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OVERVIEW OF REGIONAL ENERGY PROJECTS

and

PROJECT PERFORMANCE ASSESSMENT REPORT

for the

MALI, MAURITANIA and SENEGAL
REGIONAL HYDROPOWER DEVELOPMENT PROJECT
(CREDITS 2970, 2971 and 2972)

December 17, 2006

*Sector, Global and Thematic Evaluation Division
Independent Evaluation Group*

Currency Equivalents (annual averages)

Currency Unit = FCFA

1997	US\$1.00	FCFA 525.30
1998	US\$1.00	FCFA 595.12
1999	US\$1.00	FCFA 559.33
2000	US\$1.00	FCFA 649.88
2001	US\$1.00	FCFA 704.57
2002	US\$1.00	FCFA 744.39
2003	US\$1.00	FCFA 632.67
2004	US\$1.00	FCFA 525.10
2005	US\$1.00	FCFA 572.69

Abbreviations and Acronyms

AAA	Analytical and Advisory Assistance
CAS	Country Assistance Strategy
ECOWAS	Economic Community of West African States
EdM	Électricité du Mali
EEM	Eskom Énergie Manantali
FCFA	Franc de la communauté financière africaine (also XOF)
GEF	Global Environment Facility
ICR	Implementation Completion Report
IDA	International Development Association (of the World Bank Group)
IEG	Independent Evaluation Group
NGOs	Non-Governmental Organizations
O&M	Operation and Maintenance
OMVS	Organisation pour la mise en valeur du fleuve Sénégal
PASIE	Programme d'atténuation et de suivi des impacts des réalisations de l'OMVS sur l'environnement
PPAR	Project Performance Assessment Report
QAE	Quality at Entry
REPs	Regional Energy Projects
RHDP	Regional Hydropower Development Project
SENELEC	Société nationale d'électricité (Sénégal)
SOGEM	Société de gestion de l'énergie de Manantali
SOMELEC	Société mauritanienne d'électricité
WAPP	West Africa Power Pool

Fiscal Year

Government: January 1 – December 31

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IEGWB Mission: Enhancing development effectiveness through excellence and independence in evaluation.

About this Report

The Independent Evaluation Group assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, IEGWB annually assesses about 25 percent of the Bank's lending operations. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons. The projects, topics, and analytical approaches selected for assessment support larger evaluation studies.

A Project Performance Assessment Report (PPAR) is based on a review of the Implementation Completion Report (a self-evaluation by the responsible Bank department) and fieldwork conducted by IEGWB. To prepare PPARs, IEGWB staff examine project files and other documents, interview operational staff, and in most cases visit the borrowing country for onsite discussions with project staff and beneficiaries. The PPAR thereby seeks to validate and augment the information provided in the ICR, as well as examine issues of special interest to broader IEGWB studies.

Each PPAR is subject to a peer review process and IEGWB management approval. Once cleared internally, the PPAR is reviewed by the responsible Bank department and amended as necessary. The completed PPAR is then sent to the borrower for review; the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

About the IEGWB Rating System

The time-tested evaluation methods used by IEGWB are suited to the broad range of the World Bank's work. The methods offer both rigor and a necessary level of flexibility to adapt to lending instrument, project design, or sectoral approach. IEGWB evaluators all apply the same basic method to arrive at their project ratings. Following is the definition and rating scale used for each evaluation criterion (more information is available on the IEGWB website: <http://worldbank.org/oed/eta-mainpage.html>).

Relevance of Objectives: The extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). *Possible ratings:* High, Substantial, Modest, Negligible.

Efficacy: The extent to which the project's objectives were achieved, or expected to be achieved, taking into account their relative importance. *Possible ratings:* High, Substantial, Modest, Negligible.

Efficiency: The extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. *Possible ratings:* High, Substantial, Modest, Negligible. This rating is not generally applied to adjustment operations.

Sustainability: The resilience to risk of net benefits flows over time. *Possible ratings:* Highly Likely, Likely, Unlikely, Highly Unlikely, Not Evaluable.

Institutional Development Impact: The extent to which a project improves the ability of a country or region to make more efficient, equitable and sustainable use of its human, financial, and natural resources through: (a) better definition, stability, transparency, enforceability, and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Institutional Development Impact includes both intended and unintended effects of a project. *Possible ratings:* High, Substantial, Modest, Negligible.

Outcome: The extent to which the project's major relevant objectives were achieved, or are expected to be achieved, efficiently. *Possible ratings:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Bank Performance: The extent to which services provided by the Bank ensured quality at entry and supported implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of the project). *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Borrower Performance: The extent to which the borrower assumed ownership and responsibility to ensure quality of preparation and implementation, and complied with covenants and agreements, towards the achievement of development objectives and sustainability. *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Contents

CONTENTS	III
PRINCIPAL RATINGS.....	V
KEY STAFF RESPONSIBLE	V
PREFACE.....	VII
SUMMARY.....	IX
THE REGIONAL HYDROPOWER DEVELOPMENT PROJECT	IX
<i>Project Objectives</i>	2
<i>Project Description</i>	2
<i>Quality at Entry</i>	4
<i>Implementation Issues and Lessons</i>	5
RESULTS AT THE REGIONAL LEVEL.....	7
PROJECT-LEVEL OUTCOMES.....	8
<i>Relevance</i>	9
<i>Efficacy</i>	10
<i>Efficiency</i>	14
INSTITUTIONAL DEVELOPMENT IMPACT.....	15
SUSTAINABILITY	16
BANK PERFORMANCE.....	17
BORROWERS' PERFORMANCE.....	18
MAIN LESSONS FROM THE RHDP AND REGIONAL PROJECTS.....	19
IMMEDIATE CHALLENGES AND LESSONS FOR FUTURE REGIONAL PROJECTS	22

This report was prepared by Fernando Manibog (Lead Evaluation Officer), who assessed the project in January 2006, with contributions from Yves Albouy (Consultant). Ms. Romyne D. Pereira provided administrative support.

REFERENCES.....	27
ANNEX A. BASIC DATA SHEET.....	29
ANNEX B. NOTE ON THE DESK REVIEW OF WORLD BANK REGIONAL ENERGY PROJECTS.....	33
ANNEX C - DESCRIPTION OF THE TRANSMISSION SYSTEM.....	37
ANNEX D - PASIE COMPONENTS	39
ANNEX E - PROJECT FINANCING SHARES (AT APPRAISAL).....	41
ANNEX F - BORROWER COMMENTS	43
ANNEX G - LIST OF PERSONS MET.....	47

Principal Ratings

	<i>ICR*</i>	<i>ICR Review*</i>	<i>PPAR</i>
Outcome	Satisfactory	Satisfactory	Satisfactory
Sustainability	Likely	Likely	Likely
Institutional Development Impact	Substantial	Substantial	Substantial
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Satisfactory

* The Implementation Completion Report (ICR) is a self-evaluation by the responsible operational division of the Bank. The Evaluation Summary (ES) is an intermediate IEGWB product that seeks to independently verify the findings of the ICR.

Key Staff Responsible

<i>Project</i>	<i>Task Manager/Leader</i>	<i>Division Chief/ Sector Director</i>	<i>Country Director</i>
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Preface

This is a Project Performance Assessment Report (PPAR) prepared by the Independent Evaluation Group (IEG) on the Senegal/Mali/Mauritania – Regional Hydropower Development Project (RHDP, IDA Credits No. 2970, 2971 and 2972).

The RHDP was approved in June 1997 for three IDA Credits totaling US\$38.7 million equivalent. The IDA Credits represented only 9 percent of the total project cost estimated at appraisal to be US\$445.5 million equivalent. The RHDP, which was co-financed by numerous bilateral and multilateral agencies, closed in June 2004, with a two-year delay from the original Closing Date of June 2002.

The RHDP was selected for an IEG assessment because it is the first opportunity to assess the performance of a regional, multi-country project. It will also serve as an input to IEG's Regional Programs Study. Consequently, much emphasis has been given in the PPAR to lessons learned at the regional level, as well as the difference in the metrics for designing and evaluating regional versus single-country projects.

To enhance the practical usefulness of a regional-based PPAR, a desk review of other regional energy projects (REPs) was conducted with a view to providing comparative insights between the RHDP and other regional projects in the electricity and oil & gas sectors (Annex B). Based on this larger regional context, areas for further analysis and remaining challenges are indicated in the PPAR where relevant. Accordingly, the lessons that are specific to the project—such as those related to procurement and project administration—are presented in the Project Implementation section earlier in the report, to allow the main body and conclusions sections to focus on lessons learned at the regional level.

The RHDP evaluation is based on the Implementation Completion Report (Reports Nos. 27481, 27482 and 30931 dated January 7, 2005), the Bank's project documents, and interviews. An IEG mission visited Senegal, Mali and Mauritania during end-January and early February 2006 to discuss the effectiveness of the World Bank's assistance with the three Governments and a large number of stakeholders. Given the multipurpose use of the dam and the trans-boundary issues in the project, the IEG mission met in the three countries with the Ministries of Finance, Energy, Environment, Agriculture and Rural Development; the regional OMVS (Organisation pour la mise en valeur du fleuve Sénégal) and SOGEM (Société de Gestion de l'énergie de Manantali); the three national power utilities; and operational staff responsible for rural electrification, health and public participation programs. A list of persons met is attached in Annex G. Their cooperation in granting interviews and providing data is gratefully acknowledged. The support provided by OMVS, including the delegation of its Chief of Economic Studies, Programming and Monitoring to accompany and facilitate the mission during its entirety, is especially appreciated.

Following standard IEG procedures, the draft PPAR was sent to the Borrowers for their comments, which will be taken into account in the final version of the report.

Summary

The Regional Hydropower Development Project (RHDP) is a sub-regional, multi-donor operation that sought to provide reliable, low-cost power and increased electricity access to Mali, Mauritania and Senegal. The total actual cost of the project, which involved the construction of a hydroelectric plant downstream of the already-existing Manantali dam in Mali, was US\$342.1 million equivalent, of which the International Development Association (IDA) financed 11 percent. The US\$36.41 million equivalent that IDA financed covered 46 percent of the plant's civil works and related services, and 26 percent of the Environmental Impacts Monitoring and Mitigation Program (PASIE, or Programme d'Atténuation et de Suivi des Impacts sur l'Environnement). The RHDP was approved in June 1997, and was closed in June 2004, after a two-year delay from the original Closing Date of June 2002.

The objectives of the RHDP were to: (a) reduce the long-term cost of electricity supply to the three countries; (b) contribute to meeting debt service associated with the building of the Manantali dam; (c) contribute to increasing the efficiency and reliability of the power systems in the three countries; (d) establish an effective organization to construct and operate the project facilities and to mitigate environment and health impacts of the Manantali dam; (e) promote competitive private sector participation in project operation and in financing of future generation projects in the Senegal River Basin; and (f) support the traditional agricultural sector downstream through rational management of the Manantali reservoir.

The project's *outcome* is rated *satisfactory* overall. As a result of achieving its physical and its core development objectives, albeit with considerable delays, the RHDP has enabled the provision of low-cost hydroelectricity to the three countries, and has improved access as well as the reliability and quality of power supplies. The project also succeeded in involving a private operator and initiated pilot programs to benefit rural populations as well as mitigate the negative environmental and health impacts of the dam. However, the objective of contributing to meet the debt service associated with the construction of the Manantali dam was only partially achieved, with the power utilities in Mali and Mauritania remaining in financial arrears to the Hydrology Fund established for that purpose. Thus, while the project's efficiency is substantial based on economic rates of return of 21 to 24 percent at closing (or much higher at today's global oil prices), its financial efficiency is modest.

While there are tripartite sovereign guarantees that the Manantali debt will be covered, the inability to provision the Hydrology Fund as agreed with donors reflects the unwillingness of utilities in Mali and Mauritania to fulfill their financial obligations (Senegal has no arrears) and the inability of SOGEM (which holds the Manantali assets) to collect necessary revenues. The RHDP's relevance remains high given steep crude oil prices, the unmet electricity needs in the three countries, the regional integration aspirations of the West African states, and the assistance the Bank is currently providing for infrastructure integration. The RHDP also rates favorably compared to other regional energy projects that the Bank has implemented.

The project's *institutional development impact* is rated substantial, as the Project is expected to make significant contributions to the Region's ability to use its natural and human resources more efficiently. The degree of cooperation achieved among the three countries, particularly for water resources management, are exemplary. *Sustainability* is rated *likely* although it is marginally so given the financial risks posed by the outstanding arrears of the electric utilities in Mali and Mauritania to SOGEM for the Hydrology Fund, and artificially low end-user tariffs. *Bank performance* is rated *satisfactory* owing to the Bank's ability to successfully coordinate the dialogue and collaboration among the three countries and donors, and its support for compliance with safeguards by ensuring the satisfactory implementation of an environmental impact assessment and resettlement for the project. However, quality at entry was only moderately satisfactory given the late effectiveness of the Credit and the implementation delays caused by inadequate preparations of some of the key components of the project.

Experience with other regional energy projects shows that the Bank has the comparative advantage of being able to convene stakeholders and catalyze resources for promoting compliance with safeguards. The rating for borrower performance is satisfactory although moderately so, considering that the governments did not adhere to some of their undertakings during the implementation of the Project. The implementing agencies were also late in resolving implementation delays. Toward the end, the implementing agencies did achieve the project's multiple objectives and demanding trans-boundary operations, and the three member countries demonstrated significant commitment towards regional cooperation on energy and water management. Mali and Mauritania, however, remain in arrears with their financial commitments to the Hydrology Fund to service Manantali debt owed to a consortium of bilateral and regional co-financiers for the construction of the dam itself.

The RHDP shares many of the characteristics of other regional energy projects (REPs) the Bank has implemented in the past. The RHDP together with the Bank's other REPs offer several important lessons, categorized under two overarching, main lessons for future regional projects. These lessons are:

(a) Regional projects are high-risk operations that are complex and resource-intensive but when well-designed and efficiently implemented, they can yield high economic rewards. REPs are demanding in the following ways, but these demands can be potential assets in later years:

- REPs raise many concerns for governments and utilities, as the political desirability and feasibility of such projects are not always evident. REPs demand a full stakeholder analysis to identify the main winners and losers. REPs also require an analysis of the power exercised by the leaders and champions of reforms, and their level of commitment. Country commitment may prove fickle, hence a complete accounting of the political pressures on the REP governance framework is a key first step to determine the potential for project success and risks to sustainability. This is crucial if substantial reforms are contemplated.
- Regional approaches require that countries be willing to share benefits and to implement mechanisms that could infringe on their sovereignty. This includes the

- ability to forge a broad-based legitimacy of the authorizing environment, intricate vertical and horizontal partnerships, strong public participation, and robust systems to ensure fairness for sharing benefits. Differences in institutional capital matter all the more if the project aims at deep and sophisticated reforms such as market liberalization.
- Project management of REPs has stringent requirements for clarity and efficiency. Compared to national projects, REPs tend to have sounder governance frameworks and sales/pricing agreements because REPs adopt systems that are closer to global standards and tend to involve the most experienced contractors. Differences and lags in institutional development among member countries can be overcome by importing and transferring the skills needed for project management and operation, and using a multinational entity that can facilitate regional exchanges, as was done by OMVS under the RHDP. Bridging institutional differences is an important side-effect of a regional approach.
 - Cross-border cooperation is essential for managing risks in REPs. Because regional projects tend to be big, debt-financing is correspondingly large. The financing requirements of REPs could impact heavily on single-country fiscal resources and project financial sustainability, but the regional approach helps mitigate and distribute risks. Trans-boundary cooperation is crucial for resolving issues within REPs. For example, intervening in several countries is a difficult task especially for health and environmental issues. Strong cooperation across borders through regional institutions, however, enables more effective implementation of environmental, resettlement and health safeguards.

(b) The approaches for appraising, supervising, monitoring and evaluating regional projects differ significantly from national projects. Regional approaches need to take into account trans-boundary benefits, as well as tap opportunities to apply new Bank products and instruments, enhance the Bank’s “honest broker” role, and strengthen performance monitoring and evaluation.

Compared to single-country projects, the Bank and its borrowers in REPs need to adopt different metrics in the design, implementation and evaluation of projects owing to the important differences between single-country and regional project design and implementation approaches, as follows:

- Multi-country projects open up opportunities and unexpected benefits that may not be present in a single-country project. For example, a regional approach can serve as a system of checks and balances among the partner countries. Moreover, greater efficiencies can be achieved through the interconnection of infrastructure facilities and multi-country approaches to environmental issues. Thus, the analysis of outcomes through a regional lens becomes much more complex.
- In regional projects, because there are multiple Borrowers and a likely large number of donors, the Bank’s role comes into much sharper focus. This makes quality-at-entry a greater challenge, particularly with respect to performance criteria such as the Bank’s knowledge of the local political economy, the quality and relevance of its advice, its ability to build consensus, and its effectiveness in leading policy dialogue across multiple countries. This in turn puts greater

pressure on partner countries and the Bank to overcome internal silos (for example, in cases where partner countries straddle two or more Country Departments in the Bank, to what extent do these CDs address *jointly* the weakest country or stakeholder/s?)

- Regional projects can elevate social and environmental aspects (often focused in single-country projects on safeguards compliance) to the plane of trans-boundary public goods and programmatic approaches to address issues sub-regionally. Consequently, new instruments such as sub-regional Sector Environmental Assessments (rather than a project-focused EIA) become more relevant across several Borrowers.
- Monitoring and evaluation (M&E) systems are crucially important in regional projects, to create strong feedback loops between cross-country performance data and sub-regional governance and operational policies. There are heavier demands for effective M&E systems in regional projects to generate real-time data, given the larger potential for delays from having multiple countries involved.

Vinod Thomas
Director-General
Evaluation

The Regional Hydropower Development Project

Background

1. The RHDP is a sub-regional lending operation that involved Mali, Mauritania and Senegal. The project's conceptualization began in June 1996, and its formal appraisal was in December 1996. It was approved in June 1997, and with a delay of four months, Credit effectiveness took place in April 1998. The project closed on June 2004, after a two-year delay from the original Closing Date of June 2002.
2. At the time RHDP was conceptualized, the power sectors of these three countries were faced with the serious need for reliable, low-cost power supply and increased electricity access by the Senegal River Basin populations. The project was especially important to Mali, as the electricity generated was projected to represent around 50 percent of its total power demand beyond 2001. The proposed project provides a substantially lower-cost alternative to thermal-based power generation, given the high cost of petroleum fuels particularly in the land-locked country of Mali.
3. The RHDP financed the following: (i) the hydroelectric plant downstream of the Manantali dam located in Mali, which was completed in 1988 without World Bank financing; (ii) transmission lines; and (iii) the Programme d'Atténuation et de Suivi des Impacts sur l'Environnement (PASIE), or the pilot Environmental Impact Monitoring and Mitigation Program, which was intended to address the environmental and health issues that resulted from the Manantali dam's construction. In 1981, with financing of about US\$620 million from 12 donors,¹ construction began on two dams: (i) Diama, on the Senegal River delta, to prevent intrusion of salt water into the lower valley; and (ii) Manantali in western Mali, for water storage, river flow regulation and power generation. Both dams have been in operation since 1988. The barrier dam at Diama has made irrigated agriculture possible throughout the year and allowed the supply of water for populations and cattle upstream from Diama and for the city of Dakar. Storage of the annual flood by the Manantali dam has allowed the Diama reservoir to be maintained at full and stable level, and the levels of two lakes² to be raised, thus considerably reducing the costs for pumped irrigation systems around these water bodies. Because of these improvements, irrigated agriculture has become a major economic force in the valley.

1. Manantali dam co-financiers include: AFD (France); KfW (Germany); Italy; Saudi Arabia; Kuwait; Abu Dhabi; OPEC Fund; CIDA (Canada); BID; Fonds africain de développement; Banque africaine de développement; and USAID.

2. Guiers and Rkiz.

4. As designed, the RHDP would develop an extensive power system to serve the urban areas of Mali, Mauritania and Senegal, fed with hydroelectricity to be generated at a power station at the foot of the Manantali Dam. The proposed power station would have 200 MW of installed capacity and an average energy output of about 807 GWh.

Project Objectives

5. The RHDP's objectives were to: (a) reduce the long-term cost of electricity supply to the three countries; (b) contribute to meeting debt service associated with the building of the Manantali dam; (c) contribute to increasing the efficiency and reliability of the power systems in the three countries; (d) establish an effective organization to construct and operate the project facilities and to mitigate environment and health impacts of the Manantali dam; (e) promote competitive private sector participation in project operation and in financing of future generation projects in the Senegal River Basin; and (f) support the traditional agricultural sector downstream through rational management of the Manantali reservoir.

Project Description

(A) IMPLEMENTING AGENCIES

6. The project's implementing agencies were the Organisation pour la Mise en valeur du fleuve Sénégal (OMVS) and the Société de Gestion de l'Énergie de Manantali (SOGEM). OMVS is the Senegal River Basin authority and SOGEM holds the assets of Manantali dam, hydroelectric plant, and transmission lines.

7. OMVS was created in 1972 by the Governments of Mali, Mauritania and Senegal. Its mandate is to manage – on behalf of the three member states -- specific construction works as they relate to irrigation, energy and navigation specifically, and more broadly to manage river resources in order to prevent major floods and droughts. The supreme authority of OMVS is the Conference of Heads of State and of Government, while its supervisory body is the Council of Ministers. The executive organ of the OMVS is the High Commission, which is headed by a High Commissioner and assisted by a Secretary-General, both of whom are appointed to four-year terms.

8. SOGEM was created in January 1997 to operate, maintain and refurbish the jointly owned structures at Manantali. SOGEM is responsible for all industrial, commercial or financial operations. The OMVS Council of Ministers – in its capacity as the General Assembly of Shareholders – is the supreme organ of SOGEM, which is administered by nine members of a Governing Council and headed by a Director-General appointed to a four-year term.

(B) PROJECT COMPONENTS

9. The RHDP included investment, institutional strengthening, technical assistance, and environmental impact mitigation components, which were not revised during implementation.

10. The **Investment Component** consisted of the construction of a power station and a High Voltage transmission system (see Annex C), both operated by a central real-time load dispatching system. The power station included (a) civil works for the power station itself and a dispatching center at Manantali; (b) electromechanical equipment (5 turbo-generator units of 40 MW each); (c) a step-up substation; and (d) reinforcement works on the Manantali dam. The transmission systems (not financed by IDA) comprise two main systems. The Eastern system is a 306 kilometer-long, single-circuit 225-kV line from Manantali to supply Bamako. The Western system is a 945 kilometer-long, single-circuit 225-kV line from Manantali to Tobene, Senegal, with an off-take from Dagona to connect to Nouakchott, Mauritania through SOMELEC's system.

11. The **Institutional Strengthening and Technical Assistance (TA) Component**. The institutional strengthening was to support the OMVS High Commission (HC) in implementing the environmental mitigation and monitoring plan (paragraph 1.10), studies relating to the reservoir management optimization program, and to develop rural electrification in the Senegal River Basin and second generation hydroelectric sites. The component was also to support SOGEM in recruiting a private operator for the management and operation of project facilities, as well as in reviewing and establishing tariff principles and mechanisms and energy purchase agreements. Several knowledge and technology transfers, including information technology, were also provided. The TA sub-component was to provide SOGEM with expertise in project implementation, especially in procurement, project management, implementation supervision, and the monitoring of contracts execution.

12. The **Environmental Impacts Monitoring and Mitigation Program (PASIE)** was an important component of RHDP, comprising various capacity-building activities that were agreed at appraisal under the project's Component D on "Institutional Strengthening". During Board approval, however, serious concerns were expressed that the project did not address fully the adverse social, health and environmental impacts of the Manantali and Diama dams, which were not financed by IDA. Consequently, Component D was given a stronger focus on these issues. Moreover, there were also concerns on the need to ensure that, after the hydropower plant becomes fully operational, the three governments would continue the artificial flooding required by traditional agricultural activities downstream.

13. The cost of PASIE was US\$19 million, of which IDA financed US\$5 million. It was initially designed to assist the countries of Mali, Senegal, and Mauritania in their efforts to design policies and legal principles leading to a shared and balanced management of the Senegal River Water Resources, with a focus on the operation of the Manantali dam and reservoir. The program consisted of six components (see Annex D):

- Consultation, coordination and communication
- Monitoring program to mitigate the impacts of construction
- Reforestation and compensation for land and right-of-way appropriations
- Optimal reservoir management
- Environmental sanitation
- Other measures (limnology unit, rural electrification, income-generating activities)

(C) PROJECT COSTS

14. At appraisal, the RHDP's total project cost was estimated at US\$445.5 million, including physical and price contingencies, and net of taxes and duties. On June 26, 1997, the International Development Association (IDA) of the World Bank Group approved three credits for the beneficiary countries for the total amount of US\$38.7 million, in the following amount for each:

Country	Special Drawing Rights (SDR millions)	US\$ equivalent (millions)
Mali	12.6	17.1
Mauritania	8.1	11.1
Senegal	7.7	10.5
TOTAL	28.4	38.7

15. The relative foreign exchange gain (Euro to SDR) during project implementation resulted in an actual project cost of US\$342.1 million. IDA disbursements reached US\$36.41 million, distributed as follows: Mali, US\$15.5 million; Mauritania, US\$10.6 million; and Senegal, US\$10.4 million.

(D) PROJECT FINANCING

16. The three IDA credits financed 46 percent of civil works and related services³ and 26 percent of the PASIE,⁴ which together represented only a small part (11 percent) of the project's total actual cost.

17. RHDP was a major multi-donor initiative that included Agence Française de Développement (AFD, France, formerly the Caisse française de développement), Kredistanstadt für Wiederaufbau (KfW, Germany), Canadian International Development Agency (CIDA – Canada), the European Union, European Investment Bank (EIB), Islamic Development Bank (IDB), African Development Bank (AfDB), Arab Fund for Economic and Social Development (FADES), and West African Development Bank (BOAD), among other smaller financiers. The financing shares of these numerous donors and lenders are presented in Annex E.

Quality at Entry

18. Quality at entry (QAE) was moderately **satisfactory**. While some of the elements of the project's design contributed substantially to enhance the quality of the project at the entry, there were also major shortcomings. On the positive side, at the time of project conceptualization and appraisal, there was a close strategic fit between the RHDP's objectives and those of the three governments, particularly the integration and pooling of energy generation capacity, and regional cooperation in water resources management. A

3. IDA cofinanced civil works for the power plant with the Islamic Development Bank and the Banque Ouest Africaine de Développement (BOAD).

4. IDA cofinanced PASIE with KfW, CIDA and AFD.

review of the project documents indicates that there was also a substantial dialogue with the three governments and the implementing agencies. Further, some of the engineering – technical aspects benefited from rigorous analysis, such as the hydrological aspects and reservoir storage capacity which were well analyzed, thus providing sufficient guarantees regarding the operational capacity of the power plant in relation to variations of river inflow to the reservoir.⁵

19. However, there were also major shortcomings with respect to QAE. Despite the strong dialogue with the three governments and OMVS in which the Bank and other donors were active participants, the Bank failed to obtain a stronger commitment from the governments with respect to their key undertakings related to project implementation. The effectiveness of the Credit was delayed by about 4 months due to government's failure to comply with IDA covenants (para.1.21). Some of the key actions that were intended at project entry were significantly delayed, reportedly due to the political difficulties that were involved in obtaining tripartite agreement. For example, the critical step of adopting the Water Charter and the Manantali Reservoir Management Plan was only implemented toward the end of the project in 2002.

20. Another major shortcoming was that the design of a key component of the project (the civil work for the power plant) was not sufficiently advanced for implementation. The bidding process for the civil work and related services was launched without detailed design studies, thus leaving the contractor--which in itself had serious weaknesses (see "Implementation Issues" below)--with the responsibility of preparing the detailed studies during contract negotiations. This weakened the leverage of the Bank and other financiers, and may have resulted in cost overruns of the project's civil works (by some 58%). Subsequently, as may be expected, there was a significant number of important contract amendments. In addition, the civil works contractor and the electromechanical contractor were blaming each other for the delays in delivering the power station. Under these circumstances, it would have been advisable (and consistent with the Bank's practices) to have opted for some type of a Fixed Price-Turnkey Contract with a pre-qualification process and a strong Engineering, Procurement, and Construction (EPC) Contractor. There were also inadequate studies for the construction of transmission lines, which increased costs further and delayed the installation and commissioning the equipment. Moreover, the signing of critical agreement, namely the Water Charter, was delayed for almost three years due to lack of strong support by the governments (para. 1.19). When these factors are all taken into account, the quality of the project at entry is rated as moderately satisfactory.

Implementation Issues and Lessons

21. Issues That Caused Delays. The RHDP was hampered by many delays. At the outset, civil works could not be started due to delays in project effectiveness resulting from the governments' failure to comply with IDA's covenants related to: (i) adequate counterpart

5. The dam reservoir has an effective storage capacity of 7.9 billion m³, or the difference between its full capacity of 11.3 billion m³ and its minimal operational level of 3.4 billion m³.

funding for SOGEM; (ii) accounting procedures for SOGEM and OMVS acceptable to IDA;⁶ and (iii) budget allocations sufficient to cover the 1998 operating costs of OMVS. Moreover, due to the weak political will at the outset, two other key IDA covenants were also delayed. The Water Charter should have been ready in January 1999 but was not signed until May 2002. There was also a long delay in signing the agreement between SOGEM and the three States to establish SOGEM's performance indicators and delineate the States' obligations toward SOGEM, including their contribution to SOGEM's budget until project completion.

22. Another serious delay resulted from the flooding during the 1999 rainy season, which disrupted the delivery (via road and railway) of materials and equipment to the Manantali site, resulting in additional project costs.

23. Two serious, interrelated problems caused major implementation delays. First, the Contractor for civil works lacked of adequate project implementation capacity. The Contractor performed well below expectations, which had caused numerous delays as well as reworks. The Contractor lacked engineering capability in electricity distribution and water drainage. It did not meet its committed schedule for site organization, assign qualified and adequate personnel on the site, or provide adequate quality and quantity of equipment (e.g., concrete pumps and the crushing mill were defective). There were many unannounced personnel departures, delays in equipment mobilization, and material shortages, such as cement. Task scheduling was ill prepared and delivered equipment were not always of required specifications. These had the combined effect of delaying the commissioning of generation units 1 and 3 by around 4 months. The civil works Contractor was not willing provide additional time and resources to compensate for prior delays.

24. The procurement process itself, including the lack of compatibility among the procurement procedures of the various donors, may have contributed to the foregoing problem and undermined project implementation. The civil works contract were bid twice, and while the contract was awarded to the lowest evaluated bidder, the technical evaluation found that (i) the selected contractor had executed only a limited number of prior contracts and (ii) a significant risk was posed by its lack of the robust technical experience needed to deliver on a contract of this size. Instead of a single package, what occurred instead was piecemeal construction by several contractors with incoherent contract conditions. Ideally, there should have been only one round of properly formatted bidding, as experience has shown that having gone for two rounds may have distorted the final outcome.

25. Throughout implementation, the project documents show many additional delays in the following areas: (i) payments, including advances on civil works contracts; (ii) processing of disbursement requests; and (iii) completion of the Appropriations and Right-of-Way Program and compensation to the beneficiaries. PASIE also suffered from delays in the required reforestation activities and the provision of technical supervision for the pilot health facilities in six target villages.

6. The audit of SOGEM's 1998 financial statements and project accounts for 1998 was delayed three months, after which only a qualified certification was issued since the financial management system was not yet operational.

26. The foregoing delays were exacerbated by the difficulty in coordinating the large number of lenders and their differing procedures for procurement, payments, disbursements, and the handling of numerous amendments that required their no-objections. The RHDP's complex financing arrangements undermined project execution. In this regard, Special Accounts should have been established for the Mauritania and Senegal Credits to reduce the work slowdowns due to delays in payment. Nevertheless, the project documents show that overall OMVS and SOGEM adapted and took the corrective measures to complete the project, albeit with a two-year delay.

27. Lessons. At the project level, the experience of implementing RHDP yields the following lessons (lessons at the regional level are discussed later in the report):

- At the design and preparation stage, good technical preparation is essential if delays and cost increases are to be avoided. For the RHDP, the lack of detailed design studies for the power plant, the transmission lines, and the dispatching center led to numerous delays and successive cost increases.
- Procurement activities related to the key components should be as advanced as feasible prior to negotiations, in order to allow sufficient time for project management to take any necessary corrective measures and avoid delays.
- Harmonization of donor procedures, particularly on procurement, should be established prior to implementation. Financing and disbursement procedures should also be harmonized to achieve better coordination among co-lenders in the processing of payments.
- Mitigation of environmental impacts should be appropriately covenanted in the legal documents, and time-bound with provisions for remedial actions by IDA.. In the case RHDP, the long delay in signing the Water Charter and implementing the Manantali Reservoir Management Program posed serious risks in terms of escalating the negative environmental impacts of the Manantali dam, undermining the resettlement of expropriated populations, and delaying their compensation.

Results at the Regional Level

28. The RHDP has had a strong positive role in helping integrate the sub-region, which is seeking to promote trade, labor flows and sub-regional development. Through the strengthening of OMVS and the establishment of an institutional framework (notably SOGEM to hold the Manantali assets and ESKOM, a private operator for the power facilities), RHDP has laid the basis for joint actions between Mali, Mauritania and Senegal. The most important evidence is the signing of a common Water Charter in 2002, which triggered the implementation of a joint reservoir management plan. This established principles to equitably share environmental services and protect the rights of affected populations, ensure the maintenance of their livelihoods, and sustain the environment on which they depended.

29. Under the project’s PASIE component, joint actions have been implemented to mitigate the environmental impacts of the Manantali dam (which together with the Diama dam pre-existed the RHDP), the power plant, and the power transmission lines. The RHDP also mainstreamed broad stakeholder participation by establishing regular consultation processes at the national and local levels, including village committees and local NGOs, thus allowing those living in the Senegal River Basin to be informed about the water resources management policy of OMVS, particularly with respect to the Manantali dam upstream. This will help build consensus on water resources management policy, legal and regulatory instruments, implementing institutions, resource requirements, and priority actions. The next key step is to scale-up these pilot activities and ensure their sustainable funding (in this regard, an issue has arisen regarding the diversion of financial resources intended for the Hydrology Risk Fund to finance rural electrification instead, as discussed under project-level outcomes below).

30. Another impact of the RHDP is to help focus the tripartite dialogue on poverty reduction in the Senegal River Basin. The OMVS member states now give high priority to infrastructure development, including access to clean water, sanitation, rural electrification and health services. Income-generation investments have been piloted on recommendation of PASIE, including small and micro business schemes, improved irrigation techniques to grow off-season crops near key markets in Dakar, and other forms of entrepreneurship.

31. The RHDP also had an unintended positive impact on the telecommunications sectors of the three countries. They now have the opportunity—through the telecommunications equipment that were installed for transmission operations—to design a sub-regional telecommunications project serving the OMVS member states. This would build upon the dual-purpose optical fiber technology to link Manantali to all the high-voltage substations and the national grids of the three countries, for which SOGEM has already signed an operational agreement with the telecommunications companies. This project would establish a digital, interconnected telecommunication system for Mali, Senegal, and Mauritania, which would later be expanded to other neighboring countries.

32. The degree of cooperation between Mali, Mauritania and Senegal has ushered in an important change in international river basin development in the African region. The successful experience of OMVS has been instrumental in the appointment of the High Commission as the secretariat of the African Network for Basin Organizations (ANBO). Moreover, the role of OMVS in the region has been viewed as a model for the Gambia River Basin Organization, or the Organisation pour la mise en valeur du fleuve Gambie (OMVG). OMVS is also now an active participant in ECOWAS deliberations to promote greater power market integration and related investments in the Western Africa region.

Project-Level Outcomes

33. The overall outcome of the RHDP is rated *satisfactory*, based on its high relevance, substantial efficacy in key areas and substantial efficiency, as discussed below. During the

IEG field visit, there was a strong and solid consensus on the project's positive results among all the informants that were interviewed in the three countries, including official agencies, donors, NGOs and individual beneficiaries.

Relevance

34. The RHDP's relevance is rated *high*. At the time of project identification and preparation, the RHDP was intended to meet the priority energy issues affecting Mali, Mauritania and Senegal, namely, the need to increase energy access by the population of the Senegal River Basin through the provision of a reliable supply of electricity at a lower cost than thermal alternatives. There was also a clear need to improve the efficiency of the power sectors in the three countries, as well as to tackle the environmental and health impacts of the existing Manantali dam. The RHDP was consistent with the CAS objectives in the three countries during the mid-1990s of achieving sustained broad-based growth by promoting the private sector and developing infrastructure, while addressing environmental issues.⁷

35. Today, the RHDP has become even more relevant given the very high international crude oil prices and the remaining unmet electricity needs of the three countries.⁸ Pillar 3 of the Mali PRSP seeks to develop improved energy infrastructure and productive sectors. One goal of the Mauritania PRSP is to develop the rural and infrastructure sectors by reducing costs and promoting the sustainable provision of basic infrastructure in electricity, among other service deliveries. The Senegal CAS has as a major objective the expansion of the supply of infrastructure services, most prominently among the poor, to lower service costs and to promote private sector development. In all the three countries, the Bank proposes lending for electricity sector development.

36. The RHDP is most relevant to the long-standing regional integration aspirations of the West African states and the Bank's own 2001 Regional Integration Assistance Strategy for West Africa. The Economic Community for West African States (ECOWAS) and West African Monetary Union (Union Monétaire Ouest-Africaine) have been preparing regional infrastructure integration programs for road and air transport, telecommunications, as well as energy trade in electricity and natural gas, establishing the regional institutions to this end. ECOWAS has taken the lead with USAID support to prepare the institutional framework for a regionally interconnected electricity market. The Bank's 2001 strategy features increased AAA and financial support to deepen regional integration. The proposed Western Africa Power Project (under preparation) aims to build and reinforce regional electricity transmission lines. The OMVS Felou Hydroelectric Project was approved for appraisal in April 2006.

37. Other REP Experience. More generally, regional energy projects (REPs) have performed well on various dimensions of relevance. They were well-aligned with regional,

7. Mali CAS, January 1995 (13746-ML); Mauritania CAS, March 1994 (6156-MR); Senegal CAS, February 1995 (13909-SN).

8. Mali CAS, July 2003 (25663-ML); Mauritania CAS, May 2002 (24122-MR); Senegal CAS, March 2002 (25498-SN).

country and Bank objectives related to economic growth and sustainable energy development. REPs were mindful of the diverse socio-political interest and levels of development of the member countries, while applying uniformly the Bank's safeguard policies for safety, the environment and resettlement. In most cases, regional approaches were tailored to needs among the member countries that needed to be addressed at the regional level; otherwise, other interventions within the regional project were left at the subsidiary country level.

Efficacy

38. The efficacy of RHDP is rated *substantial*. However, although it achieved its physical objectives, one of its key development objectives was only partially achieved.

(A) PHYSICAL OBJECTIVES – ACHIEVED

39. Physical outputs have been achieved, albeit with important delays. The completed works and facilities include: (i) a water intake system comprising five penstocks; (ii) a powerhouse for five turbo-generator units and related services; (iii) a reinforced concrete tollgate channel; (iv) a step-up transformer station; (v) a high-voltage substation; (vi) a dispatching center and high voltage control building; (vii) a potable/industrial water supply system; and (viii) fortification to the dam. Beside the power station, the 225-kV transmission lines connecting selected localities and the capital cities in the three countries were successfully commissioned in January 2002 for the Eastern System and for the Western System on July 2002. The three national power —utilities achieved coordinated system operation in November 2002.

40. The delays should still be noted, however. Although eventually completed, all works related to the power station were delayed by one year. Numerous delays hampered the civil works program. There were technical problems with the electrochemical equipment, which took several months to resolve. As a result, whereas the five turbines were supposed to be delivered during the 2000-2001 period, their installation and satisfactory commissioning were completed only between December 2002 and June 2003. A review of reports from Bank supervision missions and implementation monitoring (by the engineering firm charged with on-site supervision) shows much disagreement regarding the project's implementation progress during that period.

(B) DEVELOPMENT OBJECTIVES – PARTIALLY ACHIEVED

41. With regard to project's development objectives (para. 1.5), the first four are closely related and can be considered as one objective, namely, to supply reliable electricity to the three countries, at an economically low cost and financially efficient and environmentally sound manner. In this context, the long term cost of supply has been reduced (since the hydro-based electricity costs less than thermal-based), losses in transmission have been reduced, and reliability is likely to improve due to installation of over 1200 km of new transmission lines. However, the objective of contributing to the debt service of the Manantali dam has only been partially achieved. Moreover, although not an objective of the project, the commercial-based operation of the electricity sectors of the three countries

remains worrisome from a financial standpoint because of inadequate end-user tariffs. The extent to which each development objectives have been met are discussed below.

42. The long-term cost of electricity supply to the three countries has been reduced. At a projected average output of 807 GWh per year from Manantali, SOGEM's estimates show the average cost of hydroelectricity for the three utilities range from FCFA30.9 /kWh to FCFA 32.05/kWh for 2003 and 2030 respectively. This is substantially lower than the cost of thermal-based generation. For Senegal, for example, the average cost of thermal-based generation for the period 2005-2015 is FCFA 47/kWh compared with FCFA 33.5/kWh for the hydro-based generation for same period, i.e., hydro-based cost 27% less than thermal-based power.⁹

43. The efficiency and reliability of the power systems in the three countries have also improved. The project has strengthened the efficiency and reliability of SOGEM's operations, and has eliminated incidences of load-shedding. In the Implementation Completion Report, for the period 2003-2030, SOGEM projected improvements in network transmission losses to the levels of 2.4 percent for electricity supplied to EdM, 11.3 percent for SOMELEC, and 9.82 percent for SENELEC. Updates made during the IEG mission yielded consistent figures (see table below), thus showing that the operational experience to date lends credibility to the projected efficiency improvements.

Table 1: Losses according to the Fichtner Study

National Power Company	Delivery Point	Average Losses	% of power delivered	Levelized Losses
EDM	Kodialani	2,24%	89,3%	2,15%
	Kita	2,24%	2,2%	
	Kayes	1,13%	8,5%	
SENELEC	Matam	3,13%	5,7%	6,03%
	Dagana	4,79%	9,6%	
	Sakal	5,56%	31,7%	
	Tobene	6,85%	53,0%	
SOMELEC	Kaedi	N/O		6,94%
	Boghe	N/O		
	Rosso	5,37%	10,8%	
	Nouakchott	7,13%	89,2%	

44. With better operational co-ordination among the three systems, greater reliability across the interconnected system may be expected. Under RHDP, the three countries also undertook some reforms of their power sectors, but these have had varying and limited results.

45. Institutional and environmental initiatives were implemented. Based on interviews and a review of project documents, it is evident that OMVS has provided strong support to the implementation of the PASIE environmental pilot activities. The signing of the Water

9. These costs are updated as other investments are planned or implemented, and would ultimately depend upon the generation mix between Manantali outputs, other hydropower facilities and thermal power plants.

Charter, although delayed by three years, was executed in May 2002. A rational management plan for the Manantali reservoir was also implemented through which the objective of supporting the traditional agricultural sector downstream is being pursued in the three beneficiary countries.

46. But the contribution to meeting the debt service associated with building the Manantali dam remains uncertain. This objective has only been modestly achieved. A Hydrology Risk Fund was set up under RHDP to ensure the long-term financial sustainability of the OMVS power system, with the agreement that it will be built up to FCFA 15 billion. However, at the time of IEG mission, the Fund only had FCFA 2 billion whereas the arrears were about FCFA 15.8 billion at the end of 2005. The purpose of the Hydrology Risk Fund is to ensure that payment obligations are met in the event of a disaster or a poor rainfall year, including: (i) operation and maintenance costs for the power plant and transmission networks; (ii) the remuneration of EEM (ESKOM Énergie Manantali); (iii) payment of debts incurred by the project; and (iv) coverage of SOGEM's working capital requirements. Note that the Hydrology Risk Fund is a separate issue from that of arrears, which is explained immediately below.

47. Arrears by the 3 national utilities have been present since the initial operation of Manantali power plant. At a certain period prior to the collapse of the electric utility privatization scheme in Mali, the private electricity concessionaire had been using payments that were due to SOGEM as a bargaining tool with the Malian Government in an attempt to get better terms and conditions. When the EdM privatization unraveled, EdM was left with large payment arrears to SOGEM. However, SOGEM, which now holds the Manantali assets, is cash-rich and meets all debt payment milestones. The utilities ensure a constant flow of payments to SOGEM for the power supply that they are getting from the Manantali power plant that was financed under the RHDP, and for the post-RHDP period, SOGEM has required long-term power supply contracts, which did not exist before. However, the amount of unpaid bills has remained roughly constant in the last period. Data on the present level of unpaid bills (comprising "old arrears" and contributions to the Hydrology Fund) are not exactly known. The Audited Financial Statements for 2004 mention 16.2 billion FCFA (of which 1.2 billion FCFA are subject to legal dispute by Sénélec) while the Expected Cash Flow for 2006 from uncollected payments for 2005 was 10.1 billion FCFA. SOGEM is not allocating any reserve to the "Main Equipment Rehabilitation Funds", and is not paying any amount to the old debt relevant to the construction of the Manantali Dam, although these two obligations are mentioned in the Manantali Protocol.

48. With respect to the Hydrology Fund, SOGEM theoretically has the funds for it, but it is diverting the funds to rural electrification instead, due to political pressures from local communities that are located along the right-of-way for the transmission lines. During the April 2006 appraisal of the Felou Hydroelectric Project (FHEP), it was agreed that the proceeds of the carbon financing package that would become available during the operational phase of the FHEP will be channeled to rural electrification, so that the Hydrology Risk Fund can be provisioned to the agreed levels.

49. While SOGEM's revenue projections from energy sales currently show that it would be able to cover its operational costs and debt service payments and contributions for the

period 2003-2030, non-payment of arrears is an important risk to the sustainability of SOGEM's operations. The FCFA 15.8 billion owed at the end-2005 by EdM (Électricité du Mali) and Société Mauritanienne d'Électricité (SOMELEC) to EEM (which collects the payments for SOGEM), is about eight times the current level of cash in the Fund. (The Société Nationale d'Électricité of Senegal has no arrears.). Although it is the case that: (i) a tariff agreement and structure is in place; and (ii) the three governments guarantee that they will contribute to the debt repayment in the event of adverse shortfalls in SOGEM revenues, these assurances do not address the underlying problems which are causing the member countries' power sector finances to become critical. It should be noted that the vast majority of the Bank loans to the revenue generating entities are backed by the sovereign guarantee. However, virtually all such entities are required to adhere to certain financial covenants in order to benefit from financial discipline and ensure financial viability of the sector. Therefore, credible and sustained actions are still required to build the Hydrology Fund in order to ensure debt service coverage and the financial viability of SOGEM.

50. Moreover, the objective of promoting private sector participation was also only partially achieved. Based on an international competitive bidding process, ESKOM Énergie Manantali (EEM, a private firm) was contracted to operate the facilities. But the search for financing for future generation projects downstream Manantali, in particular Felou and Gouina, is still ongoing.

51. Other REP Experience. RHDP's performance rating for Outcome falls almost in the middle of the group of hydropower REPs desk-reviewed as part of this assessment. Apart from the highly satisfactory rating for the Brazil-Bolivia gas pipeline, ratings were unsatisfactory for 4 of the 8 hydropower-related projects (see table below), or double the 22% Bank-wide proportion. These poor ratings reflect the fact that 4 of the 7 Bank-financed dams produced too much power at too high a price for the targeted market in the first years of operation. However, after these REPs closed, their situations have now vastly improved with the growth in their market and the rise in petroleum prices.

52. Three REPs had negative environmental impacts, such as the sedimentation for Kulekhani, and by today's WB policies, the profitable Kariba would not earn a passing grade because it caused a huge loss in wildlife habitat. There were positive impacts on multipurpose aspects, e.g., fisheries with Nam Gum in Laos, and water resources management with Manantali and the RHDP. Resettlement left much to be desired for 4 dams. Yacyreta made a disastrous start in its mitigation programs and although delays in construction and three subsequent Bank loans provided the extra time and opportunities to get the resettlement program right, the number of families to resettle increased with time and completion was postponed from 1998 to 2008. Institutional development was generally confined to the project owner but for Brazil, the Brazil-Bolivia gas pipeline stimulated private investment in gas distribution and brought about reforms in the structure, output pricing and regulation of the oil and gas sector.

Table 2- Completed World Bank Projects For Cross Border Energy Trading

Name of Project	Cost \$Mill.	Out-come Rating	B/C or EIRR	Impact on Environment	Resettlement	Owner & Operator
Nam Gum Dam ('90)	126	S	2.1	- water , +fish	- compens.	Laos
Kariba Dam ('93)	515	US	2.1	--- wildlife	- compens.	Bipartite
Ruzizi II Dam ('93)	80	US	4%	Not available	-- compens	Tripartite
Kulekhani Dam	119	US	0.5	-- sediment	- compens.	Nepal
Morazan Dam ('89)	745	S	0.7	- water mgmt.	++ compens	Honduras
Itaipu Transm. ('89)	158	S	15%	Not available	Not available	Brazil
Manantali ('04)	445	S	21%	++ water mgmt.	- health.	Tripartite
Yacyreta Dam ('96)	8220	US	0.4 6%	+habitat, + water	-- baseline	Bipartite
Bolivia-Brazil Pipeline ('01)	2086	HS	1.6 22%	+ land use	+ compens.	Bipartite
Chad-Cameroon Pipe	2000	n/a				Segmented

Sources: ICR or PAR (Outcome rating and Internal Rate of Return with date of attribution)

1996 OED Review of Dams (Impacts, Benefit/Cost adjusted to bring resettlement to standards)

Efficiency

53. The RHDP's efficiency is rated *substantial*, based on an economic internal rate of return (EIRR) of 21 to 24 percent when the project was completed in 2004 (based on normal generation capacity and normal capacity alternating with droughts every 5 years), compared to the 16 percent estimated at appraisal. The EIRR was not recalculated by the IEG mission since it would now be clearly even higher at current global petroleum prices.

54. Although the EIRR component of the efficiency rating was given greater weight, it should be noted that performance on other aspects of efficiency were *modest*, given the substantial delays in project completion and overruns in power plant costs, which are not consistent with the best practice in terms of cost effectiveness. Further, financially, EdM and SOMELEC continue to accumulate arrears (SENELEC is current). Consequently, the RHDP's objective of generating surplus revenue to help meet the dam's debt service requirements has been only modestly met, as discussed above. Despite assurances of sovereign guarantees, this is a serious issue as it reflects badly on the willingness of the utilities to fulfill their financial obligations and on SOGEM's ability to collect necessary revenues. The goal of mobilizing private financing of future generation projects also remain to be seen, and the Felou and Gouina project under preparation for Bank financing will be the test case.

55. Other REP Experience. REPs generally yielded high rewards, except for the Morazan, Ruzizi II, and Yacyreta dams, which showed low benefit/cost ratios in their early years of operation. Implementation efficiency has been variable: the Chad-Cameroon pipeline was completed one year ahead of schedule but its supervision was costly. Cost and time overruns were huge for dams at Kariba, Kulekhani and Yacyreta.

Institutional Development Impact

56. The project's institutional development impact is rated *substantial*, as the project is expected to make significant contributions to the Region's ability to use its natural and human resources more efficiently. The degree of cooperation achieved by the three countries are exemplary and perhaps unique in the African region. A common Water Charter that was agreed among the three riparian countries established principles for water resources management and the protection of affected populations. The application of these principles has been tested and was proven functional. OMVS and SOGEM have also proven to be effective in their respective roles as the river basin organization and owner of the Manantali dam as well as the associated generation and transmission assets. Both are pursuing the PASIE recommendations, although financing to scale-up the pilot activities has not yet been forthcoming.

57. There is strong evidence pointing to a high degree of public participation. A new Commission on Water Resources serves as a national-level forum for water users, regional communities and NGOs. In addition, several local coordinating committees have been created for regular consultations on water resources management and are functioning smoothly. Beneficiary interviews and documentation reviews indicate that there are effective feedback loops that link consultative processes and policy-setting within a decentralized institutional set-up. A clear example is the recent action to support rural electrification along the transmission lines, given the complaint from local communities that only urban areas have benefited from electricity generated from Manantali. (While this is a relevant response, the funding used—i.e., the Hydrology Risk Fund to service Manantali debt-- was inappropriate.)

58. An environment monitoring unit and an environmental database have been established in the Office of the High Commission in OMVS. This will be further strengthened and extended to Guinea through the ongoing GEF Regional Senegal River Basin Water and Environmental Management Project. The objective of this project is to provide a participatory and strategic framework for the environmentally sustainable development of the Senegal River Basin and to launch a basin-wide cooperative program for trans-boundary land and water management. The realization of these objectives was greatly strengthened in May 2002 when the three Heads of State of OMVS approved the Water Charter, within the context of the RHDP. The Charter specifically addresses the issue of sound environmental management and acknowledges the need for public participation in the management of shared water resources.

Sustainability

59. The project's sustainability is rated *likely*, albeit moderately so given the debt servicing risks caused by the serious arrears of EdM and SOMELEC to the Hydrologic Fund. This issue of financial arrears must be addressed and the member governments need to take firm action, as SOGEM's financial resilience is currently in question due to these large arrears. Although there are sovereign guarantees to service the Manantali debt, and debt service coverage is not a Bank financial covenant under RHDP (there were no financial covenants on the three national utilities under the project), it is important for the Bank to support the donors' calls for EdM and SOMELEC to settle their arrears, and for SOGEM to finance the Hydrology Risk Fund to the agreed level of 15 billion FCFA. Assurances are often given that member states and OMVS are likely to provide the necessary financial resources to SOGEM, given the critical role played by the Manantali facilities in the regional energy market, but fact remains that the Fund only has 2 billion FCFA by early-2006. Moreover, although the sovereign guarantees ultimately ensure that the project-level finances will be sustainable, the finances of the sector remain in a precarious situation due to the artificially low electricity tariffs for final end-users. (Note that SOGEM fully recovers costs at the point of delivery, for which the figures are provided in the table below.) Given the continuing fiscal drain from the energy sector in the three countries, the issue of overall energy sector reform should remain an important component of both country/sector and project processing dialogue.

Table 3 : Energy Sales Prices to Utilities at Specific Sales Points (Coyne and Bellier Study)

Tariffs	Rate	Base-reference Tariffs	Specific Tariffs
Sale Price for EDM			
Fixed payment	52%	90098,2 MXOF	4 731,0 MXOF
Proportional tariff at Bamako	2,24%	19,12563 XOF	19,56411 XOF
Proportional tariff at Kayes	1,13%	19,12563 XOF	19,34385 XOF
Proportional tariff at Kita	2,24%	19,12563 XOF	19,56411 XOF
Sale Price for SENELEC			
Fixed payment	33%	9 098,2 MXOF	3 002,4 MXOF
Proportional tariff at Matam	3,13%	19,12563 XOF	19,74356 XOF
Proportional tariff at Dagana	4,79%	19,12563 XOF	20,08737 XOF
Proportional tariff at Sakal	5,56%	19,12563 XOF	20,25155 XOF
Proportional tariff at Tobene	6,85%	19,12563 XOF	20,53229 XOF
Sale Price for SOMELEC			
Fixed payment	15%	9 098,2 MXOF	1 365,7 MXOF
Proportional tariff at Rosso	5,37%	19,12563 XOF	20,21088 XOF
Proportional tariff at Nouakchott	7,13%	19,12563 XOF	20,59479 XOF

60. Otherwise, financial issues aside, the sustainability of the project is likely because of its huge economic resilience as the result of current and forecast high oil prices. The project's physical sustainability is also assured. A reliable water-power yield can be achieved and efficient plant operations can be sustained as long as the dam's storage capacity is adequately used to manage river flow variability. The use of modern, computerized information technology in transmission system control and monitoring also enhances the long-term reliability of the transmission system. A private operator (ESKOM) is responsible

for power plant operations based on contractually agreed norms, standards and stringent performance criteria, as well as additional investments to ensure network reliability and extension to serve existing and new consumers.

61. The RHDP's environmental sustainability is also likely. The Water Charter set out the reservoir management policies, while PASIE has strengthened stakeholder participation and environmental management at the basin level. The ongoing GEF regional water resources management project would enhance RHDP's sustainability by further strengthening environmental management capacity-building, collecting data, and building knowledge on transboundary reservoir management.

62. Other REP Experience. For REPs in general, the parallel review finds that technical arrangements to sustain the benefits have proven adequate although dam safety may be a gray area worth investigating further. While Bank guidelines were complied with during implementation, one cannot be certain that they were afterwards since experience has shown that the effectiveness of periodic inspections relies in great part on the local capacity to carry them out. Financial sustainability is no longer an issue for older investments; on the contrary, issues often arise on how to apportion the economic rents that dams generate. For new dams, there are often two important issues that impinge on sustainability: (i) funding for unfinished resettlement; and (ii) debt servicing especially for those that massively resorted to commercial loans.

Bank Performance

63. The Bank's performance is rated *satisfactory*, although the quality at entry was moderately satisfactory and the supervision was weak during the early states of implementation. The Bank's experience in this project shows that much leverage can be achieved while financing only 9% of the RHDP's total cost. The Bank is credited for championing the application of environmental and social safeguards as part of the PASIE, conducting the high-level and sensitive dialogue among the three countries, and providing the "safe space" for multiple donor project teams to collaborate. The Borrowers credit this ability to focus on key issues and convoke negotiating parties as an important factor in forging tripartite agreements, and minimizing the delays and cost increases that threatened the project at the start.

64. The Bank participated effectively during project preparation and appraisal, and allocated a significant amount of time and resources to donor coordination, which at times showed signs of disagreement and potential collapse of the dialogue. The project documents also show that the Bank was instrumental in finalizing, after three years delay, the Water Charter agreement as well as the tripartite tariff agreement. However, the Bank should have ensured a better readiness of the project for implementation-- particularly with respect to civil works, considering the Bank's vast experience in dealing with these type of contracts-- and should have obtained stronger commitments from the governments with respect to their undertakings.

65. With respect to compliance with safeguards, the Bank ensured that an environmental impact assessment of the project was carried out, which facilitated the implementation of the PASIE, the reservoir management mechanism that the PASIE mandated, artificial flood measures, and pilot activities in the health, micro-business and rural electrification areas.

66. The Bank's supervision was satisfactory overall, although it started slowly. Moreover, although there was a supervision mission about every 5 months, only 8 site visits were made out of 14 missions between project effectiveness and closure. Also, the final four missions (March 2000 to May 2003 period) were made only by the Task Team Leader, despite the sustained supervision effort required by the PASIE sub-components at a time when the Water Charter and the reservoir management plan had not yet been adopted. Nevertheless, Bank staff showed flexibility and responsiveness to implementation issues as they evolved.

67. Other REP Experience. The parallel review of REPs shows that the Bank has the unique comparative advantage of acting as a convener and resources catalyst, for which it offers many integrative and specialized technical skills. It has used these assets well in most cases and also become a valued promoter of good environmental and resettlement standards.

68. The Bank also has generally performed well in terms of REP identification and risk management. In the past, the Bank may have erred on the conservative side in seizing and creating opportunities, but when it chose the right project to do—irrespective of whether it did it right—the rewards-risk ratio was potentially sound. The Bank engaged in more than two countries only twice among the 10 projects included in this REP desk review. And on two occasions, namely, for Brazil-Bolivia pipeline and Yacyreta projects, only one side got most (if not all) of the financial help for a cross border project. Bolivia and Paraguay, respectively, acted on their own. In Bolivia, it was on the basis of Bank endorsed privatizations, while in Paraguay, only minimum steps were taken given the prospect of an overabundant electricity supply, which weakened the will to reform.

Borrowers' Performance

69. The performance of the Borrowers is rated *satisfactory*, but moderately so, given the governments' failure to adhere to some of their undertakings and the implementing agencies' failure to expeditiously address implementation delays. However, at the end, OMVS and SOGEM proved capable of achieving the RHDP's multiple objectives and complex trans-boundary operations. The three member countries also demonstrated their commitment by signing the common Water Charter, which is now considered a model for river basin development in Africa.

70. The overall performance of OMVS was satisfactory and its effectiveness is evident from its planned programs and current actions, which were corroborated by field interviews in the three countries as well as among other donors. Particularly noteworthy is its continuing support for PASIE's objectives and technical assistance activities, even though the project

already closed in June 2004. This is evident from the maintenance of the staffing and institutional structures initiated under PASIE, with a view to scaling up these pilot activities under Bank and GEF projects currently being prepared. However, an issue that needs to be addressed is the diversion to rural electrification of the funds that were intended for provisioning the Hydrology Risk Fund.

71. SOGEM's overall performance in the physical implementation of the project was also satisfactory. Although procurement issues were somewhat contentious and caused delays, SOGEM, with the assistance of its consultant, eventually addressed contentious procurement issues and managed project implementation diligently. Project documents show that SOGEM closely monitored the construction of the power plant facilities and the transmission lines. However, although SOGEM addressed transparently all implementation problems in its progress reports, and collaborated well with contractors to find solutions, it did not process payments expeditiously thus resulting in numerous work slowdowns by the contractors.

Main Lessons from the RHDP and Regional Projects

(a) *Regional projects are high risk operations that are complex and resource-intensive but can yield high rewards. REPs are demanding but these demands can become assets in later years.*

72. Regional energy projects (REPs) differ from national projects in ways that have important implications for defining Country Assistance Strategies for the member countries, mapping out lending operations, and allocating budgetary resources.

73. REPs require full stakeholder analysis to understand both (i) the level of commitment, efforts already undertaken and power exercised by the leaders and champions of reform, and also (ii) who the winners and losers are. Starting a REP or even completing one like RHDP raise many questions for governments and utilities. Their political desirability and feasibility are not always evident and member countries may prove fickle. Country commitment seems stronger for operating existing facilities compared to investing in new ones; (for example, Zimbabwe's independence war did not jeopardize O&M at the Kariba dam. Yet lasting troubles in a major partner country like Zaire took its toll on the Ruzizi dam). Countries may give paramount importance to energy security and be willing to diversify away from oil or coal, yet limit imports for gas or electricity. (In the EU, for example, power imports by large countries have seldom exceeded 20% of their needs). Among REP member countries, exports could be impeded by other hot button issues like rent-sharing among domestic and foreign populations. (In Chad, this issue was defused by mechanisms that promote benefits-sharing by the population at large. In Argentina, local power consumption was subsidized when its cost was pushed upwards by exports to Brazil. In Bolivia, gas exports to Brazil were accepted, those to Chile were not and the opposition is not only about the royalty amount. And even without any unrest, political pressures bear on the renegotiation of production

sharing and supply agreements.) If heavy reforms are contemplated, the political economy is even more complex.

74. REP risks may be minimized by: (a) clear and equitable agreements on costs/benefits sharing and project output pricing; (b) capable project management and operation, possibly by using global energy investors and ring-fencing their governance and regulation against political interference; and (c) implementation supervision mechanisms that are agile enough to deal with all the main stakeholders and sound enough to inspire their trust and respect.

75. Regional approaches require the willingness of partner countries to share benefits and implement mechanisms that could potentially infringe on their sovereignty. They also demand stronger expertise from Bank staff in building institutional capital among the member countries. This includes the ability to forge a broad-based legitimacy of the authorizing environment, intricate vertical and horizontal partnerships, strong public participation, and robust systems to ensure fairness for sharing benefits. Overall, the REP desk review finds that while the performance of Bank-financed REPs is improving based on these criteria, high-profile exceptions do occur and are the ones that dominate the attention of external audiences, to the detriment of lesson-learning from successful experiences such as the RHDP. For example, weak participation by local populations hobbled Yacyreta's environmental and resettlement plans but more consultations eventually took place and made a difference in the design of recent projects, e.g., the RHDP and more so the REPs involving pipelines. Reversals have also occurred, such as Chad shifting royalties away from the funding of social programs and thus undermining the major project objective of more equitable benefit-sharing.

76. Differences in institutional capital matter all the more if the project aims at deep and sophisticated reforms such as market liberalization. For this reason, unrealistic objectives such as the establishment of regional regulatory bodies for energy trading have been shelved even in ambitious regional integrations such as the European Union. Differences and severe lags in institutional development were overcome with relative ease for hydro and oil/gas projects by importing and transferring the skills needed for project management and operation, as in the RHDP. They can also be productively managed by well-functioning multinational project companies and entities such as OMVS for Manantali and the electric company of Benin for Nangbeto. A legacy from colonial times, it helped that member countries often shared a common institutional foundations and sometimes a common language, which was also the case of RHDP.

77. ***Project management of REPs have stringent requirements for clarity and efficiency, which once met are key factors of success.*** Compared with national projects, the implementation arrangements, sales/pricing agreements and governance frameworks tend to be sounder because REPs adopt systems that are closer to world standards. REPs also tend to involve the most experienced contractors. The management and operating efficiency of REPs have done well for most projects. The best examples of good practices in close and effective supervision are the pipeline projects, including their environmental and social management plans. Good contractors would do all that could be done even in extreme cases, e.g. flooding at Kariba. But the comparison is not favorable for some dams, e.g., Ruzizi II and Yacyreta where ownership by several governments led to a complex sharing of governance and

crippling political interferences in project management. Bidding and contract awards were sources of delays and cost overruns for the RHDP and Yacyreta. For the latter, the initial delays created opportunities –that were missed – to abort the project, which may have been a less costly strategy to cope with the softening market and the lack of funds than stretching implementation for almost 30 years.

78. ***Cross-border cooperation is essential for managing risks.*** Because regional projects tend to be big, debt-financing also tends to be huge. This would impact heavily on single-country fiscal resources and weaken the financial sustainability of dam projects in the first years (hence the serious concern about RHDP's Hydrology Fund). The regional approach, however, has the advantage of dividing the risks among several off-takers and countries. For example, Kulekhani and Morazan fared much worse as national projects compared with regional power export projects. Intervening in several countries has proven to be a difficult task especially for health and environmental issues. Trans-boundary cooperation was key in resolving issues within REPs. For example, Brazil's Petrobras came to the rescue when its Bolivian partner could not finance its segment of the Brazil-Bolivia pipeline project. The Chad-Cameroon pipeline project was well served by an External Compliance Monitoring Group and periodically by an International Monitoring Group. Selectively in the RHDP, two member countries would voluntarily load-shed to allocate more electricity to the 3rd country during its peak load periods.

(b) The approaches for appraising, monitoring and evaluating regional projects differ significantly from national projects.

79. Regional energy projects (REPs) differ from national projects in ways that have important implications for defining Country Assistance Strategies for the member countries, mapping out lending operations, and allocating budgetary resources. A key lesson emerging from RHDP and REPs is that – compared to single-country projects – the Bank and the Borrowers need to adopt different metrics not only in the processing and implementation of regional projects, but in their evaluation as well. Evidence from the field points to the following important differences:

- Multi-country projects open up opportunities and unexpected benefits that may not be present in a single-country project. The regional approach can serve as a system of checks and balances among the partner countries. The additional efficiencies achieved through the interconnection of the three countries, and the consensual, tripartite approach to environmental issues, are examples from RHDP. The analysis of regional project outcomes, therefore, becomes much more complex.
- In regional projects, there are greater expectations from the Borrowers and the (most likely multiple) donors, and the Bank's role comes into much sharper focus. This, in turn, puts greater weight on quality-at-entry when evaluating these projects, particularly with respect to performance criteria such as the Bank's knowledge of the local political economy, its advice and ability to obtain consensus on design, and its effectiveness in leading policy dialogue across multiple countries. This, in turn, puts greater pressure on partner countries and the Bank to overcome internal silos (for example, in cases where partner countries straddle two or more Bank Country

Departments in the Bank, to what extent do these CDs address jointly the weakest country or stakeholder/s?)

- In the application of safeguards, new instruments such as sub-regional Sector Environmental Assessments (rather than a project-focused EIA) become more relevant across several Borrowers.
- Monitoring and evaluation (M&E) systems become critically important in regional projects, given the need to create strong feedback loops between (i) cross-country performance data and (ii) the setting or harmonization of transnational policies related to regulatory, environmental, financial, economic, political, institutional, governance, transparency and accountability issues that may result from the regional project and affect the whole sub-region. By providing “just-in-time” performance data, effective M&E systems can help minimize the potential delays from having multiple countries involved.

Immediate Challenges and Lessons for Future Regional Projects

(a) For the RHDP – the Hydrology Fund should be provisioned adequately and the PASIE needs to be scaled-up soon

80. The two major shortcomings in RHDP’s otherwise satisfactory outcome are (i) the low end-user power tariffs in the member countries, and (ii) the reticence of Mali and Mauritania to settle their financial arrears with SOGEM, and hence SOGEM’s inability to provision the Hydrology Fund to the levels agreed with the donors and sufficient to service the debt on the Manantali dam. Despite **sovereign guarantees that** the member countries will pay the debt service when it starts to become due in 2007, these large arrears of almost 15 billion FCFA do reflect negatively on the member countries’ willingness to deliver on commitments, merely postpone the long-standing need to adjust end-user tariffs, and could raise issues regarding the sustainability of the Manantali investments if left unresolved for much longer.

81. With respect to the PASIE, the successes of the pilot activities need to be sustained by scaling-up the program in the 3 member countries. As a priority, OMVS needs to develop and implement in coordination with respective health related entities in each country, a health care strategy to address the health problems affecting the population living within the Senegal River Basin, focusing particularly on the reduction of water-borne diseases, the establishment of much-needed health infrastructure, and the strengthening of institutional capacity. Although some of these short-term measures are being implemented under the ongoing GEF project, they need to be accompanied by programs to deal with endemic diseases in the long run.

82. The member states need to pursue more actively the poverty alleviation policies to the extent called for in the PASIE. Specifically, the actions required include job creation and income-generation activities, along with rural electrification and agriculture modernization. Unless conditions underlying persistent poverty are effectively addressed, the economically, environmentally, and socially sustainable development for the Senegal River Basin will remain elusive.

83. To sustain RHDP's positive outcomes and strengthen future operations, OMVS and SOGEM also need to implement measures to strengthen and widen the regional energy market, including network expansion, better resource allocation, and a long-term tariff agreement. Moreover, the member states need to promote conditions that would stimulate both public and private investments.

(b) For Regional Energy Projects – the factors of performance need to be better assessed and the lessons applied to ongoing and future regional interventions

84. It is important to ask which factors tend to be associated with successful REPs and which ones may negatively affect their outcomes. Provided below are emerging factors of performance underlying REPs based on the desk review. While these are not evaluative findings, they can stimulate further debate on how to improve the performance and enhance the sustainability of REPs, and serve as evaluation questions for future assessments of regional projects.

Project Factors of Performance: Identification and Conceptualization

85. Priority to new supplies. It appears that creating a new energy supply source has better prospects in mobilizing ownership and being successfully implemented than distributing an energy “surplus” from one country. One example is that right after its commissioning, a power line to evacuate surpluses from Itaipu was superseded by the strengthening of the whole ELECTROSUL grid. Another example is the decrease in the appeal of the West Africa Power Pool when the prospect of electricity surplus receded because of political unrest in Côte d’Ivoire or delays in getting gas from Nigeria.

86. The Bank playing a role of broker and catalyst. The complexity and risks of regional projects are largely function of several factors:

- size of expenditures and benefits
- number of countries involved
- social and environmental impacts, particularly in the case of dams
- institutional requirements, such as market deregulation

87. Big projects entail large economic and financial risks. They need not be gigantic to be of high risk if they are relatively lumpy compared to alternatives to serve domestic needs. High investments can raise government-guaranteed or -funded debt at unsustainable levels, especially when in hard currency. Sharing the risks and benefits with other countries could be a solution but important questions related to country economic management and political economy need to be analyzed. In this regard, there could be huge errors of omission if the World Bank did not use its comparative advantages as convener, catalyst and promoter of good standards for large investments in energy supply. This is especially true in hydropower for which, as experience suggests¹⁰, development by private sponsors is arduous and requires more public sector involvement than is usually estimated. The difficulty of mobilizing

10. Chris Head, *Financing of Private Hydropower Project*, WB Discussion Paper No.420, July 2000.

private sector interests points to a possibly larger financing role for the Bank and other bilateral/multilateral development agencies.

88. Number of Countries involved While the number of countries involved is a function of the economic, technical, financial as well as political aspects of the project, clearly a larger number of governments involved increases complexity and risks exponentially.¹¹ A study hobbled by too many stakeholders may take too much time and cost too much money while stalling needed investments. A regional intervention works only if the higher level of governance is stable and at arms length with respect to project management and operation and if that management follows governance rules capable of handling diverse owners. As the number of countries increases, so does the risk of disparities in institutional capital, level of commitment and program disruption.

89. Careful pre-screening for social and environmental risks. Potential social and environmental impacts add to the already complex issues (notably the large up-front expenditures) involved in multi- or single-purpose dams. A reliable screening of risk levels can be based on (a) the number of “oustees”, particularly vulnerable ethnic minorities and (b) the area lost at normal storage level.¹² With the thresholds that are acceptable nowadays for either one, many dam projects would be rated high risk¹³ and call for extra caution as proposed in the Dams Management Action Program.¹⁴ All the dam projects reviewed here, except Morazan, would be rated high risk if only because they displace more than 20 people per megawatt (e.g., 218 for Nangbeto).

90. Avoidance of complex institutional requirements. The ICR for the Brazil-Bolivia pipeline project regrets that contracts were too rigid and suboptimal. But should the project have waited for deregulation in both countries? The answer is probably no. Market deregulation and its corollaries such as service unbundling, Third Party Access and auction-based pricing will most likely put any project in the high risk category. This package of reforms is hard enough to implement in one country even in the best of cases: for power, it was rejected in Thailand¹⁵ and Mexico after it failed in California, not to speak of the Ukraine and Argentina where it was undermined by macroeconomic woes. Putting together a sound regional project design and mobilizing resources to tap most of its benefits early is often enough of a challenge. If contracts can do the job, maybe market deregulation should be promoted through simpler national projects and not through regional approaches.

11. *Transport Corridors in Africa*, OED 1994.

12. R. Goodland, “*Environmental Sustainability in the Hydro Industry-Disaggregating the Debate*”, in *Large Dams, Learning from the Past Looking at the Future*, April 11-17, 1997 Workshop Proceedings, Gland, Switzerland, IUCN-The World Conservation Union and the World Bank.

13. Define high-risk as follows: (i) major according to the International Journal on Hydropower and Dams definition or (ii) high output or cost relative to the country’s need and budget or (iii) any operation, irrespective of size that has high social and environmental impact in the Goodland definition.

14. High risk project processing should include: (a) the steps prescribed or advised in the BPs e.g. on pre-feasibility screening, resettlement, stakeholders’ participation, international water agreements and (b) extra due diligence on river basin planning, benefits sharing, licensing criteria, usage and pricing requirements.

15. *Thailand-Why Liberalization May Stall In a Mature Power Market* ESMAP Report 270/03 October 2003.

91. Scaling objectives to the weakest link. Moving forward, a key issue for the Bank is to assess whether it is assuming too many downside risks—waste of time, unmet objectives—if it were to focus on the establishment of full-fledged regional power pools and an open spot market that call for simultaneous reforms in several countries and just one of those countries with little at stake or weak commitment has the ability to delay or block progress. Consequently, it may be better to minimize the need for blanket regional treaties that have a slim chance of materializing or being enforced, while not bringing about any concrete projects. The cautious approach of the past suggests that involving three countries or less enables projects to tap most if not all of the benefits of a regional approach. Where this was followed, experience suggests that it is relatively easy to arrive at bilateral or trilateral agreements tailored to the project needs.

Project Factors of Performance: Implementation

92. Sanctity of international agreements. The need for international agreements forces more clarity and international good practice into a project. Negotiations may be protracted but the result is often worthwhile: compared with single country projects, regional agreements tend to be harder to tinker with because once closure is obtained at the political level, governments tend to provide checks and balances for each other.

93. Involvement of multinational corporations. Once a project is identified and its scope defined, it is the quality of governance and project management that will make the most difference in managing risks in the long run. In setting up these entities, energy projects enjoy two advantages: (a) international agreements that can be used to ring-fence their management from political interference and (b) the existence of competent corporations -- global contractors and investors and at times local operators-- whose core business is the construction and operation of energy projects. Greenfield institution-building is a slow and risky undertaking; therefore, before creating new ones, it may be better to try and use a well-functioning one, as is or by expanding its mandate and/or membership (e.g., by admitting Guinea into OMVS).

94. Revenue-sharing mechanisms. The sharing of project benefits both among the countries and within each one is a hot-button issue. It can make or break any deal whatever its economic merits. Because the stakes are so high, the governments involved and the Bank can no longer shy away from marshalling equitable and workable solutions to this problem. A recent examples that yields many useful lessons is the Chad-Cameroon pipeline for oil & gas. Future projects for which the Chad-Cameroon pipeline sharing agreement may be instructive, include the Inga in Zaire or Cabora Bassa in Mozambique for hydropower.

95. Effective supervision. Supervision mechanisms and entities are important in dealing with risks related to inefficient public authorities or new institutions that are not yet fully operational in the first years of a regional project. Compliance Monitoring Groups and International Advisory Groups are good practice as long as they are competent and agile enough to act promptly across borders and to inspire trust and respect by the main stakeholders in the partner countries. In the case of RHDP, they should be independent from the member governments, OMVS and SOGEM. As with any project, the responsibility for decision-making should not be confused with the role of competent technical advice. For

regional projects, agility depends on the ability of partner countries and the Bank to overcome the “technical silos”, which are often manifested by poor communications at the intermediate technical levels and decision bottlenecks at higher levels.

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Annex A. Basic Data Sheet

MALI/MAURITANIA/SENEGAL – REGIONAL HYDROPOWER DEVELOPMENT PROJECT (CREDITS 2970, 2971, 2972)

Key Project Data *(amounts in US\$ million equivalent)*

	<i>Appraisal estimate</i>	<i>Actual or current estimate</i>	<i>Actual as % of appraisal estimate</i>
Total project costs	445.5	342.6	76.9
Loan amount	38.7	36.5	94.3
Cofinancing	406.8	306.1	75.2

Cumulative Estimated and Actual Disbursements By Fiscal Year

(In US\$ million equivalent)

IDA Credits	1998	1999	2000	2001	2002	2003	2004
Mali (IDA 29700)	2.87	1.88	1.74	2.96	1.45	3.55	1.29
Mauritania (IDA 29710)	1.70	1.57	2.29	1.59	0.48	2.57	0.36
Senegal (IDA 2920)	1.61	1.45	2.11	1.67	0.47	2.36	0.53
Total	6.18	4.90	6.14	6.22	2.40	8.48	2.18
Total Cumulative	6.18	11.08	17.22	23.44	25.84	34.32	36.50

Project Dates

	<i>Original</i>	<i>Actual</i>
Initiating memorandum	06/17/1991	06/17/1991
Negotiations	05/14/1997	05/14/1997
Board approval	06/26/1997	06/26/1997
Signing	09/10/1997	09/10/1997
Effectiveness	01/08/1998	04/30/1998
Closing date	06/30/2002	06/30/2003

Staff Inputs (staff weeks)

	<i>Actual</i>	
	<i>N° Staff weeks</i>	<i>US\$US\$('000)</i>
Preappraisal	n.a	n.a
Appraisal	30.90	105.20
Supervision	n.a	265.53
Total	30.90	370.73

Mission Data

	<i>Date (month/year)</i>	<i>No. of persons</i>	<i>Staff days in field</i>	<i>Specializations represented</i>	<i>Performance Rating</i>	
					<i>Implementation Progress</i>	<i>Development Objective</i>
Identification/ Preparation	n.a	n.a		n.a		
Appraisal	11/26/1996	15		Mission Leader (1), Power Engineer (1), Lead Advisor (1), Counsel (1), Agriculture Specialist (1), Environment Specialist (1), Environment Legal Specialist (1), Private Sector Specialist (1), Health Specialist (1), Task Team Assistant (1), Economist (1), Consultants for economic, hydrology, financial and institutional (4)		
Supervision	06/05/1998	1		Sr. Energy Specialist (1),	S	S
	02/10/1999	5		Team Leader (1), Environment Specialist (1), Financial Specialist (1), Agriculture Economist (1),		S
	10/21/1999	6		Project Officer (1)	S	
	03/06/2000	1		Team Leader (1), Economist (1), Reservoir Management (1), Financial Management (1)	S	S
	06/05/2002	1		Procurement (1), NGO (1)	S	S
	09/20/2002	1		Task Team Leader (1)	S	S
	05/21/2003	1		Task Team Leader (1)	S	S

	<i>Date (month/year)</i>	<i>No. of persons</i>	<i>Staff days in field</i>	<i>Specializations represented</i>	<i>Performance Rating</i>	
					<i>Implementation Progress</i>	<i>Development Objective</i>
				Task Team Leader (1)		
				Task Team Leader (1),		
Completion	05/21/2003	1		Task Team Leader	S	S

Annex B. Note on the Desk Review of World Bank Regional Energy Projects

1. To increase the usefulness of the findings and lessons from this Project Performance Assessment Report (PPAR) and enhance its relevance to the World Bank's growing number of regional energy projects (REPs), IEG conducted a desk review of other regional projects in the electricity and oil & gas subsectors, to serve as the larger context for comparative performance vis-à-vis the Senegal/Mali/Mauritania – Regional Hydropower Development Project (RHDP). The desk review covered 9 projects that supported cross-border energy trade and include 7 hydropower and 2 pipeline projects (with the year of closing indicated):

- Nam Gum hydropower (1972) in Laos serving Laos and Thailand
- Kariba hydropower at the border of Zambia and Zimbabwe serving both (1980)
- Ruzizi II hydropower at the Burundi-Rwanda-Zaire border serving all 3 (1989)
- Nangbeto in Togo serving Togo and Benin (1992)
- Itaipu hydropower at the Paraguay-Brazil border serving both (1984)
- Manantali hydropower in Mali serving Mali, Mauritania and Senegal (2004)
- Yacyreta hydropower at the Paraguay-Argentina border serving both (2003)
- Bolivia- Brazil gas pipeline (2000)
- Chad-Cameroon petroleum pipeline (2004)

2. The overview also mentions technical assistance for establishing/improving power trade in West Africa (WAPP), South Africa (SADC), Latin America and the Greater Mekong area. Data and comments are added for two projects not intended for regional trading but that exported a fair share of their output at least in their first years of operation:

- Kulekhani hydropower in Nepal (1982)
- Morazan (El Cajon) hydropower in Honduras (1985)

3. The World Bank's main regional REPs are found in the hydropower and oil/gas pipeline subsectors. The experience and lessons from REPs are still relevant today. REPs have yielded sizeable benefits and the risks, while high, were well known and manageable. REPs have special characteristics: they have seldom involved more than two countries; they have relied on regional institutions to facilitate the trans-boundary studies; and they have hardly needed major reforms because they could be implemented and run by enclave multinational companies that tend to enjoy better governance and resilience than national utilities and operate with relative efficiency under their own rules.

4. **Main Characteristics of REPs.** The RHDP shares many of the characteristics of other REPs, as follows:

- REPs are high risk-high reward operations. There are many opportunities for REPs whose costs and benefits to the main stakeholders make them politically desirable to

undertake. However, the same cannot necessarily be said for power interconnection projects that redistribute a tight supply.

- Desirable REPs include the development of hydropower, fossil fuel production and energy transport markets. Since they involve high risks at the outset, they should avoid additional complexity, e.g., involve 3 countries or less, and stick only to the most essential policy reforms.

Other REP characteristics are discussed immediately below.

5. **Rationale and Scope of REPs.** The REP concept usually originates from sector studies that make the case for energy market integration as well as regional approaches to tackle the complex package of policies and investments. Generally, region-wide studies have plodded along for 5 to 10 years (e.g., for power pools), and even longer the more countries are involved. In some cases, these studies have led to projects in (rarely more than) two countries and have featured multipurpose or single purpose hydropower plants and/or dedicated transmission lines; upstream oil or gas development with dedicated pipeline facilities; cross-border interconnections to enhance supply reliability, albeit more rarely. These REPs are usually justified on the basis of: (a) using a resource located at the common border of several countries; (b) enhancing the availability and low cost of energy and water by tapping a cheap resource endowment that is too big for any one country to develop, and maximizing economies of scale; and (c) promoting regional integration as an overarching political goal. What precipitates the actual REP intervention is an imminent shortage or a surge in demand, or potential problems created by the sub-optimal or unilateral use of a common resource. This, and a common border resource, apply to the RHDP.

6. The quality of REP studies was generally mixed and although relevant, their impact was notable only when they fed into well-funded projects. The contrast is striking between (a) studies that led to projects and sales contracts involving 2 or 3 countries and (b) region-wide studies to foster regional power trade and power pools. For the latter, some long-awaited agreements have emerged, e.g., for the West Africa Power Pool (WAPP) and the Mekong River Basin. Even then, only the basics have been addressed and a lot remains to be done to arrive at a regional pool and tangible benefits.

7. **Role of the WB and Partners in REPs.** The WB eschewed dam construction for Itaipu (helping with Extra High Voltage transmission only) and Manantali (transmission and generating facilities only). Lending involved the usual partners: energy ministries and national companies in each country, multilateral and bilateral donors, and commercial banks. Oil & gas projects involved major global energy investors in addition, e.g. Exxon and Chevron for the Chad-Cameroon pipeline. Donors funded a large share of the studies (often through trust funds such as the Energy Sector Management Assistance Program and the Population and Human Resource Development Fund) but only a small fraction of the physical components. Regional entities played a limited role, mostly as facilitators for studies involving more than two countries, e.g., the Greater Mekong Commission, the Comisión de Integración Eléctrica Regional for power trading in Latin America, and Economic Community of West African States (ECOWAS) for the WAPP.

8. Project management was-- and operation continues to be-- vested in multinational entities when dealing with a shared resource at or near common borders, e.g., dams at Ruzizi, Kariba, Manantali, Itaipu and Yacyreta. For pipelines, the segment in each country is jointly owned by global investors and a partner in that country, generally a state-owned enterprise (an exception is the YPBF, a private company holding the minority share of Chad in the Chad-Cameroon pipeline). Consultation and mutual support agreements were and still are used among co-owners, e.g., assistance by Zimbabwe to Zambia and by Argentina to Paraguay for the operation and maintenance of Kariba and Yacyreta respectively.

9. After the REPs closed, their situations have now vastly improved with the growth in their markets and the rise in petroleum prices. One exception, however, is Yacyreta: although the last unit was commissioned in 1998, the plant operates only at 60% of capacity because the reservoir cannot be filled until resettlement difficulties have been overcome.

Annex C - Description of the Transmission System

The transmission system from Manantali consisted of an Eastern System toward Bamako and a Western System toward Dakar. The Eastern System comprised a 306 km long, single-circuit 225 kV transmission line (TL) from Manantali to Kodialani (Bamako), with an en-route supply at Kita; and a 20 km long, 150 kV TL built between Kodialani and Sirakoro, where the Eastern System interconnects with Electricité du Mali (EDM s.a) system. The Western System comprised a 945 km long, single-circuit 225 kV TL from Manantali to Tobene. At Sakal it interconnected with the Société Nationale d'Electricité du Sénégal (Senelec) system. The Sakal to Tobene 225 kV TL already existed. Substations ensuring energy supply were to be established at various locations along the Senegal River, in particular Kayes, Matam, Dagana, and Sakal. From Dagana, a 30 km long, single-circuit 225 kV TL was to be fed at Rosso through a 132 kV, 195 km TL with Société Mauritanienne d'Electricité (SOMELEC)'s system at Nouakchott. At Matam, the network was to connect into a 90 kV, 86 km TL to Kaedi.

Annex D - PASIE Components

The components of the Environmental Impacts Monitoring and Mitigation Program (PASIE) are described below:

(1) Monitoring, Coordination, and Communication Program

This component called for continuous collective consultation through a steering committee at the regional OMVS level, and subcommittees in charge of water management and environmental health assessments. The program also called for effective public participation through committees established at local and national levels, as well as initiation of an active public information process. Environmental monitoring was also put in place, and environmental databases were created.

(2) Construction Impact Mitigation and Monitoring Program

To further enhance and strengthen the environmental monitoring aspect of the project, comprehensive environmental management procedures and detailed remedies were included in the project civil works contracts. These procedures proved effective in limiting physical degradation to the maximum extent possible to the dam and power facilities immediate environment.

(3) Appropriation and Right-of-Way Program

This program consisted of three parts: (i) Right-of-way during construction, where the transmission line program sought to avoid already developed land, and expropriations largely avoided privately owned agricultural land; (ii) a compensation program for privately occupied land, based on market values; and (iii) a reforestation program mandating compensation for affected public forests to be made by OMVS in the form of reforestation of an equivalent area.

(4) Optimal Reservoir Management Program (ORMP/MRMP)

This component involved studies assessing the implications of specific water uses. Important factors included the artificial flood from the Manantali dam, and optimization of the management of Manantali and Dama dams. Studies have been undertaken to support the preparation of the MRMP and the Water Charter, which are now in effect.

(5) Environment Sanitation Program (ESP)

Environmental health and environmental concerns arose not as a consequence of the project, but as a consequence of the Dama and Manantali dams, which were not financed by IDA. The area had become prone to water-borne diseases, especially intestinal and urinary bilharzias and malaria. To address these issues, the three Governments, in agreement with the World Bank, made the strategic choice to limit the role of the OMVS HC to an awareness,

monitoring and integrative role of national health and environmental health programs in the Basin. As a result, environmental health activities planned by PASIE were limited to three domains: (i) pilot projects aimed at limiting contact between humans and infected water, preceded by a feasibility study; (ii) study of reservoir fluctuations, to better define their correlation with the decrease in the number of snails, transmission agents of bilharzias; (iii) preparation and monitoring of a regional environmental health plan.

(6) Other Associated Measures

These measures included: (i) assistance to the Manantali limnology unit, whose goal was to monitor the water quality of the reservoir, the traditional fishing system in the reservoir, and the health status of people in the area. This assistance also provided expertise in freshwater fishing to Senegal and Mauritania, as well as to other parts of Mali; (ii) promotion of rural electrification in the Senegal River Basin, consisting of a comprehensive study of the promotion of electricity in rural areas, and detailed studies on the design of adequate supply solutions; and (iii) poverty alleviation and income generating activities.

Annex E - Project Financing Shares (at appraisal)

Doner/Lender	% Share
AFD	22 %
KFW	14 %
FADES	10 %
UE	9 %
BEI	9 %
IDA	9 %
FAD	8 %
BID	6 %
ACDI	6 %
BOAD	5 %
SOTELMA	1 %
MAURITEL	1 %
Interest	2 %
Total	100 %

Annex F - Borrower Comments

**ISLAMIC REPUBLIC OF MAURITANIA
MINISTRY OF RURAL DEVELOPMENT**

**PROJECT PERFORMANCE ASSESSMENT REPORT
for the
“MALI, MAURITANIA AND SENEGAL REGIONAL HYDROPOWER
DEVELOPMENT PROJECT”
THE WORLD BANK JUNE 21, 2006**

COMMENTS ON THE FORMAT OF THE REPORT

After reviewing the document, a number of observations regarding the format were made.

The document contained the following spelling and grammatical errors and omissions:

Page on Abbreviations and Acronyms: the list is incomplete;

Page 2, 1.7: Please replace with “le Haut Commissariat est dirigé” [the High Commission is headed];

Page 2, 1.8: Please replace with “Elle (la SOGEM) est gérée.... et dirigée” [It is administered...and headed by];

Page 2, 1.11: Please replace with “le Haut Commissariat” [the High Commission];

Page 3, 1.11: Please replace with “devait fournir à la SOGEM l’expertise” [was to provide SOGEM with expertise];

Page 5, 1.20: Please replace with “l’appel d’offre a été lancé” [the bidding process was launched];

Page 5, 1.20: Please replace with “il eut” [there was];

Page 5, 1.21: Please replace with “les frais d’exploitation de l’O MVS” [operating costs of OMVS];

Page 5, 1.21: Please replace with “leur contribution à son budget” [contribution to its (SOGEM’s) budget];

Page 6, 1.22: Please replace with “la saison des pluies de 1999” [1999 rainy season];

Page 6, 1.26: Please replace with “l’OMVS et la SOGEM se sont adaptées” [OMVS and SOGEM adapted];

Page 7, 1.27: Please replace with “la passation des marchés... devrait aussi être avancée” [procurement activities...should be as advanced];

Page 7, 1.27: Please replace with “gestionnaires” [management];

Page 7, 2.2: Please replace with “Le PDRH a également mis” [The RHDP also mainstreamed];

Page 8, 2.5: Please replace with “du Haut Commissariat” [of the High Commission];

Page 8, 2.5: Please replace with “(RAOB)”;

Page 9, 3.2: Please replace with “populations riveraines du bassin du fleuve” [population of the Senegal River Basin];

Page 9, 3.2: What does “environnementales 5” mean?;

Page 9, 3.3: What does “les trois pays6” mean?;

Page 9, 3.4: Please replace with “La stratégie 2001 de la Banque a renforcé l’aide technique” [The Bank’s 2001 strategy features increased AAA...support];

Page 9, 3.4: What does “en avril 2006.2” mean?;

Page 10, 3.8: Please replace with “leur installation et mise en service n’ont eu lieu” [their installation and satisfactory commissioning were completed only];

Page 11, 3.12: Please replace with “les trois gouvernements devraient contribuer” [the three governments guarantee that they will contribute];

Page 12, 3.13: What does N/O in Table 1 mean?;

Page 13, 3.18: What does Manantali H mean?;

Page 13, 3.18, Table 2: Please replace with “eau + poisson” [water + fish];

Page 13, 3.18, Table 2: What do the terms “mgmt” and “exploit terre” [land use] mean?;

Page 14, 3.19: Update the EIRR in the final report;

Page 14, 4.1: Please replace with “l’OMVS et la SOGEM se sont avérées” [the OMVS and SOGEM have also proven];

Page 15, 4.11: Please rephrase the final sentence;

Page 17, 6.3: Please replace with “des lâchers” [releases];

Page 19, 7.3: Please replace with “les marchés...ont provoqué”; and “la SOGEM, aidée” [procurement issues...caused; and SOGEM, with the assistance];

Page 22, 8.8, Table 2: Please rephrase the final sentence;

Page 23, 9.3: Please include the poverty reduction level recommended by PASIE;

Page 23, 9.4: Replace with “leurs enseignements appliqués” [applied lessons];

Page 25, 9.9: (b) Replace with “la zone noyée à la cote normale du reservoir” [the area lost at normal storage level];

Page 33, Annex B, 5: Replace with “pertinente” in the first sentence, and “CEDEAO” in the penultimate one” [relevant; and ECOWAS];

Page 35, Annex C: Sakal is not located along the river;

Page 33, Annex D, (5): Replace with “le Haut Commissariat” [the High Commission];

Done in Nouakchott, September 7, 2006.

Annex G - List of Persons Met

I. Senegal

Ministère de l'Économie et des Finances

M. Diatourou Ndiaye, Chef de la Division, Programmation et Suivi des Projets

Organisation pour la Mise en valeur du fleuve Sénégal (OMVS)

M. Mohamed Salem Ould Merzoug, Haut Commissaire

M. Moctar Sylla, Directeur des Etudes

M. Yaya Amadou Sow, Chef de la Division Suivi et
Promotion du Développement Agro-Sylvo-Pastoral

M. Mahamadou Sacko, Coordonnateur du Cache Inclusif, Département Technique

Mme. Ndéye Dior Mbacke, Expert Régional Information et
Participation du Public, Project GEF/BFS

Ministère de l'Énergie et des Mines

M. Cheikh Diakhate, Directeur de Cabinet du Ministre d'État

Ministère de l'Environnement et de l'Assainissement

M. Mamadou Tall, Directeur de Cabinet du Ministre d'État

M. Ndiawar Dieng, Conseiller Technique du Ministre

Mme. Fatima Dia Touré, Directrice, Direction de l'Environnement
Et des Établissements Classés

M. Pathé Balde, Chef de la Division Cadre de Vie

Mme. Aita Sarr Seck, Biologiste Environnementaliste

Mme. Tadia Carvalho Fall, Juriste Environnementaliste

Ministère du Plan et du Développement Durable

S.E. M. Mamadou Sidibe, Ministre

M. Aboubary Demba Low, Directeur de Planification

M. Séni Coly, Conseiller Technique

M. Amadou Dickel Niane, Conseiller Technique

Ministère de l'Agriculture et de l'Hydraulique

M. Oumar Top, Secrétaire Général

M. Thierno Mademba Gaye, Directeur de Cabinet du Ministre d'État

M. Ababacar Ndao, Coordonnateur, Cellule Nationale OMVS

M. Babou Sarr, Directeur de la Maintenance et de l'Entretien

M. Mamadou Sarr, Directeur Adjoint de la Direction Gestion et
Planification des Ressources en Eau

Société Nationale d'Électricité (SENELEC)

M. Abdoulaye Dia, Délégué aux Mouvements d'Énergie et Télécommunications

M. Papa Mademba Biteye, DEA Énergie Solaire
 M. Alioune Fall, Chef du Service Dispatching

II. Mali

Société de Gestion de l'Énergie de Manantali – OMVS (SOGEM)

M. Saloum Cissé, Directeur Général
 M. Mountaga Diallo, Directeur Département Technique
 M. Moussa Niang, Directeur Département Administratif et Juridique
 M. Mahamadou Y. Miaga, Directeur Financier

Ministère des Mines, de l'Énergie et de l'Eau

M. Souleymane Diallo, Chef de Cabinet
 M. Ousmane Kanoute, Conseiller Technique
 M. Oumar Sidibé, Direction Nationale de l'Énergie
 M. Moolibo Traore, Expert Énergie, Cellule OMVS

Agence Malienne pour le Développement de l'Énergie Domestique et de l'Électrification Rurale (AMADER)

M. Amadou Tandia, Président Directeur Général
 Mme. Niang Emma Kourouma, Chef de Service Matrise de la Demande
 En Énergie Domestique

Ministère de l'Environnement

M. Yafong Berthé, Secrétaire Général

Direction Nationale de l'Hydraulique

M. Sidi Touré, Chef de Division Inventaire Ressources Hydrauliques

Projet de Développement Rural Intégré en Aval du Barrage de Manantali (PDIAM)

M. Aliou Bamba, Directeur

Énergie du Mali (EdM)

M. Alpha Sékoou Djittèye, Directeur Général
 M. Daouda Kane, Directeur Général Adjoint
 M. Georges Garrigue, Directeur Général Électricité
 M. Koulibaly, Chef Service de Planification

III. Mauritania

Ministère des Finances

M. Niang Idrissa, Directeur Adjoint de la Dette Extérieure

Ministère de l'Hydraulique

M. Brahim Ould Bah, Coordonnateur National, OMVS
M. Oumar Coulibaly, Directeur
M. Bouyaqui Camara, Chef Service Irrigation
M. Mohamad Fadel Ould Saadbouh, Chef de Service Ressources en Eau

SONADER

M. Guisset Alassane Cherif, Directeur Études et Aménagements

Ministère de l'Énergie et du Pétrole

M. Tall Ousmane, Directeur

Société Mauritanienne d'Électricité (SOMELEC)

M. Mohamed Ould Bahiya, Directeur Général
M. Lam Mamadou, Directeur Général Adjoint
M. Sidi M'Bareck Bihizia, Directeur Technique