Document of
The World Bank

Report No: 30711

IMPLEMENTATION COMPLETION REPORT
(IDA-30820 PPFI-P8660)

ON A

CREDIT

IN THE AMOUNT OF SDR 4.0 MILLION

TO THE REPUBLIC OF

CHAD

FOR A

HOUSEHOLD ENERGY PROJECT

November 24, 2004

CURRENCY EQUIVALENTS

(Exchange Rate Effective)

Currency Unit =

FISCAL YEAR

January 1 - December 31

ABBREVIATIONS AND ACRONYMS

AEDE =	Agence pour l'Energie Domestique et l'Environnement	
CAS	=	Country Assistance Strategy
CDS	=	Comité Directeur de Suivi
DSM	=	Demand-Side Management (Maîtrise de l'énergie)
LPG	=	Liquid Petroleum Gas
NRM	=	Natural Resource Management
PADS	=	Programme d'Action pour le Développement Social
PDA	=	Plan Directeur d'Approvisionnement
PPF	=	Project Preparation Facility
PROADEL	=	Programme d'Appui au Développement Local
SAR	=	Staff Appraisal Report
SLG	=	Structure locale de gestion
VERT	=	Village Exploitant Rationnellement son Terroir
Woodfuel	=	Firewood or charcoal

Vice President:	Gobind Nankani
Country Director	Ali Khadr
Sector Manager	Yusupha Crookes
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CHAD
TD HOUSEHOLD ENERGY

CONTENTS

Project ID: P000532	*Project Name:* TD HOUSEHOLD ENERGY
Team Leader: Christophe de Gouvello	*TL Unit:* AFTEG
ICR Type: Core ICR	*Report Date: December 29, 2004*

1. Project Data

Name: TD HOUSEHOLD ENERGY
L/C/TF Number: IDA-30820; PPFI-P8660
Country/Department: CHAD
Region: Africa Regional Office

Sector/subsector: Other domestic and international trade (74%); Renewable energy (16%); District heating and energy efficiency services (10%)
Theme: Environmental policies and institutions (P); Participation and civic engagement (P); Other rural development (P); Land administration and management (P); Climate change (S)

KEY DATES		*Original*	*Revised/Actual*
PCD:	08/03/1993	*Effective:*	11/11/1998	06/23/1999
Appraisal:	12/01/1995	*MTR:*	05/03/2002	05/03/2002
Approval:	06/02/1998	*Closing:*	06/30/2003	06/30/2004

Borrower/Implementing Agency: GOVT OF CHAD/AEDE
Other Partners: N.A.

STAFF	Current	At Appraisal
Vice President:	Gobind T. Nankani	Jean-Louis Sarbib and Callisto Madavo
Country Director:	Ali Khadr	Serge Michailov
Sector Manager:	Yusupha B. Crookes	Mark Tomlinson
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2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

Outcome: S
Sustainability: L
Institutional Development Impact: H
Bank Performance: S
Borrower Performance: S

	QAG (if available)	ICR
Quality at Entry:		S
Project at Risk at Any Time:	No	

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:

The Development Objective of the project was to provide an economic and sustainable supply of energy for households. The specific objectives of the project as per the Development Credit Agreement were to: (i) promote the establishment of the sustainable production of woodfuels using a community-based natural resource management system in selected villages providing energy to the capital, N'Djamena; (ii) strengthen the capacity of the Borrower to extend such production elsewhere; (iii) carry out institutional reforms in the household energy sector; and (iv) improve efficiency in the use of household energy.

3.2 Revised Objective:

The Development Objectives were not revised.

3.3 Original Components:

Component A: create capacity to develop a village-based natural resource management system. Simple community-based sustainable land-use and wood exploitation plans would be created for villages in the N'Djamena woodfuel catchment area. At the most basic level, the maximum allowable wood exploitation (or quota) for a village would be set lower than the occurring natural regeneration (initially at 50 percent to compensate for past overexploitation). A local management structure would be created in each village. At the most sophisticated level, detailed plans would be available indicating where, how many, and what species of trees to cut over time, and which techniques to use to propagate regeneration. A master plan would be developed using the individual village plans as building stones. On a contract basis, the responsibility for maintaining and managing the natural resources would be transferred to the village. With the responsibility came the right to refuse outsiders from using the village's resources and to levy a management fee on all wood products that are sustainably produced in the village. This management fee was levied in the form of a tax on the transport of woodfuels.

Component B: create capacity to monitor and control wood products flows; The inflow of wood products from rural production zones into N'Djamena would be monitored. User fees/taxes would be collected and payment compliance would be verified. The user fee would be used as an environmental policy instrument, working on three different levels: (a) providing an incentive for villages to manage their wood resources in a sustainable manner; (b) guiding transporters towards areas of least-cost wood locations; and (c) giving incentives for end-users to use improved stoves and wood products more rationally as prices increase.

Component C: improve the efficiency of household fuel use. The supply enhancement (component A + B) would be complemented with a demand-side management effort to reduce the overall woodfuel consumption. This would be realized through: (a) the commercialization of efficient cooking stoves (firewood, charcoal); and (b) the promotion of the use of low-cost kerosene and LPG stoves. Suitable improved stove models would be identified and laboratory tested. Private stove producers would produce prototype stoves and receive feedback from users to improve the models. The objective of this subcomponent was not to promote the use of charcoal stoves and encourage households to switch from firewood to charcoal but to have households use less fuel and derive greater benefits. There would be a publicity and awareness campaign to start market development for the models developed under the project.

Component D: project management. Successful implementation requires a capable organization dealing with household energy issues; a small independent agency ("association") for household energy and environment would be created (AEDE). AEDE would develop several databases to monitor performance and evolution of household energy markets over time. Capacity building and raising awareness would be

realized through training, technical assistance and education/information and promotional actions for both public and private actors through systematic stakeholder consultation. Part of the project would be to prepare for an extension to the South and East of the country, around secondary cities).

3.4 Revised Components:

At the mid-term review, the expected outputs under the DSM component were revised downwards to better reflect progress in the sector. The number of LPG and kerosene stoves that were expected to be in use by the end of the project was reduced. Since the petroleum projects were at an advanced - but delayed - stage of realization, it was deemed necessary to postpone the promotion of cooking equipment until the supply of these fuels could be guaranteed, a condition that did not materialize during the project period.

3.5 Quality at Entry:

Quality at Entry is rated satisfactory. This is based on :

- the strongly correlated objectives for rural development and poverty alleviation. This assertion is supported by the fact that the project allows the creation of numerous new jobs and revenues in poor rural areas,
- the project design went beyond successful experience and lessons learned under several similar projects elsewhere in the region as well as pilot activities in Chad. This assertion is supported by the fact that papers written by members of project preparation team have been accepted in international peer review scientific journals (see list of supporting documents). One of the key quality features of the project concept is that it intended to build a chain of intermediate results along the energy chain to ensure sustainability, from the very upstream natural resource management at the village level, to the very final use of the energy product by urban households.
- strong ownership by the borrower. This assessment is supported by (i) the participatory process of the preparation which has mobilized 50 villages, (ii) the fact that the Government created a conducive regulatory environment prior to the start of the project (Law 36 plus implementing decrees transferring property rights on natural resources to villagers); (iii) the acceptance by the Government of the proposal to create an independent implementing agency for household energy and environmental issues during the preparation phase; (iii) the commitment of the Ministry of Environment to mobilize around 100 foresty inspectors to collaborate in the field with the Implementing Agency,

The project was in fact an operational instrument of the Bank's Country Assistance Strategy (CAS) adopted in February 1996; it directly supported four of the CAS's objectives: poverty alleviation, rural and private sector development and environmental protection.

The project's bottom-up methodology and early results could be instrumental in the Decentralization Process as well as for other IDA-financed projects in Chad supporting local development.

However a shortcoming should also be acknowledged regarding the formulation of the general objective of the project, which is not fully consistent with the well formulated detailed objectives. As a result, there is a certain contrast between the consistency and the pertinence of the Performance Monitoring Indicators proposed in Annex 3.6 of SAR to monitor the achievement of intermediate outcomes and the absence of indicator for the general outcome in terms of development.

However a shortcoming should also be acknowledged, which is the lack of monitoring provisions to assess the general objective of the project. As a result, there is a certain contrast between the consistency and the pertinence of the Performance Monitoring Indicators proposed in Annex 3.6 of SAR to monitor the achievement of intermediate outcomes and the absence of indicator for the general outcome in terms of

development.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

As stated in section C, the project formulation lacks an indicator to assess the general outcome of the project. The overall objective formulated in both the SAR and DCA was "*to provide an economic and sustainable supply of energy for households* ". Obviously the project couldn't pretend to achieve such a sustainable supply for all households in five years with such limited means (there are around 1,000,000 inhabitants in N'Djamena).

However the final objective, to provide sustainable and economic supply of energy for households, requires a series of intermediate outcomes. These outcomes are measured by the performance monitoring indicators correctly provided in the SAR, which capture the different aspects of what makes for sustainable and economic supplies. These intermediate outcomes are: strong regulatory and institutional framework, adequate resource management, improved efficiency of household final energy use, and capacity for scaling up. The project has been largely successful in achieving most of intermediate outcomes along the chain of results required to progress toward the overall objective:

(i) carry out regulatory and institutional reforms in the household energy sector: AEDE has been created under the preparation phase. Law 36 was implemented transferring property rights to villages. Good working relationships were created between Forestry Department officials in N'Djaména as well as in the rural areas. Local management structures woodfuel rural markets have been designed and set up in the VERT villages. Reliable and efficient control system has been created;

(ii) adequate resource management: The project developed a replicable methodology to render the woodfuel supply sustainable at the village level. This was realized by creating community-based capacity for natural resource management sustained by adequate technical input and the generation of substantial local revenues under a conducive regulatory environment. Such capacity has been implemented and is fully operational in 100 villages, covering more than 450,000 ha of natural resources.

(iii) improve efficiency in the use of final energy by households : The potential for improving the efficiency in the use of household energy was demonstrated by the project. However, as detailed below, this objective faced serious constrains which drastically limited the corresponding intermediate outcome of the project.

(iv)capacity for scaling up: Through the existence of AEDE, Chad is now endowed with a considerable capacity to undertake household and environmental work. AEDE already provides services to other organizations working in this field. The methodology for creating community-based NRM systems as developed under the project was adopted by the new proposed Programme d'Appui au Développement Local (PROADEL) project for further replication; whole measured natural resource potential available is sufficient to cover projected needs of the City of N'Djamena, as established on a scientific basis and published in an international peer-review scientific journal (see K.Chomitz C.Griffiths, 2001 in Annex 7-List of supporting documents).

4.2 Outputs by components:

Component A: *create capacity to develop a village-based natural resource management system; (US$2.6m SAR; US$2.77m actual).* This component was highly satisfactory. In advance of the Decentralization, local management structures (SLG) were created in 100 villages (SAR: 100 villages) and simplified management plans were developed for sustainable production of woodfuel covering about 500,000 hectares (SAR: 300,000 hectares). Based on the existence of management plans and the organizational capacity of the elected SLGs, usufruct rights were granted to 100 villages called "VERT" (Village Exploitant Rationnellement son Terroir). The main benefits for VERT are: (i) legally able to prevent outsiders from using the village's wood resources, which was the main source of deforestation

before the project; (ii) turn wood resources into a sustainable source of income; this is in addition to – and not in substitution to - the traditional income generating activities of the village. During the first six months of 2004, on average some F.CFA 918,000 were earned per VERT from the sale of wood and charcoal, (iii) in addition, VERT are allowed to levy a non-negotiable tax on woodfuels that remains for 90 percent in the village and the community. The woodfuel tax revenue was about F.CFA 184,000 per village during the first six months of 2004; this is expected to increase considerably in the near future since not all VERT are yet producing at 100 percent of their capacity. This provides a source of money available for priority investments in the village infrastructure particularly if villagers are able to use this as their co-payment in rural development programs.

Many VERT maintain a tree and seedling nursery, often shared with other VERT, to increase the standing stock of trees and to complement regeneration naturally occurring after exploitation; this will further increase the sustainable output, and their future revenues. Some VERT created a union to better negotiate prices with transporters. While all the 100 VERT are already fully implemented and fully operational, combined they provide about 7 percent to 11 percent of the estimated demand for N'Djaména (depending on the estimate of bags that enter N'Djaména outside of the control). This would double if quotas in existing VERT were set at regeneration capacity. For the time being it happened to be necessary to first ensure the full recovery of the local resource before increasing quota to full regeneration capacity. As the result target value set in SAR (40 percent) appears far too optimistic, mostly because of (i) an underestimated level of degradation of the natural resources in the VERT areas before effective implementation of the VERT; and (ii) the failure of component C in reducing the demand by improving stove energy efficiency.

Component B: *create capacity to monitor and control wood products flows; (US$1.1m SAR; US$1.22m actual)* This component was highly successful. A differential taxation system was implemented and a payment verification system created. A low tax is levied on woodfuel produced sustainably in a VERT (F.CFA 300 per stere of wood or per bag of charcoal; transporters pay this tax to the VERT at the newly implemented Wood Rural Markets; 90 percent is transferred to the bank account of the SLG; and 10 percent flows back to the government). A high tax is levied in all other areas (F.CFA 600 per stere of wood or per bag of charcoal; transporters pay the tax at a Forestry Inspection office in the production zones or along the road, or at one of five control posts created by the AEDE around N'Djaména; and 100 percent of the tax flows back to the government and is shared with AEDE to pay for its operations).

Compliance rates of tax payment by transporters in the established VERT are close to 100 percent as villages are allowed to keep most of the revenues. To increase payment compliance in both managed and non-managed zones, AEDE created a ring of professional control posts along the main entrances into N'Djaména, and staffed these posts with Forestry Police seconded to AEDE. Mobile brigades plied between fixed control points using cars and motorcycles. After six months, infractions were reduced to less than 5 percent from 25 percent at the start. Most transporters accepted the fiscal changes and simply pay their tax at a designated place. Overall tax collection efficiency increased from 23 percent in the first year to an estimated 84 percent in 2003 (SAR: 40 percent). Tax collected nationally prior to the project amounted to around F.CFA 30 million per year; the average monthly collected tax revenue over the period of January 2003 and June 2004 was F.CFA 51.7 million. Over the three-year period that taxes were collected, a total of about US$2.7 million was obtained. (SAR: US$1.5m over 5 years).

Component C: *improve the efficiency of household fuel use; (US$1.1m SAR; US$0.43m actual)* This component was rated unsatisfactory. Several models of metal and ceramic stoves were tested by households; the two models that were preferred showed high performance in the laboratory (35 percent fuel

savings) and in households (20 percent -30 percent) (to be compared to baseline level of 13 percent according to ESMAP study). The most popular model is a duel-fuel metal stove and allows the use of both firewood and charcoal. Households reacted positively to the awareness and promotional campaign: sales increase substantially; a total of 11,433 stoves have been sold, which is short of the 28,000 indicated in the SAR. About 50 artisans and two cooperatives have been trained in the production of the "Nafacamu" improved stove. The main problem has been a lack of sufficient raw material of good quality; the preferred material is recycled oil barrels. AEDE temporarily solved the problem by negotiating a contract with Cotonchad for the supply of barrels, but stove producers were not able to produce sufficient stoves to develop a market. Nevertheless, some 12 artisans continued to produce a cheaper imitation of this stove using other sources of scrap steel, with an estimated total production capacity of 300 per month for a total of about 3,500 after they received the formation (the total number of stoves sold thus amounts to about 14,900 by the end of the project).

Households showed no interest in kerosene stoves, mainly because the cost of cooking with kerosene is much higher than with charcoal. LPG is highly subsidized but generally not available (consumption was limited to 320 t/yr in 2003). It was decided to discontinue this sub-activity because the steady supply of LPG and kerosene at reasonable prices cannot be guaranteed until the Sedigui Project is realized included a LPG production plant, which is not expected in the medium term.

Component D: *project management. (US$0.6m SAR; US$3.09m actual).* This component was satisfactory. The creation of AEDE as an association with an *Assemblée Générale*, a *Conseil d'Administration* has proven to be a good choice. A *Comité Directeur de Suivi* (steering committee) has also been put in place by the Government to monitor the adequacy of the project implementation with the GOT policy. AEDE could generally concentrate on the substance of its considerable work without major political interference. AEDE has demonstrated real capacity to deal with household energy issues in Chad. From the fiduciary point of view, there were no major problems during the execution of the project. While procurement capacity has been acknowledged to be insufficient to fully comply with Bank guidelines, no misprocurement has occurred. If it was not for this shortcoming, this component could have been rated highly satisfactory.

4.3 Net Present Value/Economic rate of return:

The project shows an ex-post ERR of about 44 percent (SAR: 34 percent); this is calculated using available data on woodfuels and transport costs as they occurred during the project implementation period. This performance is the overall result of the performance of the project's two distinct components: the resource management component (RMP) and the demand side management component (DSM). The ERR of 46 percent for the RMP is almost double of what was expected (SAR: 25 percent), reflecting the excellent performance of this component. The ERR of 30 percent for the DSM is much below what was expected (SAR 75 percent); the mere fact that it is still positive is a reflection of this genre of activities that promote low-cost equipment yielding high returns.

The recalculated NPV of the project net economic benefits as a whole is about US$13.5 million over a period of 20 years; of this, US$12.7 million is attributed to the RMP and US$0.8 to the DSM activities.

4.4 Financial rate of return:

The project shows an ex-post FIRR of 22.4 percent (estimated at 6.9 percent in the SAR); this is calculated using available data on proceeds and costs as they occurred during the project implementation period. The financial benefits are considerable: the 100 VERT combined generated US$0.5 million from the management of their wood resources and their part of the tax receipts during the 3 years from July 2001 – June 2004; local government in Mayo-Kebbi and Chari-Barguimi collected about US$1 million in terms of

tax revenue.

The recalculated Financial NPV (discount rate = 12 percent) of the project as a whole is about US$3.7 million over a period of 20 years (US$-1,755 million in SAR). Payback time is 8 years (SAR 14).

4.5 Institutional development impact:

The project's considerable institutional development impact is visible at two different levels: at the central level (AEDE), at the regional level and at the village level (VERT). The Government's decision to create an autonomous project implementation entity during the preparation phase, as recommended by the WB project team, has shown to be excellent to ensure the quality of the staff and global efficiency of the project. AEDE was created using PPF resources. Such a decision was quite challenging in the Chadian Environment. Since the project initiated profound changes in the way people conduct woodfuel business, some powerful and influential individuals tried to influence the outcome of the project and to destabilize AEDE. In particular, traditional chiefs realized that they lost control over a source of income once the villagers obtained management rights. Also, some rich and influential transporters, who used to employ laborers that camp in the forests for making charcoal, found that their business was changing and employed a high level political pressure. AEDE has generally been able to resist this pressure, which may not have been possible if it were part of a Ministry. The independent status of AEDE including legal provisions, ruling nomination and revocation of the Director has shown to be critical to preserve AEDE's efficiency from external pressure. Such issues surfaced in particular during the portfolio review, and the preparation of the follow-up component in PROADEL, when some not well-grounded criticisms were formulated to suggest the integration of AEDE's activities under PROADEL, which would be under direct government administrative control. It also more generally prevented the project from being endangered by the overall turmoil that has deeply affected the Chadian energy sector for years.

AEDE was intended to evolve into a specialist agency in the overlapping fields of household energy and environment, and this has been fully achieved.

At the regional level, an efficient and lasting collaboration has been set up between AEDE and Forestry Inspection offices to enforce both the quota and tax control systems. At the same time, by creating management committees (SLG) at the village level, and by providing these with both the knowledge to function and the means to invest in their own development, the project has developed considerable village-based institutional capacity, well in advance of the Decentralization process. The Programme d'Appui au Développement Local (PROADEL) and other local development projects can easily build on this capacity.

If it were not for some concerns regarding AEDE's sustainability (see section F), institutional development would have been rated highly satisfactory in Annex 5.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

(a) *Factors outside the control of government or implementing agency*. The most important factor was non-availability of scrap metal for stove production. This resulted in a lower production capacity of improved stoves than necessary to satisfy the demand. AEDE decided to discontinue the substitution component due to slow progress with the Sedigui natural gas production and transport project and non-availability of LPG, plus the high price of kerosene as well as households' dislike for kerosene. AEDE was not able to become self-financed as was expected. This would be impossible under the current design of the tax collection and redistribution mechanism: as a result of the basis for generating revenue for

AEDE, the more effective AEDE is in creating VERT, the less money it will receive. The reason is that the tax on wood products transport is higher when such products come from a non-VERT territory.

5.2 Factors generally subject to government control:

(b) *Factors generally subject to government control*. Slow progress with decentralization caused certain implementing decrees to be delayed (the commune still needs to be officially defined). Delayed repayment of non-disbursed PADS (Programme d'Action pour le Développement Social) budget after project closure caused all Chad disbursements to be frozen for several months and resulted in a delayed start of the activities and necessitated an extension of the closing date of the Household Energy project. While drafted and as a matter of fact applied, neither the Decree officially transferring the rights and responsibilities to VERT nor the Decree allowing penalties for woodfuel transport tax evasion have been published.

5.3 Factors generally subject to implementing agency control:

(c) *Factors generally subject to implementing agency control*. The CDS, a commission created to increase the flow of information, mainly functioned at the start of the project only; had it been involved more and particularly towards the end of the project, it would have been likely that it could relieve some of the pressure on AEDE.

5.4 Costs and financing:

Cost changes were limited; within categories changes occurred to reflect the fact that a more substantial and long-term effort is required to escort rural villages with the preparation and implementation of their wood resources management systems.

Implementation and disbursement delays were insignificant. Despite the delayed start of the project, disbursements amounted to about 98.7 percent and most objectives were generally achieved within the course of the project. Total disbursement amounted to SDR 3,946,471 compared to estimated project cost of SDR 4 million. Actual expenditures for services, goods and operational costs were respectively disbursed at 100.5 percent, 95.9 percent and 100.3 percent while expenditures for civil works were disbursed at 63.2 percent. This could be considered as excellent performance for a project that consists mainly of rural capacity building and training.

An undisbursed balance of US$75,914 thousand equivalent will be cancelled from the credit account. In effect, during appraisal, the credit amount was the equivalent of US$5.277 million and is now the equivalent of US$6.081 million. The actual financing contributions are as follows: the Government contributed 19 percent (SAR: 16.3 percent) or US$1.43 million and IDA US$6.081 million.

6. Sustainability

6.1 Rationale for sustainability rating:

The project sustainability is rated as likely. The regulatory environment was shown to be a real achievement of the project preparation phase. It had changed just prior to effectiveness of the project, as a result of recommendations during project preparation, and remained in effect throughout implementation. Law 36 provides very strong incentives to local communities to manage their resources, and it is unlikely that the 100 VERT will ever give up their acquired rights. There is a waiting list for other local communities that wish to be converted into VERT.

Rural development benefits at the village level are indeed considerable: organizational structures are created at the village level (SLG), which can also be used for other purposes than natural resources management (NRM); VERT are given the opportunity to obtain sustainable financial benefits from NRM; villagers are now involved in sustainable wood production and reap the financial benefits thereof (financial

benefits from non sustainable full wood cutting was previously enjoyed by outsiders, who can now officially be refused by the villagers). As a result, the environmental sustainability of VERTs resources is highly likely. However until the whole N'Djamena's woodfuel supply basin is fully covered by VERTs – which is aimed by the continuation of the project activities under PROADEL - there is still a risk of a partial displacement of production and consequently an increase of resources depletion in non-yet regulated areas.

AEDE's autonomous existence was successful; political and other pressure could generally be deflected. The institutional capacity created by AEDE is considerable but not yet fully sustainable and cannot become so under the current design of the project, since for the time being, the more AEDE creates VERTs, the less money it will receive. The reason is that the tax on wood products transport is higher when such products come from a non-VERT territory. For the time being AEDE role has been renewed for the continuation of its activities under PROADEL, but this should not be taken for granted for the future and the institutional sustainability of the project may be again endangered by external pressure trying to reintegrate all activities in non-efficient administrative structures. The difficulties in maintaining an autonomous agency in the Chadian environment were discussed at length during the portfolio review.

Given the fact that it appears during the course of implementation that AEDE will be required to continue to play a regulatory role (adjustment of quotas) and a control function (verify sustainable production at VERT level; monitor tax system performance) - this was not anticipated at the preparation stage - the financial sustainability of AEDE should be resolved in the near future.

6.2 Transition arrangement to regular operations:

The number of VERT created is not sufficient to allow a sustainable supply inside a radius of 150 km of N'Djaména and a rapid expansion is necessary. This will happen in part under PROADEL under which AEDE is expected to create another 300 VERT (200 around N'Djaména and 100 in the Doba – Moundou area). It was estimated that VERT actually contribute about 7 to 11 percent of the total supply of N'Djaména (SAR: 40 percent); however, not all VERT have reached their full production capacity yet as they became operational only towards the end of 2003, and the quota for all VERT have been set at below half the regeneration capacity to compensate for prior deforestation. If all 100 VERT produced at regeneration capacity, they would satisfy about 24 percent of N'Djaména's estimated demand.

AEDE therefore has a crucial role to play in ensuring a sustainable supply of woodfuels and in minimizing deforestation; this can only be done by creating more VERT in areas further away. AEDE's functioning therefore needs to be assured. The expected self-financing was demonstrated to be unrealistic: the more successful AEDE is in creating additional VERT, the less money it will receive to finance its operations (it receives F.CFA 15 per bag produced in a sustainable way by a VERT and F.CFA 285 per bag produced elsewhere). Further expansion is planned under the PROADEL, but this is neither deemed sufficient to obtain a 100 percent sustainable supply of woodfuels for N'Djaména nor to provide sufficient funds to fully finance AEDE's functioning. AEDE's capacity building's function is taken care of as long as it creates new VERT. However, its regulatory functions are not financed unless there are sufficient tax proceeds - and these diminish as AEDE is more successful in creating VERT. Environmental monitoring is not systematic, and only qualitative. A system should be developed whereby independent audits are carried out to assess the state of the environment in selected VERT. An energy-planning model (PDA) was developed at the beginning of the project to prioritize the different types of intervention (supply-side management; demand-side management, substitution; regulatory intervention). This should be updated to reflect actual conditions and achievements. The incentive structure should be revised to ensure that there is real gain for villagers if they adopt efficient carbonization techniques (there is presently a counter incentive since the quota is measured in number of charcoal sacks produced per VERT and any overstepping is

penalized).
A new demand side management activity should be launched for instance to promote and diffuse autocookers/hotboxes made with local cotton and vegetal fiber products in order to reduce final unitary consumptions per household. This is a requirement for both avoiding a displacement of production and consequently an increase of resources depletion in non-yet regulated areas.

In synthesis, it is recommended to: (i) Scale up the implementation of VERTS to cover all the catchment areas of N'Djamena; (ii) renew and strengthen the energy efficiency component; (iii) develop a mechanism to finance AEDE; (iv) include more rigorous environmental monitoring specially in non managed areas; and (v) update energy planning data.

7. Bank and Borrower Performance

Bank

7.1 Lending:

Bank performance at lending is rated satisfactory. The Bank played a decisive role in project identification and preparation. During the course of an energy sector review, the urgent need for intervention in the woodfuel supply was identified. This was subsequently investigated in more detail under an ESMAP project and finalized under a PPF. Cutting edge knowledge in Natural Resource Management (NRM) practice, NRM economics and participative process have been provided by very high level Bank experts. As stated earlier, this assertion is supported by the fact that papers written by members of project preparation team have been accepted in international peer review scientific journals (see list of supporting documents). Preparation and appraisal missions paid careful attention to beneficiary feedback, with a participatory study, impact assessment, and several stakeholder workshops.

7.2 Supervision:

Bank performance at supervision is rated unsatisfactory. It has to be stressed that during the period from effectiveness through mid-term review, Bank supervision was minimal (no supervision mission during a two-year period) and thus unsatisfactory. However, after this period supervision improved considerably although it remained focused on mainly substantive performance of the project. Fiduciary aspects were carried out ex-post through SOE reviews rather than through involvement of Bank specialists in this field. And it can be credited to both the design and the borrower's ownership build during the preparation phase – including the quality and the commitment of AEDE's team recruited during that phase - that the project went well even in absence of significant supervision for two years.

7.3 Overall Bank performance:

In view of the foregoing, the overall performance of the Bank was rated satisfactory.

Borrower

7.4 Preparation:

As already indicated, the Government showed early signs of commitment and followed through by implementing corrective legislative changes (Law 36) and implementing several important decrees among which the one that has granted to AEDE the status of "*association reconnue d'utilité publique*".

7.5 Government implementation performance:

The implementation responsibilities were split between MEE (Ministry of Environment and Water Resources) and MMEP (Ministry of Mines, Energy and Petrol). This changed later on to MEE only as part of reshuffling of energy and environment projects when the Petroleum ministry was created. Good relations were maintained between AEDE and the Department of Forests as well as the Department of Energy. Forestry officials working in the field (Inspection Forestière) in the project zones were fully

incorporated in the project activities and appreciated the change of responsibilities (from control, inspection, and repression to giving technical advice to VERT).

7.6 Implementing Agency:
AEDE turned out to be a capable agency; it carried out several simultaneous tasks with success: providing training and assistance to villages over a long period of time, carrying out the control of a taxation payment system around N'Djaména and in production zones, and satisfy political and bureaucratic demands.

7.7 Overall Borrower performance:
Taking into account the above, the overall rating was satisfactory.

8. Lessons Learned

The principal lessons learned apply to three different levels: (i) at the central level, the fact that the regulatory and environment was correct from the beginning was crucial for the success of the project. The fact that AEDE was autonomous and sufficiently independent also helped enormously to preserve the project both from the turmoil affecting the rest of the energy sector and from political pressure resulting from induced redistribution of the rent extracted from the natural resources. Such autonomy had to be supported continuously by the Bank. In other Sahelian countries these elements are generally not satisfied, which probably explains why the results in Chad are more profound than most other places; (ii) at the local level, the fact that villagers were legally given an opportunity to become owners of their natural resources and to earn money from this was shown to have truly far reaching impact: from "subjects" they became "individuals" and moreover, "organized individuals", with as one of the results that environmental degradation could be halted in VERT; (iii) the capacity to combine AEDE formal autonomy with active participation on the ground of both villagers and local Forestry Inspection Offices teams ensured a high level of ownership by stakeholders. Looking at the future, the results to date are very promising. The model developed in this project demonstrably delivers results, but its full impact can only be achieved if it is scaled-up considerably. Therefore, the activities need to continue and to expand. The new PROADEL project, under which an extension of this project will soon be financed, will significantly contribute to that. This means not only that more VERT need to be quickly established so as to make 100 percent of the woodfuel supply sustainable, but also that there are more DSM results (improved stoves, substitution fuels, including non-petroleum substitution fuels and autocookers/hotboxes, etc) in order to mitigate the risk of unbalancing the market. For this to happen, it is necessary that AEDE continues to play its roles, both as promoter of solutions along the whole supply-consumption chain and as regulator as described before.

9. Partner Comments

(a) Borrower/implementing agency:
See Annex 8.

(b) Cofinanciers:
See Annex 8.

(c) Other partners (NGOs/private sector):
See Annex 8.

10. Additional Information

Poverty Alleviation and other Social Objectives

Poverty Alleviation. The project specifically targeted rural communities who belong to the poorest segment of the Chadian society. These rural communities were included in project design through several

participatory activities. The wishes expressed at that time, to become owner of the resources in their village, to reject outsiders from using up their resources, and to earn additional money could all be achieved (see Section D for quantitative figures); around 1,500 temporary or permanent jobs have been created in the targeted rural areas (see details in "Partner Comments" in annex 8, section "Impact du projet"). What is more, organizational structures (SLG) have been created at the village level that gives the villagers more capacity to get organized and take their development in their own hands.

At the urban level, the project intended to ensure that charcoal and firewood would continue to be available at a reasonable prices. It was expected that charcoal prices would increase by 10-15 percent, but this was not observed. One reason to explain this is that there are sufficient rents captured (e.g., in transport and distribution) that the actors did not mind absorbing some of the price increases. Improved stoves are not available at a large-scale (only 5-10 percent of the population of N'Djaména owns one), but it is promising that there is continued production. The stove allows households to reduce fuel consumption by at least 20 percent.

Environmental Objectives

Environmental Assessment. Considerable environmental benefits were obtained at two levels: consumption and supply of woodfuels. The improved stoves component was able to reduce CO2 emissions by about 31,888 t. over the 5-year project period. This is below the expected level of savings (SAR: 112,000 t) and this is entirely due to the lower than expected number of improved stoves in use. Since some 8-11 percent of the total supply of charcoal has become sustainable, deforestation has been reduced and this also implies a lower overall CO2 emission level. The associated estimated reduction is about 33,340 t of CO2 over the 5-year project period.

However, the most important environmental impacts are the conservation effects at the village level: wood resources are preserved, soil conditions can be improved, and biodiversity in general can be maintained or improved. This has not been monitored in Chad, but was observed elsewhere in the Sahel. As a result, the environmental sustainability of VERTs resources is highly likely. However until the whole N'Djamena's woodfuel supply basin is fully covered by VERTs – which is aimed by the continuation of the project activities under PROADEL - there is still a risk of a partial displacement of production and consequently an increase of resources depletion in non-yet regulated areas. For that reason for the time being Environmental Objectives/Outputs have been rated satisfactory and not yet highly satisfactory.

Private Sector Development Objectives

There were no specific private sector objectives other than that improved stoves should be produced by private actors. Although the project team found it difficult to transfer the responsibility to these actors, at the end of the project it was observed that the latter had started to produce after all on limited scale, despite the reported problems with supply of adequate raw material and the absence of subsidy.

Annex 1. Key Performance Indicators/Log Frame Matrix

Outcome / Impact Indicators:

Indicator/Matrix	Projected in last PSR[1]	Actual/Latest Estimate
Implement appropriate institutional and regulatory reforms in the household energy sector	Decrees enacted on land granting for Rural Markets (=VERT) established; decree updating woodfuel tax levels; tax revenues for the Treasury to exceed $400,000 per year in year 2; auto-financing of AEDE operating costsat increasing levels (10% y1, 20% y2, 30% y3, 40% y4 as per the Credit Agreement, schedule 1)	Decrees depend on the Decentralization texts; however, in practice land is granted and all procedures are applied correctly. The tax revenues collected amounted to $2.7 million over the three years that taxes were collected; AEDE fully paid for the operating costs as projected. (1)
Establish sustainable production of wood for urban supply in 100 villages	100 RM fully operational; improved kilns used in all RMs; RM supply 40% of N'Djaména charcoal market; RM forest management techniques fully operational	100 RM fully operational; improved kilns used in some VERT, but quota system needs to be revised as improved charcoalers are now punished rather than promoted (With improved techniques, they would produce more charcoal than allowed as per quota, using the same quantity of wood) ; VERT supply 8%-11% of N'Djaména charcoal market; RM forest management techniques fully operational (2)
Improve efficiency of household energy use and reduce household cooking expenditures	Market established for fully private sector operation; 28,000 improved woodfuel stoves sold; 4000 LPG stoves and 8000 kerosene stoves sold; 138000 t of standing wood saved; 10% reduction in cooking expenditures	Market established for fully private sector operation; 14,900 improved woodfuel stoves sold; LPG and kerosene stove activities were dropped; the stove activities enables savings of about 64,000 t of standing wood saved; these stoves allowed savings of at least 20% in cooking expenditures, more than compensating for charcoal price increases (3)
Increase monetary income in villages	Average RM turnover over 1 million F.CFA/market; village collective investment realized out of woodfuel tax revenue	VERT annual turnover ranges from about 1.3 to 2.1 million F.CFA/market, depending on the how long ago the VERT was established and how well it functions; some village collective investment was realized but not all villages were ready to do this and are waiting for amounts to accumulate; woodfuel tax revenue per VERT amounts to F.CFA 270-410 thousand per year. (4)
Ensure efficient implementation of the Project; improve knowledge of household energy sector performances	Semi-annual work programs; satisfactory audit; monitoring system in place; Regular publication of main household energy indicators fully operational and auto-financed.	Annual work programs and audits were timely prepared and found adequate; monitoring system is in place. The main household energy indicators are available and will soon be put on a web site.(5)

Sources: (1) AEDE progress Reports and Audits
(2) data from Control Posts and Forestry Inspection Offices
(3) AEDE progress reports and economic analysis carried out for the ICR
(4) raw data from SLGs, consolidated by AEDE and from Treasury
(5) PSRs and AEDE progress reports.

Output Indicators:

Indicator/Matrix	Projected in last PSR[1]	Actual/Latest Estimate
(a) Office and logistic arrangements in place		
(a) One test village operational		
Visit to Niger and Mali for DG, Resp. Opérations, Resp. Taxe		
TA in place		
Efficient stoves tested		

[1] End of project

Annex 2. Project Costs and Financing

Project Cost by Component (in US$ million equivalent)

Component	Appraisal Estimate US$ million	Actual/Latest Estimate US$ million	Percentage of Appraisal
Establish village-based NRM systems	3044.90	4568.00	150
Monitor/control wood products flows	1297.10	1543.00	119
Improve efficiency of energy use	1228.00	533.00	43
Project management	737.00	963.00	131
Total Baseline Cost	6307.00	7607.00	
Total Project Costs	6307.00	7607.00	
Total Financing Required	6307.00	7607.00	

Source: SAR for Appraisal Estimate, AEDE for latest estimates

Project Costs by Procurement Arrangements (Appraisal Estimate) (US$ million equivalent)

Expenditure Category	Procurement Method[1] ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works	0.00 (0.00)	123.10 (104.60)	0.00 (0.00)	0.00 (0.00)	123.10 (104.60)
2. Goods	1342.80 (1141.30)	311.70 (265.00)	101.10 (85.90)	0.00 (0.00)	1755.60 (1492.20)
3. Services	0.00 (0.00)	0.00 (0.00)	3060.90 (0.00)	0.00 (0.00)	3060.90 (0.00)
4. Miscellaneous	0.00 (0.00)	0.00 (0.00)	1157.40 (0.00)	0.00 (0.00)	1157.40 (0.00)
5. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
6. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Total	1342.80 (1141.30)	434.80 (369.60)	4319.40 (85.90)	0.00 (0.00)	6097.00 (1596.80)

Project Costs by Procurement Arrangements (Actual/Latest Estimate) (US$ million equivalent)

Expenditure Category	Procurement Method[1] ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works	0.00 (0.00)	137.30 (123.60)	11.90 (10.70)	1.20 (0.00)	150.40 (134.30)
2. Goods	1340.00 (1340.00)	514.80 (463.30)	480.70 (436.60)	48.10 (0.00)	2383.60 (2239.90)
3. Services	0.00 (0.00)	611.40 (611.40)	951.60 (951.60)	0.00 (0.00)	1563.00 (1563.00)
4. Miscellaneous	0.00	0.00	3598.20	1304.30	4902.50

	(0.00)	(0.00)	(2293.80)	(0.00)	(2293.80)
5. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
6. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Total	1340.00 (1340.00)	1263.50 (1198.30)	5042.40 (3692.70)	1353.60 (0.00)	8999.50 (6231.00)

Source: SAR for Appraisal Estimate, AEDE for latest estimates

NBF- financed by government 1) works - other US$1.2 thousand: modification AEDE office building; 2) works NBF US$1.2 thousand: construction of latrines at control posts; 3) goods other US$480.7 thousand and 4) goods NBF US$48.1 thousand - training material used to create VERT and train stove makers; 5) services NCB US$514.8 thousand and 6) services other US$951.6 thousand - training and VERT creation by local NGOs and consultants; 7) Miscellaneous other US$3598.2 thousand and 8) miscellaneous US$1304.3 thousand operational costs (mainly for extensive travel to the 100 VERT to prepare, monitor, and follow up on training.

[1/] Figures in parenthesis are the amounts to be financed by the IDA Credit. All costs include contingencies.

[2/] Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government units.

Annex 3. Economic Costs and Benefits

	Economic Analysis	
(PV of flows, US$ thousand 2003)	Appraisal	Latest Estimates
Benefits		
- RMP	7,492	5,094
- DSM	5,028	835
Costs		
- RMP	3,877	17,818
- DSM	1,981	1,701
Net Benefits	6,662	13,589
IRR/NPV	34.4 percent	44.2 percent

Source: Excel based model “ICR Economic Assessment of the Chad Household Energy Project” see List of Supporting Documents

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation				
1994	*3*	Task Manager (1), Energy Specialist (2)		
1995	*1*	Task Manager		
Appraisal/Negotiation				
1996	*4*	Co-Task Managers (2), Rural Energy Specialist Consultant (2)		
Supervision				
9/1999	*1*	Rural Energy Specialist	S	S
02/2000	*2*	Rural Eneryg Specialist	S	S
05/2002	*1*	Rural Energy Specialist Consultant	S	S
3/2003	*1*	Rural Energy Specialist Consultant	S	S
8/2003	*1*	Rural Energy Specialist Consultant	S	S
7/2004	*5*	Task Manager (1), Rural Energy Specialist Consultant (1), Rural Development Specialist (1), Financial Management Specialist (1), Procurement Specialist (1)	S	S
ICR				
Desk Review				

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US$ ('000)
Identification/Preparation	24	62.20
Appraisal/Negotiation	129.6	312.64
Supervision	50.5	118.01
ICR	4.7	9.47
Total	208.9	502.33

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	Rating				
☐ *Macro policies*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*
☐ *Sector Policies*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*
☐ *Physical*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*
☐ *Financial*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*
☐ *Institutional Development*	○ *H*	● *SU*	○ *M*	○ *N*	○ *NA*
☐ *Environmental*	○ *H*	● *SU*	○ *M*	○ *N*	○ *NA*
Social					
☐ *Poverty Reduction*	● *H*	○ *SU*	○ *M*	○ *N*	○ *NA*
☐ *Gender*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*
☐ *Other (Please specify)*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*
☐ *Private sector development*	○ *H*	● *SU*	○ *M*	○ *N*	○ *NA*
☐ *Public sector management*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*
☐ *Other (Please specify)*	○ *H*	○ *SU*	○ *M*	○ *N*	● *NA*

Annex 6. Ratings of Bank and Borrower Performance

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

6.1 Bank performance	*Rating*			
☐ *Lending*	○ *HS*	● *S*	○ *U*	○ *HU*
☐ *Supervision*	○ *HS*	○ *S*	● *U*	○ *HU*
☐ *Overall*	○ *HS*	● *S*	○ *U*	○ *HU*

6.2 Borrower performance	*Rating*			
☐ *Preparation*	○ *HS*	● *S*	○ *U*	○ *HU*
☐ *Government implementation performance*	○ *HS*	● *S*	○ *U*	○ *HU*
☐ *Implementation agency performance*	○ *HS*	● *S*	○ *U*	○ *HU*
☐ *Overall*	○ *HS*	● *S*	○ *U*	○ *HU*

Annex 7. List of Supporting Documents

1. Staff Appraisal Report (1998).

2. Aide-mémoires and Back to Office Reports.

3. Project Progress Reports (12 sequences).

4. Rapport de la mission d'évaluation du projet Energie Domestique par l'Équipe Interministérielle d'Evaluation (Oct. 2003).

5. Borrower's Implementation Completion Report (August, 2004).

6. Chad: Household and Biomass Energy Study: Final Report (I.S. Limited).

7. Démonstration de Méthodes de Carbonisation à haut rendement: Partie I – Rapport de Mission du 10 au 29 avril 1995 (Johan Lejeune, 1995).

8. Etude sur les consultations rurales (M.A. Abdel –Hamid, Agala Ahmat, B.A. Bakhit, 1996).

9. Projet d'Energie Domestique : Manuel d'exécution (1997).

10. Projet Stratégie de l'Energie Domestique: Etude de Marché des Systèmes de cuisson et de l'Electrification Solaire Domestique (SEED- Michel Matly).

11. Stratégie pour l'Energie Domestique Urbaine: Cas de N'Djamena: Préparation du Plan d'Action Détaillé (ESMAP, PNUD/BM-Amos Allemagne N'Djal-Amava, 1994).

12. Stratégie de l'Energie Domestique: Etude du Cadre Institutionnel (SEED-Gérad Madon, 1995).

13. "An economic analysis of the resource management component of the Chad household energy project" (K. Chomitz, C.Griffiths, July 1996) and "An Economic Analysis and Simulation of Woodfuel Management in the Sahel." *Environmental and Resource Economics* 19: 285-304, (K. Chomitz, C.Griffiths, 2001) (empirical data used in this analysis are those of the project).

14. "Can the woodfuel supply in sub-Saharan Africa be sustainable? The case of N'Djamena, Chad", *Energy Policy*, Vol 33/3, pp297-306, (R. van der Plas, M. A. Abdel-Hamid, 2003).

15. Excel based model "ICR Economic Assessment of the Chad Household Energy Project" (new version, August 2004).

16. Fiche pour la Revue Conjointe GOT/WB du Portefeuille (2004).

17. CD Rom of Projects Maps (VERTs).

18. AEDE's Progress Reports.

Additional Annex 8. Partner Comments (in French)

INTRODUCTION

La maîtrise d'œuvre de l'exécution du Projet Energie Domestique est confiée à l'Agence pour l'Energie Domestique et l'Environnement (AEDE) par le Gouvernement à travers la signature d'une Convention entre la République du Tchad et l'AEDE. L'AEDE, créée suite à une assemblée générale de ses membres, est enregistrée le 5 avril de la même année au Registre des Associations du Ministère de l'Administration du Territoire sous le Folio N° 324. Placée sous la tutelle du Ministère de l'Environnement et de l'Eau, l'AEDE est une association non gouvernementale (ONG) reconnue d'utilité publique en vertu du Décret 470/PR/PM/97 du 24 octobre 1997 et qui dispose de ses propres Statuts et Règlement intérieur. Ses organes sont l'Assemblée Générale et le Conseil d'Administration.

Il faut noter aussi que le Gouvernement a mis en place un Comité Directeur de Suivi (CDS) composé de cinq (5) directions techniques des différents ministères, chargé de suivre l'adéquation de l'exécution du Projet avec la stratégie de l'énergie domestique adoptée par le Gouvernement.

OBJECTIFS

Objectifs globaux et nature du Projet : Les objectifs poursuivis par le Projet Energie Domestique (PED) vont dans le sens d'une contribution à la protection de l'Environnement tchadien, à l'amélioration des conditions de vie des populations rurales et urbaines, au développement économique, et au renforcement de l'efficacité institutionnelle. Ces objectifs se résument de :

- objectifs environnementaux : limiter le prélèvement de bois à des fins énergétiques à la capacité réelle de régénération des formations forestières naturelles et développer des modes d'exploitation moins prédateurs, réduire les émissions de CO2 liés à la consommation de combustible ligneux, et diminuer ainsi la contribution du pays à l'accumulation du gaz à effet de serre (GES) ;
- objectifs sociaux : assurer une plus grande participation des populations rurales riveraines à l'activité de production et de commerce des combustibles ligneux et augmenter ainsi leurs revenus monétaires, permettre l'approvisionnement des ménages urbains de façon durable, efficace et à un coût raisonnable en combustibles, et en équipements améliorés de cuisson (foyers et réchauds) ;
- objectifs économiques : tirer le meilleur parti des ressources ligneuses nationales par leur gestion participative, rationnelle et durable, améliorer l'efficacité économique des activités d'exploitation, de transport et de commerce des combustibles ligneux, élever l'efficacité de l'utilisation domestique des combustibles en milieu urbain à travers la diffusion des équipements améliorés de cuisson ;
- objectifs financiers : générer des recettes fiscales significatives au niveau local et central sur le commerce des combustibles ligneux en simplifiant et rendant plus efficace le système fiscal, et augmenter ainsi la capacité d'autofinancement du suivi, du contrôle et de la rationalisation de la gestion des ressources ligneuses ;
- objectifs institutionnels : renforcer la capacité des services en charge des politiques forestières et énergétiques en matière d'orientation, de coordination, d'appui technique de gestion et de planification des activités dans le domaine de l'énergie domestique, définir les mesures législatives et réglementaires nécessaires pour assurer un transfert adéquat de la responsabilité de gestion aux collectivités et aux populations locales. Ce qui est aussi une contribution importante à la décentralisation.

Les objectifs spécifiques du Projet sont :

- Préserver l'environnement et lutter contre la désertification par une gestion rationnelle, durable et participative des ressources forestières, des actions d'économie d'énergie et de substitution ;
- Réduire la pauvreté en milieu rural ;
- Assurer un approvisionnement durable et stable en énergie domestique aux ménages urbains.

DESCRIPTION

La base juridique permettant au Projet d'atteindre ces objectifs, est la loi 36/PR/ 94 portant organisation de la Commercialisation et du Transport du bois – énergie et la fiscalité qui lui est applicable, dans les grandes agglomérations et son décret d'application. L'application de cette loi conduira à des réformes majeures dans la gestion du secteur et dont les plus importantes sont :

- le désengagement de l'Etat, de la gestion des ressources forestières, par le transfert progressif, de la responsabilité de cette gestion aux communautés locales, riveraines de ces ressources, à travers la création des Villages Exploitant Rationnellement leur Terroir (VERT) ;
- l'orientation du rôle classique, exclusivement répressive des agents forestiers, vers des actions d'encadrement, de formation et de suivi des communautés locales, dans la gestion des ressources ligneuses;
- le contrôle effectif des flux des combustibles ligneux en vue d'améliorer les recettes fiscales et leur répartition optimale entre les différents intervenants : les communautés locales, pour le renouvellement de la ressource et la réduction de la pauvreté d'une part et le Trésor Public, pour le fonctionnement et la pérennité des actions engagées, d'autre part (voir en annexe la Loi N°36 et son Décret d'application);

Pour atteindre les objectifs ci-haut cités, le Projet est organisé en quatre (4) composantes qui sont :

(i) Gestion villageoise des ressources forestières par la mise en place et le fonctionnement des Village Exploitant Rationnellement leur Terroir (VERT) ;
(ii) Organisation, Contrôle et Suivi de la filière bois – énergie ;
(iii) Rationalisation de la demande énergétique urbaine ;
(iv) Gestion du Projet.

Etat d'exécution par composante

En quatre (4) ans d'exécution, tous les objectifs fixés sont atteints et les principaux acquis par composante sont :

Composante « Gestion villageoise des ressources forestières » :

- 100 terroirs de VERT qui totalisent plus de 450.000 hectares sont gérés de manière participative et durable par les communautés locales, organisées en Structure Locale de Gestion (SLG) – véritables associations de développement de ces terroirs. Ces villages sont déclarés des Villages Exploitant Rationnellement leur Terroir et dont le sigle est « VERT » ;
- le Plan Directeur d'Approvisionnement (PDA) en énergie domestique de la ville de N'Djamena est finalisé et validé;
- Près de 47.000.000 Fcfa de ristournes sont réalisées au profit des populations des VERT, depuis le fonctionnement des premiers VERTS (2003 et 2004) ;
- De même, près de 300.000.000 Fcfa de chiffre d'affaire sur la vente du bois énergie, prélevé de ces terroirs, sont partagés entre les communautés locales des VERTS.

Composante « Rationalisation de la demande énergétique »

- Mise en place d'un panel de ménage représentatif et réalisation d'enquêtes de consommation, conduite de plusieurs tests de foyers et choix d'une gamme de foyers dont l'économie varie de 25 % à 35%,;
- Formation d'une quarantaine de forgerons dans la fabrication des foyers améliorés métallique et des potière de Gaoui, dans leur équivalent céramique. Ce qui a permis de créer d'emplois et d'assurer des revenus réguliers à ces forgerons.
- Près de 16.000 foyers améliorés achetés par les ménages de la villes de N'Djamena. Ces foyers réalisent des économies sur les budgets des ménages de plus de 30% par rapport aux foyers traditionnels.

Composante « Organisation, Contrôle et Suivi de la Filière bois - énergie »

- Grâce aux performances du Dispositif de Contrôle et de Recouvrement (DCR) de la taxe sur le bois – énergie, les recettes sur le bois – énergie, entrant à N'Djamena, ont évoluées de 30 millions Fcfa avant projet à 218 millions Fcfa en 2001, 500 millions Fcfa en 2002, 564 millions en 2003 et 350 millions Fcfa pendant le premier semestre de 2004.
- Grâce au DCR, le pays dispose pour la première fois des statistiques fiables sur la consommation en énergie domestique de la ville de N'Djamena. Ces données statistiques sont d'une ultime nécessité pour l'élaboration des politiques environnementale et énergétique cohérentes.

Composante « Gestion du Projet »

L'objet de cette composante est la gestion de toutes les ressources humaines, matérielles, l'assistance technique, la planification et le pilotage des activités ainsi que les relations publiques avec les partenaires publiques et privés impliqués de près ou de loin dans l'exécution du Projet, grâce au financement du crédit IDA et la contrepartie provenant des recettes de la taxe forestières.

Les ressources humaines : Jusqu'au 31 décembre 2003, date d'achèvement du Projet, le personnel de l'AEDE se composait de 10 cadres techniques et de gestion (y compris le Directeur Général), un Comptable, un Régisseur, une secrétaire, 2 gardiens, 2 plantons et 10 chauffeurs. A ce personnel s'ajoutent les agents forestiers affectés au Dispositif de Contrôle et de Recouvrement (DCR) de la taxe forestière sur le bois – énergie entrant à N'Djamena et ceux des inspections forestières (Mayo – Boneye, Baguirmi et Chari). Cependant, il faut noter que le Directeur Administratif et Financier de l'Agence est décédé en novembre 2003 et après le 31 décembre 2003, l'Agence a fonctionné avec un personnel réduit compte tenu des contraintes financières.

Les moyens matériels : à la date de clôture du crédit IDA, le 30 juin 2004 et selon les conclusions du rapport sur l'inventaire physique des immobilisations du Projet, 95% des immobilisations et sont en bonne état de marche. Dans ces immobilisations, il y a 12 véhicules et 29 motos. Ce parc est partagé entre l'AEDE et les inspections forestières du Baguirmi, de Hadjer Lamis et du Mayo Boneye. De même, il faut noter que le parc informatique de l'AEDE est composé de 13 ordinateurs de bureau, connectés en réseau et 2 portables.

L'assistance technique : pour l'exécution du Projet, l'AEDE a signé en 2000 pour deux (2) ans, un contrat d'assistance technique globale avec le groupement ECO Consult/Agritchad, associant une société allemande et un bureau d'étude tchadien. Démarré en novembre 2000, ce contrat a pris fin en novembre 2002. Le choix avait été fait de faire appel à une assistance technique relativement courte de 2 ans, soit la

moitié de la durée du projet, avec un rythme de mission assez intense d'une part et en privilégiant l'aspect transfert de compétence par des actions de formation ciblées principalement vers le personnel de l'AEDE mais en intégrant, suivant les domaines, les services forestiers et/ou les villageois ou des prestataires de service.

Les aspects de planification et pilotage des activités : à partir de novembre 2001, l'Agence a tenu à assurer une planification semestrielle et un suivi très rigoureux de toutes les tâches à réaliser dans les différentes composantes ainsi que le budget correspondant. Grâce à cette planification systématique des activités et la capitalisation de l'expertise acquise, le rythme et la qualité de l'exécution du Projet après le départ de l'assistance technique n'ont pas changé à la baisse et ce jusqu'à la clôture du crédit.
Les relations publiques : compte tenu des enjeux socio – économiques du sous secteur de l'énergie domestique qui touchent l'ensemble des populations rurales et urbaines, les relations publiques dans la réussite de l'exécution du Projet sont déterminantes. Sont concernés par ces relations publiques d'abord les bénéficiaires du Projets qui sont les populations rurales du bassin d'approvisionnement en bois – énergie de la ville de N'Djamena, les ménages urbains, les professionnels de la filière bois – énergie, le Ministère de tutelle et aussi d'autres départements ministériels, les décideurs politiques, les ONGs et bureaux d'étude qui interviennent comme des prestataires.

L'AEDE exécute deux des composantes du Projet à savoir : « Gestion villageoise des ressources forestières » et « Organisation, contrôle et suivi de la filière bois – énergie », en étroite collaboration avec la Direction de la Protection des Forêts et de Lutte Contre la Désertification (DPFLCD). La troisième composante « Rationalisation de la demande énergétique urbaine » est exécutée en collaboration avec la Direction de l'Energie du Ministère des Mines et de l'Energie.

Les contraintes principales dans l'exécution de cette composante proviennent de la gestion des intérêts divergents des différents partenaires impliqués dans l'exécution du Projet qu'il faudra concilier. A ces contraintes il faut ajouter l'importance et les difficultés de suivi de 100 VERTs opérationnels en terme de mécanisme de suivi et de coût.

INDICATEUR DE PERFORMANCE DU PROJET

Indicateur 1 : Création de 100 Villages Exploitants Rationnellement leur Terroir (VERT) qui totalisent 200.000 ha de formations forestières gérées de manière durable et participative
Valeur actuelle : 100 VERTs sont opérationnels et couvrent plus de 500.000 ha de formations forestières gérées de manière durable et participative
Commentaires : taux de réalisation : 100%.

Indicateur 2 : Chiffre d'Affaire annuel moyen par VERT : 1.000.000 Fcfa
Valeur actuelle : Chiffre d'Affaire moyen par terroir dont le quota mensuel est de 200 sacs et pour une période d'exploitation de 7 mois par an est de : 2.100.000 Fcfa.
Commentaires : taux de réalisation : 200%.

Indicateur 3 : Taux de recouvrement de la taxe sur le bois – énergie entrant à N'Djamena supérieur à 45%.
Valeur actuelle : Taux de recouvrement atteint en 2003 est de 70% qui représente près de 600.000.000 Fcfa y compris les VERTs.
Commentaires : Un dépassement du taux de réalisation attendu de 25%.

Indicateur 4 : Autofinancement des coûts de fonctionnement :

- 10% en première année ;

- 20% en deuxième année ;
- 30% en troisième année ;
- 40% en quatrième année.

Valeur actuelle : Taux de réalisation de 100% de cet indicateur.

Commentaires : Cet indicateur constitue parfois un blocage dans le décaissement. Il arrive qu'on reporte à une date ultérieure une dépense nécessaire pour la bonne exécution du Projet, juste parce que notre trésorerie relative à la taxe ne nous permet pas d'honorer le payement du différentiel.

Indicateur 5 : Diffusion de 8.000 foyers améliorés à bois et 20.000 foyers améliorés à charbon de bois.

Valeur actuelle : Diffusion de 16.000 Foyers Améliorés mixtes adaptés à l'usage du bois de chauffe et du charbon de bois.

Commentaires : la diffusion de 16.000 foyers mixtes rapporté aux données de l'indicateur attendu représente un taux de réalisation de 57% par rapport à l'ensemble des foyers prévus (bois et charbon de bois) et 80% par rapport à l'indicateur des foyers à charbon. Ce faible taux est due principalement aux difficultés d'assurer la disponibilité de la matière première constituée par des fûts de récupération.

PRINCIPALES DIFFICULTES

L'approche VERT a obtenu une grande popularité auprès des populations villageoises. Pour la première fois, elles ont obtenu la responsabilité mais aussi le droit d'usage des ressources forestières. En conséquence, la motivation des populations locales de mettre en œuvre l'approche VERT est très grande. Les exploitants allochtones sont déjà maintenant maintenus hors du territoire des villages. Cependant, l'appui de l'administration forestière est nécessaire. Celle-ci n'a pas encore correctement compris son rôle de conseiller auprès des communautés rurales. Comme jusqu'à présent ils étaient les administrateurs unique d'une ressource étatique, beaucoup de forestiers ne s'identifient pas encore suffisamment avec leur nouveau rôle, et cela malgré le soutien matériel massif du Projet à travers l'AEDE.

2. La prise en charge des investissements et des coûts de fonctionnement des services des inspections forestières par l'AEDE dépasse le budget de cette dernière et ne peut pas être maintenu à long terme.

3. Les résultats de l'évaluation des services des Opérateurs Privés (ONG/BE) sur le terrain ont montré que le personnel employé ne correspondait pas toujours aux critères de performance demandés par l'AEDE et que des remplacements ont eut lieu. Cela apparaît être une difficulté générale du Tchad : le marché de ressources humaines qualifiées pour de telles tâches est très réduit.

4. La petite équipe de l'AEDE, dont trois à quatre personnes sont directement lié avec l'approche VERT, n'est pas en mesure de suivre la charge de travail croissante du pilotage et du contrôle des ONG en opération ainsi que les responsabilités qui lui sont confiées dans l'approche VERT. Cela se manifeste d'abord de manière éclatante au retard énorme dans l'introduction des données dans le SIEP et de la préparation des plans de gestion forestière. Cet effet est également renforcé par le fait qu'il n'existe pas encore une répartition claire des tâches entre les membres du personnel pour la phase de diffusion. En outre, il est à craindre que des difficultés apparaîtront au sein des communautés villageoises avec le début des activités des VERT, qui éventuellement demandera une modification des instruments appliqués. Avec annuellement 50 nouveaux VERT.

5. Le système de taxation actuel ne favorise pas le développement des VERT. En effet, la différence de taxation entre zone contrôlée (300 FCFA/sac de charbon) et zone incontrôlée (600 FCFA/sac) ne permet pas de compenser le manque à gagner d'un commerçant qui achète le charbon dans un VERT (environ 1 250 FCFA/sac) par rapport à un commerçant qui installe ses employés en zone incontrôlée (prix de revient

du sac : environ 500 à 700 FCFA). Cela peut conduire à un revers sensible au moment où les VERT, surtout ceux éloignés du marché, veulent commercialiser leur bois et ne rencontreront pas une demande suffisante de la part des négociants.

6. Malgré les efforts énormes déployés par les responsables de l'AEDE seulement 5% des commerçants transporteurs se sont fait immatriculés depuis le début du projet. Ceci résulte en première lieu dans la complexité des démarches à entreprendre et au coût élevé de cette immatriculation au registre de commerce. L'introduction d'une carte professionnelle, prévue par la Loi 36 est en cours.

7. D'une manière générale, les différentes unités du dispositif de Contrôle fonctionnent de manière satisfaisante. Seule une unité n'a pas répondu aux attentes, il s'agit de la brigade fluviale.

8. Le contrôle du contrôle n'est pas aussi développé qu'il devrait l'être par manque de suivi quotidien des responsables du dispositif. Les moyens techniques ne sont pas suffisamment utilisés en particulier en ce qui concerne les moyens de communications. Ces dysfonctionnements nuisent à l'efficacité de l'ensemble et entraînent des risques pour la sécurité des agents en charge du contrôle.

9. L'approvisionnement insuffisant en „matière première" a été la cause principale du retard enregistré dans le processus de diffusion massive des foyers améliorés. L'AEDE doit faire des efforts pour que les grandes sociétés de Moundou livrent le nombre nécessaire de fûts de récupération pour le marché de N'Djamena. L'importation de tôles neuves du Nigeria s'est révélée être excessivement chère car le coût unitaire élevé influencera de manière négative une diffusion rapide des foyers quand les subventions de l'AEDE disparaîtront. La grande part du coût de production prise par le matériau de base (35 – 55% selon la taille du modèle) dépasse largement les capacités financières des petites entreprises de ferronnerie.

Les difficultés d'approvisionnement et les investissements élevés requis ont conduit les producteurs à être largement dépendants de l'AEDE. Cette dépendance empêche actuellement la prise en charge de la production et de la diffusion par le secteur privé.

Beaucoup d'efforts ont été réalisés pour le développement d'un foyer de terre cuite à meilleur coût. Malheureusement déjà au cours de la phase de tests, ces efforts n'ont pas été honorés par les utilisateurs ; ceux-ci ayant montré une acceptation réduite pour ce modèle. L'introduction d'un réchaud à pétrole adapté n'a pas pu être réalisé. Les tests avec un modèle provenant d'Haïti n'ont pas été poursuivis, dû aux difficultés d'allumage.

Comme l'équipe de l'AEDE s'est dédiée en grande partie à la diffusion des foyers améliorés métalliques, le développement d'un foyer en terre cuite comme celui d'un réchaud à pétrole lampant a été retardé. En outre, cela a également conduit à une collecte insuffisante de données sur les utilisateurs et des prix de différents combustibles ainsi que leur incorporation dans le SIEP.

Problèmes	**Solutions à mettre en œuvre**	**Par qui**	**Quand**
1.Libéralisation de	Identification des	AEDE	2 ème phase

l'activité de production de foyers améliorés	opérateurs privés		
2.Renforcement du suivi des activités du projet par le Gouvernement	Rendre opérationnel le Comité Directeur de Suivi (CDS)	Les Ministères membres du CDS	2 ème phase
3.Complexité de la procédure de mise en place des VERT	Simplification de procédure	AEDE/DPFLCD	2 ème phase
4.Lente diffusion des meules améliorées	Sensibilisation des VERT dans l'utilisation des meules améliorées	AEDE	2 ème phase
5.Insuffisance de textes d'application	Elaboration des arrêtés et des décrets d'application	DPFLCD	2 ème phase

IMPACTS DU PROJET

Les impacts du Projet Energie Domestique sont d'ordre écologiques, économiques et institutionnels.

Les impacts écologiques vont dans le sens d'une contribution à la protection de l'environnement et à la lutte contre la désertification :

- A travers les 100 Villages Exploitants Rationnellement leur Terroir (VERT), plus de 450.000 ha de surfaces des terroirs, sont gérées de manière durable et participative par les Structures Locales de Gestion (SLG) ;
- Avec l'application des plans d'aménagement, les surfaces annuelles d'exploitation se limitent à environ 10% de la superficie totale. Ce qui permet la mise en défens annuellement de plus de 90% de la surface totale ;
- Des mesures de compensations annuelles sont réalisées par semis directs et par reboisement à base des pépinières sur l'ensemble des parcelles d'exploitation ;

Les impacts économiques du Projet vont dans le sens d'une contribution à l'amélioration des conditions de vie des populations rurales, au redressement économique et à la réduction du déficit budgétaire :

- Avec une production moyenne de 1400 équivalent sacs de charbon sur la base d'un quota mensuel moyen de 200 sacs de charbon sur une période de 7 mois d'exploitation chaque année, chaque terroir villageois peut bénéficier de 378.000 Fcfa de ristournes et de 2.100.000 Fcfa de chiffre d'affaire au profit de villageois de chaque terroir ;
- L'extrapolation annuelle de ces estimations sur les 100 VERT, totalise 37.800.000 Fcfa de ristournes et 210.000.000 Fcfa de chiffre d'affaire au profit des populations de 100 terroirs villageois ;
- Grâce aux performances du Dispositif de Contrôle et de Recouvrement (DCR), les recettes de la taxe sur le bois – énergie entrant à N'Djamena, qui étaient de 30 millions par année avant Projet, ont atteints successivement 218 millions en 2001, environ 500 millions en 2002, 564 millions en 2003 et près de 350 millions pour le premier semestre de 2004 ;

Les activités du Projet ont permis de créer d'emplois à plus de 1500 personnes qu'on peut décomposer comme suit :

- 10 bûcherons /année X 100 SLG donne 1.000 emplois ;

- 03 personnes/année par SLG, ce qui donne 300 emplois ;
- 50 artisans, fabricants des foyers améliorés ;
- 40 personnel des ONGs ;
- 30 personnel de l'AEDE ;
- 100 agents forestiers ;

Les impacts du Projet vont dans le sens d'une formulation d'une approche cohérente et opérationnelle de la politique sectorielle en matière de gestion durable et participative des ressources naturelles :

- L'élaboration des différents outils, manuels de procédures et des méthodologies, permettant la planification, l'exécution, et le suivi des programmes et projets de gestion durables des ressources naturelles ;
- Le développement de l'expertise nationale dans les différents domaines et le renforcement des capacités du Ministère en charge des ressources naturelles, des ONGs et des communautés villageoises.

COMMENTAIRES SPECIFIQUES SUR LA GESTION DU PROJET

La gestion est encadrée grâce aux différents mécanisme de contrôle, de supervision mise en place par le bailleur des fonds (missions de suivi et audit annuel), par le Gouvernement à travers le Comité Directeur de Suivi (CDS) et par l'Assemblée Générale de l'AEDE à travers le Conseil d'Administration de l'AEDE (réunions du Conseil et procès verbaux).

L'absence d'un spécialiste en passation de marché dans l'équipe de gestion du Projet Energie Domestique a influé sur la qualité de l'application des procédures en matière de passation de marché. Aussi, la présence d'un tel poste pourrait améliorer davantage cette fonction.

A la lumière des différents rapports d'audit pour les exercices 2000, 2001, 2002 et 2003 et de la mission d'audit du Gouvernement qui ont certifié la régularité des états financiers avec des petites réserves ainsi que de la dernière mission d'achèvement du Projet de la Banque mondiale, la gestion financière du Projet n'appelle pas de commentaires particuliers.

Cependant, il faut noter que le caractère progressif du différentiel sur les dépenses de fonctionnement, à financer sur la taxe forestière, a souvent constitué un blocage dans les engagements du Projet.

PERFORMANCE DE L'EMPRUNTEUR

La performance de l'Emprunteur est satisfaisante au regard des indicateurs de performance du Projet.

La coordination du Projet entre le Ministère de tutelle et l'AEDE est parfaite. Le Ministère à travers sa Direction de Protection des Forêts et de Lutte Contre la Désertification (DPFLCD), est entièrement impliqué dans toutes les phases du Projet : planification, exécution, suivi et évaluation des activités. De même, le Ministère est fortement impliqué dans la formulation et la validation de manuels de procédures, des outils de planification et de suivi, ainsi que des différents rapports techniques.

Le Ministère est membre du Conseil d'Administration de l'AEDE à travers le Directeur de Protection des Forêts et de Lutte Contre la Désertification qui assure la vice présidence du Comité Directeur de Suivi (CDS). Cependant, il faut noter que le CDS n'a pas été opérationnel comme il se doit durant toute la durée de vie du Projet.

La qualité des relations entre l'AEDE et les bénéficiaires est basée sur le partenariat, la participation et l'équité. Les bénéficiaires du Projet sont : les populations rurales des villages concernés (VERT) par le Projet dans le bassin d'approvisionnement, les ménages urbains de la ville de N'Djamena, les transporteurs du bois – énergie, les producteur des foyers améliorés et les Ministères impliqués. Le Projet est avant tout l'œuvre des ces bénéficiaires et l'AEDE n'intervient que comme partenaire devant leur donner l'appui nécessaire pour la réalisation des résultats attendus et dont les retombées écologiques, économiques, sociales et institutionnelles sont exclusivement la propriété de ces bénéficiaires.

La seule contre-performance de l'Emprunteur est le caractère non opérationnel du Comité Directeur de Suivi (CDS) durant toute la durée de l'exécution du Projet.

PERFORMANCE DU BAILLEUR

De même, pour le bailleur, la réussite de l'exécution du Projet, certifie la performance du bailleur. Cependant, il faut noter qu'une supervision régulière du task manager durant toute la durée du Projet pourrait améliorer davantage la performance obtenue dans la réalisation des indicateurs.

CONCLUSION

Les résultats obtenus à travers l'exécution du Projet Energie Domestique, montrent à suffisance que grâce à l'approche utilisée, la protection de l'environnement est devenue un véritable facteur de développement local.