoption, adaptation of transferred technologies, as well as the national expertise for negotiating such transfers and ensuring technology monitoring and follow up.

Issues relative to information and information dissemination are essential, as they are the very basis for a permanent and constructive dialogue between actors and partners identified by this UNIDO programme.

Phase I culminated in a national report submitted to UNIDO in 1999 ;
Phase II of the UNIDO programme must lead to :

- a reinforcement of capacities of a group of stakeholders ;
- specific national proposals on development capacitiesx ;
- a need assessment and of financial, industrial and technological barriers, as well a large dissemination of information.

Phase III must result in :

- the implementation of strategies to be developed in order to remove the barriers ;
- the eligible development of CDM projects ;
- the setting up of a national network on the UNIDO programme.

Phase IV will be project implementation.

Mr. Sylla the National Programme Co-ordinator, presented the division of labour among the national experts and the future operation of this group. Studies are developed according to technical skills of the experts. Regular meetings will be held within the group of experts in order to exchange on the terms of reference of studies to be carried out and to ensure the follow up of studies already carried out by the national experts. Progress reports will be prepared by the group.

However, in order to disseminate information and validate reports from consultants, plans are to organise three workshops with the national committee, particularly with the industrialists. This will help monitor the evolution of the programme and ensure a due consideration of the national requirements and priorities in this UNIDO programme.

Mr. El Hadj Mbaye Diagne of SONACOS presented the characteristics of the Senegalese industry and indicated what opportunities are offered by the UNIDO programme for the Senegalese private sector. The expectations of the Senegalese industry from this project have also been underlined.

VI. GENERAL DISCUSSIONS

During the two days the discussions focused on :

- the type of industries likely to be explored by the programme, those to be proposed by the country based on national realities and priorities ;
- the possible training under the UNIDO programme, which will be defined by the experts based on national requirements ;
- the possible correlations between the UNIDO project and the SUSAC project will be explored for an optimal realisation of the ONUDI programme objectives ;
- the reports to be supplied to UNIDO by the national experts group are four in number and the last report will be submitted prior to COP7 for completion of the final regional report ;
- donors and strategic project partners would be targeted and presented in a funding programme to be used during Phase 3 of the UNIDO programme ;
- Industries, namely SONEPI, welcome the project and rely on the flow of information to actively participate in this programme which will assist all the small and medium size enterprises to negotiate their technology requirements ;
- the involvement of NGOs and industrial associations and trade unions in the dissemination of information and as a pressure group with policy-makers, was strongly requested ;
- the need for a rapid start of projects in the industrial sector has also been raised in a bid to further sensitise industrialists on the benefits accruing to them from the programme, namely in the field of technology transfer.

VII. CONCLUSION

At the outcome of the two-day meeting, a large consensus is noted by the participants on the following points:

- a good flow of information at the level of the industries ;
- a sensitisation of the policy-makers and of the public at large ;
- a concrete implementation of projects in industries targeted in Phase I.

In the conduct of the activities, and in light of the large number of questions which will be raised, the participation of all stakeholders is required.

- Finally, a significant documentation has been distributed over the two days, as well as the possibilities for all the team to take part in the discussion forum initiated by UNIDO.

ANNEX 2

LISTE DE PRESENCE DE L'EQUIPE RESTREINTE

05 Avril 2001

Prénoms	Nom	Structure	Tel – Email
1. Ibrahima	SOW	DEEC/ME	821 07 25 ibsow@sentoo.sn
2. Mamadou	DAFF	MT/DPAT	821 39 26 652 69 17
3. Libasse	BA	ENDA	822 59 83 libasseba@hotmail.com
4. Djibril	NDIAYE	CSE	825 80 66 – 630 79 18 Djibril@cse.sn
5. Ndiaye Cheikh	SYLLA	DEEC/ME	
6. El Hadji Mbaye	DIAGNE	SONACOS	849 17 08 sonacosa@telecomplus.sn
7. Madeleine	DIOUF	DEEC/ME	mad@metisacana.sn
8. Cheikhou Oumar	TOURE	Consultant	864 10 53 Ctoure@caramail.com
9. Pim	KIESKAMP	ETC ENERGY (Hollande)	
10. Peter	PEMBLETON	UNIDO	ppembleton@unido.org
11. Mme Badiane Reine Marie COLY		DEEC/ME	822 62 11 rmcoly@sentoo.sn

ANNEX 3

LISTE DE PRESENCE DU GROUPE CIBLE

06 Avril 2001

Prénoms	Nom	Structure	Tel – Email
1. Cheikh	FOFANA	DEEC/ME	821 0725
2. Elhadji Mbaye	DIAGNE	SONACOS	849 17 08
			sonacosa@telecomplus.sn
3. Libasse	BA	ENDA-TM Programme Energie	libasseba@hotmail.com
4. Ibrahima	SOW	DEEC/ME	ibsow@sentoo.sn
5. Mamadou Lakhassane	CISSE	SONEPI	864 04 81 – 646 19 18
6. Mamadou	WANE	DPIE Zone Franche Ind.	834 07 84 – 834 00 02
7. Madické	NIANG	CONGAD	647 41 70 madickeniang@hotmail.com
8. Mamadou	BALL	Direction Industrie	
9. Takia	CARVALHO	ISE	645 31 60 takefay@hotmail.com
10. Mamadou	DAFF	Ministère du Tourisme DPAT	821 39 26 652 89 17
11. Papa Birane	SARR	DEEC/ME	822 38 48
12. Mady	FADERA	DEFCCS	832 06 28
13. Madeleine	DIOUF	DEEC/ME	821 07 25

13.	Peter	PEMBLETON	UNIDO	
14.	Pim	KIESKAMP	ETC ENERGY Pays-Bas	
15.	Pape Jean	FALL	ONUDI/Dakar	823 18 76 onudi@cyg.sn
16.	Ndiaye Cheikh	SYLLA	DEEC/ME	denv@sentoo.sn
17.	Reine Marie	COLY	DEEC/ME	rmcoly@sentoo.sn
18.	Cheikhou Oumar	TOURE	Consultant	Ctoure@caramail.com
19.	Colonel Mbareck	DIOP	Présidence de la République	
20.	Mamadou	BOCOUM	ICS	
21.	Directeur		SOCOCIM	
22.	Ismaël	NDIAYE	SAR	
23.	Issa Mare	DIAW	SENELEC	
24.	Seila	TOURE	Direction Energie	
25.	Mamadou	BALL	"	"
26.	Souyebou	SALL	Direction de la Coopération Economique et Financière	
27.	Mansour	KAMA	Président du Conseil National des Employeurs du Sénégal (CNES)	
28.	Président		Conseil National du Patronat (CNP)	
30.	Directeur		SODIDA	
31.	Ely	SY	CONGAD	
32.	Cheikh	DIOP	ISE	
33.	Coordonnateur		PROGEDE	
34.	Abdoulaye	DIEYE	SENCHIM AG (ICS)	

ANNEX 4

RÉPARTITION DES MEMBRES DE L'ÉQUIPE RESTREINTE

Membres = 06
Appui = 04

Name	Expertise
Ndiaye Cheikh SYLLA	Coordonnateur
El Hadji Mbaye DIAGNE	*Private- Technology transfert , Industries efficiency*
Cheikh Oumar TOURE	Private- Consultant : Legal, barriere removal, institutionnal aspects
Souyebou SALL	DCF : Finance - Investissement
Libasse BA	Energy secteur in industrie
Djibril NDIAYE	C S E (Monitoring Center of environment) : training, information, awarness, website
PERSONNEL D'APPUI	
Fatima Dia TOURE et Reine Marie Coly	Legal, barrier removal, institutional aspects
Madeleine Rose DIOUF	DEEC- CC Negociation, Implementation of CDM - Technologies transfer
Ibrahima SOW	DEEC : Monitoring and Report review
Mamadou BALL	Ministry of Industry : Industry-environment, implementation of CDM

ANNEXE 5 : ACTIVITES ET CHRONOGRAMME

Comité restreint = CR

ACTIVITES		Avril	Mai	Juin	Juillet	Août	Septembre	Octobre	Novembre
Rencontres	démarrage	X							
	CR	x x	x	x x	x X		x	x	
	Groupe	x		x	X		X	X	
	Sous-régionale							X	
Etudes	Démarrage	x							
	Projet rapport			x					
	Validation			x					
Rapports	Rapport 1		x						
	Rapport II			X					
	Rapport III					x			
	Rapport IV						X		
	Rapport final								x

Rapports	Période	Contenu
Progress Rep. I	I April	Cpte rendu des réunions de lancement et liste des membres des comités (team et groupe cible)
Progr. Rep.II	II June	Suivi des activités
Progr. Rep. III	July	Identification des barrières

Progr. Rep. IV	September	Développement des stratégies
Final Report 30	November	Rapport final

ANNEX 6

Definition of activities included in the Terms of Reference for the UNIDO project

In light of the objectives of the Convention on Climate Change, the Consultant will have the following tasks in Senegal :

Technology Transfer

1) To identify and assess technology transfer requirements in industry ;
2) To make efficient and efficacious technology options ;
3) To define the modalities for technology adaptation ;
4) To identify inadequacies in technical skills and define training adapted for technicians ;
5) To identify barriers to TT and propose solutions likely to remove them ;
6) To assess cost-efficiency/profitability of the technologies opted for against other current technologies ;
7) Assess the adaptation cost of technologies selected.

Utilisation of Energy in the Industrial Sector

1) To present the national energy policy ;
2) To present the types of energy used in industries and the cost history of such energies;
3) To present energy processes developed and their limitations ;
4) To define technical, technological and managerial strategies for the reduction of energy ;
5) To identify barriers to the utilisation of clean and less emitting technologies, as well as measures for removing them.

Finance and Investments

1) To review the national investment system (*inter alia* investor's track records) ;
2) To review the national tax system (taxes, exemptions)
3) To review the operation of the financial system in Senegal (how the state integrates the TT dimension into its development budget) ;
4) To review the financial budgets allocated by the private sector in the area of technology transfer) ;
5) To review the TT management system in Senegal between the various partners including : the state, the private sector and donors or bilateral co-operation ;
6) To demonstrate the financial windfalls offered by CDM for industry and to propose a financial strategy for the implementation of such CDM projects compatible with and profitable to the Senegalese economy ;
7) What are the national public or private partners, the international partners to be considered.

Regulations

1) To review the current regulation in technology import, technology transfer and the regulations relative to the energy efficiency in industry and the control of pollution by industries ;
2) To review the customs regulation as well as the obstacles to TT ;
3) To describe the national regulations in place in this sector and the inherent inadequacies ;
4) To identify barriers and propose a strategy to remove such barriers or improve the procedures for an efficient implementation of CDM projects in the industrial environment.

Information System

1) To facilitate the participation of the group in the UNIDO discussion forum.
2) To create and maintain a website for the integration of project studies and findings ;
3) To define the information and communication strategy for the programme studies and findings for the policy-makers and the large audience, using various and accessible channels;
4) To assess the cost of such a strategy.

ANNEX 7 :

TRANSFER OF TECHNOLOGIES IN INDUSTRY

Par : **El hadj Mbaye DIAGNE et Madeleine DIOUF**

I. INTRODUCTION

Article 4.5 of the UN Framework Convention on Climate Change (UNCCC) stipulates that the developed countries parties to Annex II "shall take all possible actions with the view to encouraging, facilitating and financing the transfer of or access to technologies and ecologically rational know-how for other parties according to their needs, and in particular, for the developing countries, so as to enable them to enforce the provisions of the Convention".

Technology transfer has been defined by the Intergovernmental Experts Group on Climate Change (IEGCC) in their special report on methodological and technological issues pertaining to technology transfer as a comprehensive process which includes the sharing of know-how, information, experiences and materials for the mitigation of climate change and the adaptation to such a change. The Group is one of such different stakeholders as governments, NGOs, the private sector, donors agencies, and research and training institutions.

In Senegal, there is no specialized structure to promote transfers of technologies in general, and ecologically friendly ones, in particular; all the actions inventoried in this field are isolated initiatives of industrial enterprises.

However, it is believed that the existence of the Higher Council for Industry, the revitalization of the Energy Savings Office, the reform of the energy sector, the actions of sensitization, as well as the studies carried out within the ambit of projects initiated by the Directorate of Environment and some NGOs, the implementation of decrees for the enforcement of provisions in the Environment Code, as well as the launch of the Clean Development Mechanism, will certainly promote a genuine process of technology transfer in the field of climate change if all the parties involved play their roles in a clearly defined institutional framework.

II. BACKGROUND

The Senegalese industry is diversified and comprises such sectors as extractive industry, agriculture and fishing, food industry, chemical industry, textile, building materials, water and electricity, mechanical industry, wood and paper industry.

Most of the industries date back to the colonial era and the capitals were in the hands of foreigners whose major concern was to maximize profits as quickly as possible by manufacturing goods earmarked for the domestic market or the metropolitan market through the processing of local raw materials.

The technologies used were very simple and adjusted to the skills of the local labor while the development of the equipment was rather responsive to the need to keep up with the demand. Investments were very marginal and the machines which were often second hand acquisitions, were not renewed on a regular basis.

It is this historical context which largely justifies the run-down industrial infrastructure in Senegal.

As the result of nationalizations in the 70s, new policies were developed in the large enterprises in a bid to streamline some of them, but the attendant protectionist environment led to inefficient management and inability to carry through the equipment renewal programs as initially planned.

The New Industrial Policy initiated in 1984, along with the implementation of structural adjustment programs, has resulted into a decline in the demand for locally manufactured goods and, subsequently, into a significant decline in the utilization rates of installed industrial capacities and the collapse of whole segments of the industrial fabric.

It is the devaluation of the CFA Franc in 1994 that made possible for the some of the enterprises which benefited from its mechanical effects to survive, while the revival of some of some sectors allowed the resumption of investments in industry.

Presently, after all these tribulations, a much more consistent industrial policy has emerged. The option for the roll-back of the state is clearly re-stated in the economic and social policy paper and in the sectoral plans and programs, while UEMOA offers a regulatory framework and a much more attractive market. As part of the privatization of enterprises operating in the market sector, technical criteria including investment plans constitute the basis for any transactions.

Hence, we believe that if a number of measures are taken by the different partners, the Senegalese industry will fit quite well into the process of transfers of ecologically sound technologies under the UNCCC and the Kyoto protocol.

Within the Senegalese industry, the sector of food industry is numerically the most important activity sector with 30% of enterprises inventoried followed by chemical industry (20%), and the "Wood and Paper" sector ranks third (12% each), the other sectors accounting for less than 10% each.

A classification according to the turnover (TO)or value added (VA)confirms the weight of the food industry (40% of TO) followed by chemical industry (28% of TO and VA).

By taking as a criterium, that of investments measured against the fixed asset, the "Energy-Water" sector takes the lead, followed by food industry, chemical industry and extractive industries, textile and finally, the "Wood-Paper Box" sector and "Agriculture and Fisheries".

The review of investments from a representative sample of the industrial sector between 1992 and 1995 shows that such investments are relatively low and account for about 6% of the gross fixed assets.

The review of the liabilities of the balance sheet from the sample of industrial enterprises shows that long term indebtedness is very much on the decrease, which is indicative of the mode of funding of the new assets through resort to own resources and partly through short term credits.

The inventories carried out as part of the first national communication show emissions of greenhouse effect gases account for 44% of emissions inventoried.

As part of this study, our analysis will be limited to activities associated with the transfer of know-how and equipments between the developed countries and the Senegalese industry. A situational analysis will be made to identify the limitations and constraints, and to see ultimately what appropriate solutions can be proposed to promote TOT under the Clean Development Mechanism provided for by the Kyoto protocol.

In the industrial circles, improved business competitiveness, guaranteed product quality and safety as well as environment protection, are currently the basis for technological development. The latter manifests itself in three areas:

- new production processes;
- new equipments;
- organization (production management, quality of environment). In an initial phase, we set out to make an inventory of the processes implemented, the equipments used and to look at the technical organization of a few enterprises of the Senegalese industrial sector.

Then, a situational analysis will be made of these three sectors in relation to environmentally friendly technologies.

Finally, barriers to technology transfers as well as identified solutions will be reviewed in the context of Senegal.

It should be noted that lack of reliable data made it impossible to review all the industries targeted.

III. PRESENTATION OF INDUSTRIES

III-1 SENELEC

The National Electricity Board – *La Société Nationale d'Electricité du Sénégal* is the national electricity production and distribution operator.

III-2 SONACOS

The National Oilseeds Marketing Board – *La Société Nationale de Commercialisation des oléagineux du Sénégal* is a backbone enterprise for the internal and external equilibrium of

Senegal. A primary factor of social stability by dint of the revenues it generates hinterland within a well structured circuit, groundnut is both a cash and food crop. Because of the exports earnings it brings in, groundnut contributes significantly to the country's trade balance, even though its importance has declined. The sudden divestiture of the state in the mid eighties, as the result of the structural adjustment programs, has generated some problems: decline in quantity and quality of the seeds and fertilizers available for farmers, obsolete agricultural material, soil degradation, etc....

The Government responded appropriately by setting up a recovery program since 1997, with the support of the European Union, namely through the STABEX fund. Such major corrective measures were concomitant with the decision of the state to roll back from the marketing sector, including the groundnut marketing sector.

Hence, as part of its privatization option of the marketing sector in our economy, the Senegalese state which holds 80% of the SONACOS capital, is looking for a strategic buyer with sound international credentials, a proven technical track record, as well as significant financial resources, in a bid to support the revival of the groundnut sector, and finally, to make the sector realize its full potential.

Created in 1975 following the resumption of activities in the factories formerly owned by Europeans, SONACOS is made up of five plants: one is located in Dakar (trituration of groundnut seeds, refining and conditioning of edible oils, soap manufacturing), one at Lyndiane (trituration of groundnut seeds), a third one in Ziguinchor (trituration of groundnut and palm tree seeds), a fourth one in Diourbel (refining and conditioning edible oils, production of vinegar, bleach, margarines and poultry and cattle feed) and a fifth one in Louga (production of edible groundnut).

SONACOS is one of the heaviest consumers of power and thermal energy in Senegal.

It stands out as a producer of thermal and power energy from biomass and more particularly from its by-products composed of the groundnut hull and the palm husk.

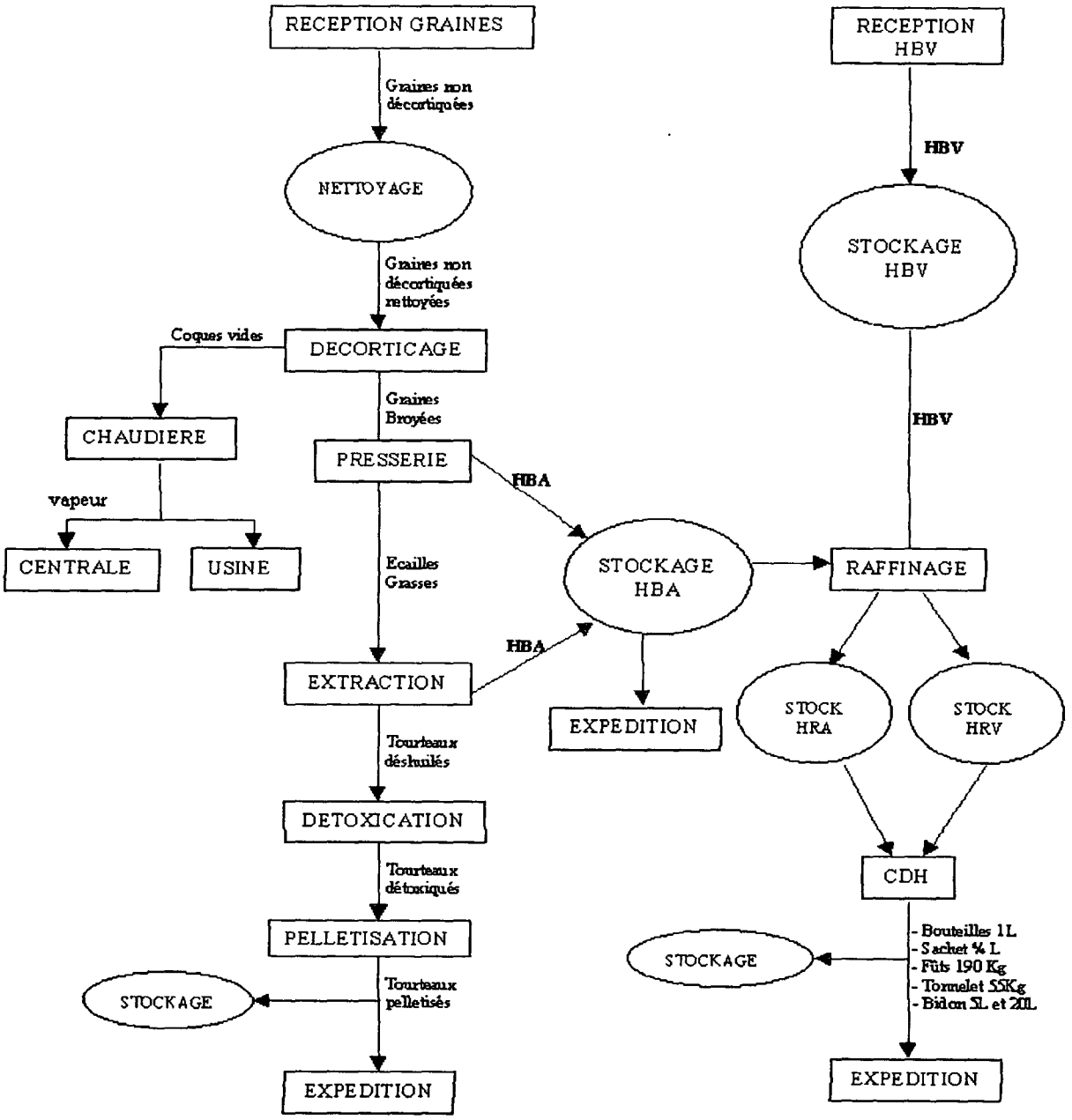
Hence, in each industrial unit, there is a combined thermal and power station to cater for the its own needs and to sell the surplus to the local operator.

As part of the assessment of efficient and effective technologies, the energy producing installations will be reviewed, as well the heavy energy consuming ones.

III-2-1 PRODUCTION PROCESS

Production of crude oil, refined oil, and toxin-free groundnut cakes, is the main activity of SONACOS.

A – Production Process:



III – 22 DESCRIPTION

III – 22 1 Trituration of groundnut seeds:

The groundnut seeds received are pressed and cleaned.
They are then husked and the kernels are separated from the groundnut hulls.
The kernels with a content in fat matters of about 50%, are crushed, conditioned and then mechanically pressed to collect 80% of the oil they contain.

The residues are sent into a chemical unit for extraction of the residual oil, using a solvent.

The flour obtained is rid of the solvent then of the toxin so of the aflatoxin it initially contained.

The groundnut cakes thus obtained are processed in such a manner as to increase the density of product and to facilitate its transportation.

The oils obtained at the press room and the ones extracted at the workshop using solvents, are stored and then either exported or locally refined.

The nominal capacity of groundnut seeds trituration is 900. 000 tons per year.

III – 23 OIL REFINING AND CONDITIONING:

The refining of oils through a traditional continuous process, consist in a chemical neutralization of fat acids and making them colorless and deodorized.

The refining capacity of the plants in Diourbel and Dakar is 200 000 tons per annum.

The characteristics of groundnut oil make it one of the best oils for frying and dressing.

Refined oils are conditioned in 190 kg drums, in 20 and 05 liter kegs and in glass bottles, polyethylene and vinyl polychloride bottles. The equipment in the process of streamlining makes it possible to wash and fill the drums and the glass bottles; while the PE and PVC bottles are manufactured locally by the traditional extruder-blowers.

III – 24 SOAP FACTORY

By-products from refined oils are used to produce domestic soap in traditional saponification facilities.

III – 25 MISCELLANEOUS ACTIVITIES

The manufacturing of other products stems from the will of the management to diversify its activities so as to mitigate the exclusive dependency on groundnut the production of which has been erratic over the past few years.

All such facilities are power and thermal energy consumers.

III – 26 ENERGY PRODUCTION:

In the four factories, the power stations allow to produce power and thermal energy to cater for the energy requirements of the production equipments; the power surplus being sold to SENELEC.

For the production of energies, steam is produced from boilers using groundnut hull as fuel, with a pressure ranging from 56 bars to 28 bars according to the factories. The boilers' feed water is produced from demineralization or crude water distillation facilities. The steam produced from boilers is used to feed turbo-alternators as well as production facilities. An alternator coupled with the turbine produces average voltage electricity.

Out of the turbine and production equipments, the steam is condensed and sent back to feed the boilers.

III – 3 SOCOCIM

Manufacturing process

The constituents of the cement are:

- Clinker, a synthetic rock manufactured in the "cement stove";
- Dairy products from blast furnace ;
- Gypsum, an inlet regulator.

The manufacturing of the clinker involves:

- preparing the mixture (homogenization and crushing) from 80% of limestone and 20% of clay;
- thermal processing in a boiler where the crude matter flows against the stream of hot gases and gradually reaches a temperature of 1450 °C, under the effect of a flame which can reach temperatures as high as 2000°C.

The transformation into clinker is carried out as follows:

- Up to 550 °C: drying of the raw mixture and dehydration of the clay;
- From 550 °C to 900 °C, pre-heating and decarbonatation (decomposition of the limestone into lime;
- formation of a part composed of such crystallines as aluminates and ferro-aluminates, bi-calcic silicates;
- from 1300 °C to 1450 °C, formation of tricalcic silicates, as the main constituent of the clinker and responsible for hydraulic properties of the cement.

The required temperature of 1450 °C must be reached by the matter during the clinkerization process.

After the burning, the clinker is suddenly cooled then finely crushed, mixed with gypsum (3% to 5%) and/or with other constituents.

The processed used to produce clinker is called the drying method. In such a process, decarbonation is virtually completed at the entry of the boiler. Sococim operates two limestone quarries and to supplement them, it gets supplies of laterites for intakes in iron and alumine oxyde.

The drying method has a production capacity of 2 300 T of clinker per day. The boiler has been installed since 1982.

An analyzer operating around the clock is installed on the production line which allows to adjust the supply of constituents, i.e. iron oxides, silicon dioxide, aluminum oxide and calcium carbonate.

The manufacturing of flour is ensured by crushers with a yield of 600T/H and 200T/H; and two grinder-dryers fed with gas from the furnace.

The PFEIFFER roller-mill has a yield of 96 T/H;
The ball-mill has yield of 100T/H.

The line includes :

- the 56 m long ONADAde rotating furnace, with a yield of 3.5 T/H;
- the four-level cyclone pre-calciner;
- the flour feed system;
- fuel intake at the nozzle of the furnace and at the pre-calciner;
- the clinker cooler

Treatment of gases

Combustion gases flow through the furnace against the stream of the matter and rise up to the four levels of the cyclones of the matter pre-heater. The gases are then channeled towards the two lines for flour preparation (grinder dryer).

Out of the grinder (PFEIFFER), the gases are filtered by an electro-filter with the brand name ELEX. Such a filter has been in use since 1970. Its technology and state ensure a discharge of dust of about 200 to 250 mg/Nm3 on crude gases. Following the works carried out in 1995, with the replacement of the electrodes, the level of discharge is expected to near 50mg/Nm3 on crude gases.

Out of the second line, the gases are filtered by a PEABODY electrofilter.

The rejections are to the magnitude of 50 mg/NM3 on crude gases. Each filter is connected to a stand-alone chimney. The gases reclaimed in the clinker cooler are partly channeled into a smoke box of the pre-heater and partly into the PFEIFFER grinder.

Energy

a) the fuel

The cement factory utilizes one single combustible, a fuel number 2 supplied at a room temperature.

Such a fuel is delivered by SHELL, the oil distribution company. The quantity of this fuel depends on its origin:

- on the refining by SAR with a lower heat capacity of 9600 Kcal/kg;
- on the imported fuel with a lower heat capacity of 10 000Kcal/kg.

The sulfur content ranges between 2 and 2.5 %; this fuel is stocked in two 450 M3 tanks. During the rainy season, the stocks are maintained at a temperature of 17°C thanks to a reheating circuit with a boiler generated steam.

The fuel is reheated at 100 °C prior to its injection into the nozzle and into the precalcinator. Its intake is to the tune of 85 kg of fuel/ton of clinker produced, or a thermal consumption of 850 thermies /ton of clinker.

The distribution of the energy input between the precalcinator and the nozzle:

60% of the energy is introduced into the precalcinator;
40% of the energy is introduced into the nozzle.

The price of fuel is determined by the state. Its price being CFA 92 740 per ton in May 1995.

b) Electricity

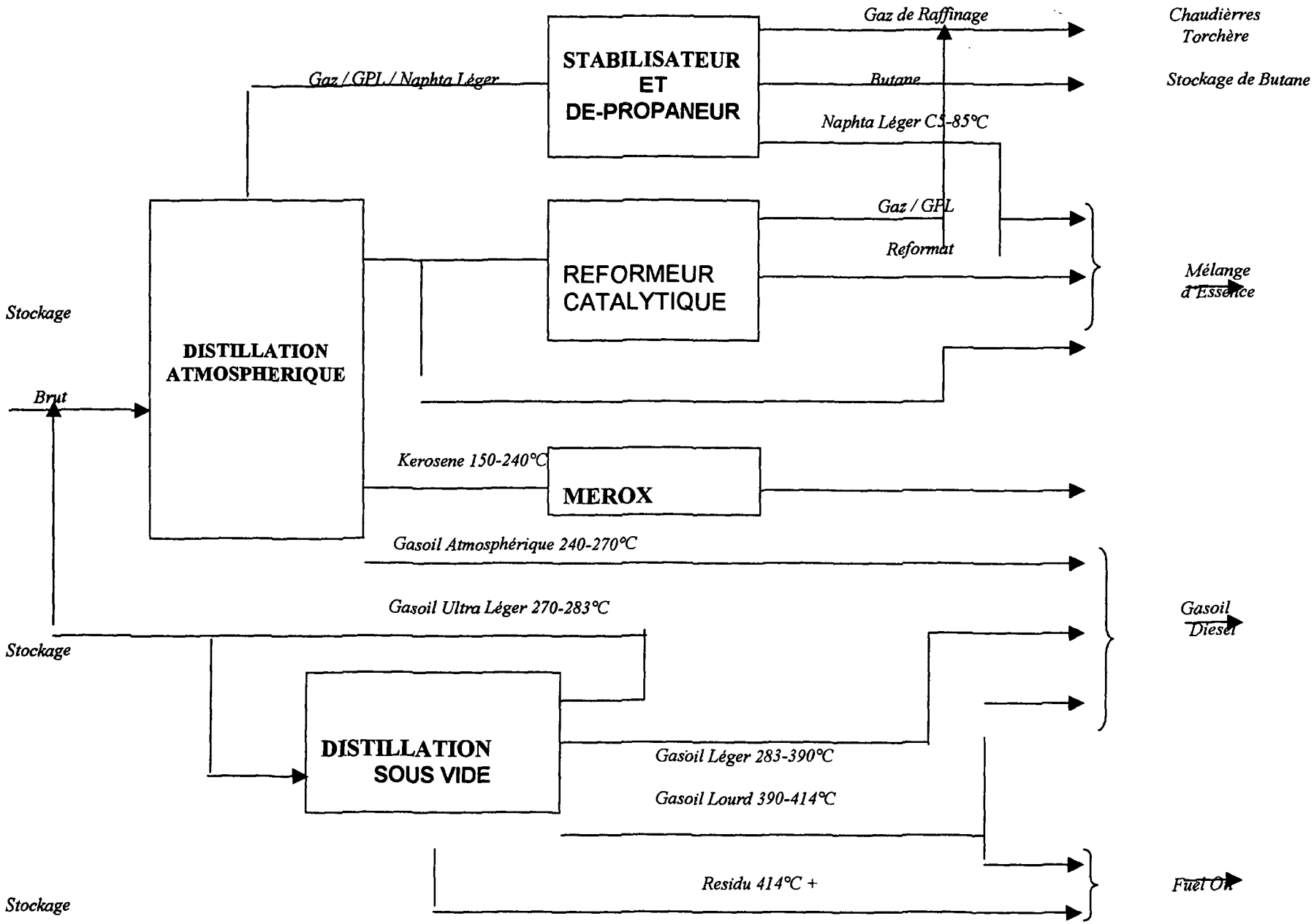
The electricity supply is ensured by SENELEC. In the industrial context of the cement factory, such a supply poses the serious problem of its reliability, given the many power cuts. The factory has a backup generator to run the furnace during these power cuts.

c) General Maintenance and Operation

The factory has a production program based on 310 days of operation. Two annual stoppages of some twenty days are programmed for the maintenance work.

III -4 SAR

III-41 PRODUCTION PROCESS



The separation of the crude oil into several oil fractions is dependent upon energy utilizations. From the Nigerian oil, SAR produces such white products as :

- butane gas ;
- regular gas and "super";
- kerosene ;
- gas oil ;

as well as black products like fuels, heavy fuel used by SENELEC and SOCOCIM.

SAR presents:

- a distillation unit of a vacuum and atmospheric type;
- Such a unit presents a distillation column where the separation of vaporized oil products takes place. The crude oil is heated in a furnace at 350 °C. The separation of the oil products is of a physical type. Indeed, depending on their boiling point and on their molecular weight, the white products will pile up along the distillation column; the residual heavy fuel will remain at the bottom end of the column in a liquid form.
  The white products (light and heavy oil, GPL, naphta, fuel gas, kerosene gas oil and diesel oil) will be collected through pipes after liquefaction then stored. Beforehand, the mixture of petrol and gas are purified through a distillation column to obtain butane gas; the residual fuel (propane and ethane) is stored in balloon shaped tanks to be used to feed the furnace. Candelabras will be used to reduce pressure in the tanks and to enhance safety in the refinery.

The fuel residues are placed in a distillation column for a vacuum separation by easing out the atmospheric pressure in order to raise the light products like gas oil and diesel, residual fuel being a Senelec combustible.

- A catalytic reforming unit :

The Naphta is placed in the catalytic reformer with a catalyst at 450 – 550 °C, at 25 pressure bars, in an attempt to produce reformats, high octane hydrocarbons. Such reformats, mixed with light gas according to well defined proportions, will yield regular gas or "super". In order to raise the octane of such combustibles, it is combined with lead reformat (0.3g/l).

- A Meros unit :

It allows for the oxidation of mercaptanes (sulfuretted hydrocarbons) to limit the presence of sulfur in the kerosene and avoid corrosion of aircraft tanks. Such a process is dependent upon the characteristics of the crude oil, which turn mercaptanes into less corrosive disulfuric hydrocarbons.
Hence, mineral oil and its derivatives, namely kerosene, are regularly analyzed to check their characteristics and their sulfur content.

The value of a mineral oil is related to its light hydrocarbon content.
Hence, with crude mineral oil of the light Nigerian type, for a consumption of 130 tons per hour of crude oil and a consumption of 2% of combustibles, the yield at SAR is as follows :

- butane: 103%
- regular gas: 16%
- kerosene: 16%
- gas oil/diesel: 36%
- fuel oil: 25%

Whereas with the Mandji type of crude oil, fuel oil accounts for 50% of the finished products.

SAR meets its own energy requirements with the following utilities :

- two 1.8 KVA power generators;
- three 0.8 KVA power generators.

The 1.8 and 0.8 KVA generators are powerful enough to run the industry. The other generators are used as backup generators.

- a system of heat recovery (heat exchangers), hence the fuel from furnaces is heated beforehand;
- the steam (obtained from diesel burners and refinery gas) is used to recover light hydrocarbons in the distillation column;
- a control unit whose operation is ensured by pneumatic equipments (transmitters and regulators, detectors of pressures and levels);
- one SNCC (HW system) is in place to collect butane, while polytubular links ensure the transmission of local pneumatic signals to the control room;
- one 5.600 km long pipeline with a 24 inch diameter.

III – 4 2 CHARACTERISTICS

Compared to the Coopers & Lybrand data base (C&L, 1996) for a configuration of refineries of "non complex" type, SAR exhibits the following characteristics:

- The Permanent Employed Equivalent (PEE) is of 230 against 227.
- The crude processed by SAR is 1.1 for 2.7 million ton/year;
- The ratio imports/total crude (KT/KT) is 60% for SAR against 78%. SAR imports sizeable quantities of finished products compared to other "non complex" refineries;
- SAR, Raffinerie Hydroskimming, has a port terminal and a complexity (Nelson) comparable to that of the data base (2.7 against 2.8), knowing that the best category of refinery has complexity of 4.1;
- The average obsolescence of the equipment is 29 years for SAR against 24. Indeed, the atmospheric distiller of SAR dates back to 1963, the vacuum distiller to 1983, both atmospheric distiller and the reformer have gone through major reparations;
- SAR has a complexity similar to that of the database refineries, it is smaller that average and exhibits an unfavorable scale economy which contributes to the high level of PEE per MilT/year of production;
- Computer technology is used averagely and is comparable to those of C&L data. It is not specialized and the growth rate is low (less than 3%/year), the global objective of SAR being to match oil production with oil sales;
- The production costs per crude barrel are higher than the database average category.

III -4 3 LIMITATIONS:

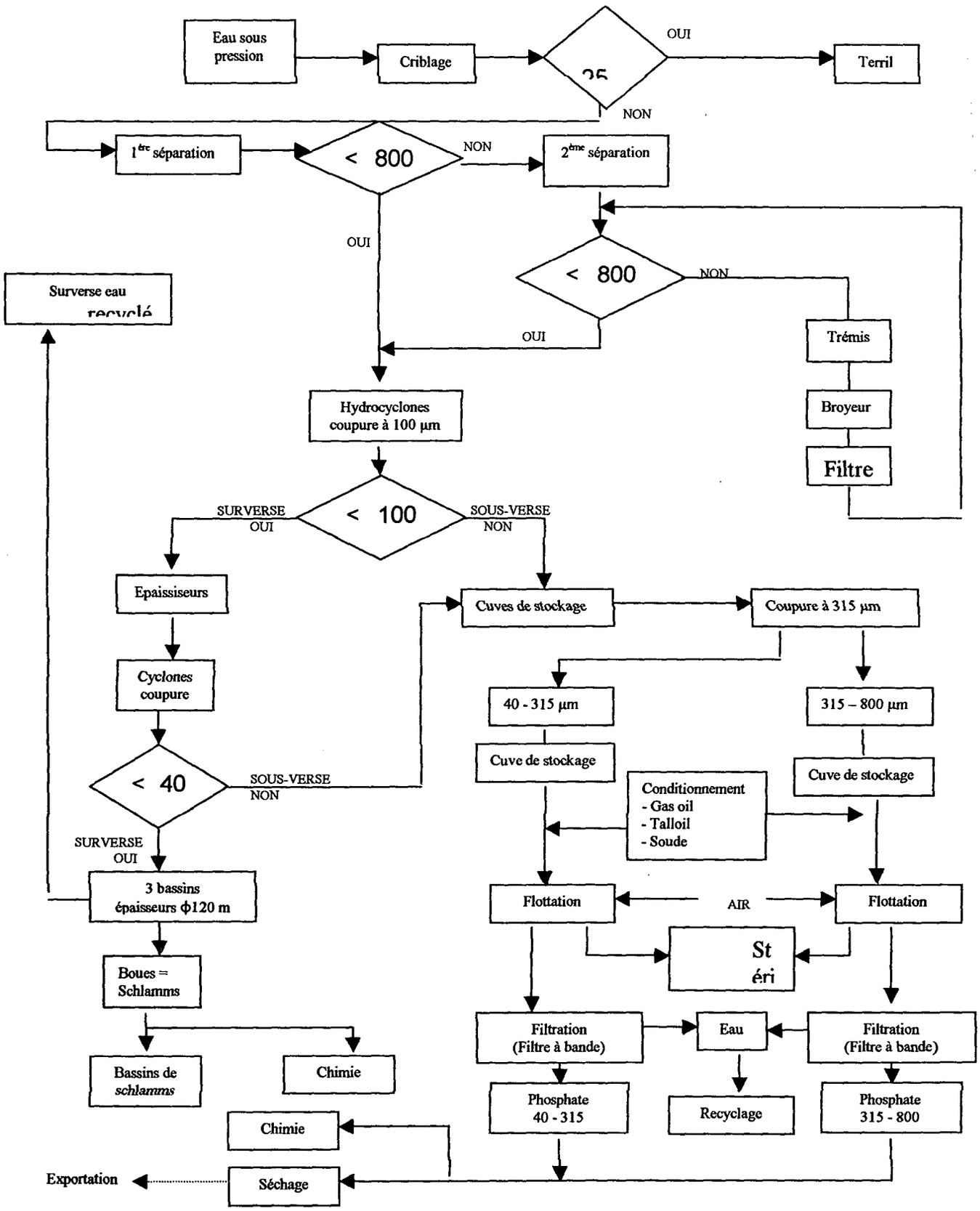
SAR has a production of 1.2 million tons a large portion of which is earmarked for the domestic market of Senegal and 110 000 tons for the neighboring countries: Mali, Gambia, Guinea Bissau. An annual 2% growth rate is expected for the domestic market with a shift from heavy fuel towards average and light products. In contrast, the external market

experiences a stagnation due to such logistical constraints as inadequate roads to Mali, obsolescent railway, inadequate fleet of tank cars, lack of means of sea transportation.
The installations date back to:

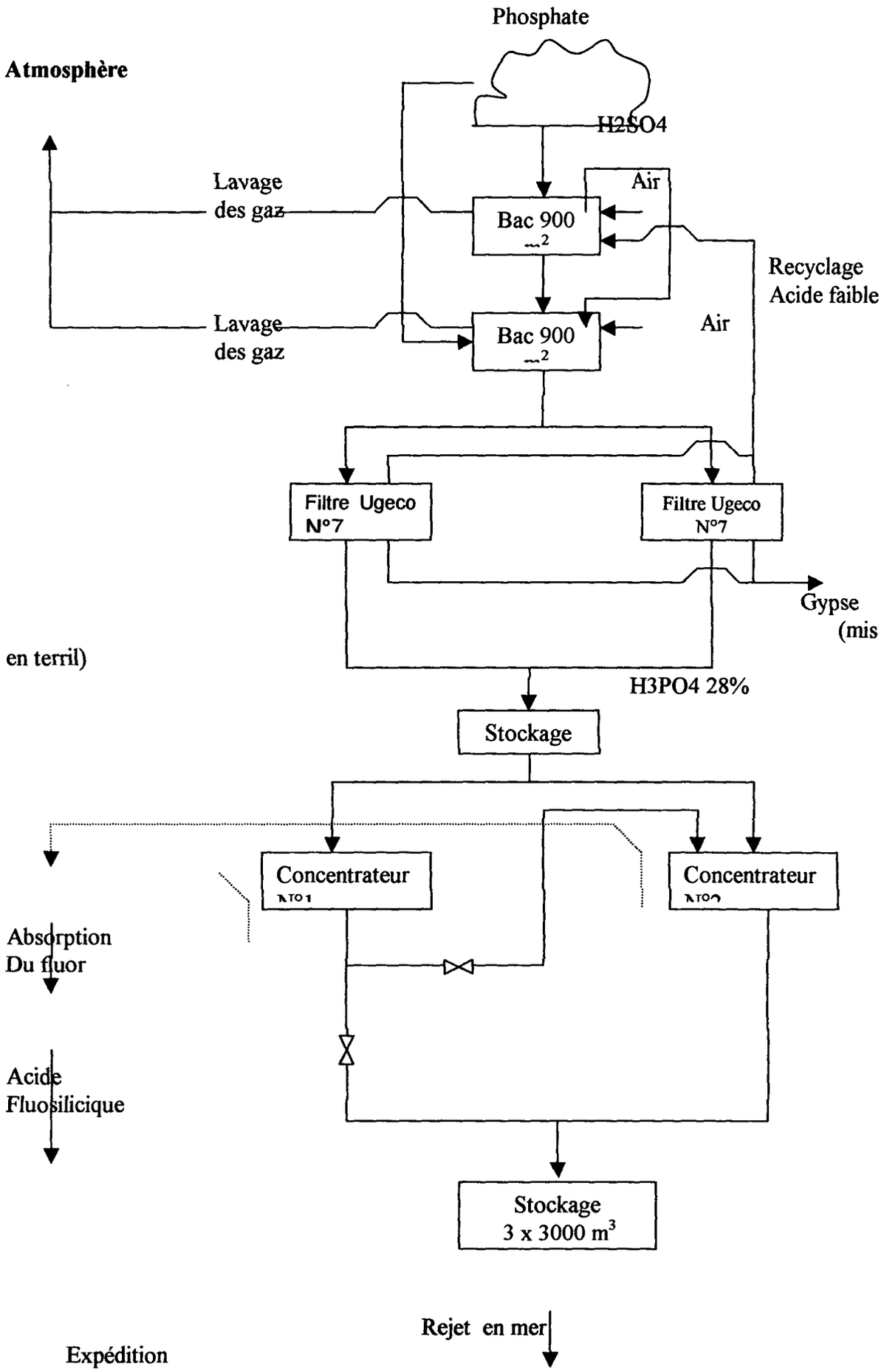
- 1963, launch of the atmospheric distillation with a capacity of 0.6 million ton/an and of the catalytic reformer of 11.6m3/hour;
- 1975/1979, changes in the distillation, changes in the crude pre-heating train, installation of a desalinator (installation of an atmospheric distillation of a capacity of 0.9 million ton/year and of the catalytic reformer of 14m3/hour);
- 1983, installation of a vacuum distillation to improve the gas oil yield and of the Merox Unit for the processing of the aviation fuel (atmospheric distillation of capacity of 1.4 million of ton/year and of the catalytic reformer of 19 m3/hour.

III-5 – ICS

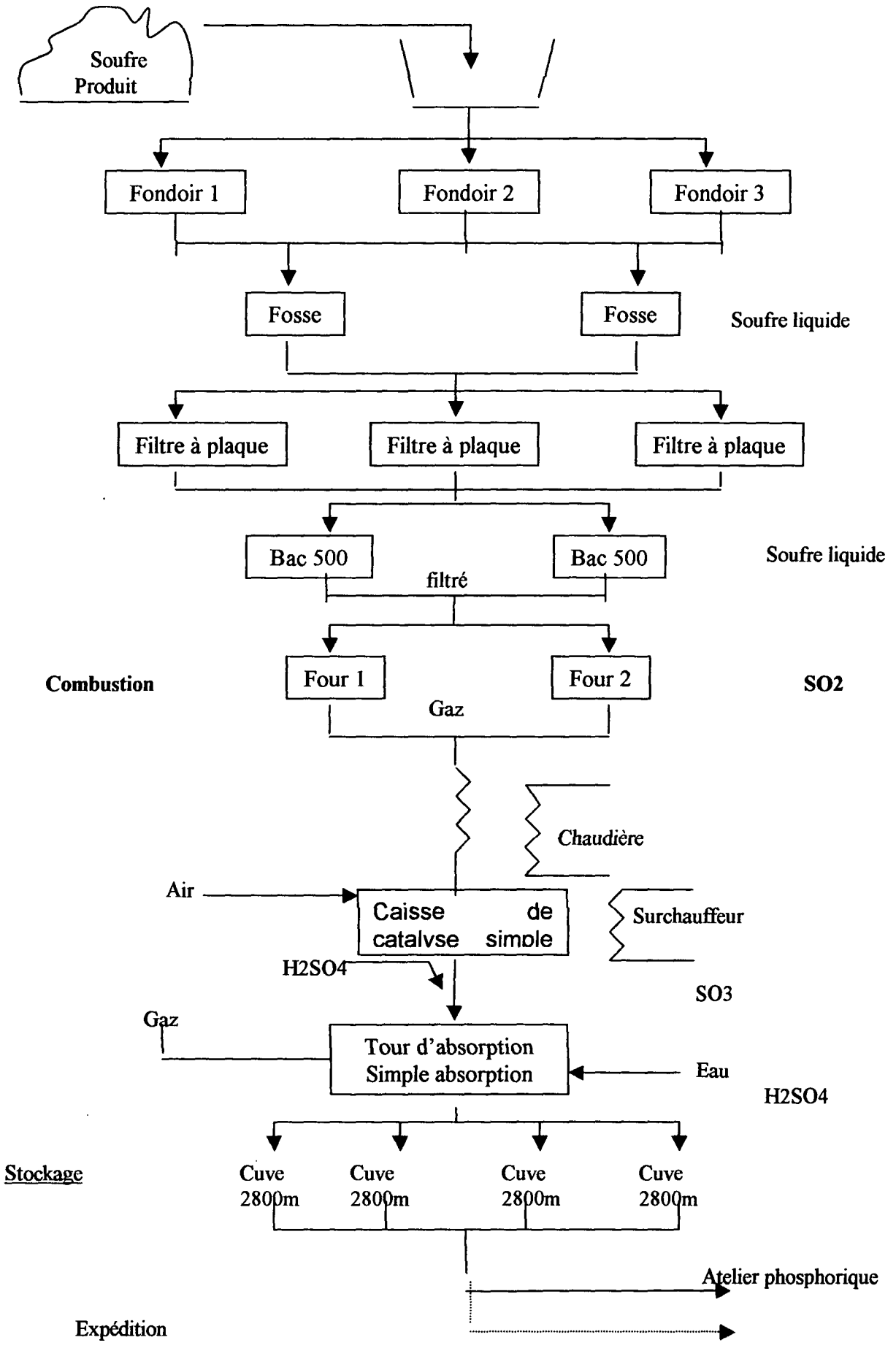
SYNOPTIQUE SIMPLIFIE DU TRAITEMENT D'ENRICHISSEMENT DU MINERAI



SYNOPTIQUE SIMPLIFIE : ATELIER PHOSPHORIQUE



SYNOPTIQUE SIMPLIFIE : ATELIER SULFURIQUE



III-52 Taïba Deposit – Panneau de Keur Mor Fall

Exploitation of Panneau de Keur Mor Fall is currently under way. To date, the remaining reserves are estimated at a maximum of 9 293 600 T of marketable phosphate. The operational principle can be broken down into three phases: stripping, exploitation and recovery. In addition to exploitation, the mine has an installation for the preparation of the ore, which involves screening, washing, crushing, separating, floating, and filtering the phosphate ore.

The main energies and combustibles used are electricity, domestic fuel and gas oil.

The main equipments used are made up of excavators, spade wheels, dumpers, pumps, hydrocyclones and conveyor belts.

III- 5 3 Usine de Darou

Usine de Darou receives the phosphate and part of the schlalls from the mining installations which are turned into phosphoric acid and then dispatched by railway.

III–54 CSS

IV REQUIREMENTS IN SOUND AND EFFICIENT TECHNOLOGIES

IV – 1 SENELEC

IV – 2 SONACOS

Technological development in the oilseeds sector being relatively low, technology transfer requirements also remain rather marginal. However, the obsolescence of some of the installations, the non adaptation of nominal capacities between different workshops, the non mastery of some processes and the non recognition of the environmental dimension in the implementation of the various operations, mean that actions should be taken to improve the performance and reliability of the factories.

IV – 2.1 Oil factory:

The transfer of seeds from the warehouses to the processing unit should be automated through the use of mechanic carriers instead of the trucks currently in use.

In some of the units, husking workshops are equipped with single head huskers whereas current technology offers double head huskers which allow for power energy savings up of to 35%.

Moreover, the spiral presses in place date back to over fifty years ago. The process of oil collection by pressing is still the same, yet the current equipments on the market have unit capacities that are four to five times more significant and allow to obtain much higher performances in terms of energy consumption.

IV – 2.2 Refining and Conditioning

IV – 23 Energy production

IV - 3 SOCOCIM

IV - 4 SAR

IV – 4.1. The different technological options for streamlining:

Originally, SAR had been designed to process crude Mandji (a medium crude) the characteristics of which allow to obtain a range of acceptable products with a fairly simple process (distillation and reforming) adapted to the equipment of the company. As the Senegalese market for white products develops, SAR began to refine Nigerian crude (Bonny Light) and Mandji. In the years to come, the sole change in the types of crude processed will no longer be enough to adjust the production structure of SAR to the market structure which has significantly been changed by a rapid shift in the demand towards white products.

In a bid to secure a more adapted production with increased value added, the refinery will have to be streamlined through a technological upgrading.

Hence, streamlining the refinery has been in order for the past ten years and this has led to the granting of an additional subsidy of 2.3 US$/ barrel on all oil products marketed in Senegal, including imports.

To date, only a few investments have been made. Only the fire network has been rehabilitated and the reception and transportation facilities developed, this for a cost of CFA 3 billion.

The streamlining of the measurement instrumentation as well as of the control room is also in progress for a cost of CFA 3 billion.

The streamlining options are based on the assessment of the capacities of existing facilities and of their technological limitations. The solutions proposed are:

- installation of a viscoreducer for the residue in the existing vacuum distillation unit, which allows to earmark for sale all the distillates obtained, instead of providing part of it for adjustment to fuel oil viscosity;
- installation of a combined viscoreducer + thermal cracker processing the residue in the existing vacuum distillation unit which, in addition, allows to increase the proportion gas oil obtained;
- installation of a medium size hydrocracking unit processing the distillate from a new vacuum distillation unit, which further increases the proportion of average distillates produced and, even more so, the quality of finished products, thus raising them up to international standards;
- the increase in the distillation capacity to 1.5 million ton/year by addition of a "preflash" column to the existing atmospheric and vacuum distillation facility with a current capacity of 1.2 million t/year;

IV – 4.2 Options Analysis

- the reference case: considers improvement in the operation of the refinery with the basic technological structures unchanged and which requires no additional investments, besides those already made for the instrumentation of the control room. Economic analysis, in the scenarios considered, shows that the refinery can survive without the US$ 2.3/bl, but it is not able to make profits to streamline itself;

- option 2: the addition of a viscoreducer allows to use a larger proportion of Mandji, the Gabonese crude oil, which is cheaper than Bonny Light, the Nigerian crude oil. The investment required amounts to CFA 10 billion. The cost-effectiveness obtained is poor: 9%;
- option 2bis, with addition of the preflash in order to increase the total processing capacity to 1.5 million tons per annum would require investments to the tune of CFA 14 billion, but would help achieve an acceptable yield: 16%;
- Option 3: addition of a combined viscoreducer + thermal cracker, allows to further increase the proportion crude Mandji and to bring the production structure closer to the reference market. Investments stand at 14 billion for the current production capacity, or 19 billion for the capacity brought to 1.5 million t/year with the installation of the preflash in addition. The yield is slightly higher than in the previous case: 10% and 18% respectively for the two variants of total capacity processing.
- Option 4: installation of one hydrocracker with the necessary units as annexes, constitutes a significant change in the structural and operational conditions of the refinery which will only process Mandji crude and, thus, meet all the requirements of its reference market. The necessary investment, including the capacity increase, amounts to CFA 66 billion. Cost-effectiveness is virtually nil in this case due to the important investments required;
- Option 5: deriving from Option 3, considering naphta intake by the combined cycle GTI power station being installed. The investment is about CFA 24 billions, including a capacity increase to 1.5 million t/year. The yield arrived at is 31% with scenarios other than those previously considered.

The best solution would be to install the combined viscoreducer + thermal cracker; such a recommendation has been approved by the refinery's shareholders and submitted to an engineering study office.

The works required include:

- distillation upgrading and catalytic reforming;
- constructing a preflash to increase the total 1.5 million tons/year processing capacity;
- constructing a visbreaking unit, a process of atmospheric and vacuum conversion of residues. Its aim is to lower the viscosity of residues through thermal cracking and to reduce the production of heavy fuels as much. The proportion of white products (gases, petrol, kerosene, gas oil) is on the increase in the gamut of commercial products offered by the refinery, hence, improving its economic performances.

In the Preflash Unit, crude oil is separated from gas, oil and naphta. The purpose of the operation is to reduce the risks of clogging in the atmospheric distillation column and, thus, increase its capacity to 1 500 000 t/annum. The preflash column is the main element of this unit. It is equipped with plateaus which ensure the separation between gas, oil and naphta from crude oil which then becomes stabilized. A pump is used to feed crude oil into the column through a furnace which determines the temperature.

The visbreaking is designed in such a way as to be able to process 400 000 tons/annum. The following sections are generated :

- a gas section, which directly sends gas to the fuel gas collector;
- a petrol section feeding the stabilization column which produces the stabilized oil and liquefied oil gases;
- a kerosene section;
- a heavy gas oil section;
- a vacuum residue section, as the basis for fuels 380 CST and 180 CST.

Estimated budget:

- Preflash: CFA 5 000 million;
- Visbreaking: CFA 15 000 million.

The production of lead-free oil is to be developed, through the use of alternative processes like distillation by alkylation or by catalytic cracking, which requires high cost investments.

V – 4.3 Streamlining the Control Room

Facilities to be implemented:

- construction of new armored control room to be located at a reasonable distance from the processing units, for protection against any serious incident which may occur in those units;
- replacement of obsolete pneumatic instruments by electronic devices;
- implementation of a digital operation control system and high reliability safety control mechanisms;

The system proposed is consistent with the regulation. Elf.... The centralized control is ensured by a redundant equipment from a licensed manufacturer.

Safety processing is ensured by a tri-redundant API. The control of operations in the control room will be replaced by a redundant centralized digital system, coupled with a tri-redundant API. The local instrumentation will go electronic.

V – 4.4 Streamlining the infrastructures:

- It is necessary to streamline the harbor infrastructures because, only small size ships (with a carrying capacity of 100 000 tons of crude oil) can be accepted due to constraints associated with the draft (10 meters maximum);
- Streamlining railway transportation is also to be realized in order to increase the export of finished products from the refinery towards the neighboring countries like Mali;

With a pro-active policy of investment and approach to the oil tank markets, refueling at sea, the level of SAR's operations could reach 500 000 tons/year by 2005.

V – ICS

An analysis of the different processes used in the industries selected shows insignificant gaps between the technologies used and those in the industrialized countries, except for SAR where some major technological options are necessary. Only the nominal capacities of the different equipments making up the industrial units must, in some cases, be readjusted so as to ensure internal consistency and meet market requirements.

Indeed, as noted in the cases of ICS and SOCOCIM, with the doubling of their production capacities, as well as in the cases of SONACOS and SENELEC, with the successive increases of their production capacities, the facilities of the industries visited have been implemented incrementally in order to respond to a expanding market This has not been possible without subsequent significant energy over-consumption.

However, the most significant improvements which could be brought lie in the area of energy control which calls for some specific technologies.

Generally, efficient and effective technologies include:

- Production of feed water for boilers:

Several technologies are currently used for the production of feed water for steam boilers (demineralization, distillation, reverse osmosis, etc...)

Based on the characteristics of the water required, it is necessary to select the most appropriate technology, bearing in mind energy consumptions (electricity, de-concentration purges, etc.).

- Automation of some the installations:

When installing such units, many technicians recommended to choose user-friendly technologies taking into account the environment of the country. Yet, the findings in some of the installations show that mastery in the conduct of large capacity units requires a system of piloting using a programmable automate as well as a centralized supervision, as reliability of components have been demonstrated, and as maintenance can be taken care of by local technicians.

For instance, it was noted that all the industries concerned by the study had boilers or burners to meet their thermal energy requirements.

Yet, it appeared that a sizeable portion of the energy losses was due to the inadequate control of the production process (loss of steam, poor combustion, excessive de-concentration purges, etc..)

Advanced automation of such installations allows for a greater control over their operation.

- Production of electricity and steam in co-generation:

Some of the industries visited meet their thermal and calorific requirements by producing steam with traditional boilers and by producing electricity with power generators or through connection to the SENELEC grid.

La simultaneous production of steam for heating and electrical requirements presents two main advantages:

- reduced energy costs as the result of improved energy yield from conversion because of the recovery of steam after production of electricity;
- improved reliability of energy supply by limiting or by stopping the use of the grid.

However, thermal energy requirements for different sectors of activities being highly variable over time, the scaling of the co-generation generator (boiler and turbine) will determine the level of savings to be achieved.

- Improving the quality of the local area energy grid:

In many industries visited, the local area steam and power distribution grid generates significant losses beyond control.

Reviewing the design of the grid and of the equipments composing it, and setting up a structure for follow up, equipped with adequate measuring instruments, could help achieve important savings.

- Various energy saving measures:

Generally, various energy saving measures could be implemented, both in the large scale industries and in small and micro-industries. These include:

- Heating: adapted choice of the type of boiler, operation follow-up, verification of the yields, improved insulation, monitoring the quality of water treatment, etc...
- Steam or gas turbine: monitoring the operation and yield monitoring, improved regulation;
- Electricity and electrical engines: condenser batteries, choice of the types and characteristics of engines, removal of on-line losses, etc...
- Thermal insulation: replacement of inadequate materials;
- Steam and condensation grids: replacement of obsolete appliances, harnessing of heat from condensates, improved thermal insulation;
- Lighting: installations of more efficient appliances, control and modification, if need be, of utilization conditions.

VI IMPACTS OF TECHNOLOGIES SELECTED

Between 1986 and 1990, the Energy Savings Program in Industry – *Programme d'Economies d'Energie* (PEEI) of the World Bank ESMAP program in Senegal has made it possible to conduct energy audits in industries operating in the several sectors of activities which include medium size as well as small size industries. Such a study reveals that energy savings account for 17% of the energy consumed by such industries.

For want of a comprehensive update of all the actions and technologies proposed, a few of them are mentioned, particularly at the level of SONACOS and SENELEC, which yield significant energy savings, and consequently, important reduction in CO2 emissions.

VII BARRIERS TO THE TRANSFER OF TECHNOLOGIES

- Complex administrative procedures;
- Need for an improved legal and judiciary framework of economic activity;
- Inadequate assistance and counseling system, particularly for SMEs and SMIs;
- Inadequate tax incentives to stimulate investments in clean technologies;
- The body regulating the sale of energy by private operators although in existence, is still not yet operational;
- The monopoly of the distribution by one local operator.

7 – 1 Technical Constraints:

The main technical obstacles to an efficient transfer of efficient and effective technologies are as follows:

- lack of competitiveness of the productive factors compared to other competing countries, namely as regards water, electricity, transports, labor cost;
- inadequate technical and managerial capacities of enterprises and skilled labor;
- complexity associated with the implementation and maintenance of some technologies;
- Non-existence of a databank on new technologies, their costs, the advantages they offer, as well as their mode of implementation, especially in relation to the small and micro-enterprises;
- Inadequate mastery of the new techniques, methods and tools required to manage such industrial units as quality management, productive maintenance, conditional maintenance, statistical control of processes, etc...

7 – 2 Financial Constraints:

The main constraint is the inadequate financial instruments tailored to the needs of the different economic operators.

It was noted that as part of the World Bank funded Energy Savings Program, 15% of projects identified were implemented. Their yield was high and the return on investment time was relatively short (less than two years). Those implemented were the low cost, less complex and high yield projects and most of them were implemented on own resources.

Such results suggest that a financial instrument should be set up to support enterprises in the implementation of their energy savings program.

Also, further factors associated with the operation of the enterprise contribute to diminish productivity and, therefore, competitiveness, i.e. technological lag, obsolete equipment, difficult input supply and low quality or inadequate local raw materials.

Such constraints constitute a break on the development of the private sector, by preventing modernization of productive bases and inflows of private foreign investment whose role in technology transfer is undeniable.

VIII STRATEGIC SOLUTIONS PROPOSED

The challenge to the Senegalese economy and to its industrial fabric is undoubtedly competitiveness. For a long time shielded from international competition as the result of many protectionist situations, Senegal has experienced serious problems of competitiveness, as witnessed by the magnitude of the 1994 devaluation.

The competitiveness of the Senegalese economy goes through its capacity to stabilize its macroeconomic framework, to liberalize and deregulate economic activities. Presently, Senegal is a member of the regional integration of West African Economic and Monetary Union (UEMOA).

Hence, the Senegalese economy which competes with the other UEMOA member countries within the Free Trade Area between the union members set up since January 2000, will have to face the challenge of competitiveness, which will call for significant investments.

The strategy to make of the Senegalese sector, the driving force of the national economy relies on :

- the consolidation of the bases for long term development (physical infrastructures, natural resources, legal framework, financing) ;
- improved efficiency in state interventions (conducive environment for private investment, free trade and strengthened competition, adaptation of the labor laws and tax policies);
- private sector capacity-building, including the review of the supportive mechanism. Such a capacity-building must assume several forms:

- training of local stakeholders in the energy auditing techniques. Indeed, only a few enterprises have acquired the necessary expertise to carry out audits in industrial circles ;
- Training of operational actors in quality management ;
- Training of operational actors in new managerial and maintenance methods;
- Training of operational actors in environmental management;
- Promote the development of the national consultancy firms' expertise in energy control, quality and environment.

IX - CONCLUSIONS

While the study focused on the six largest energy consuming or producing industries in Senegal, the industrial environment is made up of small or micro-industries with often very different characteristics.

It remains clear that there is a real need for transfer of ecologically sound technologies for the benefit of the Senegalese industry and of developing countries.

Although the primary objective of an industry is to achieve management performance with the view to ensuring its sustainability and that ecologically friendly technologies allow in most cases to generate substantial gains in our countries where the costs of productive factors are very high, we believe that the implementation of an efficient mechanism for the transfer of technologies must meet a number of requirements:

- The High Council for Industry (*Conseil Supérieur de l'Industrie*) will be able to play its role in the definition and leadership of the industrial development process in Senegal. To this effect, it will have to redefine the industrial clusters, to identify priorities in accordance with the strategic guidelines enshrined in the Economic and Social Orientation Plan, to merge needs in capacity building and to take actions at the level of the professional associations to meet such needs;
- The control agency must be operational in the shortest notice and an incentive policy must be implemented;
- The setting up of an appropriate system for the financing of ecologically friendly technologies, particularly for the small and medium size industries;
- The enforcement of decrees establishing the norms applicable in the field of environmental protection, following the recent promulgation of the code of environment;
- The genuine involvement of professional organizations which, organized in activity sectors, could play an instrumental role in sensitization, training, technical assistance and host a regularly updated database on environmentally sound technologies, with particular reference to small and medium size

industrial enterprises which suffer from a conspicuous lack of financial resources and high level technical competences.

Bibliographical references :

- Methodological and Technological Issues in Technology Transfer (a special report of IPCC Working Group III, 2000) ;

- Document de présentation journées de réflexion sur le secteur de l'énergie (Ministère de l'Energie et de l'Hydraulique) ;

- Projet GF/2200 96-15 Evaluation des coûts des gaz à effet de serre au Senegal ;

- Programme cadre II – Développement du secteur privé et promotion de l'emploi : L'industrie sénégalaise de 1992 à 1995 (Patrick MATHIEU Conseils).

ANNEX 8

UTILIZATION OF ENERGY IN INDUSTY

I. INTRODUCTION

This study focuses on the utilisation of energy in the industrial sector.
Its aim is to suggest strategies for a rationalisation of the energy consumption in the industrial sector and the mitigation of Greenhouse Effect Gases (GHGs) with a view to protecting the environment, in light of the Energy Policy of Senegal and the energy situation of the Senegalese industries.

Recall of the terms of reference

1) to present the national energy policy;
2) to present the types of energy used in industry and the costs history of such energies;
3) to present the energy processes used and their limitations;
4) to define technical, technological and managerial strategies for a reduced energy consumption;
5) to identify barriers to the utilisation of clean and less emitting energies, as well as measures to remove them.

II. THE ENERGY POLICY OF SENEGAL

In 1998, with the 98-29 Act of April 1998, Senegal reformed its energy sector.
Such reform was motivated by a number of constraints including:

- The existence of monopolies and a rent situation

Licences for forest exploitation were granted to urban dealers, hence the creation of an oligopolistic industry.

In the oil sector, SAR, the private and highly subsidised refinery, enjoyed a monopoly for the import of oil products; its shareholders were the sole distributors of products in the country.

- A high energy prices

Oil product prices were three times above international quotations, and were determined more on the basis of tax than economic considerations;

The average unit cost of electricity was relatively high (about CFA 70/kWh).

- A relatively low rate of electrification

Less than 5% of rural households are electrified;

Even in urban settings, over 40% of households are not connected to the electricity grid and large semi-urban areas are still not connected either.

Serious environmental problems

Year in year out, some 80.000 ha of forest formations disappear due to bush fires, clearing for new land, poor rainfall, overgrazing and overproduction of fuel wood and charcoal.
Yet, the Senegalese energy sector exhibits undeniable assets :

- A favourable geographic location

An international port near Europe;

A good infrastructure for transport towards neighbouring countries.

- Important potentials in natural resources

An excellent solar energy potential and a good wind energy potential.

- A comprehensive oil industry

It is composed of SAR, the refinery and an efficient and reasonably dense distribution network.

- Significant human competences

Companies in the energy sector have highly qualified staff.

1) Within the framework of the new energy policy

a) Major axes of the new energy policy

- Increasing the competitiveness and efficiency of the energy sector for a better response to the needs of the economic actors;
- Harnessing new economic, human and financial resources at national and international levels;
- Improving the living standard of communities by expanding access to energy;
- Taking into account and promoting respect for the environment.

b) Major implementation stages

In order to achieve such objectives, the Government of Senegal has just carried out a wholesale review of the legislative and statutory framework mainly through:

- an overhaul of the Forest Code so as to rationalise the supply in domestic fuels and to promote environment protection;

- introduction of a "Strategic Operator" with SENELEC, as part of its privatisation, in a bid to increase its competitiveness and its efficiency through private management;

- setting up a Regulatory Commission for the Electricity Sector in order to regulate and ensure objectivity in the decisions taken on this sector.

- promotion of licensing for the production and transmission of electricity and of leasing for the distribution of electricity in a bid to encourage the participation of private actors and local communities in the sub-sector;

- setting up the Agence Sénégalaise d'Electrifidcation Rurale (ASER) for the promotion of rural electrification to support projects undertaken by independent actors through provision of a technical and financial assistance to them;

- review of the Oil Code in order to encourage the development of exploration activities;

- liberalisation of the oil sector, review of the price system, setting up the National Hydrocarbones Committee to enhance the participation of private actors in the seub-sector and encourage competition.

2) The major innovations of the New Energy Policy

The new policy of the Government as reflected by the paraphernalia of laws and decrees, is characterised by a far-reaching change in the approach that can be summed up as follows:

a) A major role assigned to the private sector:

Today, the Senegalese state considers that the development of the energy sector must essentially be driven by private actors at all levels, its role being regulatory. Hence, it is expected to monitor and not operate the sector itself, either directly or indirectly. The national or foreign private sector, is thus challenged to reinforce its role in the oil sector (operation, development, refining, storage and distribution), and to largely engage in production, transmission and distribution of electricity in urban and rural settings, in the promotion of energy savings, in the management of energy infrastructures of local communities, in the marketing of domestic fuels, in the dissemination of solar systems, etc.

b) New legal and financial modalities for participation in the development of the sector

In order to promote the mobilisation of the necessary financial and human resources for the modernisation and expansion of the sector, the Government has introduced in the legislation the possibility for new modalities of funding and management of infrastructures (leases, BOT, BOO, issues of bonds, etc.) thus supplementing the traditional solutions.

c) An increased participation of local communities and users

As part of the decentralisation policy, a much more important role will be assigned to local communities for the management of their energy infrastructures (public lighting, pumping stations, small size power stations) who will have to work out sustainable organisational,

technical and financial solutions, often including user fees. Similarly, as regards wood fuels, village communities, under the new Forest Code, are challenged to play a major role in the rational management of their forest resources.

d) *A particular emphasis on local capacity creation or building for sustainable development in the sector*

Along with this concern for decentralisation and participation, the Government, with donor support, is carrying out a major effort aimed at local capacity building in programme development and management, relying on local communities, NGOs and private investors.

e) *An increasing awareness of environmental aspects*

The environment component already plays a determinant role in the new domestic fuel policy of the Government aimed at checking the wanton deforestation of the country. Further actions of control over the demand for electricity or fuel in the transport sector are expected to emerge in the next years for a better use of energy which will remain expensive and for an improved competitiveness of the Senegalese economy.

3) The thrust of the new energy policy

a) *Institutional building*

The new statutory and legal framework governing the energy sector calls for the creation of new institutions to supervise the sub-sectors. The Government is very much aware of the strategic nature of such institutions underlying the credibility and success of the on-going reforms. The Government is also aware of the need for a rigorous choice of the personnel in charge of managing such new institutions and of the usefulness of a support and upgrading programme, should such institutions have solid bases with a recognised professionalism.

b) *Domestic fuels*

The domestic fuel new policy guidelines of the Government of Senegal revolve around the following axes:

- A sustainable experience which takes on board the real availabilities in the different forest formations;
- A devolution of the management of natural forest formations to riparian local communities;
- Development of a real price cross-sectoral policy;
- Diversification of the fuels proposed to consumers by widening the range of current choices;
- The reduction in consumption losses (improved stoves) and processing losses (efficient stacks).

c) *Search for and development of oil and natural gas resources*

The Government has redefined the role and statutes of PETROSEN in a bid to concentrate its efforts on an intensified promotion of hydrocarbon searches in two main directions:

- Searches for oil, namely in the pleozoic offshore area of Casamance (when and as the political condition will permit);
-
- Searches for gases, both in the area of Thiès and, mainly in the paleozoic formations around the centre and north of the country. For the latter area regarded as the most promising one, PETROSEN will have to organise a seismic campaign and conduct additional studies in order to prepare promotion and to attract foreign oil companies interested in oil explorations. A cooperation with Mauritania in the preparation of such a promotion will help ensure its success in the interest of both parties.

d) Refining and distribution of hydrocarbons

The liberalisation measures taken by the Government over the past few years have not yet had far-reaching effects on the structures and operations of this sector, but accelerated changes are to expected following the latest measures taken in April 1998, namely:

- Free access of all commercial distribution companies to the use of existing storage warehouses;
-
- The new policy in the field of price adjustment and oil product taxation;

The first of such measures opens the possibility for imports to all companies selling oil products and, therefore, exposes SAR to a real competition. The second measure is aimed at revamping the market by gradually removing price distortions introduced by an excessively imbalanced taxation and by subsidies on some of the products.
The economic protection of the refinery will now be ensured by a surplus tax on imported refined products, a surplus tax which will be gradually reduced over the next years, until it is phased out in 2002.

e) Renewable energies:

The potential of Senegal in renewable energies is quite significant:

- 5.4 KWh/m2 (2000KWh/M2/year) of radiance for about 3000 hours of sunshine a year;
-
- a wind speed of between 4 to 5 m/s along the coast from Dakar to Saint-Louis over a strip of 30 to 40 km long;
-
- an important and variegated biomass (forest resources, groundnut shell, bagasse, balls of rice, rice straw, etc.)
-
- significant hydraulic resources along the Senegal River and the Gambia River to be harnessed and tapped under OMVS and OMVG.

All such renewable resources will be valorised in order for them to take a more important part in the energy balance sheet of the country.

III. TYPES OF ENERGY USED IN INDUSTRIES AND COSTS

1) *The types of energy used in industry*

The types energy used in industry are:

Primary energy

- Biomass products (bagasse, groundnut shell) for the production of steam and electricity;
- Terminal steam associated with the production of phosphoric acid a part of which is used for the production of electricity.

Secondary energy

- Fuel oil for the production of steam and electricity;
- Gas oil for the production of electricity and other specific usages;
- Electricity for the motorisation of industrial processes.

2) *Electricity consumptions in industry*

Senegal has a rapidly expanding industrial fabric made up of some 353 inventoried enterprises. Among these, the largest energy consumers (LECs) are SAR, SONACOS, CSPT, SSPT, SDE, SOCOCIM, ICS, COLGATE PALMOLIVE, NESTLE, etc.

Some of these LECs including SAR, ICS and CSS are virtually autonomous in terms of meeting their electric energy requirements. Others like SOCOCIM, SONACOS, and GMD have, over the past few years, been encouraged to reduce their dependency vis-à-vis SENELEC. Hence, the target of SOCOCIM which has extended its electric power station from 9 MW (3 x 3 MW) is to achieve a coverage rate of about 90% as of 2001.

With the liberalised production, the persistent difficulties encountered by SENELEC to meet the demand as well as the high electricity costs, most LECs are expected to gradually to equip themselves in order to cover most of their needs, specially as all of them already produce steam. ICS, in order to meet the power energy requirements for its mining activities (Taïba), contemplates slogging the terminal steam surplus likely to derive from the extension of its phosphoric acid production unit at Darou.
The autonomous production of electricity by industrial enterprises is estimated at 100 GWh (1996 data). This level will be retained as an initial estimate pending additional data to be collected during the next visits.
In 1998, Electricity consumptions in the industrial and mining sector are estimated to have reached 430 GWh (37,000 TEP) broken down as follows:
Purchases from SENELEC grid

- HV Sales : 163 GWh
- MV Sales: 167
- GWhClean production : 100 GWh

In 1998, consumptions of oil products in the industrial sector reached 169,800 TEP distributed as follows :

- Fuel oil: 106,400 TEP

- G.O./DDO : 63,400 TEP

In 1998, the steam consumption from agricultural residues and terminal steam was estimated at 122,800 TEP and broken down as follows:

- Bagasse: 27,800
- Groundnut shell: 10,400
- Terminal steam: 84,600

In 1998, the total consumption of energy stood at 329,800 TEP distributed as follows:

- Electricity: 37,000 TEP
- Oil products: 169,800 TEP
- Steam: 122,800 TEP

3) *Costs history*

EVOLUTION THE FUEL OIL PRICES (SENELEC)
380 CSTGC CFA per ton
source direction de l'énergie

MONTHS / YEARS	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEPT	OCT	NOV	DEC
1995										76,27 $	76,27 $	76,27 $
1996	60773	60773	60773	62408	62408	62408	62408	62408	62408	62408	62408	62408.
1997	62408	62408	62408	62408	62408	62408	62408	62408	62408	62408	62408	62408
1998	62408	60448	60448	60448	62394	61542	61542	60448	60448	61816	60694	60694
1999	55614	60585		60988	62849	62849	62849	75760	88637	94257	94257	94257
2000			76391		91652	118500	99951	86294				
2001	125 822	101109	120410	120410	119075	122108	122108					

DIESEL OIL (SENELEC) F CFA per ton

Source direction de l'énergie

MONTH / YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEPT	OCT	NOV	DEC
1995											139,62 $	139,62 $
1996	157660	157660	157660	157660	157660	157660	157660	157660	157660	157660	157660	157660
1997	157660	157660	157660	160190	121510	121510	121510	115259	115259	125933	114733	110249
1998	157660	157660	157660	157660	160190	121510	121510	115259	115259	125933	114733	110249
1999	104350	110204		121984	136450	136450	136450	159206	166734	169134	169134	
2000			174288		178442	198390	198391		199208			
2001	247817	204371	233795	236592	225700	239514	239514					

EVOLUTION OF GAS OIL PRICES
(all taxes inclusive)

MONTH / YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEPT	OCT	NOV	DEC
1995											143,605 $	143,605 $
1996	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000
1997	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000
1998	30000	30000	30000	28303	28303	26194	26194	25591	25591	26642	25528	25075
1999	24498	25065	26265	26265	27687	27687	27687	30675	32516	32571	32626	32626
2000			34419		34808	37023	37023		35560	47390	47390	47353
2001	40252	35683	38757	37086	37888	39372	39372					

EVOLUTION OF ELECTRICITY PRICES

Source : cahier des charges de senelec

Low Voltage Price List (prices in FCFA/KWh)

Price list category	First bracket	Second bracket	Third bracket	Fixed Primium of capacity suscribed
domestic usage :				
Special price	91.15	101.73	59.19	
General price	114.84	83.13	59.19	
Professional usage :				
- with fixed premium	119.49	107.18	73.09	1768.75
- without fixed premium	80,95	73,09		
Public lighting	82.56			2048.75

Mean and High Voltage Price List (prices in FCFA/KWh)

Price Category	Off peak	Peak	Monthly fixed primium
Mean voltage :			
- price for short utilisation	77.64	112.04	594.36
- general price			
- price for long utilisation	55.88 45.89	80.63 66.24	2529.84 6106.16
High voltage	36.48	46.55	6197.85
- ICS backup prices	48.57	58.29	2755.35

IV. ENERGY PROCESSES AND LIMITATIONS

1) The processes

a) Thermal

The production of power energy in Senegal is almost solely ensured by thermal stations using oil products (fuel oil and diesel oil) and natural gas.

The stations can be clustered into three sub-sets according to their integration into the SENELEC power transmission grid:

- Stations of the interconnected grid;
- Regional stations;
- Secondary stations.

The total installed capacity is 340 MW (SENELEC) and 50 MW (independent production).

b) hydroelectricity

To the thermal processes is to be added hydroelectric production expected to be effective by 2002 for Senegal within the framework of the Manantali Dam.
The Manantali energy policy project works are under way and in the end, some 66 MW will go to Senegal out of the 200 MW expected.

2) Limitations of such processes

a) production constraints

It can be considered that some 50% of the installations are constituted by obsolete equipments, which is the primary cause of the current degradation in the quality of the service.
In the context of a growing demand of 3.5% per year, delays in the investments in the means of production are sources of power cuts, frequent and at times long interruptions in the service. This, subsequently, leads to an overuse of the existing generators at the expanse of their maintenance.

Because of the unpredictable unavailability of the units and of blatant delay in investments, the demand is still not met yet. Hence, in 2000, SENELEC carried out regular power cuts for a non distributed energy of 21.70 MW in late October, with a total power cut duration of about 1000 hours, or on average, an unmet capacity of 21 MW with peaks of up to 70 MW.

b) Effect on the environment

The use of thermal energy or hydroelectricity has negative effects on the environment.
Regarding thermal energy, beyond noise pollution, it is in particular the emission of GHGs which is the most serious source of concern.
For hydroelectricity, while the emission of GHGs is next to nil, its operation can have deleterious impacts on the environment, i.e., disequilibria in aquatic ecosystems, outburst of some diseases, displacement of communities, etc...

V. STRATEGIES FOR A RATIONAL UTILISATION OF ENERGY IN INDUSTRY

There are many techniques and technologies to improve the energy yield of industrial processes and the mitigation of harmful gases emissions, including CO2.

Such techniques and technologies must focus on both energy production and consumption.

Furthermore, statutory measures must be taken in order to rationalise energy consumption and to reduce GHG emissions.

1) Technical and Technological Strategies

a) More efficient conversion of fossil fuels:

It is about increasing the conversion yield of fossil fuels with, for instance, gas-fired combined-cycle power stations, or opting for a combined electricity-heat production.

Yields ranging from 45% now to 60% in the long term can be obtained through such techniques as:

b) Utilisation of fossil fuels with low tension in carbon.

A low atomic hydrogen/carbon ratio can lead to a reduction in the emissions of CO2 and, therefore, an increase in the conversion yield. A case in point is natural gas (15 kg C/Gj) which can supplement oil (20 kg C/Gj).

c) Rehabilitation of existing power stations
d) Use of renewable energies

Viable exploitation of renewable energy sources calls for low emissions of GHGs or even zero emission.

Hydroelectricity: its operation must take into account social, economic, geological and ecological factors;

Biomass: its conversion allows to obtain electricity, heat, biogas or bio-fuel. The use of biomass in steam/gas turbine cogeneration systems;

Wind energy: Its use can help reduce emissions of CO2 from 0.1 to 0.2 GtC/year;

Solar energy: It is a safe technology; however, photovoltaic solar energy is competitive only for small-scale applications and not for large-scale applications connected to the grids.

The thermo-helio-electric sector could, in the long term, meet a sizeable portion of the demand for electricity and power.

e) Diesel Station

Yields can reach 50%.

f) Combustion Turbine (CT)

The single cycle technology can produce yields ranging from 30% to 35%, while the combined cycle technology can reach yields as high as 50%.

g) Recycling of materials:

Recycling and re-using goods made up of materials the manufacturing of which consumes a considerable quantity of energy can help save energy and reduce emissions of GHGs (steel, copper, glass, recycled papers).

2) Statutory measures

a) Subsidising the use of clean technologies

Through financial incentives, industries could be encouraged to use clean technological processes with good energy yields.

b) Other measures

- Taxation on the major GHG emitting energies;
- Guarantee of a market for the production of some forms of energy (heat, electricity) produced by industries;
- Collection of materials to be recycled;

- Adoption and observance of norms;
- Research and development.

The public authorities and the private sector must provide financial support to research and development in the field of clean technologies, remove institutional barriers hindering the access to clean technologies./.

V. BARRIERS TO THE UTILISATION OF CLEAN TECHNOLOGIES AND ACTIONS TO TAKEN

1) Barriers

The use of clean technologies presents some clear advantages:

- Energy efficiency with high yields;
- Environment protection through reduction in GHG emissions.

However, it should be noted that the adoption of clean technologies in our country is still very low and almost non existent.
Such a situation can largely be explained by the following elements:

a) Lack of a genuine energy control policy

In the past (80s), Senegal attempted to develop an energy control policy by putting into place an Energy Savings Office – *Bureau d'Economie d'Energie* (BEE) at the Directorate of Energy. Such an Office did not survive after the end of the "industrial energy audits" (1998).

b) Lack of information on clean technologies

Information is crucial in the choices of energy policies to be implemented in relation to the diptych energy efficiency-GHG emission reduction.

Such data can be acquired through training, participation in energy and environment related meetings, through collaboration between and among stakeholders (ministries in charge of Environment, of Energy and of Industry).

c) Lack of capital and high costs:

The clean technology option calls for the mobilisation of significant financial resources often beyond the reach of our country or of its industrial and energy sectors.

d) Training, Transfer Of Technology, Research & Development

Today, there are rapid changes in science and technology. In developing countries like Senegal, there is a real deficit in local human resources since training, transfer of technology, research and development cannot keep up with technological developments.

e) *Lack of "clean" fossil energy resources: an inadequate use of renewable energies*

The potential in energy resources of Senegal is mainly composed of biomass, solar energy, wind energy and hydroelectricity. While oil is imported for the production of industrial energy, its valorisation is a source of GHG emissions.

2) Measures to be taken for the use of clean energies

For a rational consumption, and a mitigation of GHG emissions in the Senegalese industries, a number of actions must be taken. The following solutions, without being exhaustive, are called for:

a) *Developing a genuine energy control policy by the public authorities*

The implementation of specific energy efficiency policies to check wastage in industry must be a priority.
In this regard, there is need for the creation of a structure in charge of conducting and monitoring energy saving projects or programmes in the large scale local industries.
Pending the creation of such a structure, the Directorate of Energy could strive to initiate some saving control measures;

- Dissemination of comprehensive information on energy efficiency in industry;
- Rehabilitation of obsolete equipments;
- Introduction of strict norms and energy saving equipments in industry;
- Energy audit of major GHG consumers and emitters.

b) *Information – Education – Consumption (I.E.C.)*

For a good sensitisation of all stakeholders, the Senegalese state, in relation with the Senegalese industries, must develop a genuine IEC policy in the field of clean technologies.

c) *Training –Transfer of Technology – Research and Development*

The control of clean technologies calls for a high quality training and an appropriate transfer of technologies. Indeed, the simple replication of new technologies without taking into account the local environment and realities is the best way of remaining an importer of useless knowledge and know-how forever.

Consequently, to avoid falling into this trap, there is need to identify the types of training and transfer of technology likely to build local capacities in the field of clean industrial technologies. Ministries in charge of industry, energy and the industrial private sector, must take actions along these lines.

The Energy industry and the State must fund R&D in this sector.

d) *National and International Cooperation*

National and/or regional integration of energy systems and the growing trade of energy services could, through diversification, contribute to facilitating access to clean technologies and sources of energy.

The international community has the duty to provide material as well financial support to clean energy exchange projects (natural gas, hydroelectricity, cogeneration, etc...).

e) Technical and financial support for the option of renewable energies

Generally, renewable energies require very high costs and, consequently, are not often competitive for industrial uses compared to traditional fossil energies.
Financial incentives (grants, tax exemptions...) could be provided for with the view to developing the exploitation renewable energies in association with fossil fuels for the production electricity.
Solar heating, connection to the electric grid of windmills, photovoltaic generation or cogeneration (of biomass) in some industries, should be developed by the private industrial sector in consultation with ministries of Industry, of Energy and of Environment.

Example of reduction in GHG emissions through the implementation of an energy savings policy (source: report of the study on the creation of the Senegalese Agency for Energy Control)

The potential of reducing GHG emissions assessed on the basis of the following hypotheses:

The thermal production of electricity is essentially fuel oil based (90%) and to a much lesser extent diesel oil based (10%); the contribution of Natural Gas (NG) becoming increasingly marginal;

- 1TEP = 42 Gj;
- Emission factor: 20 kgC/Gj;
- Carbon fraction: (42 x 20)/1000 = 0.84
- Emission of CO2 (44/12) x 0.84 = 3.08
- 1 GWh of electricity saved corresponds to the combustion of 220 TEP of liquid hydrocarbons.

The table below shows the changes in the amounts of CO2 avoided thanks to power savings achievable in the different sectors of activity.
Evolution of CO2 emission reductions

	1998	2000	2005	2010	2015	2020
Electricity	24,700	27,600	38,900	52,100	71,100	97,200
Consume of products	63,200	70,600	99,500	133,000	181,900	248,600
$CO_{2\ avoided}$ (™)	194,600	217,400	306,500	409,600	560,200	765,700

The GHG emission reduction potential related to hydrocarbon savings achievable in the different activity sector, including for electricity production, is provided in the table 4.26 below:

Table: Potential of CO2 emission reduction

Activity	GHG	1998	2000	2005	2010	2015	2020
Trans-	TEP	111,500	127,200	177,200	250,800	358,900	519,900
mission	CO_2™	343,400	391,800	545,800	772,500	1,105,400	1,601,300
Industry	TEP	13,600	14,200	17,700	23,800	32,600	42,000

	CO_2 TM	41,900	43,700	54,500	73,300	100,400	129,400
Elec.Prod.	TEP	101,700	131,500	104,000	83,000	78,000	67,000
	CO_2 TM	313,200	405,000	320,300	255,600	240,200	206,400
	CO_2 TM	698,500	840,500	920,600	1,101,400	1,446,000	1,937,100
	CO_2 (Gg)	893	1,058	1,227	1,511	2,006	2,703

The potential of CO2 emission reduction in 1998 accounts for about 25% of net emissions in Senegal in 1995.

To this potential should be added not only emissions of miscellaneous greenhouse effect gases, but also the potential likely to result from the reduction in the consumption of charcoal and wood, consecutive to the extension programmes on improved stoves and improved, carbonisation yields, as well as from the regeneration of forest formations and from their carbon dioxide sequestration capacity.

Bibliography

- Start-up Report entitled « *Etude pour la mise en place d'une agence pour la maîtrise de l'énergie* », November 2000.

- Presentation paper on « *Journées de réflexion sur le secteur de l'énergie* », March 2000.
White paper on la « *Nouvelle politique énergétique du Sénégal », June 1999.*

- *Structures des prix des produits pétroliers, Direction de l'Energie* .
Revue « Liaison – Energie – Environnement », n° 48& 49 , 3^{e} et 4ème trimestre 2000.

ANNEXE 9:

STATUTORY AND LEGISLATIVE ASPECTS

Cheikh Oumar TOURE

I. INTRODUCTION

With such important global issues as depletion of the ozone layer or climate change, issues of environment protection which had, as hitherto, been perceived as locally-specific problems, are increasingly subject to a holistic approach which brings out the interdependence between and common accountability of all inhabitants in the planet. Hence, the United Nations for Industrial Development Organization (UNIDO) wishes to experiment pilot projects within the framework of the Clean development Mechanism (CDM) resulting from the Kyoto Protocol (KP) of the United Nations Framework on Climate Change (UNCCC). The experimentations will be conducted in six (6) countries in Sub-Saharan Africa (SSA), including Senegal. Although two industries are mainly covered in this study (SENELEC and SONACOS), the study can apply to all the industries in Senegal.
This new CDM approach points out the necessary interdependence between countries in the North and countries in the South, regarding the solutions to be found to mitigate the emissions of greenhouse effect gases (GHG) in the atmosphere. Senegal, like most countries in the South, has neither technological nor financial resources to observe these new environmental obligations. As for the countries in the Northern hemisphere, which, for now, remain the main polluters in the globe and the ones mainly responsible for the tightening of the environmental obligations, it rests upon them and in their interest to transfer adequate resources to the South so that population growth, urbanization and industrialization do not generate in this part of the world levels of pollution which would frustrate the efforts undertaken in this field. To this effect, Senegal must set up an appropriate legislation in an attempt to facilitate the technology transfer required to implement CDM projects in the industrial sector.

Customs Regulation and Barriers to TT

Following the change in the parity of the CFA Franc which occurred on 12 January 1994, Senegal had embarked upon a far-reaching reform of its imports duties in order to accommodate subsequent tariff changes.

A new dynamics of international trade liberalization, including non tariff barriers, was then launched with the signing of agreements pertaining to the creation of the World Trade Organization (WTO).

At the sub-regional level, the West African Economic and Monetary (UEMOA) Treaty came into force and one of its objectives is to create a monetary union in the mid term.

Against this backdrop, it appeared necessary to undertake a reform of the customs tariff for a greater opening of our economy in order to take into account the globalization of exchanges.

To this effect, this reform will translate into a decrease in the level of import duties and national economy protection taxes.

Also, for the purpose of rationalization, the import duties currently in force (tax and customs duties) are collapsed into one single customs duty which includes four rates: 0%, 5%, 10% and 25%.

A further important aspect of the reform is characterized by the re-composition of categories of products, including oil products, based on the following criteria:

- the level of transformation (unprocessed raw materials, semi-finished products, finished products);
- production versus consumption;
- technologically, socially and culturally-oriented products.

Finally, the categories of products are broken down as follows:

Category 1 (customs duties 0%): priority products with social, cultural and technological content, primary sector inputs, capital goods, computer and telematic material;
Category 2 (customs duties: 5%): raw materials, crude oil, cereals earmarked for industry;
Category 3 (customs duties: 10%): semi-finished products, miscellaneous inputs for industry, cereals, non locally manufactured utility vehicles, diesel oil and fuel oil;
Category 4 (customs duties: 25%): final consumption goods, miscellaneous white oil products, new and used vehicles.

Regarding the protection of the local industry, it will be ensured by a differential taxation of 20% on unprocessed raw material and finished product; this differential is of 15% between the semi-finished product or other industrial input and the finished product.

Regulations relative to industrial pollution control

In its fundamental principles (articles L3, L4, L5, L6 and L7), the Environment Code, developed by the Ministry of Environment shows the importance given to environment protection as part and partial of the national cultural and socio-economic development policy. Any development policy implemented in the country must take on board the imperatives of environmental protection and development.

However, with the new Environment Code, precautionary measures dictate that any industry wishing to establish itself in the Senegalese territory must conduct an impact assessment study of the structure concerned on the environment so as to identify both beneficial and harmful consequences on the environment and to ensure that such consequences are duly taken into account in the design of the project. The main actors involved in the impact assessment study are the promoter and the relevant authorities.

The impact study is taken care of by the promoter who submits it to the Ministry of Environment which issues a clearance certificate after receiving technical advice from the *Direction de l'Environment et des Etablissements Classés.*

The impact assessment study includes at least one analysis of the initial state of the site and its environment, a project description, a study of the changes the project is likely to bring about, and the measures contemplated to remove, mitigate or compensate for the negative impacts of the activity, as well as the cost of such measures before, during and after project implementation. A decree taken upon report by the Ministry of Environment spells out the content of the impact assessment study.

Regulations pertaining to energy efficiency in industries

Senegal, as yet, has still not set up regulations for the enforcement of energy efficiency in industries. However, studies have been conducted under the United Nations Framework Convention on Climate Change (UNFCCC) and funded by the Netherlands in order to assess such energy efficiency in three large industries in Senegal (ICS, SONACOS,SENELEC). The mitigation scenarios show a net reduction in the consumption of fossil energy (see appendix).

Such findings could possibly be concretized with the implementation of the CDM project in the industrial sector.

However, Senegal is in the process of developing new guidelines in the energy sector where industry has a dominant share in the national energy consumption. Such guidelines are aimed at reducing inefficiencies, mobilizing the necessary funds for the development of the sector and at providing a reliable, adapted, quality and low cost energy delivery service to consumers. Such reforms fit into a macro-economic policy characterized by the implementation of a global adjustment program which refocuses the role of the state on planning, regulation and control.

1/ - The Oil Sub-Sector

The 98-05 of 08/01/98 Act pertaining to the Oil Code was taken, including its enforcement decrees.

This new oil code contains innovations regarded as essential, namely:

A duration of 25 years for the validity of leases, which can be extended to a period of 10 years renewable;

Provisions on environment protection have been improved in light of the trends in international practice;
A rate of loyalty based on the productions of crude oil or gas now between a minimum 2% and a maximum 10% against 12.5% in the ancient code;

Consolidation of the tax and customs incentives of the 1986 Code which provides that the incumbents of conventions or service contracts, as well as the enterprises associated to them in the framework of the protocols or agreements, are exempted from any taxes and duties during the phases of research and development.

2/ Electricity

Restructuring and reforming the legal framework

The distribution of electric power is currently a monopoly of SENELEC except for the wavers granted to a few large energy consumers like ICS, SONACOS, etc. The Government has embarked upon a far-reaching reorganization of the of the sub-sector which is expected to culminate in the privatization of SENELEC.

The triple role of the state as developer-regulator-owner, no longer lends itself to the newly liberalized environment of the electricity sub-sector.

Restructuring the electricity sector

The 98-29 Act of 14 April 1998 relative to the electricity sector was adopted and the enforcement decrees taken. This act has introduced the following major innovations:

The exercise of any activity in the sector is now subject to the obtaining of a license (production and sale of power energy) or lease (transport and distribution) delivered by the Ministry of Energy; however, SENELEC maintains the monopoly over transport across the country;
SENELEC is no longer authorized to invest in the construction and operation new power stations, as such roles have now to be played by independent producers selected on the basis of tenders for bids. In any case, SENELEC will play the role of single buyer for a period to be determined in consultation with the future strategic partner;
The change in the ownership regime of the electric lines which no longer are within the competence of the state; in a bid to attract investors, leaseholders will become the owner of the lines they have developed;

The setting up of an independent body called "Commission de Régulation du Secteur de l'Electricité" *which is responsible for the control and supervision of all the activities in the sub-sector;*

The creation of the Agence Senegalaise d'Electrification Rurale *(ASER) in charge of promoting rural electrification by providing the necessary technical and financial assistance to the electricity sector enterprises and to private individuals.*

3/ ENERGY CONTROL

The Government intends to pursue its efforts in this field. As part of the global restructuring of the electricity sub-sector, plans are to set up an agency for energy control whose mandate will be to contribute to environment protection through actions of information and advice, and on costs of production factors.

Q.3: To carry out a diagnosis of the industrial sector, pinpointing the inadequacies and describing the new guidelines

II. DIAGNOSIS OF THE SECTOR

In reality, the Industrial Policy of Senegal is an extension of colonial realities which had made of the country a point of relay for the manufacturing of consumption goods for French West Africa.

Such a drive for imports substitution was to inform the different development plans of our country, with a clear determination of the state to conduct and boost industrial development.

Three instruments were emphasized:

- Protection of the local market through high import taxes and administrative mechanisms and practices (prohibitions, prior clearances, quota system, etc.) *de jure* or *defacto;*
- Regime of exception (investments code, establishment conventions, production and marketing monopolies);
- The labor code which promotes to some extent job creation and security;
- As of 1979, Senegal has successively experienced a period of stabilization and structural adjustment aimed at changing drastically the organizational system of the national economy and make it more efficient.

A New Industrial Policy (NIP) was challenged to play a leading role in the search for solutions to the crisis of the industrial production model. Such a model was predicated upon the following observations:

The imports substitution policy had reached its limits and subsequently, an opening up to international markets became a must.

The new natural resources our country could rely on and around which it could articulate a new industrial development under the current circumstances were limited;

The only one model it could possibly follow to overcome the constraints resulting from the costs of some of the production factors (energy, transport, etc.) was one that dictated a shift towards high value added activities and high unit price productions.

Such a model focuses on:

- the roll-back of the state from areas where its presence gives rise to many interferences with the choice and decisions of private operators, in particular, from industrial tasks;
- the need for changing the industrial production structure in a bid to obtain a higher value added;
- the densification of the industrial fabric, namely in the regions, through the development of SMEs/SMIs;
- The Plan of Action for Industry (PAI) adopted to that effect included any actions likely to contribute to :

    - improving the environment and promotional instruments;
    - reducing the costs of productive factors (labor, energy, transport, etc.)

The implementation of the PAI has been very timid, leading to distortions in the NIP overall rationale.

From 1992 to 1994, the problems of the Senegalese industry revolved around:

- the instability of its legal framework (lack of transparency in the texts, unequal treatment of economic actors in relation to the legal texts, proliferation of fiscal regimes);
- low local value added (low level of employment and productivity);
- its low level of competitiveness (high costs of technical factors of production).

Consequently, distortions must be corrected which appear as constraints hindering the development of the private sector initiatives. Such constraints are institutional, physical, or productive factor- related.

- Institutional Environment

The role of the state is essential in any market economy. For the private investor, the institutional environment in Senegal is characterized by the difficulty in accessing economic information on time. In terms of statistics, the information provided by the enterprises are incomplete, and are not processed on time.

- Constraints related to the technical environment

Such a constraint relates to labor and technical factors (water, energy and communication). Subsequently, these are factors which are determinant in the cost price of the product. Hence, business competitiveness is largely dependent upon such factors.

Although the level of training remains acceptable, labor productivity has declined due to several social rigidities, combined with the lack of good management of human resources:

- the large and sometimes unpredictable number of bank holidays;
- absenteeism, as a consequence of the many social events;
- lack of corporate culture, associated with the lack of motivation.

b) – Technical factors of production

For some enterprises, water remains the main input. Its quality which requires some treatment or its poor supply due to frequent reductions of pressure, represent a challenge. The cost of energy alone, is a major constraint especially for fuel and electricity. In the case of electricity, this constraint is further exacerbated by a poor quality of the service leading power cuts detrimental to production.

In the field of telecommunications, Senegal is relatively well endowed. The service is diversified and of good quality. Yet, despite the several reductions effected over the past few years, its cost still remains high.

As regards transport, the difficult access to some of the regions with high economic potentialities, do not militate for the fluidity of the supply circuits. Cost prices are increased by user fees at the port of Dakar coupled with related service costs.

III. NEW GUIDELINES FOR THE SECTOR

The ambition of Senegal is to become an export-oriented manufacturing country, a gateway to Africa. The quality of our labor and our geographical location renders such an objective achievable.

The strategy will involve identifying and promoting industrial clusters in which comparative advantages do exist. In this respect, export-oriented industrial clusters with a high value added will be encouraged. The Government is also busy trying to help factories and industrial zones that had been closed down or at stoppage, restart, while organizing a monitoring unit to prevent difficulties for enterprises within the framework of the *observatoire de l'industrie* . An Agency for the development of SMIs/SMIs (*Agence de Développement des PME/PMI*) will be created, while the *Conseil Supérieur de l'Industrie* (CSI) will be revamped and the Normalization body restructured. An incentive framework will be created for the private sector to implement industrial zones and parks.

A strategy for the promotion of exports will be implemented including: a strong incentive for the production of variegated and exportable goods or/and services, a closer monitoring of the trends in the global demand, per product and per market, in a bid to adapt our national production, as well as organizing, assisting and monitoring more efficiently the Senegalese exporters.

Since it has embarked on the global economic adjustment, development of the private sector has featured high in the overall strategy. However, distortions and constraints which punctuate the business environment were such that the much hoped for burgeoning of enterprises did not occur;

Hence, the Government focused its efforts on constantly improving the economic, fiscal, legal and judiciary environment, a determinant factor for the development of enterprises and creation of conditions for the resumption of economic growth.

The aim of the Structural Adjustment and Competitiveness Program (PASCO) as identified and implemented as part of the global adjustment strategy, was to enhance internal business competition and competitiveness, to promote investments and exports, to improve the operation of the labor market. It fitted in this approach of permanent dialogue and in the strategic option of economic liberalization and private sector promotion

However, given the marginal results achieved, the Government intends to maintain the reforms in order to further open the economy and to enhance competitiveness as a result. The private sector being central to the development strategy, is challenged to achieve high economic growth rates in a context of scarce resources in order to enable the state to meet a social demand which is on the increase as democracy takes roots.

- ***Reform of the Legal Framework and Judiciary System***

A set of provisions have been adopted at both the national and international levels in order to improve the business legal environment and the operation of the judiciary apparatus. At the

national level, an arbitration center was created at the Dakar Chamber of Commerce, Industry and Agriculture.

In the particular cases of enterprises in difficult situations, draft bills governing professions associated with judiciary supervision (administrator of sequestered property, official receiver and judiciary administrators) have been developed to ensure the enforcement of norms of competence and ethics. The training program for magistrates and legal auxiliaries in business law will continue.

Within the Organization for the Harmonization of Business Law in Africa (OHADA), the uniform acts relative to general commercial law, and to law as it relates to corporate organizations and interest groups and to the organization of securities have been in force in all the countries signatories, including Senegal, since January 1998. Other uniform acts are in preparation in the area of recovery and enforcement procedures, collective procedures and accounting law.

- ***Support to the modernization of the texts governing enterprises***

The actions undertaken focus mainly on the following aspects:

- Modernization of the arbitration law: in June 1998, Senegal adopted the new texts governing the domestic and international arbitration law in reference to the international standard law on trade arbitration (developed in 1985 by the UN Commission for International Commercial Law);
- Enterprises in difficult situation: In order to enhance the efficiency in the judiciary procedures of redress concerning SMEs, a direct warning mechanism has been defined in the framework of the texts governing the professions associated to the judiciary supervision of enterprises in difficult situation for the observance of norms of competence and ethics.
-
- Banking litigation: In 1998, banking institutions and groups representing their customers (enterprises and other users) have adopted the terms of reference of the bank charter. Such a program will be conducted in the second half of 99. It will constitute a benchmark for the definition of banking practices likely to prevent litigation or facilitate the treatment of same, namely, through arbitration;
- New guidelines are proposed with the view to modernizing the procedures for implementing real guarantees. The difficulties noted at this level represent a major barrier to the capacity-building of the banking system for long term funding.
  The breakthroughs expected at this level will be built on in order to study the conditions for a certification of banking rates on the basis of real guarantees.

- ***Assistance in the improvement of business competitiveness***

Direct assistance to private sector development implemented by the Private Sector Foundation should mainly focus on the following aspects:

- Managerial capacity building;
- Technical and technological knowledge building;
- Competitive production costs;
- Easy access to credit and finally;
- Improved market penetration.

Enterprises responded positively to management and to technical and technological inputs and market penetration components. In contrast, the Foundation received only a few requests for the remaining two components. Developing a communication plan for the private sector capacity building project should make it possible to correct the shortcomings in the implementation of the operational plan.

- ***Support to the public enterprise privatization process***

The implementation of the government option for economic liberalization is following its normal course. Its approach based on a wide dialogue with all sectors concerned of the Senegalese society should allow, all things being equal, to reach a consensus on the reform program.

The year 1997 was marked by a speed up of the actions and processes of state divestiture.

- ***Development of the private sector:***

The Government is resolved to carry through the initiatives taken since 1994 in order to improve the statutory framework of economic activities and to strengthen the capacities of the private sector. In order to promote private investments and exports, an agency has been set up. This project - which will receive financial support from the World Bank – is based on the conclusions of the recent study prepared by the World Bank section on the competitiveness of the Senegalese economy.

Q. 4 To identify barriers and propose a strategy to remove such barriers or improve the procedures for an efficient implementation of CDM projects in industrial environment

Regarding technology transfer, the causes of failure encountered in the Senegalese industrial sector can be merged into the following three themes:

a) Costs and conditions of transfer:

In many cases, Northern technology providers are blamed for taking advantage of their dominant position to impose :

- high transfer costs: costs of the technology, technical assistance, spare parts, inputs, etc...;
- constraining and restrictive conditions of transfer: restriction on further modification brought into the technology, on the possibilities of exporting the products of the technology, exclusive supply of inputs at abusive prices, etc.

Such costs and conditions of transfer have seriously eroded the economic and financial benefits the recipients could draw from the technology in question.

b) The inappropriate character of the technologies transferred:

Such an inappropriate character is:

- technical: the technologies transferred, because they had been designed elsewhere and in a different economic and human resources environment, failed to operate fully in their new physical and economic environment;

- economic: the choice of the relevant technology which is justified in the economic environment of the country of origin, implies capital intensity, use of imported inputs, hard currency costs, etc., in Senegal, which makes it an economically inappropriate choice.

c) Highly limited ownership

Transfers of equipments and factories generally constitute technological enclaves under the exclusive control and know-how of the technology provider. Expropriation by the recipient is extremely marginal, and should the provider leave, only a very few sustainable fall-outs would remain from the transfer.

Possible solutions

Clean Development Mechanism (CDM) is a mechanism among many others to promote technology transfer. The implantation of CDM in the industrial sector in Senegal would involve the participation of the local industry, of the Government and the multinational companies of the Northern countries which are interested in investing in this sector.

For the enforcement of CDM in the Senegalese industrial sector, the following elements require greater attention:

- conditions of demand;
- recipient capacity building;
- incentives for the strengthening of the supportive functions of the transfer;
- issue of over-costs due to the choice of the "environmentally sound" technology.

Conditions of demand

For there to be technology transfers that take into account the objective of sustainable development, there should first and foremost a demand for such technologies, that is to say, a need identified in such a context that the response to it becomes economically viable.

The conditions that allow for the emergence of such a need in such a context depend on:

- the general economic environment;
- a conducive, legislative and statutory and fiscal environment consistent with sustainable development objectives;
- the level of information and mobilization of actors.

A.1. Improvement in the general conditions

The prerequisite for the promotion of increased and more efficient technology transfers in Senegal, is the restoration of the general economic conditions, which requires:

- a rapid and drastic alleviation of the external debt burden and a significant increase in the net flows of capitals;
- far-reaching reforms of the economic structures to create a more conducive environment for private investment: reform of the investments code and customs tariffs, discharge of the domestic payment arrears, rehabilitation of the financial system and of public enterprises, etc.

A.2 Create an appropriate legislative, statutory, fiscal and conducive environment

This point has been developed in the first part of the terms of reference. However, to promote the creation of an incentive and statutory framework in accordance with CDM objectives, it is recommended to undertake a systematic review of the existing legislative, statutory, fiscal and incentive framework in a way to adjust it to CDM objectives.

A.3. Information and mobilization of different stakeholders

Recent experience of countries in the North as well as in the South shows the extent to which sensitization and empowerment of all the stakeholders involved are critical in the environmental action and, consequently, in the creation of a framework conducive to the choice of the environmentally sound technology. Yet, Senegal finds itself in a situation where :

- the concern for the environment is far from being a priority for a large segment of the populations which are confronted with more pressing needs;
- the level of information on environment-related issues is low;
- the administration can find itself in a situation of weakness in the face of local or foreign industries to pass or enforce environmentally-friendly laws and to introduce technologies that are compatible with sustainable development objectives.

To address this situation, training, information , mobilization and empowerment of industrial stakeholders in Senegal can be provided using the media and, in particular, the TV, for public information and sensitization. Scientifically-based articles and sensitization programs are some of the actions to be promoted.

Recipient capacity-building

Technology transfer stands as good chance to succeed as the capacities of the recipients are developed to:

- identify their needs;
- choose the technologies tailored to their needs;
- own such technologies then modify them and innovate according to their own needs.

Incentive for reinforced supportive roles in technology transfer

Such supportive roles are :

- adaptation of the technology to the situation of the recipient(available input, human resources, market characteristics, etc...);
- training of the recipient teams (technical and managerial);
- technical assistance;

- development of maintenance capacities;
- if necessary, continued development of the technology.

They require:

- availability of recipient human resources;
- involvement of the provider;
- possible use of external services.

The Problem of technology acquisition costs and over-costs due to the choice of environmentally sound technologies

It may be that the choice of the most environmentally friendly technology is not the most cost-effective economically and, that it does not make business sense for the enterprises to choose it.

In response to this general problem, several scenarios are possible :

The case of situations which can be resolved by a change in the incentive and statutory framework: the case of the non enforcement of the "paying polluter". The systematic review of the incentive and statutory framework is aimed at eliminating such cases;

The cases where the most environmentally sound technology is the most economically cost-effective if account is taken of the lifespan of industries, but requires an initial investment much more important and out of the reach of the enterprise considered

Such a problematic is often encountered in the case energy savings (SONACOS), energy production (SENELEC).

In the case of energy savings, it may be useful to draw on the mechanisms put into place by the Global Environment Fund (GEF) so that environment-related over costs are funded by this institution.

ANNEXE 10

TAXATION, INVESTMENT AND TECHNOLOGY TRANSFER IN SENEGAL

By Ibrahima SALL

I. INTRODUCTION.

In order to contain the rampant poverty in most Sub-Saharan African countries, governments are striving to establish sustainable development mechanisms through a steady equity-oriented economic growth which takes into account social and environmental considerations. This requires increasing productivity through the use of technologies commonly known as clean technologies.

Indeed, increase in production, while assuming an economic character must be coupled with environment protection. Hence, the state of Senegal, since 2000, has decisively embarked upon a policy which pays due respect to the environmental aspect in industrial development. The Environment Code (200101 Act of 15 January 2001 clearly states that any new activity or extension must be preceded by an environmental impact assessment study.

However, it should be indicated that such an act, while recent, is the fruit of a long and deep process of reflection the first benchmarks of which were laid in 1983 (83-05 Act of 28 January 1983) with the development of an Environment Code but which remained ineffective.

The other dimension of the increase in productivity is essentially economic. The translation of this dimension requires significant investments through mechanisms of Technology Transfer with flows highly correlated to the tax incentive policy.

In this respect, it is, therefore, necessary to carry out a study of the national taxation and investment system, as well as of technology transfer policies with the view to appreciating the efforts made by privates individuals and the state in a bid to establish a conducive framework for a sustainable industrial development.

II. TAXATION IN SENEGAL

Taxation as an economic policy element is characterized in Senegal by two major stages: one first stage during which tax played a role of provision of means to the state for public investment and for its (financial) functioning. The second and current stage is one in which tax plays an economic role.

Indeed, prior to the 70s, the Senegalese tax base was essentially characterized by a colonial influence, both in terms of direct and indirect taxes. Such a period which was highly marked by financial tax was not conducive to the development of private enterprise. Financial tax represented a major cost in business operations accounts. It seriously undermined the cash position of enterprises while creating, by transfer, an inflationary impact on prices. This was even more a hindrance as the bulk of the public savings invested did not live up to expectations.

However, one must point out that even in those days when many efforts were made to capture revenues, the state never forgot that tax could be an instrument for the promotion of investment.

Hence, after several reforms of the tax system, the state reasserted its will to set up an industrial fabric through the creation of public enterprises from public savings, but also and mainly through private investment incentives. Such incentive measures result from a common law and from a derogatory law.

The common law, initially characterised by a set of codes (Income Tax Code, Registration Code) and miscellaneous texts dealing with specific taxes, became more complex, as the different texts and codes were collapsed into one single document: The General Tax Code or *Code Général des Impôts* (CGI for ease of reference).

The CGI of 1976 contained incentive measures for investments; a case in point is the regulatory provisions for depreciations and tax rebates for investment. Such different instruments have been improved throughout the legislative process.

The derogatory law was adopted in 1962. It aim was to attract foreign capital by providing guarantees (stabilisation and repatriation of capital) and by granting tax incentives (various tax exemptions). The early tax interventionism was essentially public investment-oriented. It was only later that it became private investment-oriented, with an increased awareness of the economic role of taxation.

However, in order to respond to the economic crisis of the 90s, Senegal embarked upon a structural adjustment process expected to restore the country's macroeconomic equilibria in the mid term and to re-launch growth in the long term. To this effect, the state set up a new tax purview. The diagnosis which led to this option relies in particular on the implementation of a tax policy likely to be integrated in the design and implementation of the adjustment plan, by matching improved financial performance with economic and social growth objectives. According to the statement of the objectives of the February 87-210 Act pertaining to the CGI, it is about "a renovation and innovation effort". According to its authors, the purpose is essentially to re-launch the national economy not only by alleviating the tax burden as much as possible, but also by promoting savings as well as investment through a simplification of the legislative texts for more consistency and efficiency.

Such a sketchy analysis of the Senegalese taxation reveals that taxes which were initially designed to ensure the financing of public expenditures constitute nowadays an instrument for

financing investments. Indeed, investment is directly financed through tax levy (various taxes and duties) or indirectly through tax exemptions.

Financing investments through tax levy

Such a levy is on persons, goods and services.

Tax levy on entities

The term entities can be divided into two groups: individual and corporate entities.
The tax levy on individual entities is commonly known as Income Tax (IT). It is governed by Book 1 of the CGI (92-40 Act of 9 July 1992). Such a tax is levied according to the income bracket and is based on the kind of activity (see appendix III and next) and on the principle of decreasing scale in relation to the global income. It is subdivided into several taxes including:

- Taxes on wages and salaries affecting salaried workers;
- Taxes on land income (LI) affecting landowners;
- Taxes on non-commercial benefits (NCB) affecting liberal professions.

2. Corporate entities

Corporate entities such as limited liability companies, are subject to Corporate Tax (CT) which is collected every year on the net profits from industrial, agricultural and commercial activities realised during the previous year by business companies. The rate of this tax is 35% and a number of activities are not concerned by this tax:

- Groupings for centralised purchases of consumption goods ;
- Agricultural credit funds;
- Rural supervision and development companies;
- Non-profit making associations;
- Administrative or professional types of public institutions.

A number of charges are deductible including overheads (staff and rental charges), financial costs, funds and depreciations (from 5% to 33% accordingly).

The proceeds from business taxes have evolved as follows: from 11.6 billion in 1993 it went down to 8 billion in 1994, then went up again to 18.5 billion in 1995 and to 25 billion in 1996 and 1997.

Tax levy on goods and services

Such a tax is levied on transactions on goods and services. The provisions governing the tax on goods and services are contained in books II and III of the CGI. They relate to Value Added Tax (VAT), Bank Operations Tax (BOT) and other specific taxes contained in book II. They also include registration fees levied on changes of possession and property pertaining to movable and immovable goods.

VAT is a general tax on consumption which normally affects all goods and services consumed or used in Senegal be they of national or foreign origin. Its scope of application is extremely vast and is defined by article 283 of the CGI which pertains to business transactions carried out

in Senegal as an economic act between two distinct individuals in return for a reciprocal arrangement.

Following several legislative reforms, the VAT provision was simplified as part of a community convergence. Hence, the number of rates fell from 4 to 2. Only the reduced rate of 10% and the regular rate of 20% were maintained. The downward review made it possible for Senegal to get closer to the other UEMOA member countries. Some of these only have one single rate as strongly recommended by the IMF tax experts. With such reforms, VAT proceeds has significantly improved since 1993, from 46.8 to 60.2 billion in 1994, 73.7 billion in 1995 and 85 billion in 1996.

In order to increase VAT proceeds and expand its base, the authorities are preparing its generalisation decided in May 1996. Partial agreements are concluded for the margin rates on which VAT will be calculated. A few commodities still raise some problems including rice and some other commodities.

The tax on bank operations (TBO) is levied on interests, commissions and other remunerations received by the banks and financial institutions recognised in Senegal and on credits, loans, advances, commitments by signature and operation of services realised with corporate entities whatever their domicile (article 323 of the CGI). Tax exemptions related to this tax are described in article 324 of the CGI.

The specific taxes are diverse (see article 328 of the CGI and subsequent articles). They include, *inter alia*, taxes on tobacco, alcohol, edible fat matters, tea, soda drinks, etc. The collection of these taxes does not raise any particular problem, as the tax authorities are dealing with such well identified and responsible operators as MTOA (tobacco, cigarettes) and SOBOA for the drinks. Although tobacco and cigarettes find it difficult to rise to their pre-devaluation level, the brewery sector has fared well. In 1997, only a few frauds were reported on these products that are major excise providers. Such frauds are much less significant than those reported in previous years. Two technical corrections should, however, be integrated within the ambit of the tariff harmonisation:

- the excises on tobacco and alcohol of 30% on entry and of 15% inside must be equalised because they cannot play the role of additional protection aimed at introducing differential treatments;
- their mode of calculation will also have to be normalised and valorised before VAT.

Financing through tax exemptions

The exemptions relate to the income of individuals and taxes on goods and services.

Exemptions pertaining to the income of individuals

1. Exemption pertaining to the income of individual entities (article 149 of the CGI).

In some cases, the exemptions granted to individual entities are presented in the form of a tax rebate for investment of incomes. Such a reduction under the provisions of article 149 of the

CGI bears on 10% of the tax outstanding for the first eight years limited to 5% of the net income of each of these years. The investments that can help benefit from this reduction are provided for by articles 150 and 172 of the CGI. Furthermore, article 171 of the CGI stipulates that corporate entities subject to Corporate Tax, as well as individual entities as holders of industrial or commercial, agricultural profits and profits from non commercial professions,

whatever their sector of activity, who reinvest in Senegal partly or totally the taxable profits, can benefit from a reduction in the amount of taxes they owe, upon their request, under conditions provided for in articles 177 to 183 of the CGI.

2. Exemptions pertaining to the income corporate entities.

Tax rebate for investment is governed by the provisions of articles 169 and 171 of the CGI. The tax aid to investment is applied to entities (individual or corporate) carrying out a re-evaluation of their balance sheet. They benefit from a tax assistance deductible from their taxable revenues which is equal to 15% of the net investments realised between January 1st 1995 and 21st December 2000. This 15% tax assistance cannot exceed the amount of special re-evaluation fund.

Regarding the tax rebate, it applies in some cases provided for by the law. The investment must be effective within a timeframe of three years as of the year of approval by the Directorate of Taxes of the investment programme. The investment must be over CFA 6.000.000 except in the case of subscription of shares as social shares of companies headquartered in Senegal. The beneficiaries enjoy a reduction of 50% of the tax benefit bearing on half of the investments achieved during the fiscal year under review. The 50% income tax exemption is, however, limited to eight years.

For the investments of profits in solar or wind energy, tax rebate is limited to 25% of taxes bearing on 30% of expenditure incurred.

Tax exemptions on goods and services

Such exemptions relate to export activities or regarded as such under the CGI in its article 289, on the one hand, and to commodities considered as basic commodities. However, in this latter category of exemptions, there exist provisions concerning installations (Annex I, 20), operating materials (Annex I, 21) and raw materials.

Incidentally, it should be noted that the most significant exemptions result either from legislative deliberations (Budget) or from the Code of Investments.

Tax exemptions resulting from the Code of Investments and other incentive systems

1. Code of Investments

The adoption of the first code of investment in 1962, resulted from a determination of the state to attract both foreign and domestic investments by adopting a more flexible taxation through :

- Reduction in the corporate tax rate;

- Exemption of customs duties and VAT on entry;
- VAT exemption.

The latest code of investments is derived from the 87-25 Act of 18 August 1987, amended by the 89-29 Act of 12 October 1989. It provides for several regimes and applies to virtually the economic activity as a whole, except for trade. The incentives offered by the code revolve around the three axes mentioned above. The detail of the incentives granted under the Code of Investments is captured in Table 1.

In addition, since the year 2000, the Government of Senegal has set up an Agency for the Promotion of Investments and Major Works (APIX) to boost investments. With the setting up of the agency, the duration for the administrative formalities has been shortened to 15 instead of 45 days.

Table 1: Regimes and Code of Investment Incentives

Regimes	Criteria	Incentives	Duration
Common	Eligibility for the Code of Investments	**Investment-related incentives (taxation on entry +VAT)** Entry tax exemptions on materials and equipments neither produced nor manufactured in Senegal and specifically *earmarked for production or operation under the approved* programme ; Exemption of the VAT billed by local suppliers of goods and services and necessary for the realisation approved programme. ***Operations-related incentives (internal taxation)*** Exemption of the lump contribution payable by the employers for salaries paid to employees of Senegalese nationality ; Possibility for renewing definite work contracts for 5 years.	2 years for SMEs 3 years for large enterprises Zone A 5 years Zone B 7 years Zone C 10 years Zone D 12 years
Priority (SMEs)	-*Investements* below or equal FCFA 400 million; -Creation de 3 Senegalese permanent jobs	***Specific incentives related to priority regimes*** Exemption of the minimum lump tax; Exemption of the contribution of licences (Zones B, C and D) ; Waving of the labour law regarding lay-offs	*Decreasing scale of* exemptions
Enterprises valorising local resources	-Local Intermediary Consumption; -Costs of imported inputs :at most 35% of total cost of products after processing	Exemption of a minimum lump tax	Decreasing advantages over the last three years (75%, 50% and 25%)
Enterprise promoting technological innovation	1% at least of turnover to be invested in research or use of research findings of a Senegalese research institution or researchers	Same incentives as SMEs	
Decent'lised enterprises	A least 90% of the staff work in areas located outside Zone A	Valorisation of the duration of operations-related incentives, depending on the establishment area (7 to 12 years), with a decreasing scale of incentives over the last three (3) years	Decreasing incentives over the last three years (75%, 50%

Take-over of foreign shares by Senegalese Nationals	-Investing in one of the sectors eligible under the 87-25 Act -Securing at least 15% of the capital of a foreign enterprise	**Specific incentives related to take-over operations** Exoneration of registration and fiscal stamp fees due on acts pertaining to the formation of a new enterprise or the increase in the capital of an existing enterprise ; Exoneration of change of ownership fees due on acquisitions of stock-in-trade and buildings representing the take over operation ; Exoneration of a minimum tax for 5 years; Deduction of net profit taxable under the income tax on the industrial and commercial profits, annual payment instalments of loans incurred by enterprises.	

2. The regime of export-free enterprise.

The provisions of this regime pertain to enterprises with mainly export-oriented activities. It was created by the 95/35 Act of 25 December, supplemented by the 96-869 Decree of 15 October 1996. Such a statute further extends the incentives and simplifies the procedures associated with the previous regimes:

- The Dakar Industrial Free Zone created in 1974 and;
- The Statute of the Senegal Free Points, created since 1986.

Table 2 provides the approval conditions as well as the facilities associated with the statute of free export enterprise.

TABLE 2: APPROVAL CONDITIONS AND FACILITIES FOR THE FREE EXPORT ENTERPRISE

Criteria	Incentives and Guarantees	Duration
1. To be an industrial or agricultural enterprise *largo sensu* and established on the Senegalese territory(anywhere, alone or in association within the framework of a private management of establishment areas; 2. To earmark all the enterprise's production for export or justify a potential for export of about 80% at least of its turnover.	**Tax incentives:** **1.** Tax and duty free on imported and exported capital goods, materials, raw materials and finished or semi-finished goods; **2.** Tax and duty free on imported or exported finished goods manufactured by the licensed enterprises; **3.** Illimited duration of stay for imported goods; **4.** Local tax and customs duty free on local purchases; **5.** Exoneration of customs duties on commercial and private vehicles and other means of transportation for production; **6.** Exemption of restrictions of flags concerning maritime and air transports.	25 years renewable
	Tariffs incentives : 1. Tax and duty free on imported and exported capital goods, materials, raw materials and finished or semi-finished goods; 2. Tax and duty free on imported or exported finished goods manufactured by the licensed enterprises; 3. Unlimited duration of stay for imported goods; 4. Local tax and customs duty free on local purchases; 5. Exoneration of customs duties on commercial and private vehicles and other means of transportation for production; **6.** Exemption of restrictions of flags concerning maritime and air transports.	
	Guarantees : **1.** Granting clearances for transfer to non Franc Zone countries of all the amounts necessary for the realisation of the investment and commercial and financial operations; **2.** Granting clearances for transfer to non Franc Zone countries on behalf of employees, collaborators, shareholders and foreign lenders in compliance with the exchange regulation; **3.** No discriminatory measure can be applied to free export enterprises in relation to measures enjoyed by non free export enterprises; *Free recruitment of Senegalese and non Senegalese staff*	

Following the presentation of the regulatory corpus related to investment incentives, it is important to look at the technology transfer policy.

III. TECHNOLOGY TRANSFER POLICY IN SENEGAL

Senegal has always recognised the instrumental role of Research & Development in the production support process. Indeed, R&D features high in the various development plans. Yet, the country has still not yet developed a consistent policy of technological innovations transfer to the productive sector, in particular to the industrial sector.

The creation of an agency for the valorisation of research findings had been recommended by all the research advisory bodies. The establishment of a *Technopôle* (a cluster of high tech industries) should allow to take into account some concerns associated with the establishment of advanced industries, using new technologies and likely to engage in technological research in order to ensure a better competitiveness of local enterprises. Furthermore, the establishment of advanced industries calls for a political will and the presence of a conducive environment in which it would make economic and business sense for the various actors to invest in the area of technology transfer.

As regards research and technology transfer, the 9th Plan had identified six strategic programmes:

1. Restructuring of the national research system;
2. Extension and industrial exploitation of research findings;
3. Food security and rational management of natural resources;
4. Access to energy and to modern means of communication;
5. Control of major and emerging diseases and improved reproductive health;
6. Promotion of low cost modern housing.

In this respect, Senegal allocates 0.66% of its GDP to research. The amounts allocated to scientific and technical research under the various development plans are :

* 4th Plan: CFA 15.2 billion;
  5th Plan: CFA 8.77 billion;
  6th Plan: CFA 10.4 billion;
  7th Plan: CFA 12.37 billion;
  8th and 9th Plan : CFA 11billion.

In addition to these amounts, we also rely on the *Fonds d'Impulsion de la Recherche Scientific and Technique (FIRST)* which is a specific funding mechanism for research with an amount estimated at CFA 100 million/year. The provision of this fund is subject to cumbersome credit mobilisation procedures. And the budget structure with about 80% of operating costs, means that the funding of research programmes and maintenance of equipments and infrastructures are, in most cases, taken care of by foreign sources. Consequently, national research remains highly dependent upon external contingencies. The financing of national research is ensured by external resources up to 60%, not to mention the reluctance of the private sector to invest in research.

Despite the national research output, its transfer in the productive sector is very low. The time lag before significant development results are obtained is often too long for economic operators who prefer importing technologies to address their short term problems.

In the industrial sector, the lack of industries can be explained by the highly foreign capital intensive nature of the enterprises. There is a lack of scientific databanks and global and regular inventories of research breakthroughs. Efficient consultation mechanisms and supportive structures for the valorisation of research findings are also lacking. To these should be added the difficulties in supplying accurately all the technical and financial specifications, as well as the practical modalities for industrial, pedestrian or commercial use of research results.

Although the agricultural and food sectors have benefited much from donor support, namely as part of Agricultural Research Programme (ARP), a National Fund for Agricultural Research was put into place by the state of Senegal. Such a fund was created on 24 August 2000 with a financial package of CFA 3 billion for research.

Despite such efforts, the financing of research could be improved through:

- the enforcement of the UNESCO resolution requesting OAU member countries as recipients of UNDP assistance to allocate at least 3% of such assistance to scientific and technical activities;
- allocation of 50 to 75% at least of resources from the research support fund to academic research for a period of five years.

Hence, it ensues from the above that in addition to tax incentives, policy-makers are striving to mobilise adequate financial resources for research and to ensure a better technology transfer at the national level.

After presentation of the statutory corpus related to investment incentives and technology transfer policies, it is necessary to see how the stakeholders (the state and the private sector) integrate such a dimension in the efforts they make for the economic development of the country.

IV. INVESTMENTS IN THE MODERN SECTOR

The state as an investor

As a result of its regulatory mandate, the state makes public investments directly by financing different projects or indirectly through societies in which it has a major share. Direct funding is governed by the system of project planning in Senegal which originates from the recommendations of the *Conseil Supérieur du Plan* held on 29 June 1987. Under its recommendation no1, planning in Senegal is organised around four (4) instruments :

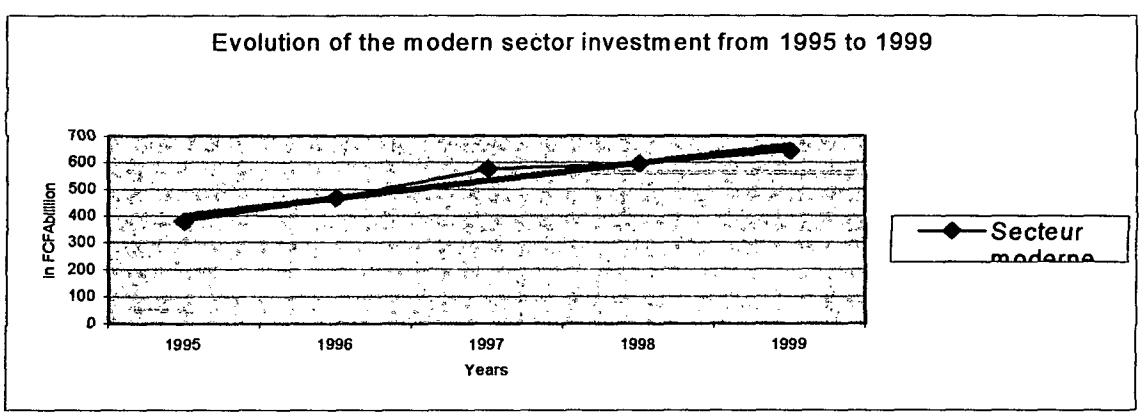
- The long term public image of Senegal in 25 years from now which is a social prospective paper ;
- The Mid and Long Term Economic Orientation Plan Act with a time horizon of 6 years and a more qualitative than quantitative content ;
- The Programme Act which includes a programme of action and a public investment programme for a period of three years called PTIP in short. This PTIP which includes a strong quantification component is subject to an annual review ;
- The consolidated investment budget from the PTIP determines for each fiscal year the amount of all public investments "*stricto sensu*", i.e.:

- Investments on internal resources;
- Investments on external resources the (Public) Treasury is not accountable for.

With such instruments and the various facilities granted under the industrial activity, we will try to appraise the technology transfer efforts made by the state and the private sector in budget terms. To do so, we will review successively the levels of public and private investments, as well as the subsidies and exemptions granted by the state from 1995 to 1999. However, it is important to point out that, given the difficulties associated with the statistical data, we will focus more on trends rather than on absolute values.

TABLE 3: DISTRIBUTION PER INVESTOR IN THE MODERN SECTOR (IN FCFA BILLION)

	1995	1996	1997	1998	1999	Total
PTIP	178.2	237.26	290.00	300.4	251.06	841.11
Public enterprise and local community	80.54	91.66	113.77	117.99	157.02	388.79
Private enterprises	121.00	137.39	170.66	176.98	235.54	583.18
Modern sector	379.74	466.4	574.44	595.01	643.62	1813.07
GDP	2388.5	2414.7	2501.4	2725.7	2935.2	16147.3



The review of the statistical data shows that on average, the estimated level of investment in the modern sector is FCFA 531.8 per annum, or 20% of GNP. This relatively high level stems from a steady and linear investment growth (see graph on the evolution of modern sector investment from 1995 to 1999). This signals a strong commitment by the modern sector agents to industrial development. However, the aggregate level does not reflect the individual efforts by the latter.

Indeed, the average annual investment level is estimated at CFA 363.6 billion, or 68.3 % of the total modern sector investment and 14.02% of GNP. The review of the evolution of such investment (see graph 2) shows the existence of two major periods:

- a period from 1995 to 1997, characterised by an investment growth;

- a period from 1997 to date, characterised by a stagnation in investment.

Such a trend stems from the will of the state roll back from the productive sector. However, as the Senegalese private sector is not ready yet to supplement the state, the latter maintains a fairly high level of investment in order to ensure a consistent economic development and cushion the brutal effect of a wholesale divestiture.

As regards the average annual level of investment, it is estimated at FCFA billion168.3, or 31.7% of the modern sector investment volume and 6.5% of GNP. The review of the evolution of private investment (see graph 3) reveals a steady growth in investments culminating in 1997. Such a growth could be explained by the positive impact of the tax reforms (incentives associated with the code of investments). Such a trend confirms need for the state to be replaced in the productive sector by the private sector.

After reviewing the level of investments in the modern sector, it is important to see how funding is taken care of.

Indeed, the private sector is often financed by the traditional banks. However, there are credit lines opened by the state with the view to facilitating access to credit.Here, it is worth mentioning the credit line to the tune of 9 billion deposited in several local banks in Senegal (BST; BICIS; etc.). It has been granted by the European Investment Bank to finance industrial development. The same for the Economic Promotion Fund credit line granted by the African Development Bank and the International Financial Society. Such funding sources which are, by no means, exhaustive, show that private sector partners are the banks through direct funding (loans granted) or indirectly (credit lines).

As regards public sector investment funding, it is done through the national budget or through loans granted by development partners made up of multilateral partners (WB, IMF, EU, ADB, BOAD, BID, etc...) and bilateral partners.

In light of the above, it appears that there are several actors ready to support the industrial development of Senegal and that the Government, in an attempt to cut down overheads and increase its efficiency, often opt for privatisation. However, is a fully privatised and profit-driven productive sector going to deliver goods and services that will best meet the general economic and environmental interest of the populations ? So, how to go about it: through law or regulation or by relying on a mechanism produced by the market?

On its part, Senegal, with the enforcement of the new code of environment, makes sure that any industrial financing is done taking "clean" technologies into consideration. Because a clearance is requested which is associated with the provision on the need to undertake an environmental impact study prior to any new investment. Furthermore, the existing investments should be attended by new technologies aimed at reducing the pollution so as to reduce charges related to the pollution tax under the new code. A further point is that the national investment system has, for a long time, encouraged the establishment of industrial units by granting them many facilities sometimes at the expense of the environment. In the past, the main eligibility criteria were based on the level of investment and on the number of jobs created. It should also be noted that in the field of technology transfer, the investment code pf Senegal provides for some facilities, even if these may be found insufficiently attractive compared to what is practised elsewhere.

Hence, in addition to these tools, i.e., the environment code and the tax incentives, it would be desirable that the policy-makers to integrate incentive measures and pro-active approaches in their environmental policy with the view to generalising the use of environmentally sound technologies, namely:

1. Taxes, fees and subsidies;

This first category is based on taxation (taxes) , on parataxation (fees levied for services provided) or on subsidies (incentives for "clean" practices). Based on the polluter – payer principle, such instruments which have been defined by public intervention, modify the prices and costs of products.

Taxes can be used to finance de-pollution costs or ensure a better use of resources with the revenues they generate or directly reduce the cost differential which is often against activities favourable or less unfavourable for the environment.

2. Property rights

This second category of instruments is based on the establishment of property right over environmental goods. In an extreme case, the constitution of a market for such goods enables to assign them a price, a value and regulate their usage. Markets for nature-provided services can be created, as is the case for right-to-pollute markets, or better still, for transferable individual quotas.

3. Voluntarist approaches

These are described as third generation environmental policy instruments. They consist in developing the enterprise's environmental performances. Out of the many instruments, three major categories of voluntarist approaches can be identified:

3.1. Unilateral commitments of enterprises

For the enterprise, it is about setting up a "self-regulation" of one's own environmental programme, a kind of code of conduct as in the "responsible car" programme of the Association of Canadian Chemical Industries.

3.2. Environmental agreements negotiated between public authorities and firms

It is about a contract between the public authorities and the industries containing ecological objectives to be achieved (reduction of emissions to a fixed quantity) and a calendar to achieve such objectives. The industry commits itself to meet these objectives within fixed deadlines and in return, the public authority commits itself to exonerate the industry of some taxes or to grant it tax facilities.

3.3. Public voluntary systems

It is about specification conditions developed by the public authorities the enterprises can deliberately endorse. In return, they receive an accreditation or a specific labelling they commercialise. The specification conditions can bear either on the environmental performances (objective of reducing emission, for example), or on the production processes used. Co-labelling is part of such mechanisms.

However, the implementation of such measures generates costs for a developing country like Senegal that are difficult to sustain. However, there are multilateral and bilateral arrangements which provide developing countries the possibility to develop the necessary capacity and set up adaptation projects or emission credit projects.

In this respect, the Clean Development Mechanism (CDM) can normally facilitate access to and transfer of environmentally sound technologies. Indeed, the private sector and multinational companies being generally the depositories of advanced technologies, their involvement in the CDM must , therefore, be encouraged to facilitate the transfer of technologies towards developing countries. CDM as an incentive could promote and channel investment towards clean technologies. CDM could serve as a catalyst to boost foreign investments. Some partners are increasingly sensitive to environmental issues and insist on the promotion of sustainable production and consumption methods.

Already within the EU, people talk of the environmental responsibility of products which is transferred to the manufacturer or to the producer (tracking). Commercial policies are subject to fairly strict environmental norms and some even talk of the "new green protectionism".

Furthermore, with the United Nations Framework Convention on Climate Change (UNCCC), there are opportunities to be tapped. Indeed, in order to meet the development objectives, the emissions produced by the developing countries will record a strong growth and yet such countries do not have the necessary resources to enforce the convention. The financial commitment of the developed countries must be translated into concrete acts, including the fact that the DCs :

- require from Developed Countries (Annex II Parties) that they assist Developing Countries Parties particularly vulnerable to the deleterious effects of climate change in meeting the cost of their adaptation to the said effects (article 4.4);
- have economic and social development imperatives and poverty eradication priorities; they can meet correctly their commitments only if the developed countries implement efficiently their own commitments regarding financial flows and technology transfer (article 4.7).

It should also be noted that financial inflows from Annex II Parties must come as new and additional resources. They cannot be mixed with ODA, they come, therefore, "in addition". However, only the developing countries Parties are eligible for funding and this funding concerns only those activities undertaken as part of the implementation of the convention. The funds are granted in the form of donations or at concessional conditions. For instance, the funds available over the period 1995-1998 stood at 2 billion US dollars for all the Global Environment Funds (GEF) interventions.

Added to the CDM and the UNCCC is the Montreal Protocol the objective of which is to reduce emissions of CFC and other chemical substances which deplete the ozone layer (ODS). The protocol provides to the developing countries the possibility of accessing financial assistance and new technologies.

Finally, it appears that, like other developing countries signatories to almost all the conventions and protocols for an improved environment, senegal can head towards a sustainable industrial development with the possibility of tapping the existing funding opportunities.

ANNEXE 11 :

CMD INFORMATION AND COMMUNICATION STRATEGY

By Djibril Ndiaye

I. INTRODUCTION

The purpose of this information and communication strategy is to help to a better understanding of the concept of CDM as well to create conditions for a permanent dialogue between CDM stakeholders and partners. Hence, following identification of the categories of partners and assessment of their needs, such a strategy will propose an information management and dissemination system among all the stakeholders. The strategy will also determine the modalities for regular exchanges between partners and allow for a non stop communication with the public at large.

II. REVIEWING THE NEEDS OF THE DIFFERENT PARTNERS IN THE IMPLEMENTATION OF CDM

The implementation of the UNIDO program on the introduction of the CDM concept in industrial development involves various stakeholders, be they at strategic or operational decision-making, control and evaluation levels, etc. Within the framework of this strategy, the following groups have been identified.

2.1 POLICY-MAKERS AND DONOR AGENCIES

The objective here is to target, through this group, the decision-makers or individuals likely to have an influence on strategic decisions in industrial development and funding. These include:

- officials and experts from ministries, directorates and state agencies;
- legislators;
- donors;
- investors and bankers.

2.2. ECONOMIC OPERATORS

This group includes industrial enterprise leaders and experts working for them. The latter are made aware of and informed about clean development mechanisms.

2.3. INDEPENDENT RESEARCHERS AND EXPERTS

Here, researchers are targeted in a bid to prompt them to engage in reflections on how best both the program and the CDM concept can be adapted to our local conditions. In this regard, this strategy will attempt to facilitate their access to the scientific and technical literature in the field. They will also be used in CDM partner capacity-building. In particular, this group will be used to train stakeholders for them to have a good grasp of the concept and a good command of transferred technologies. Finally, such a group represents a think-tank for the follow-up and evaluation of this concept and its impact in Senegal. The group is made up of:

- academics;
- researchers from public or private research institutes or laboratories;
- consultants in study firms.

2.4 Social Partners and Civil Society

An adequate information and sensitization of the above could help mobilize public opinion for the extension of CDM in the country's industrial activities. The group includes:

- workers' associations in industries;
- environmental protection NGOs and associations;
- the general public.

III. SETTING UP A CDM INFORMATION MANAGEMENT SYSTEM

3.1. SOURCES OF INFORMATION ON CDM

In order to track information on CDM, sources of such information must be systematically identified and regularly checked in a bid to identify any new pieces of information in this area. Potential sources of this type of information are:

- national and international experts involved in the reflection, design and implementation of the CDM concept across the world. With these, one can find programs in the process of design or implementation, techniques for the design of CDM capacity-building, etc.
- International organizations, in particular UNIDO. In such organizations, one can find information on the on-going programs, opportunities for access to sources of support to this development concept, technical materials, and evaluation reports, etc.
- Research institutes and laboratories interested in the industrial, environmental issues. One can obtain scientific and technical information on this concept from such structures, procedures and modalities, impacts, etc.
- Laboratories of industrial enterprises where information can be out-sourced on production processes, technologies and the impacts of the introduction of CDM in such production processes.

3.2. INFORMATION COLLECTION ON CDM

In order to secure relevant information on the CDM implementation process, it is essential to collect such an information as per their typology.

- *Textual materials*

These include reports, studies, project documents, evaluations, articles of periodicals, papers, etc. All such a documentation should be collected and referenced for ease of access. Regarding materials produced by national stakeholders, for each publication, a copy should be systematically submitted at the Resource Center of the Directorate of Environment or any institution designated to this effect. With UNIDO support, or through networking or via the Internet, documents published abroad will be identified and collected.

- *factual information*

National stakeholders, in accordance with international practice, will have to select indicators to be monitored on regular basis. A data collection matrix pertaining to such indicators will be developed and made available to the various stakeholders. The data thus collected will feed a database which will be used as an instrument for CDM follow-up, evaluation and implementation.

IV. ACCESS TO INFORMATION AND COMMUNICATION ON CDM

4.1 SETTING UP A RESOURCE CENTER ON CDM

The resource center will be a site where information available in Senegal and likely to support the implementation of the CDM Program could be consulted. It could be hosted by the Directorate of Environment or any institution designated to this effect. The resource center will operate as a specialized documentation center. Information resources in the center will be managed using the most advanced documentary techniques.

4.2 SETTING UP A CDM INFORMATION FLOW SYSTEM VIA THE INTERNET

Like the experience developed by UNIDO and that of the "Information System on Desertification", a platform of exchange will be created on the Internet. Such a platform will serve as a virtual library where all the materials would be posted which pertain to the implementation of the program, as an institutional kiosk and a forum for e-exchanges.

4.3. COMMUNICATION AND PUBLICITY ON CDM

In order to inform the general public about CDM, various outlets are proposed here. These include:

- *Publication outlet*
  - scholars and experts are urged to produce articles and papers for journals and scientific meetings on experiences of CDM in Senegal. This should be done in the form of small grants.
  - The journalists 'network on environment will be informed and sensitized in an attempt have its members publish extension articles and sensitization on CDM in their respective organs;
  - All implementation activities, evaluations, meetings relative to CDM, will be subject to publications in the form of reports, and syntheses.

- A thee-sheet flyer and a one-hundred page brochure on CDM will be developed and published in five thousand copies each and widely distributed to the public.

- *Audio-visual outlet*
  - a radio spot and TV spot will be produced and made available to all radio and television stations in the country to sensitize and mobilize the opinion around the CDM issue. A protocol will be prepared for such press organs to take care of this type of communication activity. Experts and civil servants will be encouraged to develop radio and TV programs on CDM.
  - Audio and video cassettes will be developed in French and in the main national languages to extend information and sensitization to illiterates.

4.4. SETTING UP A PARTNERSHIP NETWORK ON CDM

The CDM stakeholders will be organized around a network of partners whose objectives are to promote resource, information and experience sharing in the field of CDM. As indicated earlier on, partners will include public administration, economic operators, local communities, experts, donors, civil society and NGOs, research institutions and international organizations. The network will be coordinated by the Directorate of Environment which will ensure the secretariateship. A common charter will be adopted to set ground rules for the network, the rights and obligations of each member of the network. The constant mandate of the network is to ensure an efficient and permanent flow of information between and among all stakeholders, as well as to define the roles and responsibilities of each stakeholder in the actions to be carried out and to see to the observance of individual commitments. Experiences and information within the network will be shared in several ways:

- *regular meetings*

A general meeting of network members will be organized every 3 months. Such a general meeting will provide an opportunity to review the CDM program, share visions and experiences.

- *electronic forum*

An electronic exchange forum will be provided for in the CDM information system via the Internet. The network will also participate in the international forum on the UNIDO website.

V. BUDGET TO IMPLEMENT THE PROPOSED STRATEGY

Items	Endowment (in CFA)
1. assessment of partners' informational requirements as part of the implementation of CDM and identification of information sources	750.000
2. equipment and development of a resource center on CDM	2.500.000

3. collection of materials on CDM	250.000
4. development of indicators to monitor the CDM project	500.000
5. organization of information, sensitization and consultation meetings of stakeholders (4 meetings)	3.000.000
6. one information and sensitization workshop of environment journalists	1.000.000
7. grants for studies and scholarly publications on CDM	1.500.000
8. publication of reports, one flyer and one brochure on the CDM program in Senegal	3.000.000
9. production of one radio spot	250.000
10. production of one TV spot	500.000
11. production of audio cassettes (300 copies)	750.000
12. production of video cassettes (100 copies)	1.500.000
TOTAL	*16.750.000*

ANNEXE 12

MEETING OF 23 MAY 2001

A consultation meeting of the select group was held on Wednesday 23rd May at 10am in Mr. Sylla's office, the Co-ordinator of the Capacity-building Programme for the implementation of CDM-related industrial projects.

The objective of this meeting was to distribute to the various consultants of the programme the Terms Of Référence (TORs), to exchange views on the content of such TORs and to have a common vision on the consultancy to be carried out, as well as to draw up a calendar of regular meetings and meetings with members of the NCCC for the validation of the different studies.

The format adopted for such studies is as follows :

- submission of the draft studies is scheduled for 7th June 01 ;
- the meeting of the select group is planned for 14th June at 10am at the D.E.E.C. in order to collect comments and observations on each report from the select group members;
- Each member of the group has also received information on how to access and participate in the discussion on the UNIDO Website.

ANNEX 13

LIST OF PARTICIPANTS

- Monsieur Djibril NDIAYE du Centre de Suivi Ecologique
- Monsieur Ibrahima SALL du Ministère des Finances
- Monsieur Cheikh Oumar TOURE Consultant
- Monsieur Ndiaye Cheikh SYLLA de la DEEC
- Madame Reine Marie Coly Badiane de la DEEC
- Mademoiselle Madeleine DIOUF
- Monsieur Libasse BA de ENDA Energie
- Monsieur Mbaye DIAGNE de la SONACOS

ANNEX 14

MEETING OF 14TH JUNE 2001

The draft reports by the consultants are compiled and sent out to the various members of the select group. A meeting was convened to discuss such reports.

It was held at the D.E.E.C. on 14th June 2001 at 10am :

⇒ the objective was to stimulate interactive exchanges with the various members of the select group on the draft study reports presented and on the methodology used by the individual consultants. Suggestions and recommendations have been made to the consultants for them to improve their reports.

Hence, a number of actions have been recommended :

- To marshal information on all institutions involved in the implementation of CDM projects ;
- To assess the national capacities in terms of technical expertise in order know what are the technology transfer advantages and drawbacks ;
- To identify the barriers in each study ;
- To identify the financial stakes involved in CDM, in the transfer of technology in the fiscal context and investment programme of Senegal ;
- To define a strategy to remove such barriers with a view to facilitate implementation of CDM projects ;
- To define the communication tool on climate change and CDM adapted to each category of stakeholders ;

Such a meeting represented a major step towards the refocusing of the assignment.

⇒ The sub-regional meeting planned for October in Senegal, its organisation and the participation of members of the NCCC and of a few partners, was discussed.

Mr. Sylla stated the need for finding sponsors in the industrial sector and in the government to assist in ensuring a successful organisation of the event which is highly important for Senegal, in particular, for the national industrial sector.

In this respect, contacts have been made with director generals of the lead industries, namely SAR, SENELEC AND SONACOS, as well as the government of Senegal, through the Minister of Youth, Environment and Public Hygiene (MEJHP) to assist in the organisation of this major event.

A visit to venue of the regional meeting at Saly Portudal was made by the Programme Co-ordinator who was accompanied by Mr. Baldé, Head of the *Division Cadre de vie* of the Ministry, with the view to finding out what services are offered by the holiday reserve to the workshop participants.

Such contact made it possible to present the UNIDO programme to potential donors (national and international) and to policy-makers. This can be regarded as genuine marketing strategy for the UNIDO Programme in Senegal.

A very close collaboration was suggested between the Ministry of Environment, the Ministry of Industry and SMEs and SMIs and the Senegal Investment Board, in order to ensure a successful organisation of this event.

Such an international meeting will, thus, constitute a momentous event for the capacity-building of the different project partners, enable Senegalese and non Senegalese investors to access relevant information on the UN Framework Convention on Climate Change, the Kyoto Protocol, CDM.

⇒ Such a meeting has allowed to inform the select group about the format of the final report which represents an additional element to justify the work assigned to the consultants ;
⇒ The existence of the regional meeting's agenda to be emailed to all members has been addressed so that proposals for amendments can be taken into account ;
⇒ The need to fill in the form for UNIDO and CTI, an important partner in the TT process, has been pointed out ;
⇒ To each member of the group, a UNIDO document (2000) has been given which focuses on Phase I of the on-going programme ;
⇒ The difficulties some members of the group encounter in accessing regularly the Internet was pointed out. This limits their participation in the debate on the website. This facts deserves to be taken into account in the programme. The need to review the time allocated to the project has also been indicated. (Perhaps, to carry out an initial estimate).

ANNEX 15

LIST OF PARTICIPANTSE

- Monsieur Djibril NDIAYE du Centre de Suivi Ecologique
- Monsieur Ibrahima SALL du Ministère des Finances
- Monsieur Cheikh Oumar TOURE Consultant
- Monsieur Ndiaye Cheikh SYLLA de la DEEC
- Madame Reine Marie Coly Badiane de la DEEC
- Mademoiselle Madeleine DIOUF
- Monsieur Libasse BA de ENDA Energie
- Monsieur Mbaye DIAGNE de la SONACOS

ANNEX 16

DICUSSION WITH TARGET AUDIENCE MEETING OF THE NATIONAL COMMITTEE

A joint public audience/NCCC meeting was held on 3rd July 2001, under the chairmanship of Colonel Mbareck Diop, the NCCC Chairperson with the following agenda :

- To define the position of Senegal for COP6-bis following the presentation by Mr. Ndiaye Cheikh Sylla of the new proposals by President Pronk, in the run-up to COP6-bis.
- To inform about the implementation of the UNIDO project (Phase II) ;
- To present the level of advancement of the reports from the different consultants. The terms of reference has first been specified, and then the following reports presented :
- Study on finance and investments ;
- Study on TT ;
- Study on the regulatory framework ;
- Study on the information management system ;
- Study on the utilisation of energy in the industrial sector.

The studies presented require some amendments and improvements.

The following comments have been made :

- How to reinforce the capacities of the Senegalese High Council for Industry within the framework of the UNIDO programme ;
- The local tax system will change in Senegal with the current reforms, while it should been seen to it that re-deployment of activities from the North will not lead to still more important problems of pollution in our countries. For instance, the parent enterprise for a given production would levy taxes on the branch which represents it in a third country. How to reduce this property right in the transfer of technology ;
- The issue of globalisation, re-deployment has led to the liberalisation of our economy and the tariff barriers are significant and yet, in the current regulation, emphasis is on these tariff measures and not on the non tariff ones. How through CDM can such elements be taken on board ? ;
- Taxation in Senegal represents one difficulty which deserves adaptation to the current context of globalisation. How to adjust to some of the rules like property right in order to be in tune with the current global economic process ? ;
- To assess the impact of CDM in this fiscal environment, what innovation can it bring to Senegal ? ;
- CDM can not work without taking into consideration WTO guidelines. This aspect should, therefore, be reviewed, because we should realise that we can improve our export commodities through CDM projects ;
- The current context of regionalisation (ECOWAS) dictates that our tax regulation be in tune with the current practice in the sub-region, and this should be indicated in the document ;
- In the communication strategy, partner intervention must be reviewed ;
- Do policy-makers and industrialists have the same information requirements ? There is need for adjustment to each information requirement. Information is useful only if it targets key stakeholders ;

- The focus on communication strategy must be extended to communication tools other than the website, bearing in mind the means available to the Senegalese population ?
- To propose performance indicators to assess the proposed communication strategies.