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IMPLEMENTATION COMPLETION REPORT

REPUBLIC OF NIGER

**ENERGY PROJECT
(Credit 1880-NIR)**

JUNE 19, 1997

Water, Urban and Energy 2
Africa Region

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CURRENCY EQUIVALENTS

Currency Unit	=	CFA
US\$ 1 1990	=	272 CFA Francs
1991	=	282 CFA Francs
1992	=	264 CFA Francs
1993	=	283 CFA Francs
1994	=	555 CFA Francs
1995	=	499 CFA Francs
1996	=	508 CFA Francs
1997	=	507 CFA Francs

WEIGHTS AND MEASURES

1 meter (m)	=	3.28 feet (ft)
1 kilometer (km)	=	0.62 mile (mi.)
1 cubic meter (m ³)	=	262 US gallon
1 liter per capita per day (1cd)	=	0.26 gallon per capita/day

ABBREVIATIONS AND ACRONYMS

CFAF	Francs of the Communauté Financière Africaine
DANIDA	Danish Ministry of External Affairs
DCA	Development Credit Agreement
EIB	European Investment Bank
GON	Government of Niger
IDA	International Development Agency
KFW	Kredit Anstalt fur Wiederaufbau, Germany
NEPA	Nigeria's National Electric Power Authority
NIGELEC	Niger Electric
PPF	Project Preparation Facility

FISCAL YEAR

January 1- December 31

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PREFACE

This is the Implementation Completion Report (ICR) for the Energy Project in Niger, for which IDA approved a Credit of US\$31.5 million on February 23, 1988. The Credit became effective on July 1, 1988.

The Credit closed on December 31, 1996, two years later than the original closing date of December 31, 1994. IDA disbursed US\$17.4 million or 55 percent of the Credit amount. The last disbursement took place on May 21, 1997. Co-financing was provided by Kreditanstalt für Wiederaufbau (KfW), the European Investment Bank (EIB) and DANIDA. This report was sent to the co-financiers. DANIDA, Niamey, has indicated its agreement.

The ICR was prepared by Mark Segal, Team Leader of the Water, Urban, Energy II (AFTU2) Infrastructure Family, Africa Region, and reviewed by Willem Floor.

The preparation of the ICR began during the project's final supervision mission, in November/December 1996. It is based on material in the project file. The Borrower contributed to the preparation by providing information and reports useful for the preparation of the ICR, as well as an extensive completion report. The English translation summary of the Borrower's completion report is included in this report. The main text of the Borrower's report (88 pages) is in the project file. The Borrower had no comment on the Bank's sections of the ICR.

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EVALUATION SUMMARY

Introduction

1. The Niger Energy Project was part of an integrated approach to meeting energy needs in Niger at least cost while protecting the environment. When IDA appraised the project in 1987 the Government of Niger (GON) was focusing on developments in three priority sub-sectors: household energy, electric power and petroleum. For household energy, predominantly woodfuels, the Government of Niger had developed a plan to decrease woodfuel consumption through conservation and fuel substitution while improving the management of forest resources. In the electric power sub-sector, the emphasis was on rehabilitating and expanding the transmission and distribution system to meet anticipated load growth and replace higher cost diesel generation. The main concern in the petroleum sub-sector was the development of the legal framework and capability to accelerate private sector participation in petroleum exploration. Prior to the Energy Project, IDA had been involved in operations for all three sub-sectors: two forestry credits for increasing woodfuel supplies, a project preparation facility (PPF) for evaluating petroleum prospects, and a technical assistance and engineering credit for defining the least-cost power development program and improving power system organization and management. Also relevant to the sector's overall development was a Structural Adjustment Loan to redefine the role of the State in economic activities including its role in the energy sector.

Project Objectives

2. The project's overall objectives were to develop a strategy to address interconnected energy problems facing Niger's economy, support the financing of the related investments, and help improve the operational and financial performance of NIGELEC within the context of the state enterprise reform program. The development of a strategy required some pilot testing of operations in the household energy sector, additional knowledge of the petroleum resources, and efforts to improve the technical and commercial operation of NIGELEC as a state enterprise. The main project components supporting household energy development were policy changes and investments to improve woodfuel supply and promote the use of more efficient stoves. In the electric power sector, the main components were the construction of new transmission capacity, the rehabilitation of existing transmission and distribution facilities, studies for future power system development, additional equipment, technical assistance and training, and financial covenants concerning tariff levels and financial ratios to sustain NIGELEC's viability. The key components for the petroleum sub-sector were equipment and

consulting services to improve understanding of the resource base, preparation of an exploration strategy, and promotion of areas for exploration and training/technical assistance to the Ministry of Mines and Energy (MME).

Implementation Experience and Results

3. The project partially achieved its objectives with variable performance among the three energy sub-sectors. It achieved most of its objectives in the household energy and petroleum sub-sectors. Although it did not achieve some important objectives for the electric power sector, especially targets for financial performance, GON has committed to a plan of action for power sector reform which should improve power sector operations and financial performance. The project's objectives are sustainable but fragile. The household energy components has established viable mechanisms to help sustain the country's wood supply and avert shortages anticipated at appraisal. In the petroleum sector, the project has helped GON to formulate a clear regulatory framework for petroleum exploration and development, establish an adequate petroleum data base and an effective domestic capability to manage the data base and negotiate petroleum exploration contracts. In the electricity sub-sector, further investments in sub-transmission and distribution facilities, which the project did not finance, will be necessary to attain the benefits of the transmission line that the project constructed. In addition, the implementation of the planned restructuring of the power sub-sector, to which GON and IDA have agreed, should create the necessary conditions for power system expansion and financial sustainability of the sub-sector.

4. The project's implementation extended two years beyond the original closing date (December 1994) because of additional time necessary to complete important household energy and petroleum sub-sector components. Project costs were US\$30.4 million compared to US\$78.5 million estimated at appraisal. Bank disbursements on the Credit amounted to US\$17.5 million or 56 percent of the appraisal estimate. The lower project costs and Credit disbursements resulted from the cancellation of several sub-components for the electric power sub-sector (Part II, Tables 8A and 8B). The major factors external to the project which affected its implementation were: the political and social instability resulting from the transition to democracy during 1990-92, a weakened fiscal administration leading to GON arrears in the payment of its electricity bills, and the devaluation of the CFA franc which increased the local currency cost of imported substitutes for woodfuels, kerosene and liquefied petroleum gas (LPG).

5. The key factors subject to Borrower and implementing agency control which had a beneficial impact on the project were: a strong GON commitment to overcome some legal and institutional obstacles in the implementation of the household energy sub-component and timely completion of a new petroleum law and exploration promotion campaign. Those factors subject to Borrower and implementing agency control that were detrimental to the project were: inadequate efforts to rationalize the system of taxation and transportation for woodfuel supply from non-managed forests, the lack of sufficient commitment by GON and NIGELEC to improve the financial and institutional

management of the power sector during the project's implementation period, the weak management and procurement capability of NIGELEC, and the lack of a clear decision-making process or sufficient knowledge of IDA procurement guidelines necessary for timely completion of the petroleum documentation center. Overall the performance of IDA in project implementation was satisfactory (Part I, para. 23). Despite some deficiencies, the ICR has rated the overall performance of the Borrower as satisfactory because most of the implementation problems were in the power sector and the Borrower made a commitment toward the end of the project to initiate a power sector restructuring process (Part I, para. 25). The overall outcome of the project is satisfactory (Part I, para. 30).

Summary of Findings, Future Operations and Key Lessons Learned

6. The project has completed the necessary pilot operations, data collection and institutional analysis to develop a clear strategy for integrated energy development focused on priority actions in the household energy, petroleum and electric power sectors. The Operational Plan outlines the key actions necessary to sustain project achievements in each of the three sectors. The following lessons emerge from the project's implementation experience and results:

- a) Taking full ownership of a project requires sustaining a commitment to implement all components, and to address any constraints early in the project's implementation.
- b) In the household energy sector, it is possible to manage natural forests on a sustained basis with a project that includes both policy and investment components with a flexible approach to implementation and commitment of the Borrower to project objectives. It is important to realistically assess and anticipate both the demand and supply-side risks associated with implementing energy substitution programs.
- c) In the electricity sub-sector, despite adequate technical design and implementation capability, operational results are not likely to be satisfactory in a fundamentally defective financial and institutional context.
- d) In the petroleum sub-sector, it is possible that in Niger, and in other countries, an appropriate division of responsibilities between the public and private sectors combined with a supportive business framework will reduce non-commercial risks sufficiently to encourage private international oil companies to sustain the technical and commercial risks of petroleum exploration.

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PROPOSED OPERATIONAL PLAN

1. In order to ensure the sustainability of project objectives achieved and to reinforce those that need further attention, it is important for the Borrower and its implementing agencies to adhere to the following plan, which covers the three energy sub-sectors of concern to the Energy Project :

Household Energy

- a) It is necessary to reinforce the achievements under Energy II and extend benefits further in Niger through a follow-up project, which would extend over a five-year period. Discussions with donors are underway on the basis of detailed project documents which the project management has developed and updated over the past several years. The fiscal mechanisms introduced under the project should be amended to accommodate the autonomous financing of the project management unit.
- b) The focus of the second phase will be on the optimal ecological and economic production of wood in rural areas and rural development of wood enterprises.
- c) A key policy action will be to increase the tax on wood from non-managed forests, and to improve the efficacy of the transportation/taxation control system for this wood.
- d) The next phase of the household energy project's supply components should be coordinated with the Natural Resource Management Project of the Ministry of Rural Development, Water and Environment. Substantive work has already been done to achieve this coordination.
- e) A restructuring of the energy efficiency and woodfuel substitution component is necessary taking account of the results of Energy II, which showed that the original projections of fuel wood substitution were too high, and the economic worth of the component was less attractive than anticipated. This restructuring should be aimed at facilitating a rapid transition of the component to autonomous private sector operation, wherein the market place will be the key determinant of inter-fuel substitution.

Electric Power

- f) The major problems which constrained the achievement of the project's objectives in the electric power sector should be addressed through power sector reform aimed at increasing the sector's autonomy and commercial viability, and allowing private sector participation in management and operation.
- g) The Bank, the Government and NIGELEC have agreed that the goals of the power sector are increased electrification, the attraction of private sector funds to expand the network and the reduction of tariffs as feasible through more cost-effective investment and operations.
- h) In order to achieve this, it will be necessary to implement a sector reform program which includes the adoption of legal, regulatory, financial and corporate structures conducive to private sector participation in a commercial environment free of undue political interference. This is now being developed under a privatization project.

Petroleum

- a) While the project assisted a substantial improvement in the Ministry of Energy's capability to promote, negotiate and manage private sector investment in petroleum exploration, the Ministry is of the view that additional assistance is needed to deepen this competence and to handle the more specialized aspects requiring expert constancy.
- b) The petroleum documentation center and the laboratory are now operational and capably staffed. Their sustainability depends upon continued budget allocations from the Government. Presently, the ministry budget includes provisions to cover operations through 1997. An operational budget must be sustained in the future to cover recurrent costs, maintenance and enhancement of operations such as the conversion of some data to film base for better archival preservation and duplication.
- c) The Government should regard these service facilities as part of a long-term investment in the sector and target petroleum concession operators and other beneficiaries as an eventual source of funding.

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PART I: PROJECT IMPLEMENTATION ASSESSMENT

A. INTRODUCTION

1. The main features of Niger's energy sector which the Energy Project addressed at appraisal (1987) were: an overall low level of energy consumption but high dependence on increasing volumes of woodfuel, which did not appear sustainable, almost total dependence on imports for petroleum and electric power, and insufficient investigation and evaluation of domestic resources that could be economically deployed for meeting Niger's energy needs. Woodfuel accounted for 87 percent of the country's total energy consumption. The greatest concern in the household energy sector was the rapid growth of the urban population (6-7 percent annually) and related high levels of woodfuel consumption at prices which were well below the economic value of the resources. As a result, estimates indicated that demand would outstrip supply in 10-20 years.

2. The main options for mitigating the woodfuel problem were to reduce demand by conservation and substitution and to increase supply by better forest resource management. The Government of Niger (GON) had prepared a development plan for 1987-91 which called for cutting woodfuel consumption in half over a ten year period. On the demand side, the emphasis was to promote improved wood stoves, with estimated savings of 20-40 percent, and to encourage use of efficient kerosene and LPG stoves by the urban households which could afford them. On the supply side, GON planned to establish policies to improve wood supply management through taxation, quotas, and permits, in order to sustain supplies.

3. In the petroleum sub-sector, the GON's strategy was to accelerate private sector participation in exploration by improving the data base on petroleum and making changes in the legal framework. In the power sector, imported electricity with some thermal back-up power was the least-cost supply strategy. Niger was relying mostly on imports from Nigeria for its power supply except for a small amount of high cost, domestically produced coal-fired generation to supply power to the uranium mines and some nearby towns. The rising level of power imports caused GON to look into developing one of the country's few potential hydro resources – the Gambou site. Niger's power investment program focused on constructing a second interconnection with Nigeria to meet potential load growth in the eastern part of Niger and replace higher cost local diesel generation. It also provided for the rehabilitation and extension of the sub-transmission system in Niamey and other areas, as well as the rehabilitation of a small number of isolated diesel stations.

4. Prior to the Energy Project, IDA had been involved in all three sub-sectors: two IDA forestry credits supporting increased woodfuel supplies; an advance under the Project Preparation Facility (PPF) for studies to evaluate the economic prospects of the Sokhor petroleum discovery; a technical assistance and engineering credit to define the least-cost power development program and improve sector organization and management; and a Structural Adjustment Loan to redefine the role of the State in economic activities, including its role in NIGELEC (the power utility) and other state-owned companies. IDA assistance was appropriate to help direct energy sector investments to high-priority economic projects, resolve institutional and organizational issues, ensure that energy prices reflect economic costs and mobilize donor financing from other sources.

B. STATEMENT AND ACHIEVEMENT OF PROJECT OBJECTIVES

5. The project's overall objective was to develop a general strategy and specific policies to address interconnected energy problems facing Niger's economy along with financing of investments necessary to implement the policies. Within this broad objective, the project had specific objectives and supporting components for the three energy sub-sectors it addressed: household energy demand and supply, electric power supply, and petroleum development. Overall the project partially achieved its objectives with varied performance among the three sub-sectors.

6. For the household energy sub-sector, the project's specific objectives were: on the demand side to promote woodfuel conservation and substitution of other fuels for woodfuel, and on the supply side to promote more effective forest cover management, and to develop renewable energy technology. In support of these objectives the project's policy components focused on: adjusting household energy prices to encourage efficient energy use, developing a more efficient approach to woodfuel supply management on a pilot basis, and giving the responsibility for control and exploitation of forests to contiguous local communities. The related investment components were : on the supply side the establishment of a woodfuel trade and monitoring system, the zoning of wood supply areas around urban centers and preparation of woodfuel supply management plans, and the establishment of rural woodfuel markets and production areas on a pilot basis; on the demand side the promotion of local manufacture and marketing of improved wood-stoves and the importing and marketing of improved kerosene and liquefied petroleum gas (LPG) stoves. The major benefits were to be savings of woodfuel, improvement of the living standards of the population, employment opportunities in woodfuel trade, and reduced cooking time for food preparation using kerosene or LPG stoves. The major costs were to be increased imports of kerosene and LPG but the revenues from woodfuel taxes were to more than offset the additional cost.

7. The achievement of project objectives in the **supply components of the household energy sub-sector** was substantial. GON amended the forestry and tenure laws to allow villages to sign agreements which give them exclusive rights over their own

natural forest area. The first woodfuel markets began operating in 1992 and grew impressively from 21 in 1993 to 85 by 1995. About 67 percent of these markets supply some 83,000 tons of wood to Niamey, the capital city, or 16 percent of all woodfuel entering the city. The establishment of woodfuel markets in rural areas has taken place through arrangements which establish sustainable harvesting practices determining the allowable annual cut, and provide guidance on forest and market management.

8. As a result of the project, traders are encouraged to buy wood at prices negotiated with the villagers in rural markets supplied from managed forests, partly because they have to pay a higher tax on woodfuel from non-managed woodlands. The taxes are lower than originally envisaged at appraisal and the road transport control system for vetting the movement and taxation of wood from non-managed forests is not as effective as it should be. Nonetheless, the project induced GON to create a substantial tax differential between managed and non-managed sources of wood, and to establish a partially effective control mechanism over the movement of wood from non-managed forests. The cash flow which the project has generated is substantial by Niger's standards in rural areas (about US\$ 165,000 equivalent in 1995) and the villages have invested some of the tax revenues in local projects such as repairing wells and pumps, purchasing emergency grain stocks after harvest when prices are low, and health and social services. Thus the benefits of the project have extended well beyond woodfuel supply to general rural development and improvement of rural living standards. Perhaps the most important long-term impact of this project is that it has established in Niger the principle and the reality of decentralized ownership and control over resources and economic decision-making to the village level, vastly increasing local commitment to the preservation of the resource. It is too soon to reliably measure productivity gains per hectare of forest. However, at the very least, the system, which the project established to determine the allowable cut, has arrested degradation of the resource in the managed areas and provides for its natural regeneration; compared with tree planting, this is by far the more cost-effective approach to sustainable woodfuel supply.

9. On the demand side, the achievement of project objectives was unsatisfactory. The project's Staff Appraisal Report (SAR) had estimated that by 1997, the promotion of improved stoves for cooking with wood, kerosene, and LPG would save about 180,000 tons of woodfuel between 1988 and 1997. Based on actual stove sales under the project, these savings have been in the range of 15,000 to 23,000 tons per year between 1992 and 1996. The economic rate of return on the component was 8.5 percent, compared with 30 percent estimated at appraisal (Part II, Table 9).

10. A substantial number of higher-efficiency woodfuel stoves were marketed during the project period, ranging between 7000 and 11000 units per year over 1989 to 1994 (data for 1995 and 1996 are unavailable). However, the overall results of the woodfuel conservation/substitution program have been less than planned for many reasons: the initial targets for woodfuel substitution were ambitious in light of the difficulties incurred trying to develop the means for achieving inter-fuel substitution; low woodfuel prices combined with high prices of substitute fuels made fuel-switching much less attractive

than originally envisaged; the unexpected severity of economic hardship in the 1990s reduced the purchasing power of the target market for kerosene or LPG stoves, making this a low priority consumer expenditure; the project encountered serious difficulties finding a substitute stove model compatible with local cooking requirements, hence it engaged a local manufacturer to adapt the imported product to local needs; however, the project incurred difficulties sustaining a reliable supply of equipment from as far away as Indonesia, added to which imported stoves became unmarketable after the devaluation of the CFA franc in 1994. As a result, the project encouraged the local manufacturer to replace imported stoves with locally produced models. Due to product development difficulties and inadequate management the company became insolvent by 1996. The positive result of this experience, however, was the eventual development of a stove model well-adapted to local needs, and a substantial accumulation of technical know-how in its manufacture. It is possible that these gains could be consolidated into a commercially sustainable activity with a restructuring of the company and a recasting of the marketing approach.

11. The other major component of the demand-side program was the development of private sector "Energie-Shops". These shops are small-scale wholesale companies which facilitate the distribution of kerosene (at official prices) and stoves, providing purchasers with convenience and flexibility in their choice of cooking options. The idea was to provide consumers with the standard of convenience in kerosene purchase which they enjoy for woodfuel purchase (principally mobile neighborhood delivery service), which before the advent of these shops was not available. The shops borrowed project funds on commercial terms to become established; they have been servicing their loans satisfactorily and are commercially successful.

12. In the **electricity sub-sector**, the project's objective was to promote the conservation of electric power and to help NIGELEC provide electricity at least cost. In support of this objective the project's investment components consisted of: the construction of a 132-kv transmission line linking Nigeria's grid with areas in eastern Nigeria and related substations and the rehabilitation of transmission and distribution lines, and several studies for future power system development (preparation of the Gambou hydroelectric project, load management for the Niger Valley, energy conservation in public buildings, a transmission and distribution master plan for the Niamey area, and the technical and economic feasibility of expanding the interconnected system). Finally, the project provided for the extension of office space for NIGELEC and technical assistance, training, equipment and vehicles.

13. The project only partially achieved its objective for the electricity sub-sector, mainly due to suspension and eventual cancellation of the component due to non-compliance with financial covenants in the project's legal agreements, and non-compliance with Bank procurement procedures in the distribution component. The following components were completed. The transmission line from Nigeria to Niger was constructed. The study for the Gambou hydroelectric project was completed and concluded that the project is not economic. NIGELEC also completed the load

management study but GON did not implement the related pilot project which the study recommended. The Ministry of Energy implemented energy audits and pilot conservation programs in public buildings, an important finding of which was the acceptability of substituting de-humidifiers for air-conditioners, with major savings in electricity consumption. Unfortunately, once this latter component was implemented, it was not sustained due to lack of follow-on planning and funding.

14. The transmission line connecting NIGELEC's grid with that of Nigeria's National Electric Power Authority (NEPA) remains unused because, due to the cancellation of funds, the project did not complete the sub-transmission and distribution components necessary for connecting revenue-paying customers to the grid. Notwithstanding the inevitable loss of productivity from the transmission line, the cancellation of the funds was unavoidable. NIGELEC did not complete the other studies planned for the electricity sector, because of the closure of the component. The extension of NIGELEC's office space did not take place because the company's extension plan involved purchasing a building that was too large for its needs, and involved inappropriate terms and costs.

15. For the **petroleum sub-sector**, the project's objective was to upgrade Niger's capability to administer a petroleum exploration promotion program. To build this capability the project included components for review of legislative and fiscal regimes, preparation of a synthesis of the country's petroleum geology for greater understanding of the resource base, preparation of an exploration strategy, promotion of areas for exploration activity, storage and retrieval of geological and geophysical data, a petroleum testing laboratory and provision of equipment, training and technical assistance to the Ministry of Mines and Energy. The project achieved its objectives in these endeavors. Niger adopted a new law in 1992 covering petroleum development. The petroleum data systems are in place and have been used to evaluate the country's petroleum potential. This, combined with promotional activities financed under the project attracted oil company interest and led to the signing of a new exploration contract and work program with Hunt Oil in 1993. In 1996, Niger also sold acreage relinquished by Elf Oil in 1995. The staff training program was completed, but on a smaller scale than originally planned (training expenditure of 2 million French francs, instead of the 2.6 million planned) due to the lower number of available trainees than anticipated. Twenty-one trainees participated in technical, economic and commercial courses of varying duration. The archives/data center and petroleum testing laboratory are in place and became operational in 1996.

C. PROJECT IMPLEMENTATION EXPERIENCE

Implementation Record

16. The project's appraisal estimated an implementation period of six years, from July of 1988 through June 1994, with December 1994 as the original closing date of the Credit. The project was completed two years beyond the original closing date because of

additional time needed to complete the household energy and petroleum sector components. (Part II, Tables 3 and 5). The credit closed in December 1996.

17. IDA modified the Development Credit Agreement (DCA) twice during the project's implementation period. In 1989, IDA changed a condition of disbursement that Niger and Nigeria reach a satisfactory agreement on the operation and management of the power transmission line which the project was to construct between the two countries. Originally the condition applied to all disbursements on the project but the modification of the DCA limited the condition to electricity components which were related to the transmission line. IDA modified the DCA again in 1994, to transfer funds from the unallocated component to the remaining project components.

18. Actual total project costs were US\$29.7 (for bank and DANIDA financing) compared to US\$43 million estimated at appraisal and Bank disbursements on the Credit amounted to US\$17.4 million, about 56 percent of the appraisal estimate. The lower project costs and credit disbursements resulted from the cancellation of several sub-components for the electric power sector (Part II Tables 8A and 8B).

Major Factors Affecting Project Implementation

19. **Factors External to the Project.** During the project's implementation period, Niger faced serious economic and political problems which had an adverse impact on the project's performance. The country's transition to democracy during 1990-92 was marked by political and social instability. A weakened fiscal administration eroded the country's revenue base and caused serious on-going financial problems within the Government. This situation was a factor in GON's non-payment of its electricity bills. The devaluation of the CFA franc increased the local currency cost of imported woodfuel substitutes (kerosene and LPG) in 1994; however, it was also a factor inducing the development of local kerosene stove manufacturing capability.

20. **Factors Subject to Control of the Borrower and the Implementing Agencies.** Strong Government support of the project's **household energy** component helped to overcome some of the legal and institutional problems the project faced - in particular the vested interests of the woodfuel transporters and the forestry service to maintain control over the woodfuel harvesting and marketing business. Notwithstanding the high level of GON commitment to the principles underlying the woodfuel management strategy, constructing a new legal framework and administrative capacity took more time than originally envisaged, and there remain problems with respect to both raising the taxes on wood supply from non-managed forests to appropriate levels and to tightening the control system for transportation and taxation of woodfuel from non-managed areas.

21. In the execution of the **electric power** components, the main problem was the lack of sufficient commitment by the Government and NIGELEC to bring about needed improvement both in the financial and institutional management of the power sector and to the weak management and procurement capacity of the utility. GON's interventions in

the power sector often reflected immediate financial and political considerations rather than the long-run developmental requirements of the sector. As well, NIGELEC's lack of adherence to standard Bank procurement procedures led to only partial achievement of the project's objectives for the power sector.

22. In the execution of the **petroleum** component, the new petroleum law and the petroleum exploration promotion campaign were completed on time. Work on the documentation center and construction of the laboratory started early enough but stalled in 1991, due to insolvency of the bank where GON was keeping the project account. IDA stopped disbursements until the resolution of the banking problem, which happened only in 1994. Then delays to completion of the documentation center occurred due to lack of a clear decision-making process and insufficient knowledge of Bank procurement procedures. Delays and reduction of the staff training program resulted from the lack of sufficient qualified staff available for training. By the closure of the project, substantial training had taken place and the documentation center and laboratory were operational.

D. IDA PERFORMANCE

23. IDA's performance overall was satisfactory. It clearly identified the need for an integrated approach in solving Niger's energy problems. The appraisal of the project was satisfactory, focusing on the major sector issues and providing a reasonable assessment of the project's risks. However, the appraisal was overly optimistic about the measurable economic benefits of the woodfuel program, and did not anticipate the depth of the implementation difficulties explained above. In supervision, IDA demonstrated considerable flexibility given the innovative nature of the project, especially in the implementation of the household energy components.

24. In supervising the electric power sub-component, IDA initially focused more on technical issues than on finance and management issues. However, after 1992, IDA made repeated attempts to encourage improvement in the sector's financial condition and management. IDA ultimately took a firm stand on compliance with financial and management covenants, but gave GON and NIGELEC ample time to implement an agreed program of actions. When this did not occur, it became necessary to suspend disbursements and eventually cancel part of the electricity component. In the petroleum sub-sector, IDA's supervision could have taken more care to ensure that the Niger counterparts better understood the Bank's procurement procedures: lack of understanding and experience in procurement delayed the completion of the data center, the laboratory and the training program; however an intensive supervision effort combined with corresponding responsiveness of GON was sufficient to achieve completion in 1996.

E. BORROWER PERFORMANCE

25. The performance of the Borrower and implementing agencies was satisfactory in project preparation. However, performance in project implementation and compliance with covenants varied significantly by project component: satisfactory for the supply side of the household energy component and much less satisfactory for the demand side, satisfactory for the petroleum sector component, and unsatisfactory for the electric power sector component. The overall performance for the Borrower is satisfactory given a commitment toward the end of the project to initiate a power sector restructuring process.

26. In executing the household energy components, GON showed a strong commitment to the project - overhauling existing woodfuel traffic regulations and procedures and enduring the long process of formulating and implementing new land tenure law and tax regulations. GON also supported the new system by appointing dedicated, capable staff to key functions in the forestry service and taking firm administrative steps to prevent woodfuel traders from undermining the new system. GON could have been more firm in controlling fraud in the traffic control system and increasing the level of taxation on wood from non-managed forests, providing a stronger incentive for woodfuel traders to buy their supplies from managed areas. However, it seems instead that GON opted for a more cautious, gradual approach in light of the political counter-pressures and difficult socio-economic conditions it faced.

27. GON did not take sufficient ownership of the project's objectives to avert or minimize implementation and compliance problems in the electric power sector. An adverse combination of factors constrained NIGELEC's operations and undermined its financial performance: for example, low demand growth on account of inability to connect new customers to the grid, political pressure to supply electricity at very high cost to small loads in non-viable isolated locations, political pressure to buy electricity from SONICAR (another parastatal corporation) at inflated prices, political pressure to maintain excessive staff, and non-payment of government electricity bills. NIGELEC was unable to comply with most of the project's financial covenants. In September 1992, the Bank asked GON to submit a plan within a six-month period for correcting financial and managerial problems, in order to avoid suspension of disbursements for the electricity component.

28. Although GON indicated its willingness to improve NIGELEC's operations, it did not do so within the agreed time period. Therefore in May 1993, the Bank suspended disbursements on the electricity component and gave the Borrower a set of conditions for lifting the suspension. By August 1994, the Borrower had not fulfilled the conditions and the Bank decided to cancel the unused portion of the electricity component.

29. The Borrower satisfactorily implemented the legal reforms and enabling environment needed to attract the private sector into petroleum exploration. In this respect, the project achieved an appropriate allocation of responsibility between the

public sector to establish an appropriate policy framework and the private sector to take fundamental risk. Delayed implementation of the petroleum laboratory and documentation center occurred not only on account of the banking problems noted in paragraph 21, but also from the inability of the Ministry of Finance and the Ministry of Energy and Mines to resolve, in a timely manner, the issue of responsibility for purchasing necessary equipment; considerable effort was needed to resolve procurement and contractual problems affecting their timely completion; however, as a result of intensive supervision and the responsiveness of GON, they were operational by late 1996.

F. PROJECT OUTCOME, SUSTAINABILITY, AND FUTURE OPERATION

30. The overall outcome of the project is satisfactory. Its achievements are sustainable but fragile. The project achieved most of its objectives in the household energy and petroleum sectors. Although it did not achieve most of its objectives in the electric power sector, GON has committed to a plan of action on power sector reform, which will create the necessary conditions for private and public investment in a commercialized power system. The operational plan (Appendix C) outlines the major actions that will be necessary to sustain project achievements for each of the project's energy sub-sectors.

31. The project's **household energy** component has established viable mechanisms to help sustain the country's wood supply and avert shortages anticipated at appraisal. The country's forest cover is 16 percent. Where the rural market system operates, it has placed responsibility for woodfuel supply with the villages. This covers a small but growing portion of the total woodfuel market. The increased cashflow from the markets will provide a greater incentive for introducing more effective management of the surrounding woodlands.

32. Participating villages have shown considerable enthusiasm for the rural market system. Despite an encouraging start, the new system is still vulnerable to renewed obstruction by woodfuel traders and the forestry service, who lose control over resources under this system. It therefore requires careful monitoring and actions to sustain its achievements (Operational Plan). If the system can sustain and extend its benefits, it will serve as a good model of how to transfer economic surplus from urban to rural areas and shift control over natural resources from governments and traders to rural populations.

33. To attain the benefits of the new transmission line which the project constructed, investment will be required for the sub-transmission and distribution components not completed under the project. The power sector restructuring approach recently agreed with GON and now being prepared for implementation under a privatization project should create the necessary conditions for power system expansion and financial sustainability of the sector.

34. In the petroleum sub-sector, the project has helped to establish a clear regulatory framework for petroleum exploration and development. It also assisted GON in developing the capability to manage the country's petroleum data base, promote petroleum exploration in Niger and negotiate contracts with international oil companies. The result has been an increased level of petroleum exploration interest in Niger. However, it is important that the GON sustain the capability developed. This will require retention of competent staff and additional staff development. The documentation center and the laboratory will be sustained initially through budget allocation, but given the GON's financial constraints, these service centers should be commercialized.

G. KEY LESSONS LEARNED

35. One general lesson is the importance of sustaining a commitment to the implementation of all components and taking sufficient ownership of the project to: address any constraints early on, resolve them to ensure effective project implementation as originally designed, or modify the project if necessary.

36. In the **household energy** sector, the project has shown that it is possible to manage natural forests on a sustained basis with a project design including policy and investment components, a flexible approach to implementation and a strong commitment from the Borrower. Specifically, (i) it has proved advantageous to establish the legal framework for village-based woodland control and management early in the project cycle; in this way, the enabling environment is created to facilitate implementation of the investment components. (ii) The risks to woodfuel fiscal policy and its implementation should be carefully identified and addressed from the start to the end of the project cycle; this is necessary to insure the implementation of appropriate taxation and control structures in support of project effectiveness. (iii) The clear separation between the control function of the forestry service and the advice and support function for establishing rural markets has been useful. The latter is being carried by the project unit, to date supported by GON, Denmark and IDA. It is necessary to find mechanisms for insuring the financial and institutional autonomy of this group, which is responsible for the overall strategy and administration of the program; its survival has been excessively dependent on uncertain external support. One such mechanism could be a formula allocating to the project unit a small share of the fiscal proceeds of the woodfuel supply system. (iv) Careful analysis of the technical and operational hazards and potential benefits of a fuel substitution program is essential to design cost-effective programming.

37. Concerning the **electricity sector**, the project showed that despite adequate technical design, satisfactory results cannot be expected from implementing it in a fundamentally defective institutional and financial context. This was recognized in the cancellation of the component and the subsequent resumption of dialogue on sector reform. Hence, before a project begins substantial investment in system expansion, there should be firm commitment, identified mechanisms and some evidence of

implementation to resolve major institutional and financial impediments to the satisfactory performance of the project and the sector.

38. The experience with the project's **petroleum sector** component indicated the encouraging possibility of developing an appropriate division of roles and responsibilities between the public and private sectors, and with a correct enabling environment attracting private sector willingness to absorb fundamental risk. The experience also indicated the importance of insuring that the implementing agencies, including relevant ministries and other supervisory bodies understand both Bank procurement procedures and the basic principles of efficient procurement practices.

PART II : STATISTICAL ANNEXES

TABLE 1: SUMMARY OF ASSESSMENTS

A. Achievement of Project Objectives

Assessment Categories	Substantial	Partial	Negligible	Not Applicable
Macroeconomic Policies				x
Sector Policies	x			
Financial Objectives		x		
Institutional development		x		
Physical objectives		x		
Gender concerns				x
Other social objectives	x			
Environmental objectives	x			
Public sector management		x		
Private sector development		x		
Other				

B. Project Sustainability

Likely	Uncertain	Unlikely
x		

C. Bank Performance

Stage of Project Cycle	Highly Satisfactory	Satisfactory	Deficient
Identification		x	
Preparation		x	
Appraisal		x	
Supervision		x	

D. Borrower Performance

Stage of Project Cycle	Highly satisfactory	Satisfactory	Deficient
Preparation		x	
Implementation		x	
Covenant Compliance			x

E. Assessment of Outcome

Highly Satisfactory	Satisfactory	Marginally Satisfactory	Unsatisfactory	Highly Unsatisfactory
	x			

TABLE 2: RELATED BANK CREDITS

Preceding Operations

Title	: Small Rural Operations
Loan no.	: 18900
Year of approval	: 1988
Purpose	: Helping the government develop institutional capability in preparation and execution of small rural operations.
Status	: Supervision

Title	: Natural Resource Management Project
Loan no.	: 27960
Year of approval	: 1995
Purpose	: Assist Rural Communities in designing and implementing community land based management.
Status	: Supervision

Title	: Energy II Project Natural Resource Management Project
Loan no.	: NA
Year of approval	: NA
Purpose	: Address the various and interconnected energy problems facing the economy by developing policies and a program to redress the growing imbalance between energy demand and supply
Status	: Under preparation.

TABLE 3: PROJECT TIMETABLE

Steps in project cycle	Planned Date	Actual Date
Identification	1985	1985
Preparation	December 86	December 86
Appraisal	January 1987	January 1987
Negotiations	October 87	October 87
Letter of development policy	1987	1987
Board Approval	February 1988	February 23, 1988
Signing	March 1988	March 18, 1988
Effectiveness	July 1988	July 1, 1988
Project completion	June 30, 1994	December 31, 96
Credit closing	December 31, 1994	December 31, 1996

NA = Not applicable

Source: Project files and Bank Staff estimates.

TABLE 4: CREDIT DISBURSEMENTS: CUMULATIVE ESTIMATED AND ACTUAL
(US\$ million)

Comparative Indicators	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97
Appraisal estimate	0.7	5.0	11.3	18.3	23.9	28.0	30.6	31.5	31.5	31.5
Actual	0.0	2.4	5.5	7.3	9.2	11.3	12.0	13.5	15.3	17.4
Actual as percent of estimate	0.0	48.0	48.7	39.9	38.5	40.4	41.2	42.9	49.0	55.0

Notes:

1. All US\$ figures rounded to the nearest hundred thousand US\$.
2. All percentage figures rounded to the nearest one percent.

Source: Bank MIS and Bank Staff estimates.

TABLE 5: KEY INDICATORS FOR PROJECT IMPLEMENTATION

Key implementation indicators in the SAR/President/s Report	Estimated Completion Date	Actual Completion Date
I. Household Energy Components		
A. Supply-Side Sub-Components		
1. Construction of firewood checkpoints.	June 1989	July 1991
2. Zoning of areas by brushwood potential	December 1990	October 1990
3. Preparation of firewood supply management plans	March 1991	September 1993
4. Establishment of firewood production areas.	March 1991	September 1993
5. Population sensitization program	November 1992	February 92-December 1996
6. Establishment of rural firewood markets.	March 1993	February 92-December 1996
7. Implementation of the firewood trade monitoring system	September 1994	December 1996
8. Establishment of the firewood taxation system.	September 1994	August 1992
9. Training	September 1994	February 92-December 1996
B. Demand Side Components		
1. Testing of kerosene stoves	June 1989	July 1990
2. Preparation of marketing and promotion campaigns	November 1990	June 1990
3. Dissemination of improved wood stoves.	September 1994	December 1994
4. Monitoring of woodfuel consumption	September 1994	December 1996
5. Training	September 1994	December 1996
6. Production, importation and promotion of kerosene stoves	September 1994	Stove imports began in 1990 with sales by the operator, on a pilot basis, until June 1993. After some design modification, the local production of stoves began. The purchase of equipment for this production began in February 1994, with initial prototype production from July 1995 to the present. The stove promotion campaign is ongoing.
II. Electric Power Component		
A. Design and bidding documents for the Gambou Hydroelectric Project		
	March 1993	March 1994
B. Katsina interconnection		
C. 132-kV substations		
D. Distribution System		
E. Rehabilitation of Anou Araren Transmission Line		
F. Niamey distribution system		
	November 1991	October 1993
	December 1991	not realized by credit
	December 1994	not realized by credit
	June 1990	January 1991
	December 1994	not realized by credit
III. Petroleum Component		
A. Legislative review		
B. Organizational review		
C. Seismic data reprocessing		
D. Recovery of documents and information		
E. Diagnostic study		
F. Negotiation preparation		
G. Training		
H. Archiving of documents		
	June 1989	February 1991
	June 1989	February 1996
	February 1991	March 1994
	February 1991	December 1996
	July 1992	December 1996
	October 1992	April 1996
	October 1994	December 1996
	December 1994	December 1996

Source: Project files and Bank staff estimates.

TABLE 6: KEY INDICATORS FOR PROJECT OPERATION

Table not applicable to this project.

TABLE 7: STUDIES INCLUDED IN THE PROJECT

Study	Purpose	Status and Impact
Engineering Studies and bidding document preparation.	Preparation of Gambou Hydroelectric Project.	Feasibility study concluded the project was not economic so this component was canceled.
Load Management Study	Study to determine the most appropriate way to manage the electric power load for the Niger Valley.	Suspension of component did not allow implementation of the study.
Power system feasibility studies	Determine the technical and economic feasibility of expanding the interconnected electric power system.	Suspension of component did not allow implementation of this study.

Source: Project files and Bank staff estimates.

TABLE 8A1: PROJECT COSTS

Household Energy Component
(in US\$ million equivalent)

All costs rounded to the nearest US\$ 100,000 equivalent.

Item	Appraisal estimate			Actual or latest estimate		
	Local Costs	Foreign costs	Total Costs	Local Costs	Foreign costs	Total costs
Consultants, studies and training	1.0	2.0	3.0	0.9	3.1	4.0
Provision of office facilities, firewood control points equipment, material and vehicles	0.3	1.5	1.8	2.0	0.3	2.3
Operational support	3.0	1.0	4.0	9.4	0.0	9.4
Renewable energy	0.1	0.5	0.6	0.3	0.2	0.5
Subtotal	4.4	5.0	9.4	12.2	3.6	16.2

Source: Project files and Bank staff estimates.

TABLE 8A2: SUMMARY COSTS OF ELECTRIC POWER AND PETROLEUM COMPONENTS

Component	Appraisal Estimate (US\$million)	Actual (US\$ million)
Electric Power <i>a/</i>	53.5	9.4
Petroleum <i>b/</i>	3.0	4.8

a/ Breakdown by component into actual local and foreign costs in US dollars not available. The original estimate was to cover construction of 132-kv transmission line and sub-stations, 132-kv transmission line rehabilitation, training and technical assistance, studies, and the provision of office space. The actual costs were much lower than the appraisal costs because the component was canceled.

b/ All costs are foreign costs. No breakdown available in US\$ by component. Costs covered the following components: establishment of geological information systems; review of legislative and fiscal regimes; promotion and negotiations; geological synthesis, strategy and exploration administration; training, equipment, and technical assistance, petroleum documentation center and laboratory.

TABLE 8A3: TOTAL PROJECT COSTS

TOTAL	Appraisal Estimate (US\$million)	Actual (US\$ million)
Project Costs	86.0	30.4

TABLE 8B: PROJECT FINANCING

(in US\$ million equivalent)

Source	Appraisal estimate	Actual
IDA	31.5	17.5
KFW	10.0	N/A
EIB	6.3	N/A
DANIDA	11.5	10.3
Government/NIGELEC	16.7	2.6
TOTAL	86.0	30.4

Note: All financing amounts rounded to the nearest US\$100,000 equivalent.

Source: Bank MIS and Bank staff estimates.

TABLE 9: ECONOMIC COSTS AND BENEFITS

Component	SAR Estimate	ICR Re-Estimate
Household Energy		
Major Benefits	Incremental increase in wood 110 kg per ha due to forest protection and savings of 180,000 tons by year 1997 in firewood consumption due to improved wood stoves and the substitution of kerosene and LPG for firewood.	* Research on productivity increase has been on-going for several years but more time is needed to achieve conclusive results. * Savings in firewood consumption are estimated at 15,300 tons in 1996.
Major Costs	Capital and operating costs for improved firewood management, advertising, testing, training and other costs of improved stove promotion; incremental costs of increased imports of kerosene and LPG	
Economic Rate of Return	30 percent Does not include long-term ecological benefits. Also does not include estimated wood productivity increase. 1/	8.5 percent calculated by finding the IRR of the benefits of the woodfuel substitution component relative to the costs of this component over 1989 to 1996 inclusive.
Electricity		
Major Benefits	Minimum economic benefits approximated by valuing incremental sales at the weighted average of low and medium voltage rates for isolated areas	Not achieved
Major Costs	Generation and transmission costs of connecting Katsina to a point in Niger midway between Maradi and Zinder to hook up major load centers along with associated capital and operating costs for distribution	Not incurred
Economic Rate of Return	10 percent (base case)	8.5 percent
Petroleum	No economic analysis prepared for this component. The main benefit was to be the acquisition of data to help the Government evaluate its petroleum potential more effectively and develop its capability to administer petroleum exploration by foreign operators.	The Ministry of Mines and Energy now has a petroleum data management system and laboratory as well as the capability to negotiate and administer contracts with international oil companies. The Government has provided a budget allocation for these purposes.

Source: Project files and Bank staff estimates.

TABLE 9A : INTERNAL RATE OF RETURN CALCULATION

**Household Energy Component
(1989 - 1996 Period)**

(FCFA millions)

	1989	1990	1991	1992	1993	1994	1995	1996
COSTS								
Project Costs (related to the Demand Component) (a)	123.9	261.6	351.6	337.6	160.8	80.1	233.7	320.0
Additional Costs of Importing LPG and Stoves		14.8	29.8	5.9	13.4			
Additional Costs of Importing Kerosene		6.2	5.3	15.0	12.9	1.2	2.6	4.6
TOTAL	123.9	282.5	386.7	358.6	187.1	81.3	236.3	324.6
BENEFITS								
Total quantity of woodfuel savings (Tons) (b)		3,200	9,300	15,900	22,900	20,600	18,100	15,300
Weighted average market value per kg.		20.0	19.8	19.6	19.7	23.3	25.2	26.0
Economic Savings in Woodfuel Consumption	0	64.3	184.5	310.9	450.1	479.2	455.4	397.6
Cashflow	(123.9)	(218.3)	(202.2)	(47.7)	263.0	397.9	219.1	72.9
GDP Deflator index 1988 = 100	105.8	98.1	93.0	94.1	94.0	124.7	131.5	137.8
Real Net Cashflow	(117.1)	(222.5)	(217.4)	(50.7)	279.8	319.1	166.6	52.9
IRR (c)	8.5%							

(a) Includes investment and operating costs of the woodfuel substitution component.

(b) The difference between projected consumption without the project and actual consumption with the project.

(c) covers 1989 to 1996 inclusive

**TABLE 10: STATUS OF LEGAL COVENANTS
Development Credit Agreement**

Sections 3.01 (a)
Covenant type: Project execution
Description: Borrower declares commitment to project objectives ; delegates responsibility for components to the Ministry of Mines and Energy, the Ministry of Agriculture and Environment and NIGELEC.
Status: Compliance.
Sections 3.01 (b)
Covenant type: Project execution
Description: Borrower declares that it will cause NIGELEC to perform in accordance with the provisions of the Project Agreement.
Status: Non Compliance.
Section 3.01 (c)
Covenant type: Project execution
Description: Borrower to re-lend proceeds of the Credit to NIGELEC for executing Part B of the project as described in Schedule 1 and make available to NIGELEC on a grant basis, proceeds of the Credit for Categories 1 d and of in paragraph 1 of Schedule 1.
Status: Compliance.
Section 3.01 (d)
Covenant type: Project execution
Description: Borrower not to assign, amend, abrogate or waive the Subsidiary Loan Agreement or any provision thereof.
Status: Compliance
Section 3.02
Covenant type: Project execution
Description: Procurement of goods and services for the project to be governed by Schedule 4 of the Agreement.
Status: Compliance
Section 3.03
Covenant type: Project execution
Description: Borrower agrees that NIGELEC will carry out its part of the project according to the general conditions of the Agreement and pursuant to Section 2.03 of the Project Agreement.
Status: Non-Compliance
Section 3.04
Covenant type: Project execution
Description: Borrower to review annually, with IDA, by September 30, its overall strategy for the energy sector, including the investment program and its sector policies on tariffs, prices and taxes; and obtain IDA's approval for any energy sector investment in excess of US\$10 million equivalent.
Original Fulfillment Date: September 30 of each year
Revised Fulfillment Date: NA.
Status: Non-compliance - Sector restructuring discussions are in progress

**Table 10: Status of Project Covenants
Development Credit Agreement**

Section 4.01 (a)
Covenant type: Financial
Description: Borrower to maintain records and accounts according to sound accounting practices.
Status: Compliance
Section 4.01 (b)
Covenant type: Financial
Description: Borrower to have accounts audited by independent auditors for each fiscal year of during the project's execution and furnish IDA with audit reports at the end of the fiscal year, along with any other information reasonably requested by IDA
Original Fulfillment Date: Submission or audit reports to IDA no later than six months after the end of each fiscal year
Revised Fulfillment Date: Not applicable.
Status: Delayed compliance.
Section 4.01 (c)
Covenant type: Financial
Description: Borrower to comply with specifications for retaining records related to withdrawals from the project's Special Account.
Status: Compliance.
Section 4.01 (c)
Covenant type: Financial
Description: Borrower to provide separate opinion by independent auditors that the statements of expenditures can be relied upon to support the withdrawals from the project's Special Account.
Status: Compliance
Section 4.02
Covenant type: Financial
Description: Borrower to review, with IDA the recommendations of the tariff study to be executed under Credit 1511-NIR, and take all necessary actions to implement the recommendations satisfactory to IDA.
Original Fulfillment Date: No later than December 31, 1988.
Revised Fulfillment Date: NA
Status: Non-compliance
Section 4.03
Covenant type: Financial
Description: Borrower to make necessary budget allocations to pay all of its electricity consumption promptly beginning fiscal year 1989.
Status: Non compliance
Section 4.04 (a)
Covenant type: Financial
Description: Borrower to cause NIGELEC to reduce all receivables to not greater than three months of billing and maintain receivables at that level thereafter. And take all necessary measures to authorize NIGELEC to interrupt the electricity supply of customers with bills overdue by more than 90 days.
Original Fulfillment Date: December 31, 1988
Revised Fulfillment Date: NA
Status: Non-compliance

**Table 10: Status of Project Covenants
Development Credit Agreement**

Section 4.05 (a)
Covenant type: Financial
Description: Unless IDA specifies otherwise, the Borrower shall increase taxes on firewood consumption to levels in accordance with a timetable satisfactory to IDA.
Status: Compliance

Section 4.05(b)
Covenant type: Financial
Description: Unless otherwise agreed with IDA, the Borrower is to reduce the sales price of kerosene from CFAF 145 per liter to CFAF 105 per liter.
Original Fulfillment Date: June 30, 1988
Revised Fulfillment Date: NA
Status: Compliance

Section 4.05(c)
Covenant type: Financial
Description: Unless otherwise agreed with IDA, Borrower to reduce, by 50 percent, the taxes and duties applicable to the import and sale of kerosene stoves.
Original Fulfillment Date: September 30 1988
Status: Compliance

Project Agreement

Section 2.05
Covenant type: Execution
Description: NIGELEC to provide progress reports on the electricity component of the project.
Status and Comments: Compliance.

Section 3.03
Covenant type: Execution
Description: NIGELEC to take out and maintain appropriate insurance
Status and Comments: Non-compliance

Section 4.01 (c)
Covenant type: Financial
Description: NIGELEC to provide an auditor's report on all of its accounts including the Special Account for the project..
Original Fulfillment Date: By June 30 of each year of the project
Revised Fulfillment Date: Not applicable
Status and Comments: Delayed compliance.

**Table 10: Status of Project Covenants
Project Agreement**

Section 4.02
Covenant type: Financial
Description: NIGELEC to provide evidence that it has met a reasonable three annual average self-financing ratio for the previous fiscal year and its forecast for meeting this requirement for the next fiscal year.
Original Fulfillment Date: Beginning November 30, 1989, by November 30 of each year of the project.
Revised Fulfillment Date: NA
Status and Comments: Non-compliance - The electricity component has been closed.

Section 4.03
Covenant type: Financial
Description: NIGELEC to maintain net revenues for each fiscal year at the level of 1.5 times the debt service requirements during the period of the loan.
Status and Comments: Non-compliance - The electricity component has been closed.

Section 4.05
Covenant type: Financial
Description: NIGELEC to make adequate provisions for depreciation and renewal of fixed assets.
Status and Comments: Non-compliance - The electricity component has been closed.

Source: Project files and Bank staff estimates.

TABLE 11: COMPLIANCE WITH OPERATIONAL MANUAL STATEMENTS

Not applicable to this project.

TABLE 12: BANK RESOURCES: STAFF INPUTS

Stage of project cycle	Planned		Revised		Actual	
	Weeks	US\$	Weeks	US\$	Weeks	US\$
Preparation to Appraisal	--	--	--	--	13.9	36.3
Appraisal	--	--	--	--	57.9	165.1
Negotiations through Board approval	--	--	--	--	71.7	56.2
Supervision	10.0	21.5	26.4	44.4	214.5	294.1
Completion	1.5.5	24.6	16.0	24.9	6.5	17.7

TABLE 13: BANK RESOURCES: MISSIONS

Stage of project cycle	Month and Year	Number of persons	Days in field	Specialized staff skills represented	Performance Rating	Types of Problems
Through Appraisal						
Appraisal through Board Approval						
Supervision 1	March 1988	2	4	FA, EE		
Supervision 2	May 1989	2	12	FA EE, PE	1	COV, M
Supervision 3	January 1991	1	10	FA, EE	2	COV, M, AF
Supervision 4	October 1991	2	9	FA, 2EE, EP	2	COV, M, AF
Supervision 5	February 92	4	18	EP, FA EE, ES	2/3	COV, M,
Supervision 6	June/July 93	1		EP	3	
Supervision 7	June 1993	2	12		3	COV, M,
Supervision 8	June 1994			EP, ES		
Supervision 9 and completion	March 1995	2	13		S	COV, M
	December 1996	2	17	EC, EE EC, PA	S	COV, M

Staffing codes: EC = Energy Economist; EE = Electrical Engineer; EP = Energy Planner; ES = Energy Specialist; FA = Financial Analyst; PA = Project Assistant; PE = Petroleum Engineer

Project Rating Codes: 1 = no significant problems; 2 = moderate problems; 3 = major problems; S = satisfactory

Problem type codes: DO = disbursement operations; M = managerial;

Source: Project files and Bank staff estimates

ANNEXES

BORROWER'S CONTRIBUTION SUMMARY

The Energy II program, started in 1989, includes: (i) a household energy component (A); (ii) an electricity component (B); and a petroleum component. The main features are as follows:

1. Household Energy Component

1.1. Features

Title: ENERGY II PROJECT HOUSEHOLD ENERGY Financing for 1st phase: Up to June 1994:	Approval date: JANUARY 1988 1st extension: July 94-Dec. 95:	Start-up date: JULY 1989 2nd extension: Dec. 96:	Executing agencies: DE/MHE (VO) and DE/MME (VD) 3rd extension: Jan. -Dec. 97:
US\$12.67 million (DANIDA grant administered by the World Bank)	US\$1 million (Credit 1880/NIR)	SDR 2 million (Credit 1880/NIR)	DKK 3 million (DANIDA grant) and CFAF 537 million (credit 2796/NIR)

VO: Supply Side; VD: Demand Side

1.2. Objectives

A. Main objective: Find a global solution to the various interrelated energy supply problems affecting the country's economy by designing policies and programs to correct the most marked imbalances between supply and demand.

B. Specific objectives: (i) promote fuel wood conservation; (ii) provide for substitute energy sources; (iii) improve management of natural forest cover; and (iv) promote the development of renewable energy sources.

1.3. Implementation activities

(i) Regulation of trade in and transport of fuel wood; (ii) Control over the supply and distribution of fuel wood to towns; (iii) Preparation of master supply plans; (iv) Creation of rural markets and production zones; (v) Promotion of local production and marketing of improved wood stoves; (vi) Local production, import, and marketing of kerosene and butane gas stoves.

1.4. Results

A. Qualitative Results

SUPPLY SIDE (I) Adoption of Order 92-037; (ii) Preparation of three master supply plans; (iii) Construction of 17 traffic control stations; (iv) Creation of 92 rural markets; (v) Training of Environment Department agents; (vi) Information campaign and basic education for local people, and organization of local people into local management groups [SLG]; (vii) Creation of an environmental data bank; (viii) Promotion of private management structures on a local level (GTA/GTI)

DEMAND SIDE (I) Identification, testing, and adaptation of a petroleum stove model; (ii) Preparation and implementation of a marketing strategy; (iii) Promotion of the private sector in the household energy field (Tchip-Import and Energy Shops); (iv) Creation of a sales network and SAV for fuels and equipment; (v) Production of tools for promotion, information, and equipment maintenance

B. Quantitative results

SUPPLY SIDE (I) 92 rural markets created; (ii) 314 million FCFA in total sales revenue in rural areas, including 251 million which went directly to village lumberjacks; (iii) 490 million in forest tax revenue; (iv) 920 persons organized into village management structures; (v) Financing of various development operations, including 40 grain banks, 181 carts, inoculation campaigns, recovery and drilling of water wells, etc.

DEMAND SIDE (I) Over 13,000 petroleum stoves, 12,000 basic gas stoves (3 & 5 kg), 10,000 improved metal wood stoves per year, 4,000 wood stoves *en banco*, per year, made available; (ii) A substantial reduction in urban consumption of wood, from an average of 5% a year to 1.14% a year from 1990 to 1993; (iii) A considerable drop (15% a year) in kerosene prices, as a result of local distribution close to end-users; (iv) Total sales of over 700 million FCFA in 1995 for the Energy Shops; (v) More than 70 permanent jobs created (Energy Shops and Tchip-Import), and more than 500 indirect jobs created for distributors and retailers of fuels and equipment, etc.

1.5. Problems

A. For Niger

1. Sluggishness on the part of the Government in applying the laws: rural concessions; revision of the tax on non-managed forests; use of account 3001;
2. Policy coordination, establishing fuel prices, programming, etc.;
3. Weak purchasing power of the local people;
4. Turnover of project management;
5. Poor financial motivation, particularly in the case of moves or transfers: granting of benefits, health insurance, and the like.

B. For the World Bank

1. Cross conditionality: Household Energy and NIGELEC;
2. Consistency between sectoral policies and macro-economic policy: fuel prices;
3. Coordination of project monitoring between the resident mission and headquarters, for instance, transition of Energy II and its link with PGRN.

1.6. Prospects

The different evaluation and supervision missions conducted by the World Bank and the prime lender for this component, i.e., DANIDA, confirmed the positive outcome. However, the results are fragile. The plans are to extend it into a second phase, in order to consolidate these results.

2. The Electricity Component

The objectives of this component are as follows: (i) promote the conservation of electric power; and (ii) supply electricity at least cost.

Success was only partially achieved with this component because of difficulties encountered in reorganizing NIGELEC. These problems were aggravated by political and institutional instability during the 1990s following democratization of the country. It should be noted that the Credit Agreement on this component was modified in February 1989 in accordance with the clauses contained in Appendix 2. Some of the results achieved were: (i) Rehabilitation of the 132 kV Anou-Araren-Akokan line; (ii) Up-dated study of the Gambou dam; (iii) Interconnection between Katsina and central eastern Niger using a 132 kV line; (iv) Technical assistance to the DEPT; (v) Training by UNISYS of technical and management staff for the computer service; (vi) Training of 8 high-level technicians in Algeria (SONELGAZ); (vii) Training of about 15 electrical technicians/engineers at ESIE; (viii) Mission by NIGELEC officers regarding the accounting software package; (ix) Study on load management; (x) Acquisition of an

accounting software package from UNISYS; (xi) Acquisition of network computation software; (xii) Filing system on assets; (xiii) Accounts audit; (xiv) Acquisition of the A6 computer from UNISYS; (xv) Acquisition of vehicles.

The component involving energy conservation and monitoring of government energy billings was successful insofar as technical and economic testing was concerned. Application of this component on a large scale, however, could not be launched. Credit to the electricity component was suspended in May 1993 and was canceled definitively in October 1995.

3. The Oil Component

The objective was to improve management of oil exploration. The following was accomplished during implementation:

Organization of the Hydrocarbon Office and training plan: The training scheduled for the staff of the Hydrocarbon Office was fully completed in 1995 and 1996, and all the supplies and equipment planned for operating and managing the Office were acquired.

Study of Niger's oil potential and development: The specific results were as follows: (i) Monitoring of geological and geophysical works of the companies operating in Niger (Hunt Oil and Esso); (ii) Evaluation of new acquisitions and appraisal of recent drilling in Faringa, Agadi, and Karam; (iii) Participation by the Ministry of Mines and Energy in the Annual Convention of the American Association of Petroleum Geologists (AAPG) in Houston in March 1995, in Nice in September 1995, and in San Diego in May 1996, and in the conference on minerals and oil in Johannesburg in June 1996, and the Forum on Mines and Petroleum in Abidjan in June 1996; (iv) Revision of the 1991 promotion report, incorporating data from Elf Aquitaine; and (v) Training of personnel for the hydrocarbon control laboratory.

It should be noted that implementation of this component sparked the interest of a number of oil companies, including the partnership between Elf and Esso, which has made a commitment to a CFAF 30 billion exploration program over a period of five (5) years, as well as Hunt Oil, which has committed to US\$30 million, and TG World Energy, more recently. Around a dozen other companies have been in contact with the Ministry of Mines.

Petroleum Archives and Documentation Center: (i) Development of the premises housing the petroleum archives and documentation center; (ii) Acquisition of supplies and equipment from abroad and in Niamey; (iii) Repatriation of data including 2/3 of Niger's total petroleum documentation comprising seismic profiles, well logs and technical reports, and drilling completion reports.

National Laboratory for Analysis of Petroleum Products: (I) Construction and fitting out of the laboratory rooms; (ii) Delivery and installation of the equipment ordered; (iii) Drafting of the administrative regulations to establish the laboratory and its structure and functions; (iv) Determination and adoption of the standards and specifications applicable to oil products in Niger; and (v) Training of laboratory personnel.

Legal Component: A new petroleum code was adopted for Niger by Order No. 92-45 dated December 16, 1992, regulating oil operations in Niger.

4. Global Prospects for the Program

The principal achievements have made it possible for the Energy Ministry to make plans to pursue and expand operations through a new program, which has set the following objectives:

In the long run:

- Energy independence by developing national resources, such as hydroelectric power, coal, solar energy and wind-power;
- Supply of electricity to all the main towns of the administrative divisions [arrondissements];
- Environmental protection;
- Making power more accessible, by reducing rates and developing sales;
- Regional integration, including development of link-ups with other countries, increased trade in the energy sector, and participation in sub-regional projects.

In the short run:

- Pursuit of a household energy strategy (Energy II, phase II);
- Implementation of the Program for Sustainable Management of Traditional Energy Sources (PGDET);
- Development of interconnection, including Maradi-Malbaza-Tahoua and Geidam-Diffa-N'guigmi-Maine;
- Supply of electricity to rural areas;
- Updating and revising feasibility studies on hydroelectric power facilities;
- Studies on the master plan for electricity and reorganization of the electrical sub-sector;
- Promotion of ENRs
- Promotion of control and management of energy.

Aide-Mémoire
Mission de la Banque mondiale
Projet Energie II (Crédit 1880-NIR)
Niamey, 8-22 novembre 1996

Introduction:

Une mission de la Banque mondiale (Messieurs Mark Segal et Kwawu Gaba) s'est rendue à Niamey du 8 au 22 novembre 1996 dans le cadre de la supervision du projet Energie II et de la restructuration du secteur électrique. Elle y a rencontré Son Excellence le Ministre d'Etat chargé de l'Economie, des Finances et du Plan, Son Excellence le Ministre des Mines et de l'Energie, Son Excellence le Ministre de l'Hydraulique et de l'Environnement ainsi que les personnels du projet et des ministères de tutelle, de la NIGELEC, de la SONIDEP et de la CSPPN. La mission a reçu une substantielle documentation traitant des sujets pertinents à son travail. La mission remercie vivement les personnes dont la liste est jointe à cet aide-mémoire pour l'accueil chaleureux et l'aimable assistance qui lui ont été accordés.

A. Objectifs de la mission

1. La mission avait les objectifs suivants:
 - 1) supervision du projet Energie II pour l'année 1996 et participation à l'atelier de la première phase du projet Energie Domestique;
 - 2) recommandations pour la poursuite du projet Energie II - Energie Domestique (programme des activités de l'année 1997, collaboration avec le PGRN);
 - 3) préparation du rapport d'achèvement du projet.
 - 4) soutien à la mission Banque mondiale chargée du projet de privatisation de la NIGELEC.

B. Supervision du projet Energie II pour l'année 1996

B.1 Volet "Pétrole"

2. Tous les travaux majeurs prévus au titre de l'année 1996 ont été réalisés à savoir:
 - l'achèvement des travaux de mise en place du centre de documentation pétrolière et archives ainsi que le caractère opérationnel des activités-clé d'archivage des données et de stockage des échantillons (ou carottes) prélevés sur le terrain. Il est prévu que le responsable du centre suive, avant la clôture du crédit, une formation en promotion et en commercialisation de cartes géologiques et qu'un autre agent de la direction de l'énergie soit formé sur le système informatisé de gestion des données pétrolières afin de le seconder;
 - le démarrage des activités du laboratoire d'analyses et de contrôle des produits pétroliers. Le laboratoire a pu réaliser un premier test qui, selon le directeur du laboratoire, a été bien accepté par le client;

- Le Ministère des Mines et de l'Energie est en négociation avec une compagnie pétrolière internationale pour un permis d'exploration sur le bloc Ténére; cette démarche est le résultat de la promotion Nigérienne soutenue par le projet.

3. Il est à envisager que le laboratoire et le centre de documentation pourraient s'autofinancer par la commercialisation de leurs prestations. Cependant, comme les deux entités sont au démarrage de leurs activités, le soutien de l'administration est requis au moins pour l'année 1997. La Direction de l'Energie au MME a informé la mission que les charges de fonctionnement de ces deux entités sont inscrites au budget du MME pour l'année 1997.

4. Par ailleurs, la Direction de l'Energie juge nécessaire une assistance technique additionnelle du Cabinet BEICIP notamment en matière de suivi des compagnies d'exploration pétrolière et de promotion du potentiel pétrolier Nigérien. La mission a informé la Direction qu'il n'existe pas de financement disponible pour ces services à court terme.

B.2 Volet "Energie Domestique"

B.2.1 - Administration du projet / Compte Spécial

5. Suite à la mission de supervision du département des décaissements de la Banque mondiale, il est apparu nécessaire de mettre en oeuvre les actions suivantes:

- 1) une réallocation des fonds du crédit 1880-NIR a été faite pour corriger une mauvaise interprétation des lettres des 19 octobre 1994 et 31 octobre 1995 portant sur les amendements dudit crédit 1880-NIR et qui affectait les budgets de fonctionnement des années 1995 et 1996 de cette composante;
- 2) une prorogation à 4 mois du délai de justification des dépenses encourues sur le compte spécial a été accordée afin que le réapprovisionnement de ce compte permette un décaissement à hauteur des engagements prévus avant la clôture du crédit. (La lettre adressée à Son Excellence M. Amadou Boubacar Cissé, Ministre de l'Economie et des Finances au sujet des points (1) et (2) est jointe en annexe 1);
- 3) des démarches ont été menées auprès de la NIGELEC et du Ministère des Mines et de l'Energie pour le remboursement d'une somme de 2,000,000 FCFA sur la composante "électricité" exigé avant la demande de retrait de fonds pour le réapprovisionnement du compte spécial. Les deux institutions, par leurs Directeur Général et Ministre respectivement, se sont engagées à le faire dans les meilleurs délais;
- 4) la mission a transmis à la direction du projet et au cabinet concerné les commentaires de la Banque mondiale sur le projet de rapport 1994 d'audit du compte spécial et leur a rappelé de transmettre dans les plus brefs délais le rapport 1995 d'audit du compte spécial.

B.2.2 Appréciation générale du projet et participation à l'atelier de la première phase

6. Cet atelier avait pour objectif de présenter le bilan de la première phase du Projet Energie Domestique (PED) et d'identifier les défis à relever pour assurer la pérennité de ses

acquis dont les plus remarquables sont l'institution d'une stratégie de régénération de la ressource forestière axée sur la responsabilisation des populations rurales, et comme composante intégrante, l'économie et/ou substitution de l'énergie aux points de consommation.

7. Les organisateurs de l'atelier ont invité la Banque mondiale à présenter son point de vue sur le projet à la séance d'ouverture de l'atelier. Le discours de la Banque mondiale est joint en annexe 2.

8. Malgré tout le succès enregistré jusqu'à date, la pérennité de la stratégie adoptée est encore fragile surtout en ce moment où il faut une programmation importante pour effectuer sa large diffusion afin de l'amener à un niveau adéquat pour la satisfaction des besoins de la population en bois-énergie.

9. Compte tenu des performances et de l'expérience des structures de gestion et d'implantation du PED acquise sur une période de 7 ans, la mission estime qu'il serait souhaitable de maintenir leurs cohésion et efficacité.

B.2.3 Etat d'avancement du projet

B.2.3.1 Aménagement des formations naturelles

10. La mission note avec satisfaction les informations contenues dans le bilan de l'année 1996 relatives à la mise en place des schémas directeurs et des marchés ruraux ainsi qu'à l'entrée en activité des GTA/GTI (Groupes Techniques d'Appui ou d'Inventaire) suite à des contrats conclus entre le PED et des ONG.

11. La mission réitère sa préoccupation, déjà évoquée lors de sa mission de supervision de 1995, concernant l'efficacité du contrôle forestier. La mission constate avec satisfaction que la taxe est passée de 600 FCFA/stère à 975 FCFA/stère en 1996 et que 60 agents viennent d'être recrutés pour renforcer le contrôle forestier du trafic de bois-énergie comme prévu dans le programme d'activités de l'année 1996. M. Le Ministre de l'Hydraulique et de l'Environnement devrait faire en sorte que l'arrêté portant application du décret de révision fiscale sur le bois incontrôlé soit opérationnel avant 1997.

12. La mission reprend les commentaires des directeurs du PED relatifs à l'efficacité du contrôle forestier:

"Rappelons que ce suivi de la part des agents de l'administration de l'environnement est nécessaire pour garantir le respect des quotas et des cahiers des charges d'exploitation définis aux marchés ruraux. L'amélioration de l'efficacité du contrôle forestier des flux commerciaux de bois-énergie en reste encore et toujours aux espoirs tel que le montrent les différents rapports de F. Hauser et notamment celui rédigé à l'issue de la mission du 28/04 au 12/05/96.

Dans sa conclusion, ce dernier rappelle que:

- 1) *des progrès ont été enregistrés au niveau des recettes et dans l'alimentation du compte 3001;*
- 2) *des délais de mise en oeuvre des recommandations faites lors des missions de 1995 sont trop longs;*
- 3) *le PED devrait renforcer son action de suivi de la mise en oeuvre de ces recommandations;*
- 4) *le bon fonctionnement du compte 3001 est la condition de confiance que peuvent apporter les agents au système et rejeter par là même les anciens modes de fonctionnement;*
- 5) *le système, dans son organisation, paraît correct et perfectible. Tout dépend de la volonté politique et de l'engagement des responsables à poursuivre le processus engagé depuis 1989."*

13. La mission recommande vivement aux autorités de procéder à une augmentation de la taxe au niveau de 1375 FCFA/stère qui est le niveau requis pour assurer l'efficacité de l'instrument de fiscalité utilisé pour réguler l'équilibre entre le bois contrôlé et le bois incontrôlé.

14. De plus, il avait été proposé lors de la mission de supervision de 1995 que le compte 30-01 du trésor public affecté au contrôle forestier soit domicilié dans une banque commerciale, géré de manière autonome par la Direction de l'Environnement et soumis à un contrôle périodique de l'administration centrale des finances publiques. Toutefois, aucune discussion n'a été officiellement engagée sur cette question entre le Ministère de l'Economie et des Finances et celui de l'Hydraulique et de l'Environnement. Le Ministre de l'Economie, des Finances et du Plan saisi de cette suggestion par la mission a estimé qu'elle ne poserait pas de problème en principe.

B.2.3.2 Economie et substitution de l'énergie

15. Tel que souhaité en novembre 1995, le PED a remis à la mission une documentation qui compare les coûts de cuisson selon les options adoptées (bois-énergie, pétrole lampant, gaz) et a donné des indications sur les coûts de fabrication du réchaud Tchip. La mission a apporté un complément à l'analyse comparative des coûts de cuisson. Malheureusement, il y a eu des retards dans l'exécution de l'audit des comptes et de gestion de la société Tchip-Import ce qui fait que la mission n'a pas eu toutes les informations souhaitées pour faire une analyse approfondie des problèmes de cette filière. Cependant, on peut tout de même constater que:

- 1) la filière du réchaud à pétrole n'est pas concurrentielle comparée à celle du foyer amélioré sur le double plan financier et économique (voir annexe 3 du présent aide-mémoire);
- 2) la société Tchip Import, manufacturière des réchauds, ne semble pas viable compte tenu du taux de pénétration actuel des réchauds (le niveau moyen des ventes 1995-1996 des réchauds est d'environ 140 unités par mois);
- 3) les enquêtes menées par le projet suggèrent qu'une forte proportion des bénéficiaires directs de la modeste subvention accordée pour l'achat de réchauds à

pétrole jugent cette subvention non nécessaire et estiment surtout qu'elle n'est pas de nature à influencer le choix de leur méthode de cuisson;

- 4) à partir de ces mêmes enquêtes, il apparaît qu'une augmentation notable des ventes de réchauds au rythme de 600 unités par mois pendant 5 ans doublée d'une utilisation régulière de ces équipements pour la cuisson a un très faible impact sur la conservation des ressources ligneuses. Toutefois, ce rythme de ventes ne pourra être atteint qu'après une action commerciale très agressive difficilement envisageable avec l'organisation actuelle et les moyens de la société Tchip-Import;
- 5) la subvention croisée au pétrole lampant deviendra de plus en plus importante au fur et à mesure que sa consommation augmentera et il y a lieu de craindre qu'elle a déjà engendré des effets pervers comme le développement de la fraude et/ou la fragilisation du mécanisme de stabilisation des prix des produits pétroliers.

16. Du point de vue de la mission, la subvention croisée au pétrole lampant a des implications directes non seulement pour le PED, mais surtout pour la fiscalité de l'Etat. La mission recommande que le Gouvernement se saisisse de la question de subvention du pétrole lampant dans le contexte d'une revue du mécanisme de fixation des prix des produits pétroliers qui sera entreprise lors des réflexions sur la restructuration de la filière des produits pétroliers. Sans vouloir anticiper les résultats de ces travaux il convient de suggérer que les Nigériens devraient payer un prix pour le pétrole lampant qui reflète le coût économique de ce produit.

17. Tout en reconnaissant l'importance du Volet Demande pour la stratégie <énergie domestique> adoptée par le Niger, la mission estime qu'il s'avère important de modifier plusieurs aspects de sa mise en oeuvre. Les actions suivantes devront donc être entreprises :

- 1) la restructuration de la société Tchip Import sur le double plan organisationnel et managérial ainsi que le redressement de sa situation financière selon les résultats de l'audit;
- 2) l'annulation de la subvention à l'achat des réchauds à pétrole;
- 3) l'introduction d'autres intervenants du secteur privé dans la filière des réchauds à pétrole de sorte à en diversifier les sources d'approvisionnement (par exemple importations);
- 4) le développement de la fabrication et de la diffusion des foyers améliorés du type Mai Sauki-Plus et au cas où cela serait possible à un coût abordable l'amélioration de leur efficacité énergétique;
- 5) le maintien de l'appui technique et publicitaire aux foyers améliorés et réchauds à pétrole;
- 6) tout en tenant compte des conclusions des réflexions sur la restructuration de la filière des produits pétroliers, les activités de distribution du pétrole lampant et des équipements de substitution par les energy shops ainsi que le service après vente aux utilisateurs des réchauds à pétrole devraient être maintenues et conduites sur une base commerciale;

- 7) le maintien de la collecte et le traitement des données relatives aux tendances des ménages en matière de consommation d'énergie ainsi que le maintien des conditions de concurrence sur le marché énergétique.

18. Cette stratégie de restructuration reconnaît qu'en même temps que l'analyse économique provisoire de la substitution est équivoque, (Annexe 3 de cet Aide-Mémoire), une auto-génération suffisante de la ressource forestière n'est pas encore assurée. Il est donc raisonnable de proposer un appui judicieux à la conservation et à la substitution qui privilégie la mise en place des structures et des prix d'équipement ainsi que du combustible sur une base économiquement saine, afin que ceux qui veulent faire de la substitution connaissent les options disponibles et contribuent à la conservation de la ressource forestière sans pour autant constituer un fardeau pour les finances publiques.

C. Recommandations pour la suite du projet Energie II - Energie domestique

19. Lors de la mission de supervision de novembre 1995, il avait été convenu entre la mission et les équipes PED et PGRN qu'une stratégie d'intégration/coordination devait être adoptée par le Niger avant le mois de juin 1996. Malheureusement, il y a eu des retards imprévisibles dans le démarrage des analyses nécessaires à la réalisation de ces objectifs. Comme progrès réalisé, ils ont identifié trois options possibles et choisi "l'option III" qui semble avoir l'agrément des ministères de tutelle. Cette option envisage qu'il y aura concertation au niveau de la direction des projets et sur le terrain tout en préservant l'indépendance des structures administratives. Ce cadre de collaboration est décrit avec de plus amples détails en annexe 4.

20. Lors des analyses et discussions concernant la mise en oeuvre de cette approche, il est apparu que la question était plus complexe que prévu¹. Les PED et PGRN vont soumettre à la Banque mondiale au plus tard le 7 décembre 1996 une note conjointe adoptée par les Ministères de tutelle qui fait état de tous les postes opérationnels où il n'y aura aucun problème de coordination et d'éligibilité au financement PGRN ainsi que les points sur lesquels les possibilités et la nécessité de coordination et d'éligibilité au financement PGRN sont moins évidentes. Ce document devra mettre bien en évidence les détails par postes de dépense pour les activités du programme 1997 ainsi que les modalités de fonctionnement entre les deux projets. De plus, il servira de base à toutes les discussions ultérieures entre les autorités Nigériennes et la Banque.

¹ Par exemple, la différence d'approche entre les deux projets pose le problème d'éligibilité de certaines activités du volet demande au financement du PGRN notamment celles qui sont directement liées aux populations urbaines. En plus, les procédures d'engagement des dépenses au sein du PGRN étant très différentes de celles du PED, quant aux modalités et au calendrier, l'intégration des programmes à ce niveau retarderait la célérité dans la poursuite des activités du PED, ce qui constituerait un handicap à la pérennité des acquis actuels de ce dernier.

D. Financement d'un <projet énergie>

21. Au cours des réunions, plusieurs interlocuteurs ont sondé la mission sur la possibilité de préparer un projet dont le thème global pourrait être le développement de l'implication du secteur privé dans le secteur de l'énergie. Les principaux éléments consisteraient en :

- 1) un appui à la participation du secteur privé dans le secteur de l'électricité;
- 2) une rationalisation et un appui au programme de substitution en énergie domestique;
- 3) une assistance à la promotion et au suivi des explorations pétrolières entreprises par les compagnies pétrolières;
- 4) un développement des initiatives du secteur privé dans la prestation de services liés à l'économie d'énergie et à la facturation de l'électricité (cette opération aura un impact sur la réduction des factures d'énergie de l'administration, ce qui minimiserait le risque commercial sur les fournisseurs de ces services).

22. La mission a reçu ces propositions avec intérêt et répondu que la préparation d'un nouveau <projet énergie> devrait être discutée dans le cadre du "Country Assistance Strategy".

E. Rapport d'achèvement de l'exécution du projet Energie II

23. La mission avait transmis, au Ministère et à la direction du projet, avant son arrivée au Niger, les termes de référence pour le rapport d'achèvement consistant essentiellement aux plan du document et indications de la Banque relatives aux objectifs et contenu du rapport. Elle y avait également associé un projet de rapport d'achèvement bénévolement préparé par Willem Floor, ancien chargé du projet à la Banque.

24. Des séances de travail ont été organisées entre le Ministère des Mines et de l'Energie, la direction du projet et la mission pour préciser les modalités de forme et de fonds du rapport d'achèvement. La mission tient à noter l'abondante documentation fournie par les composantes "pétrole", "énergie domestique" et "économie/conservation de l'énergie électrique" sur l'atteinte des objectifs du projet et des mesures à implanter pour en assurer la pérennité et estime que ces documents faciliteront sans aucun doute la rédaction du rapport d'achèvement dont la version finale devra être disponible avant la fin juin 1997 pour présentation au Conseil d'Administration de la Banque mondiale. Pour la composante "électricité", la Direction de l'Energie et la NIGELEC doivent préparer un rapport retraçant l'historique des événements pertinents au programme NIGELEC jusqu'à l'annulation de cette composante.

25. La direction du projet et la mission ont arrêté les programme et calendrier de travail jusqu'à l'édition de la version officielle du rapport d'achèvement. Ainsi, les projets de rapport préliminaire sont à préparer et à échanger entre la direction du projet et la Banque au plus tard en fin janvier 1997. Les commentaires devront être faits avant la fin février 1997 afin que la version finale du rapport d'achèvement de la Banque incluant en ses annexes les commentaires du client soit disponible vers la fin d'avril 1997.

F. Collaboration avec la mission de privatisation de la NIGELEC

26. Il était prévu que la mission de supervision du PEII et la mission de la privatisation de la NIGELEC collaborent sur le terrain afin d'assurer la continuité des engagements et de faciliter les travaux déjà agréés avec le Gouvernement lors de la mission de novembre 1995. L'équipe de la Banque mondiale qui travaille sur le sujet de la participation du secteur privé au secteur électrique est en train de préparer des options qui seront discutées avec le Gouvernement du Niger. Cependant, il convient de noter ici que les équipes des deux missions maintiendront leur concertation surtout au niveau de la mise en oeuvre de certains aspects de restructuration du secteur qui sont préalables à l'exercice de privatisation, tels que le cadre institutionnel comprenant la définition des rôles et responsabilités des intervenants, la loi de l'électricité, la tarification et plus généralement la régulation du secteur.

Niamey le 22 novembre, 1996

**Liste des personnes rencontrées
lors de la mission de supervision du Projet Energie II
Niamey, 8 - 22 novembre 1996**

7

1. Membres du Gouvernement

- Son Excellence M. Amadou Boubacar Cissé, Ministre d'Etat chargé de l'Economie, des Finances et du Plan
- Son Excellence M. Maï Manga Boukar, Ministre des Mines et de l'Energie
- Son Excellence M. Labo Kada, Ministre de l'Hydraulique et de l'Environnement

2. Ministère de l'Economie et des Finances

Cellule de Coordination de la Privatisation des Entreprises Publiques

- M. Hamid Ahmed, Coordonnateur

Caisse de Stabilisation et de Péréquation des Prix et des Produits du Niger

- Mme Dia Brigitte. Directrice Générale
- Mme Ali Fatouma. Directrice d'Exploitation et des Statistiques

3. Ministère des Mines et de l'Energie

- M. Mamadou Zanguina, Directeur de l'Energie et du PE II - Volet Pétrole
- M. Adam Melly, Secrétaire Général du Ministère de l'Energie
- M. Rabiou Hassane Yari, Direction de l'Energie
- M. Mounkaila El. Moussa, Chef de Service Central de l'Electricité
- M. Boubacar Oumarou, Chef du Centre de Documentation Pétrolière et Archives
- M. Djibé Mounkaila, Chef du Laboratoire d'Analyses et de Contrôle des produits pétroliers
- M. Boubacar Nalando, Chef Service Hydrocarbures p.i.

4. Ministère de l'Hydraulique et de l'Environnement

- M. Abdou Daouré, Conseiller Technique du Ministre
- M. Laouli Ada, Directeur National de l'Environnement
- M. Wata Issoufou. Direction de l'Environnement
- M. Abdelkader René Joly, Chef CAF, Direction de l'Environnement
- M. Sani Salissou, Gestionnaire du Compte 30-01, Direction de l'Environnement
- Lieutenant Touré Adamou. Commandant Adjoint BTPN
- Lieutenant Almadjin Mamane, Chef DIC/BTPN

5. Projet Energie II - Energie Domestique

- M. Kiri Tounao, Directeur du Volet Demande
- M. Dan Baria Soumaïla, Directeur du Volet Offre
- M. Pierre Montagne, Conseiller Technique du Volet Offre
- M. Tiémou Issoufou, Chef Service Technique du Volet Demande
- M. Bachard Aboubacar, Chef Serv. Evaluation des Programmes - Volet Demande

- M. Mamoudou Hamadou, Directeur Adjoint du Volet Offre
- M. Dan Mirria Sani, Chef Comptable du Projet Energie Domestique
- M. Idrissa Madougou, Directeur Général de la Société Tchipe Import
- M. Hadi Goni Boulama, Directeur du Cabinet d'audit EFIC

6. Projet de Gestion des Ressources Naturelles (PGRN)

- M. Karbo Atahirou, Spécialiste en Suivi Ecologique
- M. Guéro Idi, Spécialiste des Ressources en Eau
- M. Elhadji Maman Saadou, Spécialiste des Ressources Fauniques, Forestières et Halieutiques

7. Société Nigérienne d'Electricite (NIGELEC)

- M. Mamane Amadou Laouali, Directeur Général
- M. Amadou Zakhou, Directeur des Etudes et de l'Equipement
- M. Adamou Boukari, Directeur Technique
- M. Laouali Abdou, Directeur Financier et Comptable
- M. Arzika Mahamadou, Direction des Etudes et de l'Equipement
- M. Moustapha. Chef Service Gros Abonnés

8. Société Nigérienne de Produits Pétroliers (SONIDEP)

- M. Souleymane Hamadou, Secrétaire Général
- M. Boulama Manga. Inspecteur Général
- M. Katzenfort J. Pierre, Directeur des Exploitations

9. Bureau de Coopération Danoise (DANIDA)

- Mme Astrid Agerholm Danielsen, Chef de Section
Division d'Afrique de l'Ouest et de l'Est
Ministère Royal des Affaires Etrangères du Danemark
- Mme Sophia Mæstrup, Représentante au Niger

10. Assistance Technique SEED-CIRAD

- M. Gérard Madon, Consultant
- M. Michel Matly, Consultant

11. Kestrel Cyprus Limited

- M. Stuart Beatty, General Manager

The World Bank

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

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le 15 novembre, 1996

Son Excellence
Monsieur Amadou Boubacar Cissé
Ministre
Ministère du Finance et du Plan
Niamey
République du Niger

**Objet: NIGER: Crédit 1880-NIR - Projet Energie II
Prorogation de la date de justification des fonds
Réallocation des fonds**

Monsieur le Ministre:

Suite aux discussions entre les responsables du projet Energie II et l'équipe du projet de la Banque mondiale, et compte tenu du délai extrêmement limité imparti avant la clôture du crédit prévu pour le 31 décembre 1996, nous avons l'honneur de vous informer que l'IDA n'a pas d'objection à prolonger le délai de justification des dépenses sur le compte spécial de la composante énergie domestique (Partie A, catégories 5(a) et 5(b) de l'accord de crédit) de quatre mois au-delà du 31 décembre 1996 pour les dépenses autorisées qui sont encourues et les biens et services rendus avant le 31 décembre 1996.

Nous avons également l'honneur de vous informer qu'aux fins de l'Annexe 1 de l'Accord de Crédit, l'IDA par la présente corrige l'allocation des fonds du Crédit par Catégorie telle que définie dans la lettre du 31 octobre 1995. En effet, "l'Annexe 1" jointe à cette dernière ne reflétait pas le niveau des dépenses qui devaient être effectuées au titre des années 1995 et 1996. Une copie de l'Annexe 1, "Retrait des fonds du Crédit", modifiée est attachée ci-joint.

Veuillez agréer, Monsieur le Ministre, l'expression de ma haute considération.



Edward Brown
Représentant Résident

cc. Son Excellence Monsieur Mai Manga Boukar
Ministre des Mines et de l'Energie

Son Excellence Monsieur Labo Kada
Ministre de l'Hydraulique et de l'Environnement

ANNEXE 1Retrait des Fonds du Crédit

Catégorie	Montant affecté exprimé en DTS	% des dépenses financé
(1) Partie B du Projet	pour mémoire, composante électricité déjà clôturée	
(2) Partie C du Projet		
(a) Services de consultants et formation à l'exception de la Partie C.5.	2.590.000	100 % des dépenses en devises
(b) Services de consultants pour la Partie C.5.	100.000	100 % des dépenses en devises
(c) Matériel et services connexes d'installations à l'exception de la partie C.5.	100.000	100 %
(3) Remboursement de l'Avance pour la Préparation du Projet	400.000	Montant dû en vertu de la Section 2.02 (c) du présent accord.
(4) Non alloué	710.000	
(5) Partie A du Projet		
(a) Matériel et services connexes d'installation	300.000	100 %
(b) Services de consultants, formation et frais de fonctionnement (salaires de contractuels, indemnités diverses au personnel et frais généraux)	1.700.000	100 %

**Communication de la Banque mondiale
à l'occasion de l'Atelier de la Première Phase
du Projet Energie Domestique**

Madame et Messieurs les Ministres
Madame la Représentante de DANIDA par intérim
Monsieur le Sous-Préfet et Chef de Poste Administratif
Honorables Chefs Traditionnels
Honorables Invités
Madames et Messieurs

Il est pour nous un privilège d'avoir été invité à prendre la parole à l'occasion de cet événement très important pour le Niger. En effet, le projet Energie Domestique a été conçu et mis en oeuvre par des Nigériens et pour le bien-être des Nigériens.

La Banque mondiale était associée au Projet dès son démarrage, en première instance comme administrateur d'un don de la coopération Danoise, et depuis 1995 comme principal bailleur de fonds.

Du point de vue de la Banque mondiale, ce projet répond d'une manière diligente et tangible aux grands objectifs du développement socio-économique, non seulement au Niger mais également dans la région du Sahel sur une plus grande échelle. Le projet vise à résoudre les problèmes directement liés à :

- la dégradation de la ressource forestière,
- la responsabilisation des populations rurales dans la conservation et la régénération de la ressource,
- la distribution des bénéfices du développement directement aux populations rurales, et l'approvisionnement au moindre coût des populations rurales et urbaines en énergie domestique.

Ce projet, qui a commencé comme <projet pilote>, est en voie de devenir une approche d'envergure nationale pour répondre aux besoins les plus pressants dans ce domaine. Le cadre institutionnel et les méthodes de mise en oeuvre du projet se sont continuellement améliorés et constituent aujourd'hui une référence dans la sous-région.

Par ailleurs, l'esprit de collaboration qui a prévalu au sein de l'équipe de gestion du projet ainsi qu'entre leurs Ministères de tutelle a fortement contribué aux acquis importants de ce projet. Tout au long de son exécution, le projet a été très bien administré. et a su développer au sein des populations rurales un esprit d'appropriation qui est de nature à assurer la pérennité des modes de fonctionnement mis en place.

Parallèlement, l'objectif de conservation de la ressource est visé par une action dont le but est de réduire au niveau des populations urbaines les besoins en énergie primaire pour la cuisson. Ceci a été mis en oeuvre par une série de mesures à caractère innovateur et expérimental qui ont également leurs acquis et dont vous aurez largement à débattre au cours de vos travaux. Il convient de souligner en cette occasion l'utilité d'intervenir d'une manière économique et stratégique non seulement sur la production, mais aussi sur la consommation de l'énergie.

Sur le plan des ressources humaines, il est noté avec grande satisfaction le renforcement endogène de l'expertise nigérienne dans tous les domaines de l'administration et de l'exercice des maintes activités qui font partie intégrante de la stratégie <énergie domestique>. Cette expertise est à sauvegarder, à promouvoir, et à mettre au service du plus grand nombre possible de Nigériens et des peuples des pays limitrophes.

Enfin, sur le plan éducatif, le projet a produit une abondante documentation de haute qualité ainsi qu'un système de données informatisé qui permet le suivi à long terme de ces initiatives. Ces outils sont d'une très grande utilité pour tous ceux qui sont intéressés par le sujet ou impliqués dans des travaux à caractère similaire. A ce niveau c'est encore un atout à préserver.

La Banque mondiale vous souhaite un séminaire fructueux et une bonne continuation de vos travaux.

Niamey, le 19 novembre 1996.

Comparaison des coûts de cuisson

Note explicative des calculs

La comparaison des coûts de cuisson est faite sur les plans financier et économique. Les coûts de cuisson intègrent essentiellement le coût du réchaud (foyer amélioré ou réchaud à pétrole) et le coût du combustible (bois-énergie ou pétrole).

A - Comparaison des coûts de cuisson sur le plan financier

Cette comparaison est présentée au niveau des colonnes C (foyer amélioré ou FA) et D (réchaud à pétrole ou Tchipe) des différentes feuilles ci-après jointes.

A.1 - Calcul du coût du réchaud

- a) Chaque ménage achète deux modèles - un petit, un grand - d'un type de réchaud pour la cuisson;
- b) Le prix des foyers améliorés est **C3**.
- c) Le prix des réchauds Tchipe est **D3** (prix au consommateur après subvention).
- d) L'amortissement annuel est donné par **C5** ou par **D5** en considérant un taux d'intérêt annuel (taux d'actualisation social) de 10%.
- e) Le coût annuel des pièces de rechange pour le réchaud à pétrole est donné par **D6** et calculé en supposant que les 36 mèches (pour modèles 12 et 24 mèches) au coût unitaire de FCFA 1300/36 sont renouvelées six fois par année.
- f) Le coût annuel total hors combustible des réchauds est donné respectivement par **C7, D7: = C5+C6; D5+D6**.
- g) Le coût par MJU hors combustible est déterminé par **C8, D8: = C7/B12, D7/B12** en faisant l'hypothèse que chaque ménage a besoin de 3165 MJU (B12) pour la cuisson par an.

A.2 - Calcul du coût du combustible

- a) Le prix de détail du combustible (bois-énergie pour FA et pétrole pour Tchipe) est donné par **C15, D15** (les valeurs sont tirées du rapport Matly)
- b) Le pouvoir calorifique du combustible est exprimé en MJ/kg et est donné par **C16, D16** (les valeurs sont tirées du rapport Matly)
- c) Le rendement (ou l'efficacité) de la combustion est donné par **C17, D17** (les valeurs sont tirées du rapport Matly)
- d) Le coût du combustible par MJU est donné par **C18 ou D18: = C15/(C16*C17) ou D15/(D16*D17)**.

A.3 - Comparaison des coûts financiers de cuisson

Le coût total de cuisson par MJU est égal à la somme du coût du réchaud par MJU et du coût du combustible par MJU et donné par **C20 ou D20: = C8+ C18 ou D8 + D18**.

A.4 - Calcul du coût du réchaud Tchip

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Dans la comparaison des coûts financiers de cuisson, il est pris en compte pour le réchaud Tchip le prix au consommateur subventionné. L'objectif visé par la présente section est de déterminer le coût réel moyen d'un réchaud Tchip en fonction du rythme de production et des différentes charges d'exploitation de la société Tchip Import ainsi que des marges de distribution.

- a) La société Tchip Import a contracté une dette auprès du projet Energie II qu'elle doit rembourser par mensualité d'un montant égal à: **B23**
- b) La société Tchip Import a contracté une dette auprès de la Caisse Française de Développement qu'elle doit rembourser par mensualité d'un montant égal à: **B24**
- c) Le service de la dette par mois est donc **B25: = B23+B24**
- d) Le nombre de réchauds vendus est de: **B26** (nombre moyen par mois en 1995/96)
- e) Le coût fixe par réchaud (12 et 24 mèches confondus) est donc **B27: = B25/B26**
- f) Le coût moyen d'exploitation (qui représente les charges variables) par réchaud est égal à **B28** (il est obtenu en faisant la moyenne des charges variables, excluant l'amortissement et les frais financiers, relatives aux réchauds 12 et 24 mèches regroupées dans le Tableau 1 du rapport Bilan 1996).
- g) Les marges de vente **B29** regroupent les marges des producteurs, grossistes et détaillants et sont déterminées par la moyenne des marges sur les réchauds 12 et 24 mèches tirées du Tableau 2 du rapport Bilan 1996.
- h) Le coût moyen total par réchaud (12 et le 24 mèches confondus) est donc égal **B30: = B27+B28+B29**.

*Observation analytique: La production/distribution de 2 réchauds par ménage génère pour la société Tchip Import 21500 FCFA de chiffre d'affaires (16500 FCFA pour le prix de vente plus subventions (provenant du projet Energie II) de 5000 FCFA pour les deux modèles); pourtant, au rythme de production actuel de 140 réchauds par mois, le coût de vente/distribution des deux modèles toutes marges comprises et subventions exclues dépasse 50000 FCFA (coût moyen par réchaud (B30) de 25866 FCFA * 2). Le manque à gagner est donc de 28500 FCFA pour deux réchauds vendus, et on peut y voir une des raisons pour lesquelles l'entreprise n'a pu rembourser sa dette de 28600 FCFA sur deux réchauds depuis un certain temps.*

B - Comparaison des coûts de cuisson sur le plan économique

Cette comparaison est présentée au niveau des colonnes E (foyer amélioré ou FA) et F (réchaud à pétrole ou Tchip) des différentes feuilles ci-après jointes.

B.1 - Calcul du coût du réchaud

Pour le calcul du coût du réchaud Tchip (futur) à prendre en compte pour la comparaison des coûts économiques, on fait les hypothèses suivantes:

- a) la dette contractée auprès du projet Energie II et de la CFD est exclue;
- b) la société a un rythme de production-vente de 600 réchauds par mois permettant de mettre en "utilisation" 35000 unités environ chez 17,500 ménages d'ici 5 ans.

- c) les coûts d'exploitation et marges sont maintenus à leur niveau actuel et donnés par **C28, C29**
- d) le coût économique moyen d'un réchaud (12 et 24 mèches confondus) est par conséquent de **C30 = C28+C29**.

La méthode de calcul du coût économique du réchaud est semblable à celle adoptée pour le calcul du coût financier.

- a) Le coût par MJU (hors combustible) est donné par **E8** pour le FA;
- b) Le coût moyen du réchaud Tchipe (12 et 24 mèches par ménage) est **F3: = C30*2**.
- c) L'amortissement annuel est donné par **F5** en considérant un taux d'intérêt annuel (taux d'actualisation social) de 10%.
- d) Le coût annuel des pièces de rechange est semblable à celui déterminé pour la comparaison des coûts financiers et égal à **F6**
- e) Le coût annuel total hors-combustible pour le réchaud Tchipe est de **F7: = F5+F6**
- f) Le coût par MJU hors-combustible est donc de **F8 := F7/B12**.

B.2 - Calcul du coût du combustible

- a) Le coût du bois-énergie est déterminé à partir du prix <calcul financier> augmenté du coût de contrôle (recommandation de SEED) et égal à **E15**.
- b) Le coût du pétrole-lampant est déterminé à partir de **F15 = D36 =** prix officiel de litre (**B34**) moins 20% de frais non-économique (**C34**) pour obtenir le coût économique net par litre (**D34**), qui est lui-même traduit en coût économique par kg égal à **D36: = D34/D35**. [Note: *B34* représente le coût d'approvisionnement sur le marché mondial auquel on ajoute les frais d'entreposage et de transport de la côte à Niamey ainsi que les taxes. La feuille <Filiaire Nigeria> démontre les mêmes calculs avec coût d'approvisionnement sur le marché informel nigerian.]
- c) Le pouvoir calorifique (exprimé en MJ/kg) du combustible et le rendement de combustion sont identiques à ceux utilisés pour le calcul financier (**F16, F17**).
- d) Le coût de combustible par MJU est donc égal à **E18 ou F18: = E15/(E16*E17)** ou **F15/(F16*F17)**.

B.3 - Comparaison des coûts économiques de cuisson

Le coût total de cuisson par MJU est donné par **E20** ou **F20: = E8 +E18** ou **F8 + F18**.

Observation: Le coût économique de cuisson avec les FA étant de 6.96 FCFA/MJU, et celui obtenu en utilisant le réchaud Tchipe étant de 17.5 FCFA/MJU, il y a lieu de subventionner fortement le pétrole lampant, tel que démontré en colonne G, si l'on désire ramener le coût de cuisson par réchaud Tchipe à un niveau concurrentiel à celui obtenu pour la cuisson avec FA.

B.4 - Calcul de la subvention accordée au pétrole lampant:

- a) Le coût économique du pétrole lampant par kg est égal à **G23: = D36**

- b) Le prix d'équilibre du pétrole lampant est donné par: $G24: = (E20-F8)*G16*G17$ [G16 et G17: = MJ/kg et rendement]. [La marge par MJU disponible pour le combustible est la différence entre le coût économique total de cuisson par la méthode FA et le coût économique du réchaud Tchipe par MJU utile hors combustible. Cette marge par MJU est ensuite convertie en FCFA par kg de pétrole lampant].
- c) La subvention par kg de pétrole lampant est donc de $G25: = G23-G24$.
- d) L'équivalent en kg de pétrole lampant des besoins en MJU par ménage et par année est égal à: $G26: = B12/(G16*G17)$.
- e) Le nombre de ménages au bout des 5 années correspondant à l'utilisation régulière des 600 réchauds vendus mensuellement est égal à $G27$.
- f) La quantité totale de pétrole lampant (exprimée en kg) correspondant au nombre de ménages déterminés au point (e) est de $G28: = G26*G27$.
- g) Le montant total de la subvention est égal à $G29: = G25*G28$ [G30 en dollars en considérant que FCFA 500 = un (1) dollar].
- h) La subvention par MJU de pétrole lampant est de $G33: = G25/(F16*F17)$.
- i) Le coût économique du bois-énergie par MJU est = E18.
- j) Le ratio subvention MJU pétrole par coût MJU bois est égal à: $G35 = G33/G34$.

Observation: La subvention au pétrole lampant dépasse très largement la valeur économique totale du bois-énergie.

Si l'on base toute la comparaison économique sur l'hypothèse que le coût de pétrole lampant était déterminé à partir du prix de contrebande à la frontière du Nigeria augmenté d'une marge substantielle intégrant évidemment les coûts de transport jusqu'à Niamey, il y a toujours nécessité de subvention pour équilibrer les coûts de cuisson entre le bois-énergie et le pétrole lampant mais la subvention est moins importante comme le montre la feuille de calcul jointe (feuille 2 "Filière Nigeria").

C - Evaluation de l'impact sur la conservation des ressources ligneuses

L'objectif de cette section est d'estimer le taux annuel de substitution réalisé par l'utilisation régulière du pétrole lampant par l'ensemble des ménages précédemment déterminé.

- a) Le nombre de ménages est égal à $B39: = G27$
- b) Le nombre de MJU par ménage est de $B40: = B12$
- c) Le nombre total de MJU est égal à $B41: = B39*B40$
- d) Le nombre de tonnes bois-équivalent est donné par $B42: = B41/(C16*C17*1000)$.
- e) La consommation totale de bois-énergie en 1995 est de $B43$ (doc. PED)
- f) Le taux maximum de substitution est donc égal à $B44: = B42/B43$.

Observation: Toutes choses égales par ailleurs, le taux de substitution serait moindre d'ici 5 ans parce que la consommation de base aurait cru entretemps. La substitution au rythme de 600 réchauds par mois - donc supérieur à quatre fois le rythme de vente observé par le passé - aurait un impact modeste sur la conservation du bois.

D - Comparaison économique entre les coûts de cuisson avec le pétrole lampant filière officielle et ceux obtenus avec le charbon de bois

Le coût du charbon de bois livré à Niamey est calculé aux lignes 47 à 55 (feuille 3):

- a) Pour un (1) kg du charbon de bois **B47**, il est requis **B48** kg de bois-énergie (source rapport Ghana).
- b) La quantité de bois-énergie (en kg) requise par kg charbon est **B49**: = $B47 * B48$.
- c) Le coût économique du kg de bois-énergie au marché rural (source fax Madon) est égal à **B50**.
- d) Le coût total de bois-énergie par kg de charbon de bois est de **B51**: = $B49 * B50$.
- e) Les autres coûts de production par kg de charbon de bois (source Ghana) sont donnés par **B52**
- f) Le coût total par kg de charbon de bois à la sortie du marché rural est de **B53**: = $B51 + B52$
- g) Les coûts de transport et marges de distribution par kg de charbon de bois sont donnés par **B54**
- h) Le coût de kg de charbon de bois vendu au détail à Niamey est **B55**: = $B53 + B54$.

Observation: Sur le plan économique, le coût pour la cuisson au charbon de bois se situe à peu près à mi-chemin entre le coût de cuisson avec le FA et celui obtenu avec le réchaud Tchip. Cependant, si tous les besoins en énergie de cuisson des 17,500 ménages sont satisfaits par le recours systématique au charbon de bois, l'impact sur la conservation des ressources ligneuses serait grand étant donné le mauvais taux de conversion du bois-énergie en charbon de bois.

E - Comparaison économique entre les coûts de cuisson avec le pétrole lampant filière Nigeria et ceux obtenus avec le charbon de bois (feuille 4)

Tous les calculs sur cette feuille sont les mêmes que sur la feuille 3. exception faite pour le coût du pétrole lampant qui est celui de la feuille 2 (coût économique du pétrole lampant).

Observation: Il est moins coûteux sur le plan économique de cuisiner en utilisant le pétrole lampant provenant du Nigeria, plutôt qu'en utilisant le charbon de bois.

Conclusions:

Les différents calculs et enquêtes permettent de tirer les conclusions suivantes:

- ⇒ La cuisson au pétrole lampant (filière officielle) n'est pas concurrentielle à celle utilisant le bois-énergie et les foyers améliorés. mais elle devient concurrentielle aussitôt que le pétrole lampant provient du marché informel nigerian, et qu'elle est comparée à la cuisson avec le charbon de bois.

- ⇒ L'impact de la filière réchaud à pétrole sur la conservation des ressources ligneuses serait modeste, excepté dans le cas où le pétrole lampant se substitue au charbon de bois. En effet, la consommation évitée de bois passe de 6.5%/an à 23%/an.
- ⇒ Le réchaud à pétrole n'est pas une option abordable pour la population à faible revenu.

Niamey, le 17 novembre, 1996

Comparaison Coûts de Cuisson

	A	B	C	D	E	F	G
1			Calcul financier		Calcul économique		
2	Rechaud		F.A.	Tchip	F.A.	Tchip	
3	Investissement	F	2050	16500	2050	23050	
4	Vie	annees	2	4	2	4	
5	Amortissement	F/an	1181	5205	1181	7272	
6	Pieces	F/an	0	7800	0	7800	
7	Cout x-combust.	F/an	1181	13005	1181	15072	
8	Cout unitaire	F/MJ utile	0.37	4.11	0.37	4.76	
9	taux d'interest.	0.1					
10	taux amortissem		0.57619	0.315471	0.57619	0.315471	
11	meches:			1300		1300	
12	MJu/an	3165					
13							petrole
14	Combustible						prix-sbv.
15	Prix detail	F/kg	25	165	28	232.91	40.2
16	Calories	MJ/kg	17	45.7	17	45.7	45.7
17	Rendement	%	0.25	0.4	0.25	0.4	0.4
18	Cout unitaire	F/MJ utile	5.88	9.03	6.59	12.74	2.20
19							
20	Cout total	F/MJ utile	6.26	13.14	6.96	17.50	6.96
21							
22	Rechauds Tchip	actuel	futur		Calcul Subvention petrole:		
23	pret A*	1000000	0		Cout economique/kg 232.91		
24	pret B*	1007733	0		Prix avec subvention 40.21		
25	Total prets*	2007733	0		Subvention/kg. 192.70		
26	ventes (unites)*	140	600		kg/ménage /an 173.14		
27	Cout/1 fixe	14341	0		# ménages 17500		
28	Cout/1 expl.	8100	8100		kg total 3029951		
29	Marges distribution	3425	3425		Cout de subvention 583,886,372		
30	Cout/1 total	25866	11525		\$US 1,167,773		
31	*(valeurs par mois)						
32							
33	Petrole:cout ec.	prix officiel	% frais n-e	cout	Subvention MJU: 10.54		
34	le litre	230	0.2	184	Cout econ. bois 6.59		
35	kg/litre			0.79	Ratio subvention/bois 1.60		
36	Cout econ/kg:			232.91			
37							
38	Conservation bois-energie:						
39	menages affectes	17500					
40	MJU/menage	3165					
41	MJU total	55387500					
42	tonnes bois-equiv.	13032					
43	consommation an.	200000					
44	taux de substitution	0.065					
					Evaluation sommaire:		
					Criteres:		
					economique: non		
					conservation: faible		
					impact sur pauvrete: non		

Comparaison Coûts de Cuisson

Filière Nigeria

	A	B	C	D	E	F	G
1			Calcul financier		Calcul économique		
2	Rechaud		F.A.	Tchip	F.A.	Tchip	
3	Investissement	F	2050	16500	2050	23050	
4	Vie	annees	2	4	2	4	
5	Amortissement	F/an	1181	5205	1181	7272	
6	Pieces	F/an	0	7800	0	7800	
7	Cout x-combust.	F/an	1181	13005	1181	15072	
8	Cout unitaire	F/MJ utile	0.37	4.11	0.37	4.76	
9	taux d'interest.	0.1					
10	taux amortissem		0.57619	0.315471	0.57619	0.315471	
11	meches:			1300		1300	
12	MJu/an	3165					
13							petrole
14	Combustible						prix-subv.
15	Prix detail	F/kg	25	165	28	113.92	40.2
16	Calories	MJ/kg	17	45.7	17	45.7	45.7
17	Rendement	%	0.25	0.4	0.25	0.4	0.4
18	Cout unitaire	F/MJ utile	5.88	9.03	6.59	6.23	2.20
19							
20	Cout total	F/MJ utile	6.26	13.14	6.96	10.99	6.96
21							
22	Rechauds Tchips	actuel	futur				Calcul Subvention petrole:
23	pret A*	1000000	0				Cout économique/kg 113.92
24	pret B*	1007733	0				Prix avec subvention 40.21
25	Total prets*	2007733	0				Subvention/kg. 73.72
26	ventes (unites)*	140	600				kg/ménage /an 173.14
27	Cout/1 fixe	14341	0				# ménages 17500
28	Cout/1 expl.	8100	8100				kg total 3029951
29	Marges distribution	3425	3425				Cout de subvention 223,360,584
30	Cout/1 total	25866	11525				\$US 446,721
31	*(valeurs par mois)						
32							
33	Petrole ex Nigeria	frontiere	marges	cout			Subvention MJU: 4.03
34	le litre	30	60	90			Cout econ. bois 6.59
35	kg/litre			0.79			Ratio subvention/bois 0.61
36	Cout econ/kg:			113.92			
37							
38	Conservation bois-energie:						Évaluation sommaire:
39	menages affectes	17500					Criteres:
40	MJU/menage	3165					economique: non
41	MJU total	55387500					conservation: faible
42	tonnes bois-equiv.	13032					impact sur pauvrete: non
43	consommation an.	200000					
44	taux de substitution	0.065					

Comparaison coûts de cuisson

Charbon de bois

	A	B	C	D	E	F	G
1			Calcul financier		Calcul économique		
2	Rechaud		F.A.	Tchip	Ch. bois	Tchip	
3	Investissement	F	2050	16500	4400	23050	
4	Vie	annees	2	4	2	4	
5	Amortissement	F/an	1181	5205	2535	7272	
6	Pieces	F/an	0	7800	0	7800	
7	Cout x-combust.	F/an	1181	13005	2535	15072	
8	Cout unitaire	F/MJ utile	0.37	4.11	0.80	4.76	
9	taux d'interest.	0.1					
10	taux amortissem		0.57619	0.315471	0.57619	0.315471	
11	meches:			1300		1300	
12	MJu/an	3165					
13							petrole
14	Combustible						prix-subv.
15	Prix detail	F/kg	25	165	69.1	232.91	138.1
16	Calories	MJ/kg	17	45.7	30	45.7	45.7
17	Rendement	%	0.25	0.4	0.2	0.4	0.4
18	Cout unitaire	F/MJ utile	5.88	9.03	11.52	12.74	7.56
19							
20	Cout total	F/MJ utile	6.26	13.14	12.32	17.50	12.32
21							
22	Rechauds Tchip	actuel	futur		Calcul Subvention petrole:		
23	pret A*	1000000	0		Cout économique/kg	232.91	
24	pret B*	1007733	0		Prix avec subvention	138.12	
25	Total prets*	2007733	0		Subvention/kg.	94.79	
26	ventes (unites)*	140	600		kg/ménage /an	173.14	
27	Cout/1 fixe	14341	0		# ménages	17500	
28	Cout/1 expl.	8100	8100		kg total	3029951	
29	Marges distribution	3425	3425		Cout de subvention	287,217,046	
30	Cout/1 total	25866	11525		\$US	574,434	
31	*(valeurs par mois)						
32							
33	Petrole:cout ec.	prix officiel	% frais n-e	cout	Subvention MJU:	5.19	
34	le litre	230	0.2	184	Cout econ charb-bois	11.52	
35	kg/litre			0.79	Ratio subvention/bois	0.45	
36	Cout econ/kg:			232.91			
37							
38	Conservation bois-energie:						
39	menages affectes	17500			Evaluation sommaire:		
40	MJU/menage	3165			Criteres:		
41	MJU total	55387500			economique:	non	
42	tonnes bois-equiv.	46156			conservation:	important	
43	consommation an.	200000			impact sur pauvrete:	modeste	
44	taux de substitution	0.231					
45							
46	Coût Charbon de bois à Niamey:						
47	kg charbon de bois	1.0					
48	taux de conversion	5.0	Ghana				
49	kg bois	5.0					
50	bois F/kg au MR	8.4	Madon				
51	cout bois/kg charb	41.8					
52	autres couts/kg	7.3	Ghana				
53	cout tot. charbon	49.1					
54	transp.+ marges	20.0					
55	cout charb Niamey	69.1					

	A	B	C	D	E	F	G
1			Calcul financier		Calcul economique		
2	Rechaud		F.A.	Tchip	Ch. bois	Tchip	
3	Investissement	F	2050	16500	4400	23050	
4	Vie	annees	2	4	2	4	
5	Amortissement	F/an	1181	5205	2535	7272	
6	Pieces	F/an	0	7800	0	7800	
7	Cout x-combust.	F/an	1181	13005	2535	15072	
8	Cout unitaire	F/MJ utile	0.37	4.11	0.80	4.76	
9	taux d'interest.	0.1					
10	taux amortissem		0.57619	0.315471	0.57619	0.315471	
11	meches:			1300		1300	
12	MJu/an	3165					
13							petrole
14	Combustible						prix-subv.
15	Prix detail	F/kg	25	165	69.1	113.92	138.1
16	Calories	MJ/kg	17	45.7	30	45.7	45.7
17	Rendement	%	0.25	0.4	0.2	0.4	0.4
18	Cout unitaire	F/MJ utile	5.88	9.03	11.52	6.23	7.56
19							
20	Cout total	F/MJ utile	6.26	13.14	12.32	10.99	12.32
21							
22	Rechauds Tchip	actuel	futur		Calcul Subvention petrole:		
23	pret A*	1000000	0		Cout economique/kg	113.92	
24	pret B*	1007733	0		Prix avec subvention	138.12	
25	Total prets*	2007733	0		Subvention/kg.	-24.19	
26	ventes (unites)*	140	600		kg/ménage /an	173.14	
27	Cout/1 fixe	14341	0		# ménages	17500	
28	Cout/1 expl.	8100	8100		kg total	3029951	
29	Marges distribution	3425	3425		Cout de subvention	-73,308,742	
30	Cout/1 total	25866	11525		\$US	-146,617	
31	*(valeurs par mois)						
32							
33	Petrole:cout ec.	prix officiel	% frais n-e	cout	Subvention MJU:	-1.32	
34	le litre	30	60	90	Cout econ charb-bois	11.52	
35	kg/litre			0.79	Ratio subvention/bois	-0.11	
36	Cout econ/kg:			113.92			
37							
38	Conservation bois-energie:				Evaluation sommaire:		
39	menages affectes	17500			Criteres:		
40	MJU/menage	3165			economique:	oui	
41	MJU total	55387500			conservation:	important	
42	tonnes bois-equiv.	46156			impact sur pauvrete:	modeste	
43	consommation an.	200000					
44	taux de substitution	0.231					
45							
46	Coût Charbon de bois à Niamey:						
47	kg charbon de bois	1.0					
48	taux de conversion	5.0	Ghana				
49	kg bois	5.0					
50	bois F/kg au MR	8.4	Madon				
51	cout bois/kg charb	41.8					
52	autres couts/kg	7.3	Ghana				
53	cout tot. charbon	49.1					
54	transp. + marges	20.0					
55	cout charb Niamey	69.1					

RESUME DU SCENARIO N°3

AU NIVEAU GENERAL

- ◆ Tutelles ministérielles différentes associées dans un comité de pilotage unique comportant notamment des représentants des ministères chargés de l'Agriculture, de l'Environnement et de l'Energie.
- ◆ Fonds engagés par l'Ordonnateur délégué (DFI) sur la base de demandes de remboursement respectant les contraintes d'engagement de chaque opération. Les budgets et les non objection seront approuvés par les chargés de mission de la Banque Mondiale.
- ◆ Fonctionnement des projets indépendants, compte tenu des impératifs de terrains et de l'état d'avancement fondamentalement différent des deux (2) opérations.
- ◆ Pour ce faire, les équipes d'exécution seront différentes et les budgets séparés.
- ◆ Le cadre de coordination sera évolutif et pourra s'affiner au fur et à mesure de l'expérience acquise et des habitudes de travail en commun sur le terrain. Le comité de pilotage aura, dans ce contexte, un rôle incitatif fondamental.
- ◆ Pour ce qui est du SIEP, les responsables du SIRN, après avoir établi leurs propres programmes de travail seront amenés à proposer le cadre de collaboration adéquat à l'équipe SIEP du PEII-ED.

AU NIVEAU LOCAL

- ◆ Dans les zones d'intervention actuelles du PEII-ED (arrondissements non PGRN), poursuite de la mise en oeuvre de la SED selon les recommandations des SDA par les équipes d'Energie II et identification, par des équipes mixtes (PGRN-ED), des possibilités offertes par le volet "Appui aux autres projets " du PGRN.
- ◆ Dans les zones d'intervention communes PGRN-PEII/ED: (i) villages disposants de marchés ruraux: identification, par des équipes associant les EMP du PGRN et les Antennes d'Energie II, des actions GRN envisageables en aval des marchés ruraux. (ii) dans les villages ne pouvant pas disposer de marchés ruraux, développement par le PGRN de ses programmes de développement villageois; (iii) dans les villages où il est possible de créer des marchés ruraux mais où cela n'est pas encore le cas pour des raisons de capacités opérationnelles du PEII-ED, mise en place de programmes conjoints d'identification d'actions et lancement à partir de financements mixtes.
- ◆ Dans les zones d'intervention PGRN, intervention du PEII-ED à la demande des EMP du PGRN pour envisager la mise en place de marchés ruraux en tenant compte de la planification spatiale déjà élaborée par Energie II dans les SDA.

IMAGING

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