

Mali

Household Energy Project

Project Document
June 1995



THE WORLD BANK

GEF Documentation

The Global Environment Facility (GEF) assists developing countries to protect the global environment in four areas: global warming, pollution of international waters, destruction of biodiversity, and depletion of the ozone layer. The GEF is jointly implemented by the United Nations Development Programme, the United Nations Environment Programme, and the World Bank.

GEF Project Documents - identified by a green band - provide extended project-specific information. The implementing agency responsible for each project is identified by its logo on the cover of the document.

Global Environment
Coordination Division
Environment Department
World Bank
1818 H Street, NW
Washington, DC 20433
Telephone: (202) 473-1816
Fax: (202) 522-3256

Report No. 14350-MLI

Republic of Mali
Household Energy Project

Project Document
June 1995

Industry and Energy Division
Western Africa Department
Africa Region

CURRENCY EQUIVALENTS

Currency Unit = CFA franc (CFAF)

US\$1.00 = CFAF 470 (April 1995)

SYSTEM OF WEIGHTS AND MEASURES

1 meter	=	3.28 feet (ft)
1 kilometer	=	0.62 mile (mi)
1 square kilometer (km ²)	=	0.39 square mile (sq mi)
1 metric ton	=	2,205 pounds (lbs)
1 kilogram (kg)	=	2.20 pounds (lb)

ACRONYMS AND ABBREVIATIONS

AGETIP	Executing Agency for Public Works <i>(Agence d'Exécution des Travaux d'Intérêt Public contre le sous-emploi)</i>
CAS	Country Assistance Strategy
CED	Household Energy Cell (<i>Cellule Energie Domestique</i>)
CCL	Woodfuels Cell (<i>Cellule Combustibles Ligneux</i>)
CFD	<i>Caisse Française de Développement</i>
CSER	Center for Solar Energy Laboratory
DGIS	Dutch Directorate General for Development Cooperation
EDM	Energie du Mali
ESMAP	Energy Sector Management Assistance Program
FAC	<i>Fonds d'Aide et de Coopération (France)</i>
GEF	Global Environment Facility
GTZ	German Organization for Technical Cooperation
IEC	Information, Education and Communication
MMEH	Ministry of Mines, Energy and Hydraulics
MRD	Ministry of Rural Development
NDSA	National Department for Social Affairs
NEHD	National Energy and Hydraulics Department
NEAP	National Environmental Action Program
NGO	Non-Governmental Organization
NPPD	National Plan to Prevent Desertification
NWFD	National Waterways and Forests Department
PIRL	Project to Inventory Wood Resources in Mali
SEL	Solar Energy laboratory
SOE	Statement of Expenditures
SEP	Special Energy Program
UNFM	Mali National Women's Union (<i>Union des Femmes Maliennes</i>)
UPS	Project Coordination Unit (<i>Unité Pilotage Stratégie</i>)

FISCAL YEAR

January 1 - December 31

PART I: Project Summary

REPUBLIC OF MALI
HOUSEHOLD ENERGY PROJECT
GLOBAL ENVIRONMENT TRUST FUND
GRANT AND PROJECT SUMMARY

Recipient: The Republic of Mali

Beneficiaries: Ministry of Mines, Energy and Hydraulics
Ministry of Rural Development

Amount: SDR 1.6 million (US\$2.5 million equivalent)

Terms: Grant

Financing Plan: (in US\$ million)	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
GEF	1.8	0.7	2.5
Netherlands	1.1	1.9	3.0
France	1.2	2.0	3.2
Germany	0.8	0.4	1.2
Government	<u>1.2</u>	<u>-</u>	<u>1.2</u>
Total	6.2	5.0	11.2

Poverty Category: **Program of Targeted Interventions.** The project would improve living standards of rural populations in affected areas and stabilize employment opportunities in the firewood trade. Increased and proper use of kerosene and charcoal stoves would also reduce the cost of cooking for low-income urban consumers.

Economic Rate of Return: Not applicable

REPUBLIC OF MALI

HOUSEHOLD ENERGY PROJECT

1. **Background.** Mali is a vast, land-locked, resource-poor country located in the Sahelian zone of Western Africa. Only about a quarter of its 1.2 million square kilometers is arable. Nearly 90% of the population, estimated at 8.5 million in 1990, is dependent on the agricultural sector. In 1992, per capita income was estimated at US\$310. Social indicators, such as life expectancy (48 years) and literacy rate (60%), are among the lowest in the world. Agriculture will remain the mainstay of the economy for the foreseeable future, and the Government is taking steps to improve agricultural productivity and diversify production. Directly linked to the Government's agricultural strategy is its objective to improve natural resource management, in particular its objective to fight environmental degradation. Having prepared a plan for desertification control in the late 1980's (para. 6), the Government has initiated the development of an integrated natural resource management program for the agricultural, pastoral and forestry sectors. This program is further elaborated in the National Environmental Action Program (NEAP) which is being formulated by the Government and is expected to be completed by mid-1996, as well as in the Country Environmental Strategy Paper (CESP) which has been completed and widely discussed with the Government (Report no. 11642-MLI). The program aims at enabling local communities to better manage their own natural resources, including fuelwood, and increasing their responsibility for such management. This program is supported by the Bank and other donors through a Natural Resource Management Project (Credit 2370-MLI). To reverse the process of degradation, measures will be needed on many fronts, including the development of new solutions to land tenure legislation, training on more appropriate farming practices, the development of economic and technological alternatives to current agricultural and livestock activities, information and awareness building, and institutional strengthening.

2. As in most Sahelian countries, fuelwood (used mostly for cooking) comprises approximately 90% of the energy consumed in Malian households. In urban areas charcoal is also used (11% in Bamako), and its use is expanding rapidly. Several analyses have drawn attention to woodfuel deficits in Mali. A detailed inventory taken in 1987 gives the most reliable overview of the standing stock of Mali's forests. According to this inventory, the current situation is less dramatic in the south than previously thought. The Sikasso and Koulikoro regions, for example, are heavily forested: 60 to 80 % of the surface area is covered with old growth timber (about 10 million hectares). Annual productivity of the accessible portions of these natural forests can supply nearby urban populations for several decades, although pockets of resource degradation around urban centers are developing. In sharp contrast, the northern regions (which were hard hit by the drought) are experiencing increasing woodfuel deficits as the resource base is being gradually destroyed. The motorized woodfuel entrepreneurs tend to "mine" nearby forests, particularly for charcoal production, thus creating corridors of deforested areas along access roads. Also, in the cotton zone, in the south, large quantities of cotton stalks are

burnt each year, because they have no economic use, though these could be transformed into charcoal briquets and replace charcoal. It is important, therefore, to reduce and rationalize the exploitation of household fuels for the major cities, particularly for the deficit areas in the north. Transporting fuelwood or charcoal from the south to the north, unfortunately, is not economically feasible, because of the long distances (1,000 km) and high transport costs.

3. The household energy sector has considerable economic importance. The sector's annual commercial turnover amounts to 10 billion CFAF, or approximately US\$18 million (twice the turnover of the electric power sector) and provides some 15,000 jobs in the rural areas. The market price for fuelwood and charcoal, however, represents only their financial, not their economic costs and fuelwood prices are considerably lower than what they should be. The rural producer, in effect, subsidizes the urban consumer who has little incentive to use energy efficiently. The economic cost of fuelwood is calculated at being 26-39 FCAF/kg (depending on the region), while the urban consumer pays only 18 FCFA/kg.

4. Because of the dominant role of biomass fuels in total energy consumption, the contribution of non-household sectors of the economy to CO₂ emissions is negligible in Mali. Currently, CO₂ emissions in Mali, excluding the household sector, are estimated at 0.01 ton/capita per year. In contrast the estimated amount emitted by the household sector is 0.3 ton/capita per year, or 30 times higher than the non-household sector. It has been estimated that Mali adds some 2 million tons CO₂ to the global CO₂ balance, mainly from energy use stemming from non-sustainable biomass harvesting. The dominant role of the urban household sector as a CO₂ emitter and the increasing charcoal consumption in Mali, combined with high urban population growth (7% per year), clearly indicate the need for the reduction of urban CO₂ emissions. More efficient stove/fuel combinations emit smaller quantities of CO₂ while accomplishing a similar cooking task. Relative to kerosene and natural gas, charcoal emits 2 to 3 times more CO₂. From these figures it is clear that the use of charcoal should be discouraged and the use of less harmful fuels such as kerosene and charcoal briquets promoted. In a "business as usual" scenario, fuelwood consumption will rise from a total of 4 million tons in 1987 to 5.2 million tons in the year 2007 as population increases, exerting further pressure on the forest exploitation zones. If this increasing consumption is not offset by equal increases in wood production, there will also be a net increase in total CO₂ emissions in the country.

5. Presently, there is virtually no control exercised over woodcutters, the production areas, or the quantities of woodfuels produced. The present level of woodfuels taxation is of little significance (far too low) and collection is at best only sporadic. This *de facto* passive policy of non-intervention in the woodfuel sector has led amongst other things to the failure of the IDA-financed Second Forestry Project (Credit 1654-MLI) (para. 18).

6. The responsibility for policy formulation and overall coordination in the household energy sector is shared between the Ministry of Mines, Energy and Hydraulics (MMEH) and the Ministry of Rural Development (MRD). The Government, with assistance from

the Energy Sector Management Assistance Program, formulated a comprehensive household energy sector strategy which was presented to several donors in November 1992. The strategy aims to facilitate access of both the urban and rural population to modern forms of energy and protect the natural environment against uncontrolled and damaging exploitation of biomass resources. The strategy is part of the National Plan to Prevent Desertification (*Programme National de Lutte Contre la Désertification*, PNLD). Implementation of the PNLD is being coordinated and supervised by an inter-ministerial organization headed by the Ministry of Rural Development through the National Waterways and Forests Department (NWFD). NWFD's main functions include: (i) monitoring forest exploitations; (ii) managing classified forests; and (iii) monitoring the flows of forest products. NWFD currently has a staff of 780 forestry agents and some 700 non-foresters and is also headquarters for the National Advisory Committee for Improved Stoves which coordinates all improved stove projects in the country. The current institutional framework in Mali is weak and characterized by insufficient resources and lack of technical expertise.

7. **Project Objectives.** The project's long-term *development objectives* are the reduction of CO₂ emissions, the abatement of forest resources depletion, and increased participation of the private sector in the management of the household energy sector. The main *implementation objectives* are to promote popular participation in household energy activities, rational use of household energy resources, and improved end-use of household fuels. Specific objectives are to (i) create an enabling regulatory and policy environment for project implementation; and (ii) provide technical assistance and training to peasants, charcoal makers, producers and sellers of stoves, and urban consumers to, respectively, efficiently harvest and carbonize fuelwood, manage the natural forest in a sustainable manner, effectively market new energy end-use equipment, and rationally use improved biomass and kerosene stoves. The basic principle underpinning this project is that the Government establishes the policy environment, but commercial decisions are left to private economic agents.

8. **Project Description.** The project would consist of two main components covering demand for and woodfuel supply of household energy. On the *demand side*, the focus of the project will consist of enhancing the role of the private sector in marketing a variety of fuel efficient end-use appliances. To assist poor consumers to overcome market barriers to energy products that would greatly benefit them, subsidies would be made available on a temporary basis and in a transparent manner. Reducing the market price of improved kerosene and charcoal stoves, both unknown products to the Malian consumer, can help overcome consumer perception that the new product is out of her reach and expand the market in the long run, which in turn will reduce the cost to the consumer. On the *supply side*, the main focus will be to mobilize popular participation in the management of the natural forest, and restructure the fuelwood trade so that woodfuel traders increasingly get their supplies from managed, rather than mined, forests.

9. **The demand component.** This component consists of: (i) identification, design and assistance to implement a marketing program for the sale of these improved biomass and kerosene stoves; (ii) provision of institutional support for central government authorities to

help with project management and assist private sector entrepreneurs with the production and sale of improved stoves; (iii) support for a comprehensive Information, Education and Communication (IEC) program and systematic consumer consultation, executed by private sector operators, on the importance of the rational use of energy through the purchase and proper use of the improved stoves.

10. **The woodfuel supply component.** This component consists of: (i) design of woodfuel supply master plans for the main towns and determine the maximum annual sustainable wood supply in the catchment areas of the towns concerned; (ii) preparation of, and assistance to, implement village forest management plans in about 260 villages in five administrative regions of Mali; (iii) identification, design and implementation of an improved carbonization program for existing charcoalers and assistance to interested local private entrepreneurs to carbonize and compress cotton stalks to replace charcoal; (iv) provision of institutional support for central and local government authorities to help with project management and assist rural communities in implementing their forest management plans; and (v) launching of a comprehensive training, client consultation, and an IEC program on forest management.

11. **Project Financing.** Total project cost is estimated at US\$11.2 million equivalent (including taxes and duties), with a foreign exchange component of 44%. The demand component cost is estimated at about US\$3.2 million, and that of the supply component at US\$7.7 million, both net of taxes and duties. The financing plan is as follows: GEF and the Netherlands together will cofinance US\$5.5 million equivalent (GEF grant: US\$2.5 million, Netherlands: US\$3.0 million equivalent), France will finance US\$3.2 million equivalent on a parallel basis, and Germany will finance the remaining US\$1.2 million equivalent, also in the form of parallel financing. The Government will contribute approximately US\$1.2 million equivalent to cover local personnel costs and taxes and duties charged to the project. Project cost estimates and financing plan are shown in Schedule A.

12. About US\$1.0 million of the GEF grant will temporarily subsidize (up to 50%) import and sale of 17,000 kerosene stoves and the production of about 68,000 charcoal stoves. The grant will also finance training and information campaigns aimed at consumers, producers and retailers of improved charcoal and kerosene stoves (US\$0.4 million). Finally, the GEF grant will temporarily subsidize (50%) the cost of 400 locally produced chimneys to modernize kilns and will also finance demonstrations for and training of charcoalers (US\$0.8 million), as well as equipment and training of operators to carbonize and compress cotton stalks (US\$0.3 million).

13. **Project Implementation.** Overall project coordination would be the responsibility of a *Project Steering Committee*. This Steering Committee will be composed of MMEH and MRD senior staff who would meet twice a year to evaluate and provide direction for the project. In addition, a *National Coordination Council* for the household energy sector will be created, in which the Government, all interested donors, NGOs and private sector representatives will participate to discuss and advise on policy, technical and coordination issues in the sector. This coordination will also facilitate collaboration in project implementation through the use of other organizations and their

staff. Day-to-day project coordination, administration and financial management of the project will be the responsibility of the Project Coordination Unit (PCU), established within MMEH under the ongoing Power II Project (Cr. 1998-MLI), and is composed of members from MMEH and MRD. The execution of the demand component would be managed by MMEH's Household Energy Unit, and that of the woodfuel supply component by MRD's Woodfuels Unit. The project will be mainly executed by private sector actors. However, for critical reasons, in particular the environmental and social dimensions and weak private sector institutions, the Government's role as a catalyst is important to stimulate private sector development in the household energy sector. Consequently, a large part of the project's activities is decentralized to the private sector, with public sector involvement declining over time.

14. The project is expected to be completed over a four-year period, and the grant disbursed over the same period.

15. **Monitoring and Evaluation** of the project's activities would be carried out to assess implementation progress against annual monitoring indicators and to coordinate actions of the many and diverse participants. Each entity responsible for executing the project would report on progress of their specific components or activities. Their reports would be consolidated by the PCU every six months and submitted to the Bank for review. Specifically, the PCU would submit (a) a project implementation progress report of the preceding six months against the projected implementation program outlined in the implementation manual, and (b) a work program and budget for the following six months, including performance indicators. A Project mid-term review would be carried out midway through project implementation to evaluate implementation progress against planned objectives.

16. **Project Sustainability.** The project sustainability would be achieved through: (i) transfer of responsibility for control and management of the natural forests from the State to the village communities; (ii) existence of a transparent regulatory framework that penalizes the purchase of mined wood, while promoting the management of trees and forests; (iii) gradual reduction of Government's role and increased private sector's role in management of the household energy sector; and (iv) reduced energy expenditures by households through the purchase and proper use of improved biomass and kerosene stoves. The Government has already put in place the first two items during project preparation (para. 19).

17. **Participatory Approach.** The project was prepared by the Government with funds available under Cr. 1998-MLI. During the preparation phase, a special effort was made to identify all potential partners and collaborators with whom contact was established and the project's objectives and methodologies discussed. These preparatory activities included various field surveys and client consultations, such as a household energy survey, consumer testing and demonstrations of energy efficient appliances, focus groups of consumers and formal meetings with NGOs and staff of projects engaged in household energy-related activities. Also, both project design and its mechanisms for evaluation are based on continuous dialogue between and

feedback to the project's executors: consumers and sector professionals (from small peasant wood choppers to directors of petroleum companies).

18. **Lessons Learnt from Previous Bank Involvement.** This is the first Bank-supported household energy project in Mali. Experience from the IDA-financed Forestry I and II Projects suggests that structural, institutional, and organizational changes need to be adopted before engaging in other forest management projects in Mali. The proposed project was designed taking into account lessons learned from these two projects as well as from the household energy project in Niger, through the enactment of policy reforms related to forest resource pricing and fiscal policies, the reorganization of the forestry service, and a pro-active policy to realize local participation in the integrated management of forestry resources. The Government has already introduced these major structural policy and institutional changes upfront during project preparation which started in mid-1992 and has taken considerable time because of the demand that these reforms be realized up-front. Hence, there are no additional policy conditions in the proposed project.

19. **Rationale for GEF Funding.** The household energy sector in Mali is the most important source of build-up of greenhouse gases. The capacity of fuelwood to capture CO₂ (sequestering capacity), if it stems from a renewable source, is 1.7 kg of CO₂ per kg of fuelwood. The net emissions of kerosene are three times less than those of charcoal. It is expected that some 330,000 tons of fuelwood will be saved, which will be equivalent to 560,000 tons of CO₂ of avoided emissions. Assuming that 50% of the wood would have been harvested in a non-sustainable manner, this translates into a cost of less than US\$10 per ton of CO₂, which is considerably below the GEF yardstick of US\$25 per ton of CO₂. Support for the proposed project would not only contribute to the sustained management of a renewable natural resource in Mali but contribute as well to reduce CO₂ emissions. In particular, GEF support for this project will focus on reducing the first cost and market entry barriers for consumers who wish to start using kerosene or briquets instead of charcoal. These barriers include high up-front investment cost for appropriate fuel-efficient cooking appliances, lack of information on the availability of these appliances and how to use them properly, and lack of an existing marketing structure for modern fuel appliances. Overcoming these barriers, through training, demonstration and promotional campaigns, and subsidization of the retail price of kerosene and charcoal stoves, will ensure general access to substitution fuels for urban dwellers.

20. **The project's objectives are coherent with the Bank's Country Assistance Strategy (CAS) (Report no. 13746-MLI) reviewed by the Board in January 1995, the completed Bank's CESP for Mali, and the ongoing formulation of the Government's NEAP, all having similar goals. In fact, the project focuses on and integrates in its approach three important elements of the CAS, environment, private sector involvement and popular participation, to bring about sector efficiency.**

21. **Agreed Actions.** As conditions of Grant effectiveness, the Government has agreed to: (a) appoint a Marketing Specialist, a Technologist, an Agro-Economist, a Rural Sociologist, and a Pastoralist, to be part of the Project staff; and (b) submit a timetable to increase stumpage fees for charcoal and fuelwood to, respectively, FCFA 6 and FCFA 2 per kg, by December 1996.

22. **Environmental Aspects.** Implementation of the strategy supported by this grant would reduce soil degradation, bush fires, deforestation, and CO₂ emissions by the household sector as: (i) sustainable natural forest management is achieved; (ii) improved carbonization techniques and alternative (commercial) fuels are introduced; and (iii) improved wood, charcoal, kerosene, and LPG stoves are introduced and disseminated throughout the country. The latter will also significantly reduce indoor environmental pollution, hence foster improved working conditions for women. Progress in these aspects will be recorded through the monitoring and evaluation system

23. **Project Benefits.** The main benefits are the protection of the fragile environment around urban areas and a reduction in CO₂ emissions. An attempt has been made to quantify some of the costs and benefits. The targeted promotion of 160,000 improved wood, 68,000 improved charcoal stoves, and 17,000 kerosene stoves under the project would result in savings in firewood consumption that could amount to about 330,000 tons a year by 1999. In addition, the project aims to bring 720,000 ha of natural forest under management and recover 200,000 tons of dead wood. Assuming the economic value of wood to be between CFAF 26 -39/kg, and taking into account only firewood savings, the rate of return on the project is calculated to be over 30%. This conservative estimate takes into account neither the increase in forest cover yields, nor the reduction in CO₂ emissions, or the major long-term ecological benefits, such as the positive effects on agricultural production, the fodder situation, and soil fertility. The project would improve living standards of rural populations in affected areas and stabilize employment opportunities in the firewood trade. Increased and proper use of kerosene and charcoal stoves would also reduce the cost of cooking for low-income urban consumers and cooking time and make food preparation easier.

24. **Risks.** The project is new and innovative in Mali and will encounter technical and institutional obstacles. The structural policy and institutional reforms introduced by the Government would help reduce these obstacles. The major risks are (a) complex coordination and implementation arrangements; (b) uncertainty whether consumers will accept and buy the new kerosene and charcoal stoves; and (c) uncertainty whether the villages are willing to participate in management of the natural forest. The following actions will be taken to minimize these risks: (a) a national coordination committee will be established to monitor and evaluate coordination and implementation of all activities in the household energy sector; (b) during project preparation, detailed market studies were conducted to determine the market profile for the new stoves, while during project execution systematic consumer consultation, beneficiary assessment and feed-back from the monitoring and evaluation system will provide information to alert project management to lack of progress and allow adjustments to be made in the project's approach; and (c) a national ICE campaign, including visits by extension agents, will ensure the villagers' participation.

REPUBLIC OF MALI**HOUSEHOLD ENERGY PROJECT****A. Project Estimated Costs (net of taxes and duties)**
(in US\$ '000)

	Local	Foreign	Total
A. Fuelwood Master Plans	311	568	879
B. Village Forest Management Plans	1,000	1,000	2,000
C. Carbonization Program	838	262	1,100
D. Kerosene and Charcoal Stoves Program	660	340	1,000
E. Institutional Support and Monitoring Program	304	1,135	1,439
F. Skills Development and Public Awareness	1,300		1,300
G. T.A., Consultancies, and Studies	523	1,250	1,773
Base-line Costs	4,936	4,555	9,491
Physical contingencies	265	210	475
Price contingencies	299	235	534
TOTAL COST	5,500	5,000	10,500

B. Financing Plan (including taxes and duties)
(in US\$ million)

	Local	Foreign	Total
GEF (C, D, F, G)	1.8	0.7	2.5
The Netherlands (DGIS) (A, B, E, F, G)	1.1	1.9	3.0
France (CFD) (B, E, G)	0.9	1.4	2.3
France (FAC) (B, E, G)	0.3	0.6	0.9
Germany (GTZ) (E, F, G)	0.8	0.4	1.2
Mali (E)	1.2		1.2
TOTAL	6.2	5.0	11.2

Note: Letters in brackets correspond to components financed by the respective donors (Table A).

REPUBLIC OF MALI

HOUSEHOLD ENERGY PROJECT

A. Summary of Proposed Procurement Arrangements
(net of taxes and duties, including contingencies)

(in US\$ million)

Category of expenditures	ICB	NCB	Other (a)	Parallel Financing (b)	Total
1. Civil Works	-	0.3 (0.3)	-	0.8 (-)	1.1 (0.3)
2. Goods	0.6 (0.6)	1.2 (1.2)	0.2 (0.2)	2.8 (-)	4.8 (2.0)
3. Consultant services	-	-	1.8 (1.8)	0.8 (-)	2.6 (3.1)
4. Service contract (c)	0.1 (0.1)	-	-	-	0.1 (0.1)
5. Incremental Operating Costs	-	-	1.3 (1.3)	0.6 (-)	1.9 (1.0)
TOTAL	0.7 (0.7)	1.5 (1.5)	3.3 (3.3)	5.0 (-)	10.5 (5.5)

Note: Figures in brackets refer to amounts financed by the GEF grant and the Netherlands.

- (a) Refers to procurement through national and international shopping, limited international bidding, and specialist services.
- (b) Refers to items financed by France and Germany on a parallel basis, as well as Government's contribution to the financing of incremental operating costs.
- (c) Aerial photographs and satellite imagery to be financed by the Netherlands.

1. All items financed by the GEF grant would be procured according to the Bank's procurement Guidelines. Items financed by the Netherlands would be managed by the Bank and their procurement would also follow Bank's procurement guidelines. Items financed on a parallel basis by France and Germany would be procured according to the donors' own procurement guidelines.

2. *Civil works* (total cost: US\$364,000) would be financed by the Netherlands and procured through National Competitive Bidding (NCB) using procedures and standard bidding documents developed by the Executing Agency for Public Works (AGETIPE) which are acceptable to the Bank, because the amounts of individual contracts would not likely attract foreign bidders. *Goods* financed under the Project would include vehicles, office equipment, audio-visual equipment and materials, and spare parts. Most of the *vehicles* would be procured in the first year of the project, except for replacement

Schedule B

Page 2 of 3

vehicles, and could be grouped into packages of at least US\$200,000 and procured on the basis of International Competitive Bidding (ICB) for an estimated total cost of US\$583,000 in accordance with the Bank's Guidelines for Procurement under IBRD loans and IDA credits. Goods procured under contracts estimated to cost less than US\$200,000 equivalent each would be suitable for procurement through National Competitive Bidding under procedures acceptable to the Bank provided the aggregate amount of such procurement does not exceed US\$1.2 million equivalent. The *remaining goods*, which cannot be grouped into bid packages of at least US\$200,000 equivalent, would be procured on the basis of price quotations from at least three suppliers, provided the aggregate amount of such procurement does not exceed US\$0.2 million equivalent. *Consultants and other experts* (about US\$3.1 million) would be selected in accordance with Bank Guidelines for the Use of Consultants (August 1981) and would be employed on terms and conditions satisfactory to the Association. *Service contracts for aerial photographs* and satellite imagery of an estimated value of US\$100,000 would be purchased through ICB.

3. Contracts for *works and goods* above a threshold of US\$200,000 equivalent each, and contracts for firms and individual consultants, respectively, above a threshold of US\$100,000 and US\$50,000 equivalent each would be subject to prior review. However, for firms and individual consultant contracts below, respectively, the US\$100,000 and US\$50,000 threshold, the Bank would review the terms of reference, single source hiring, assignments of a critical nature as determined by the Bank and amendments of contracts raising the contract to these thresholds. Procurement information will be collected and recorded as follows: (a) prompt reporting of contract award information by the Grantee; (b) comprehensive semi-annual reports to the Bank by the Grantee indicating: (i) revised cost estimates for individual contracts and the total project, including best estimates of allowances for physical and price contingency; (ii) revising timing of procurement actions, including advertising, bidding, contract award; and (iii) completion time for individual contracts; compliance with aggregate limits on specified methods of procurement; and (iv) use of standard bidding documents.

B. Proposed GEF Grant Allocation
(In US\$ million)

Category of Expenditures	GEF	Total	% of expenditures to be financed
1. Vehicles, Equipment, Materials	1.3	1.3	100% of foreign expenditures; 90% of local expenditures
2. Incremental Operating Cost (local temporary staff, promotional campaigns)	0.8	0.8	90%
3. Consultant Services	0.4	0.4	100%
TOTAL	2.5	2.5	

C. Estimated GEF Grant Disbursements
(in US\$ million)

Bank FY	1996	1997	1998	1999
Annual	0.3	0.7	0.7	0.8
Cumulative	0.3	1.0	1.7	2.5

3. **Disbursement.** The proposed GEF grant of US\$2.5 million equivalent would finance project items based on the following proportions of project total cost: (a) vehicles, equipment, materials: 100% of foreign expenditures and 90% of local expenditures; (b) incremental operating costs: 90%; and specialist services: 100%. All of the above are net of taxes and duties which would be borne by the Government.

4. Disbursement of the GEF grants will be fully documented except for expenditures valued at less than US\$100,000 equivalent which will be disbursed against Statement of Expenditures (SOEs). To expedite project implementation, a special account will be opened in a commercial Bank acceptable to the Bank and maintained and operated on terms and conditions acceptable to the Bank. All GEF financed expenditures of less than US\$100,000 equivalent will be financed from a Special Account that will be replenished with appropriate supporting documentation and an up-to-date Bank statement and reconciliation statement, except for expenditures below US\$100,000 which the Grantee will be permitted to submit on the basis of SOEs. SOE documents will be kept in the project office for immediate inspection by Bank staff during supervision missions and for annual audits. No direct payment request under the equivalent of US\$100,000 will be accepted. Purchase of the kerosene and charcoal stoves as well as for the charcoal kiln chimneys would be done by one or more private sector entrepreneurs who have been selected based on their financial and technical offers to participate in the project. The temporary GEF subsidy for these products will be passed on to the consumer through a corresponding lower retail price.

REPUBLIC OF MALI**HOUSEHOLD ENERGY PROJECT****Timetable of Key Project Processing Events**

(a) Time taken to prepare the project:	24 months
(b) Prepared by:	Bank and Government of Mali
(c) First Preparation Mission:	April 1993
(d) Planned Appraisal/Negotiations:	May 1995
(e) Planned Board Presentation	June 28, 1995
(f) Planned date of effectiveness:	July 1995
(g) Relevant PCRs:	Forestry I (Cr. 883-MLI) Forestry II (Cr. 1654-MLI)

Project preparation was based on the findings of a mission to Mali in June 1992, consisting of Messrs. Willem Floor (Senior Energy Planner) and Kjell Christoffersen (Consultant) and has been conducted by subsequent missions in 1993 and 1994 in conjunction with supervision missions of Cr. 1998-MLI led by Mr. Nadjib Sefta (Senior Energy Specialist). The timelag between project preparation and Board presentation is due to the fact that major structural policy and institutional reforms had to be implemented up-front; this took two years to materialize. The Peer Reviewers are Messrs. Claude Heimo (AF3AE) and Robert Clement-Jones (AFTES). Mr. Jean-Louis Sarbib, Ms. Silvia B. Sagari, and Mr. Emmerich Schebeck are, respectively, Department Director, Managing Division Chief and Project Advisor, for the operation.

HOUSEHOLD ENERGY PROJECT

Status of Bank Group Operations in Mali

Summary Statement of Loans and IDA Credits

(LOA data as of 3/31/95)

Loan or Credit No.	Fiscal Year	Purpose	Amount in SDRs million (less cancellations)		Closing Date
			IDA	Undis- bursed	
Credits					
19 Credits Closed			228.81		
16290-ML	1988	Highways V	50.70	4.98	06/30/95 (R)
19060-ML	1988	Office du Niger II	31.00	9.81	06/30/97
19380-ML	1988	P.E. Inst. Dev.	7.00	0.49	12/31/95(R)
19980-SN	1989	Power II	24.20	14.81	12/31/95
20540-ML(S)	1989	Ed. Sector Consolidation	18.60	3.43	12/31/95(R)
21630-ML(S)	1990	AG SECAL	40.70	12.93	12/31/96
21880-ML(S)	1991	SAL I	50.30	1.03	06/30/95 (R)
22170-ML	1991	Health, Population, Rural Water	19.20	12.13	12/31/97
22350-ML	1991	Ag. Services	18.30	10.07	09/30/95
23700-ML	1992	Natural Resources Mgmt.	15.00	12.82	06/30/98
23710-ML	1992	Public Works & Capacity-Building	14.70	4.16	03/31/97
23900-ML	1992	Mining Capacity	4.40	3.83	06/30/97
24320-ML	1993	Private Sector Assistance	8.20	6.45	12/31/99
25570-ML	1994	Ag. Research	14.20	12.46	12/31/01
26170-ML	1994	Transport Sector	46.10	46.10	06/30/01
23711-ML	1995	Public Works & Capacity-Building	6.90	6.90	03/31/97
26730-ML(S)	1995	Education SECAL	34.30	13.80	12/31/96
Total number Credits = 17			403.80	176.20	
TOTAL /1			632.61		
of which repaid			4.37		
TOTAL held by IDA			628.24		
TOTAL undischursed				176.20	

/1 Total Approved, Repayments, and Outstanding balance represent both active and inactive Credits.

(R) Indicates formally revised Closing Date.

(S) Indicates SAL/SECAL Loans and Credits.

The Net Approved and Bank Repayments are historical value, all other are market values.

The Signing, Effective, and Closing dates are based upon the Loan Department official data and are not taken from the Task Budget File.

REPUBLIC OF MALI
Action Plan to Improve Implementation

FY Board Approval	Credit No.	Project Name	RATINGS		Disbursement Lag (%)	Problems and Proposed Actions
			Development Objective	Implementation Progress		
1988	1938-MLI	P.E. Institutional Devel.	U	U	0.4	Non-compliance with several conditionalities in the credit agreement. Progress on two important studies has been slow. A mid-term review is planned for mid-1995 when project objectives will be reviewed and discussed with Borrower.
1991	2217-MLI	Health/Pop./Rural W/S	HS	S	47.0	Delays in disbursements caused by several major procurement contracts which needed to be renegotiated following CFA Franc devaluation and price revisions. However, disbursements is expected to speed up by end calendar year 1995.
1991	2235-MLI	Agricultural Services	S	HS	51.6	Delays in disbursement caused by staff build-up for certain components of the project which developed more slowly than expected at appraisal. Due to the devaluation of the CFA Franc, certain expenses denominated in local currency have decreased in dollar terms and some procurement contracts needed to be revised.
1992	2390-MLI	Mining Capacity	S	U	36.8	The unsatisfactory rating on Implementation Progress was related to project financial management issues, which led to a suspension of disbursements of the credit as of October 1, 1994. However, the Government has taken appropriate corrective actions and, consequently, the suspension of the credit has been lifted as of April 7, 1995 and the closing date extended to December 31, 1995.
1992	2370-MLI	Natural Resources Mgt.	S	HS	64.6	Delays in disbursements caused by delays in implementation of some of the project's components (land tenure tests, Baoule Natural Park, intervention with forestry dwellers). A mid-term review is planned for 9/95 which will include external assessment of the project's performance in the areas of: (i) effectiveness of participation procedures, (ii) coordination with the PNVA, and (iii) the relevance of its training program.

PART II: TECHNICAL ANNEXES

REPUBLIC OF MALI
HOUSEHOLD ENERGY PROJECT
CONTENTS

BACKGROUND	17
A. INTRODUCTION	17
B. THE ECONOMY	18
C. ENERGY RESOURCES.....	18
D. ENERGY CONSUMPTION.....	19
E. HOUSEHOLD ENERGY SECTOR.....	19
F. INSTITUTIONAL FRAMEWORK.....	22
MAIN ISSUES IN THE HOUSEHOLD ENERGY SECTOR.....	23
A. WOOD CONSUMPTION AND GROWTH IN CHARCOAL USE	23
B. CO2 EMISSIONS	25
C. MARKET PENETRATION BY IMPROVED COOK STOVES	25
D. PRICE AND COST COMPARISONS FOR HOUSEHOLD FUELS	26
E. MARKETS FOR SUBSTITUTION FUELS.....	28
F. OPTIONS FOR IMPROVING THE SITUATION IN REGIONS WITH WOOD DEFICITS	28
G. INSTITUTIONAL, REGULATORY AND FISCAL FRAMEWORK IS ILL-ADAPTED TO MANAGING WOOD RESOURCES.....	30
THE PROJECT	32
A. PROJECT OBJECTIVES	32
B. PROJECT DESCRIPTION.....	32
C. DETAILED FEATURES	33
1. Woodfuel Supply Master Plans.	33
2. Village Forest Management Plans.....	34
3. Carbonization Program.....	35
4. Kerosene, Charcoal Stoves and Briquets Dissemination Program.....	35
5. Institutional Support for Government Services.....	36
6. Skills Development and ICE.....	36
7. Technical Assistance.	37
D. PROJECT IMPLEMENTATION.....	37
E. PROJECT COSTS	42
F. PROJECT FINANCING	43
G. PROCUREMENT.....	44
BENEFITS, ENVIRONMENTAL IMPACT AND RISKS.....	47
A. BENEFITS	47
B. RISKS	48
ASSURANCES AND RECOMMENDATION	48

Project preparation has been based on the findings of a mission to Mali in June 1992, consisting of Messrs. Willem Floor (Senior Energy Planner) and Leif Christoffersen (Consultant) and has been conducted by subsequent missions in 1993 and 1994 in conjunction with supervision missions of Cr. 1998-MLI led by Mr. Nadjib Sefta (Senior Energy Specialist). The timelag between project preparation and presentation is due to the fact that major structural policy and institutional reforms were demanded up-front which took two years to materialize. The Peer Reviewers are Messrs. Claude Heimo (AF3AE) and Robert Clement-Jones (AFTES). Mr. Jean-Louis Sarbib, Ms. Silvia B. Sagari, and Mr. Emmerich Schebeck are Department Director, Managing Division Chief and Project Advisor, respectively, for the operation.

CONTENTS (Cont'd)

ANNEXES

ANNEX I	:	Supervision Plan
ANNEX II	:	Project Implementation Plan
ANNEX III	:	Monitorable Indicators
ANNEX IV	:	Organization Chart
ANNEX V	:	UPPS/Terms of Reference for Technical Assistance

Map: IBRD 27028

REPUBLIC OF MALI
HOUSEHOLD ENERGY PROJECT
PART II: Technical Appendix

BACKGROUND

A. INTRODUCTION

1.1 Mali is one of the largest countries in Africa, with a surface area of 1.24 million km². The population is estimated at 9 million in 1992. By the year 2000, the population is expected to exceed 10 million. Mali's population is still fundamentally rural (80 percent of total population). Population densities throughout the country are quite low: only 1 inhabitant per km² in the semi-desertified zones of the north and up to 30 inhabitants per km² near Segou, the most populated area. Nonetheless, the urban population has grown much more rapidly than the rural population (annual rates estimated at 5.8 and 2.3 percent respectively from 1988 to 2000); by the year 2000, the urban population is expected to represent 30 percent of the total population.

1.2 Of the eight main cities in Mali, only the capital, Bamako is a major urban centre. Bamako's population of about 800,000 inhabitants (1990) alone accounts for 43 percent of the urban population. All economic, financial, administrative and political activities are centralized in the capital, thus stimulating the strong migratory influx which fuels Bamako's population growth. The urbanization rates in other regions remain modest. The second largest town, Segou, has only 100,000 inhabitants. By contrast, the growth rate for most secondary towns is quite high. For example Gao and Koutiala both have population growth rates of about 10 percent per year. This rapid growth creates pressure on the infrastructure, which generally is not designed to support concentrated population influxes.

1.3 Mali can be subdivided into six agricultural and ecological zones. The country's ecological diversity is reflected in the variety of vegetation types which make up its wooded areas, from the scrub savannah found in the north (producing less than 10 m³/ha) to tangled undergrowth covering 25 % of the southern part of the country (production volumes of 20 to 40 m³/ha) to the forests of the Sudanese-Guinean area (production volumes of 50 to 80 m³/ha on average, with maximum levels rising to more than 100 m³/ha in the great forests of the west).

B. THE ECONOMY

1.4 Mali is one of Africa's poorest countries, with per capita GDP of US\$310 in 1992. The country is landlocked and has some mineral resources, in particular gold. The economy is largely dependent on agriculture, which is the primary source of income for most of the population and accounts for the largest share of product exports (cotton, especially). Agricultural production levels have suffered during the last two decades due to droughts, depleted fertility of soils, and traditional farming techniques. To combat these problems, the Government of Mali has implemented a wide range of economic and sectoral policy reforms. The underlying objective has been to improve the competitiveness of the economy, and lay the foundation for the sustained longer term growth needed to help raise the standards of living and alleviate poverty. These reforms have allowed greater play of market forces in the determination of economic outcomes and the removal of some bottlenecks to private sector participation in economic activity. Their impact is evidenced by improvement in economic performance over the adjustment period. The overall fiscal deficit declined from 12% of GDP in 1991, to 9.6% in 1993. Despite declining terms of trade due largely to falling world market cotton prices, the current account balance improved marginally from 14.1% of GDP in 1991 to 13.8% in 1993. Inflation has been kept in check (under 3%/year), and real GDP growth rose from an annual average of less than 2% over the first half of the 1980s, to about 3% between 1988 and 1993. On January 12, 1994 the Government of Mali, in consultation with the other member countries of the CFA zone, decided to strengthen its adjustment strategy. The fixed parity of the CFA franc was changed from 50 to 100 FCFA per French Franc.

C. ENERGY RESOURCES

1.5 Mali is rich in energy resources, especially hydro-electric, forestry and agricultural biomass, and solar energy. The country possesses a large hydroelectric potential of nearly 1050 MW installable capacity, with guaranteed power of 800 MW. Hydroelectricity produced by the Selingué, and Sotuba dams meet only part of national electricity demand (75 percent in 1992). Mali also has substantial wood resources which would allow up to 70 percent of the population (in the Koulikoro, Segou, Kayes and Sikasso regions) to be self-sufficient in energy supply for several decades. Finally, there also are renewable energy resources in the country: solar energy, agricultural biomass (some of which is only marginally usable, such as the rice husks, a by-product from the Office de Niger's rice processors, peanut shells and cotton stems). However, Mali currently has no fossil fuels, and petroleum product consumption is entirely dependent on imports. The cost of petroleum product imports represents a substantial burden for the country, despite the relatively small volumes which are imported (less than 200,000 tons annually). Because of the land-locked position of the country, petroleum product imports represented 17 percent of total imports and absorb 57 percent of export earnings in 1992.

D. ENERGY CONSUMPTION

1.6 Mali's energy consumption is relatively low, despite the abundance of indigenous energy resources. The energy balance for 1992 (Table 1.1) shows per capita energy consumption of only 203 kg of oil equivalent (kgoe) per year for all consuming sectors and fuels, or less than one-third of the per capita energy consumption in Ghana. Fuelwood is the most widely consumed energy source, even by urban households and by a non-negligible proportion of the productive sector: it represents 88 percent of total domestic energy consumption. The predominance of this fuel emphasizes the limited reach of modern energy (petroleum fuels and electricity) in Mali: consumption of modern energy is 22 kgoe per capita per year.

Table 1.1. SECTOR ENERGY BALANCE, 1992 ('000toe)						
	Fuelwood	Charcoal	Electricity	Petroleum Products	Total	%
Transportation				132	132	7
Households	1,577	40	7	14	1,638	89
Industry, other	5	5	16	35	61	4
Total Final Energy	1,582	45	23	181	1,831	100
Percent	85.5	2.5	1.2	9.8		
<i>Other: Informal Sector, Commerce, Communities/Organizations, Agriculture</i>						

Source: Government of Mali.

1.7 Households comprise the largest energy consuming sector, representing 88 percent of total final energy demand -- one of the world's highest relative consumption rates for the household sector. Many factors contribute to the dominance of the household sector in national energy consumption data: the number of vehicles is small and inter-regional trade is limited; most modern economic sectors are underdeveloped; and most of the agricultural sector has very restricted access to petroleum fuels and/or electricity.

E. HOUSEHOLD ENERGY SECTOR

1.8 As in most Sahelian countries, fuelwood (used mostly for cooking) comprises approximately 90% of the energy consumed in Malian households. Charcoal is used to some extent in urban areas (11 % in Bamako), and its use is expanding rapidly. LPG is used in only 1 % of households in Bamako. Several analyses have drawn attention to woodfuel deficiencies in Mali. A detailed inventory taken in 1987 (Project to Inventory Wood Resources in Mali - PIRL) gives the most reliable overview of the potential of Mali's forests. According to this inventory, the current situation is less dramatic than previously thought, particularly in the south. The Sikasso and Koulikoro regions, for example, are heavily forested: 60 to 80 % of the surface area is covered in old growth timber (about 10 million hectares). Annual productivity of the accessible portions of these natural formations can supply nearby urban populations for several decades, although pockets of resource degradation around urban centers are developing. By comparison, northern regions (which were hard hit by the drought) are experiencing increasing woodfuel deficits as the resource base is being mined and gradually destroyed if no actions

is taken. The costs of transporting woodfuels from forested regions to towns or under-served regions are quite expensive. As a result, wood frequently is cut along access routes by peasants (for their own consumption) and by forestry operators (for marketing in towns) in order to reduce these costs. This practice invites over exploitation of resources, further damaging the local forest resource potential.

1.9 Mali's energy situation is closely interconnected with the general socio-economic situation. Access to modern fuels such as petroleum and electricity in the peri-urban areas is an indicator of a country's level of development and wealth. Mali's present economic difficulties are similar to those of other countries in the Sahel, where expanding urban poverty is reflected in a deterioration in conditions for access to modern energy service. The electrification rate in Bamako has declined in real terms, even though three-fourths of all household electric customers are located there. In addition, consumption levels for household customers remains low. The distribution systems for petroleum products are satisfactory in the main urban areas and distribution margins for small quantities seem reasonable, but unit consumption is low.

1.10 Development of alternative energy sources (solar and other) has been attempted, and has met with some success. However, various institutional and financial barriers, which the Government wants to reduce, constrain the larger-scale use of these energy sources. Most rural areas will not have access to petroleum products for a long time to come, and thus will not have access to the variety of services which could be provided by using petroleum fuels. Temporary improvements may include greater use of small carts since it eases transport of wood and water (traditionally done by women), and the development of hand or foot pumps.

1.11 If current household energy situation persists, low and middle income households in the urban areas will continue to have little access to energy services because the choices are limited. For example, households may have a choice between a four-burner cooker which is expensive and ill-adapted to national dietary habits, or continue to use the three-stone stove for cooking. For lighting, the choice is between expensive (and sometimes impossible) connection to the national electric grid or kerosene lamps. Experience with improved stoves and the recent move towards LPG use shows that intermediate energy materials could be distributed successfully to the middle class and eventually to part of the lower income classes.

1.12 Urban households without electricity are not necessarily those without financial resources. In Bamako an estimated two out of five households with an average income and one out of five well-to-do households do not have electricity. Half of the low-income households also are not connected to the grid. These households typically own one or two kerosene lamps. Middle income households own three or more lamps and sound equipment (battery operated radio-cassette players). More than 10 % of affluent households also own battery-operated television sets. Several thousand units of battery-operated equipment is owned in Bamako and Segou. In Mopti and Kouiala, equipment owned by households not connected to the grid typically includes sound equipment (half) and two electric lamps (two-thirds). Several dozen small electric generators also can be

found in medium- to high-income neighborhoods not connected to the grid (Kalaban, Magnanbougo, etc.). Some have even solar lighting kits.

1.13 The household energy sector has an annual commercial turnover of 10 billion CFAF, or approximately US\$17 million (twice the turnover of the electric power sector) and provides some 15,000 jobs in the rural areas. This level of economic importance, however, is far lower than it ought to be, because market prices for fuelwood and charcoal only represent their financial, not their economic costs. The rural producer, in effect, subsidizes the urban consumer who, therefore, has little incentive to use energy efficiently.

1.14 Presently, there is little, if any, control over the harvesting of woodfuels and legal restrictions are largely ignored. There is virtually no control exercised over woodcutters, the production areas, or the quantities of woodfuels produced and marketed. The present (low) level of woodfuels taxation is of little financial importance and collection is only sporadic at best. This, de facto, passive policy of non-intervention in the woodfuel sector cannot continue given the growing pressure on wood resources that remain.

1.15 In general, urban dwellers consume less wood than the inhabitants in rural areas and medium-sized towns. Even so, woodfuel consumption in Bamako and the main urban areas (particularly charcoal) has a greater impact on the environment than woodfuel consumption in rural areas where the population density relative to available wood resources generally is low and exploitation is dispersed and non-commercial. Commercial fuelwood networks which are springing up in smaller towns cause more environmental damage, but the volumes of wood involved remain limited. In Bamako and the main urban areas, by contrast, commercial networks dominate the market, often resulting in deforested belts along access routes. This is especially true in areas used for charcoal production.

Table 1.2: Residential Energy Consumption in 1987							
Residential Energy Consumption (in thousand t.o.e.)							
	Popul. (‘000)	Wood	Charcoal	Electricity	Petroleum Products	Total Kgoe/Yr	Per Capita
Bamako	646	75.3	14.8	5.1	5.4	100.6	156
Medium-sized Villages	387	73.3	14.4	0.6	3.2	91.5	236
Semi-urban Areas	516	100.0	7.5	0.1	3.5	111.0	215
Rural Areas	6,071	1,348.3	0.0		1.7	1,350.5	222
Mali	7,620	1,596.8	36.7	5.7	13.8	1,653.5	218

Source: ESMAP estimates.

F. INSTITUTIONAL FRAMEWORK

1.16 Mali's institutional framework for the energy sector is relatively complex and weak, making it difficult to implement a systematic, coherent energy policy. Approximately 20 departments, agencies, or organizations manage the sector. In total, nearly 50 public or parastatal organizations are active to some extent in the energy sector. This is because of the dispersed nature of the sector, which has led to the creation of multiple coordinating or ad-hoc advisory committees.

1.17 Energy sector planning is the responsibility of the National Hydraulics and Energy Department (NHED) within the Ministry for Mines, Hydraulics, and Energy (MMHE). This department is mainly concerned with hydroelectric activities: of the 450 persons on the staff of the Energy and Dams Division, only five work on energy matters. There are plans for reorganizing the NHED which will strengthen all planning, regulatory, and monitoring functions related to the energy sector within the Energy and Dams Division.

1.18 In its management of the energy sector, the NHED collaborates with other departments and with numerous operators with activities in the sector. Within the electricity subsector -- the subsector most directly supervised by the NHED -- the major operator is Energie du Mali (EDM), the national power utility. The NHED also is responsible for promoting the development of renewable energy in coordination with two organizations: the nationally oriented Solar Energy Laboratory (SEL), which is under the supervision of the MMHE, and the regionally oriented Centre for Solar Energy Research (CSER). Two ongoing renewable projects, being implemented by NHED, are the Special Energy Program (SEP) and the Solar Equipment Maintenance Unit (SEMU). Finally, the secretariat of the National Committee for Butane Gas Promotion is part of the NHED. This Committee was created in 1990 under a CILSS/EEC regional program for promoting LPG to substitute for woodfuels.

1.19 Among the priorities of the National Plan to Prevent Desertification (NPPD) are management and control of woodfuels supply, and improved use of woodfuels. Implementation of the NPPD is being coordinated and supervised by an inter-ministerial organization, the Sectoral Group for Monitoring the NPPD, which is headed by the Ministry of Rural Development (MRD). National Waterways and Forests Department (NWFD) within the MRD is responsible for the forestry sector, including woodfuels. Its main functions are to monitor forest exploitation, manage classified forests, and verifying the flows of forestry products. The NWFD staff numbers 780 forestry agents and nearly 700 non-foresters organized into eight Regional Divisions and five "Operations". The latter are parastatal organizations and include the OAPF and OARS which, in addition to its main management tasks, produces and markets fuelwood and charcoal. The NWFD also is the headquarters for the National Advisory Committee for Improved Stoves, which coordinates all improved stove projects. Both the NPPD and the NWFD staff have not been very successful in realizing the NPPD objectives. The Government has realized this and has taken action to correct this situation, inter alia, through the formulation of a National Environmental Action Plan (NEAP), the restructuring of the NWFD and the

adoption of new laws and regulations which provide incentives to local communities to manage their natural resource base in an efficient manner.

1.20 Promotion and distribution of improved stoves is the objective of several projects; the main project is under the jurisdiction of the National Department for Social Affairs (NDSA). In addition to programs administered by the Regional Divisions for Waterways and Forests, assistance for stove distribution was provided in the 1980s by the Mali National Women's Union (UNFM). Promotion of butane gas is mainly the province of private petroleum distributors, who have introduced portable butane cook stoves in the market.

MAIN ISSUES IN THE HOUSEHOLD ENERGY SECTOR

Several issues characterize the use of energy in the household sector. A clear understanding of these issues is necessary for resolving the major problems in the sector.

A. WOOD CONSUMPTION AND GROWTH IN CHARCOAL USE

2.1 Wood is currently the dominant energy resource, even in urban areas, and is likely to remain so in the medium term. It is used primarily for cooking and for secondary energy needs such as water heating. In rural areas, daily per capita fuelwood consumption varies between 0.7 and 2.4 kg for an average-sized family. This variation is linked to the availability of wood resources and thus to the time needed to collect wood. With the exception of kerosene used for lighting, modern fuels are rarely used in rural areas. In urban areas, wood also dominates as the primary fuel. In Bamako, nearly 9 out of 10 households use wood, and the proportion is even higher in the urban areas of the interior. However, most families also use several "auxiliary" fuels, such as butane gas and charcoal.

2.2 There are also major variations in urban fuelwood consumption levels, both in terms of average consumption in each urban area as linked to the price of wood, and in terms of the energy intensity of activities for which fuelwood is utilized. For example, average wood consumption in Koutiala (located in the Sudanese area where wood resources are abundant and where beer brewing consumes large quantities of wood) is four times higher than consumption in Gao where wood is scarce. In Gao fuelwood is mostly used for cooking, and the price is three times higher than in Koutiala. Furthermore, the averages hide major variations in per capita consumption based on household size. In Bamako and Segou, for example, large households only consume 0.7 kg per capita, per day, whereas daily per capita consumption for small families can reach as high as three kilos. Eating habits also contribute to major variations in consumption levels for fuelwood and charcoal. Traditional Malian cuisine (grains and long-simmered sauces) is very energy intensive. A number of recent modifications to traditional eating habits -- mostly in younger, well-to-do small households -- have led to a decrease in consumption levels of wood and charcoal. Some of these modifications, which often

happen simultaneously with the household switching its primary fuel, is a welcome sign and helps.

2.3 Despite the noted variations in consumption levels, the typical household expenditures for fuelwood are relatively constant from one urban area to another, although slightly higher in Bamako (16 CFAF per capita/day, as opposed to 12 to 13 CFAF in other urban centers in 1989). Based on these figures, energy expenditures in a typical household (8 people), with fuelwood consumed as primary fuel, and charcoal and kerosene used as auxiliary fuels, are about 6,000 CFAF/month in the capital and 5,000 CFAF in other urban areas. This represents a little less than 10 % of total monthly household expenditures; the percentage is slightly higher for poorer households.

2.4 Urban charcoal consumption has grown steadily: in Bamako, the percentage of households using charcoal as the primary cooking fuel went from 3 % in 1978 to 11 % in 1989. In the future, increased use of charcoal is probable since the fuel is more convenient and better adapted to modern life. It is gaining prominence in households in the capital and in the northern urban areas. Charcoal production induces further environmental pressure, however, because of low carbonization yields (approximately eight tons of wood are needed to produce one ton of charcoal with a calorific value only twice that of wood; and, efficiencies for charcoal cook stoves are similar to those for wood-burning metal cook stoves).

2.5 Use of butane gas (LPG) by the most affluent households and even by a small number of middle class households also has increased. About 20% of households in the capital own single-burner gas cook stoves, 13% in Mopti and from three to seven percent in the other main urban areas. This corresponds to more than 20,000 cook stoves, a significant level of market penetration given the obstacles linked to initial investments, the cost of gas, and users' apprehensions about appliance safety. Few, however, cook regularly with gas (one percent of households surveyed in Bamako). Decisions to switch to gas as a primary fuel are restrained by its current price (which is not taxed or subsidized). Finally, use of kerosene for cooking is limited for two reasons: kerosene cook stoves are poorly adapted for use in Malian cuisine and the kerosene price is heavily taxed.

2.6 There are other woodfuel consumers in addition to household consumers (industries, small craftsmen, service sector, communal food and beverage services) but their impact on total woodfuel consumption is relatively small. Altogether, they accounted for four percent of Bamako's total wood consumption and 10 % of its charcoal consumption in 1989. In certain urban areas, these figures are probably higher, since these fuels are used for traditional activities such as drying fish (Mopti) and brewing beer (Koutiala). Furthermore, informal sector producers are micro-consumers -- the largest among them, the iron masons, average a daily consumption of only 10 kg of charcoal. Still, expenditures for charcoal can represent a significant percentage of the turnover of small producers such as iron masons, jewelers or launderers, whereas expenditures for wood have a much smaller impact on the family's finances.

B. CO₂ EMISSIONS

2.7 Because of the dominant role of biomass fuels in total energy consumption, the contribution of other sectors of the economy to CO₂ emissions is negligible in Mali. Currently CO₂ emissions in Mali, excluding the household sector, are estimated at 0.01 ton/capita per year. The estimated amount emitted by the household sector is 0.3 ton/capita per year, or 30 times higher than the non-household sector. It has been estimated that Mali adds some 2 million tons CO₂ to the global CO₂ balance, mainly from energy use stemming from non-sustainable biomass harvesting. The dominant role of the urban household sector as a CO₂ emitter as well as the increasing consumption of charcoal in Mali in combination with the high urban population growth (7% per year) require the reduction of urban CO₂ emissions. More efficient stove/fuel combinations emit smaller quantities of CO₂, while accomplishing a similar cooking task. Relative to kerosene and natural gas, charcoal emits 2.5 times more CO₂ and wood 3.6 times more. However, for a proper environmental comparison one needs to take into account not only end-use, but also conversion, transport and replenishment of the fuel. Fuelwood, if grown on a sustainable basis, does not, in principle, contribute to net additional CO₂ emissions, for example. Wood is grown through photosynthesis while capturing CO₂ from the atmosphere, which is again released during combustion. For the global CO₂ balance it makes no difference whether wood decomposes naturally or is burnt in a stove. Therefore the net emission from wood is only 0.3 kg CO₂ per kg, while the figures for charcoal, kerosene and gas are respectively: 9.4, 3.1 and 5.1. From these figures it is clear that the use of charcoal should be discouraged and the use of less noxious fuels such as kerosene promoted. In a "business as usual" scenario, fuelwood consumption will rise from a total of 4 million tons in 1987 to 5.2 million tons in the year 2007 as population increases, exerting further pressure on the forest exploitation zones. If this increasing consumption is not offset by equal increases in wood production, there will also be a net increase in total CO₂ emissions in the country of 9.4 kg of CO₂ per kg of charcoal.

C. MARKET PENETRATION BY IMPROVED COOK STOVES

2.8 Mali's distribution rate for improved stoves is quite high relative to other Sahelian countries. For example, 71 % of the households in Bamako using wood as the primary fuel own at least one improved cook stove; more than two-thirds of these are portable metal stoves. Comparable figures for Burkina Faso, Niger, and Senegal are at best 20%. Real savings in wood consumption attributed to use of improved stoves amount to between 10 and 20 %, depending on whether the household has one or several improved cook stoves. These figures are even more remarkable, since in Bamako only 35 to 40% of the main meals actually are prepared using the improved stoves.

2.9 Successful market penetration by metal improved cook stoves has been achieved at all socio-economic levels of the urban population. There are several reasons for this success. First, the price differential between the most popular model of improved stove and a traditional cook stove is only about 500 CFAF. This differential easily can be amortized in less than a month on average, assuming the stove is used efficiently (wood

savings of about 25%). Promotional and educational activities sponsored under various projects also have had an influence. Of special note are the SEL/VITA project, the DNAS/GTZ project and the joint UNFM/DNEF program. These three projects were launched in response to a March 1986 law requiring the use of improved stoves. Surveys record a high level of satisfaction among female consumers with regard to the marketing network, prices and performance of the stoves. The success of these improved cook stove programs has led to the creation of an autonomous, private-sector for cook stove distribution, especially in Bamako. There is a need for such private-sector initiatives and enhanced consumer information programs to be continued in Bamako and initiated or strengthened in the urban areas of the interior, especially in Gao, Tombouctou and Mopti. Wood shortages are felt more keenly in day-to-day life in these urban areas; thus the need for improved stoves programs here is more urgent and the programs are more likely to be successful.

2.10 It also should be noted that promotion of improved woodstoves typically has a high economic rate of return. Under conservative hypotheses of performance and use (10% wood savings), a minimum annual savings of 15,000 to 20,000 tons of wood could be achieved by the sale of about 50,000 improved stoves. This assumes both direct and "indirect" stove distribution -- the direct distribution under "official" programs and the indirect distribution arising from spontaneous actions by small entrepreneurs. The economic value of wood savings of this magnitude is estimated at US\$500,000 per year.

D. PRICE AND COST COMPARISONS FOR HOUSEHOLD FUELS

2.11 A theoretical and empirical comparison between cooking fuels (ESMAP, 1992) -- wood, charcoal, kerosene, and gas -- showed that, using the current price structure, wood is the least expensive fuel; charcoal is 1.3 times more costly than wood, and the prices of gas and kerosene are about 1.6 times higher than charcoal. This relationship has not changed very much since the 1994 devaluation, due to the fact that the price of charcoal has increased more than that of kerosene between 1989-1994. Gas purchases are only marginally more expensive for the consumer than purchasing kerosene. For most Malian households, the switch from wood to charcoal is considered a luxury, reserved for an elite group of small, relatively well-to-do households, because of its perceived higher cost. Yet the actual cost differential is quite modest, making charcoal well within the reach of many households. Cooking with gas requires that the consumer breach a totally different cost threshold. For an average household, using gas as a primary cooking fuel would require expenditures of about 20 % of the family budget (not including other energy requirements such as hot water heating, etc.), which represents a substantial financial burden. Thus the fuel is not readily accessible to most households.

2.12 Urban households in the interior typically also find wood the financially most attractive fuel. Although retail prices for woodfuels vary significantly from one urban area to another, even between neighborhoods in the same urban area, and between seasons, the differences between them are such that wood is the favored fuel. The lowest average prices were found in Koutiala, where a kilogram of wood costs 6 CFAF and a kilogram of

charcoal was sold for 40 CFAF. The highest prices, in 1989, were in Gao: 19 CFAF/kg for wood and 76 CFAF/kg for charcoal, almost identical to prices in Bamako -- 19 CFAF and 66 CFAF, respectively. These prices are similar to woodfuel prices in other Sahelian urban areas. The evolution of wood and charcoal prices generally have been stagnant throughout the 1980s; in real terms, prices actually have decreased since 1984 when Mali joined the group of West African countries using the CFAF as common currency. Several factors contribute to this phenomenon, which although contradictory to the increasing peri-urban area of the resource, is common in most Sahelian countries: increased competition among producers and, to a lesser extent, among other parties acting throughout the supply network; decreased opportunity costs of peasant labor and the drop in the real price of petroleum products.

2.13 The price structure for wood and charcoal is determined by the structure of the supply network. In most cases, the network is so complex with its numerous transfers that it is possible to describe the price structure only in general terms. Producer costs can account for 30 to 60 % of the retail price depending on the distance between the production zone and the urban consumption centre. For example, round wood purchased along the roadside at a distance of 30 km from Bamako sold for 13 to 14 CFAF/kg at the end of 1988, as compared to 6 CFAF/kg for wood sold 60 km away from the capital (along the Bamako-Segou roadway). However, distance is only one factor affecting producer costs. Other factors include access to and type of transport employed, access to wood resources, inventory levels of woodfuel resources and availability of wood for purchase from roadside vendors. The price of standing wood fluctuates between 3 and 10 CFAF/kg (not including the opportunity cost of the land). Thus it was not profitable, with wood prices stagnating, to plant trees specifically to supply fuelwood, even in peri-urban zones. After the devaluation of January 1994, the prices of all fuels increased. The price of wood in Bamako increased to FCFA 19/kg and charcoal to FCFA 87/kg, which represents an increase of about 20%. However, even this increase has not affected the interest in planting trees.

2.14 Margins for carriers and urban marketers also vary according to the number of parties involved and the type of sale (wholesale, discounters, retail). Available statistics suggest that urban retailers earn margins of about 30 to 50 %, with carriers taking between 10% and 30 % of the retail price. Similar margins have been noted where the markets for wood and charcoal are large and competitive. Likewise, the numerous small retailers (a majority of whom are women) generate large margins; however, net revenues tend to be low.

2.15 Retail prices for petroleum fuels are higher than their economic costs -- significantly so in the case of kerosene, but less so in the case of gas, because of high taxes and margins. The prices of household fuels (in terms of useful energy) were compared under existing (1994) market conditions. The cost of butane is more than twice that of kerosene, in terms of useful energy. Modifying the terms for fuel competition appears therefore to be a necessity.

2.16 The financial advantage of using wood is strong in most regions of the country because retail prices for wood is lower. The economic differential is even more pronounced since wood resources are more abundant in southern regions (and thus the economic cost of wood is lower). By contrast, the financial comparison of costs in northern urban areas yields results almost equivalent to those in Bamako. In these urban areas, however, standing wood has a economic value considerably higher than in other parts of the country (39 CFAF/kg). Thus the perspectives for substituting petroleum fuels for wood are more favorable in these areas.

E. MARKETS FOR SUBSTITUTION FUELS

2.17 The surveys of choices between household fuels identified two parameters which most influence the decision to use a substitute fuel: the availability of local wood supplies and the degree of urbanization. Women in Bamako, Mopti and Gao presented with a choice of cooking equipment displayed a strong and immediate interest in the use of charcoal, as well as a long-term preference for gas. The potential markets for substitution fuels in Bamako and the southern urban areas tend to differ from those in the northern urban areas. Substitution in the south is based on a desire for convenience and modernity.

2.18 By contrast, substitution in northern urban areas has a different nature since woodfuels are becoming increasingly scarce and expensive. In these urban areas, where 50 to 60 % of the households expressed a willingness to switch fuels, kerosene is better positioned than gas to become the primary substitution fuel among well-to-do and middle income populations. This advantage is conditional, however: kerosene would have to be cheaper, i.e. priced more closely to its economic cost.

F. OPTIONS FOR IMPROVING THE SITUATION IN REGIONS WITH WOOD DEFICITS

2.19 Beyond programs to promote substitution fuels or improved stoves, as discussed above, there are two other options for improving wood supply in areas with resource deficits (mainly the northern regions): modify woodfuel prices or develop new sources of supply (plantations, transporting wood and charcoal from the southern regions). However, these actions will have only a limited impact on the situation. Urban consumers are responsive to wood prices and tend to conserve the fuel when it becomes scarce and costly; this is evident from the differential between wood consumption levels in the northern urban areas and those in the south. However, heavy taxation of wood to reduce consumption has its limits. The price elasticity of wood demand is certainly less than one, and for lower income households a large price increase would substantially increase the relative share of wood expenditures in the total household budget. This would lead to fewer hot meals for the family, and to less frequent sterilization of water, potentially with detrimental health consequences.

2.20 Urban consumers also could be supplied with wood transported from longer distances, if they are willing to pay higher fuel price. Preliminary calculations show that it is not financially viable to transport wood or even charcoal produced in the south to

shortage areas in the north. In the case of Gao and Tombouctou, the distances may exceed 1000 km, and transport costs amounted to at least 15 CFAF/kg for wood and 30 CFAF/kg for charcoal in 1991. The break-even retail price given these costs plus production costs, marketing and taxes, was considerable higher than prices obtaining in the two urban areas. The devaluation of the FCFA has not changed this situation, transport cost has increased as has the cost of charcoal (by 20%). The economic costs of transporting wood produced in southern regions exceeds the economic value of standing wood in northern regions, and therefore the option also is not economically viable for wood, but might be viable in the case of charcoal. It is probable, however, that charcoal transport from the south might provide an unwanted incentive for charcoal production in the northern areas (once the market has been created), with devastating environmental consequences for those areas. In the case of Mopti (and even for Gao and Tombouctou), the only option under which long distance transport is likely to be viable is for woodfuels produced from dead wood reserves along the Niger River. Another option would be the use of charcoal; since it is more economic to transport, this fuel already is making inroads against fuelwood in the northern urban areas. However, forestry solutions alone (tree plantations, transporting woodfuels from southern regions) would not prove sufficient to stem the problems of the northern region. Thus emphasis must be given to developing infrastructure and programs to promote improved stoves and substitution by petroleum fuels.

2.21 Various kinds of plantation projects -- dry and irrigated, large-scale industrial and small landholders -- have been attempted in Mali, and have mostly failed because they are not financially and economically profitable and because of lack of local participation. Given current market prices and a cost of standing wood estimated between 11 and 13 CFAF/kg, it is not profitable for a peasant to plant trees to produce wood or charcoal. The orientation of recent projects has been towards agroforestry wood production or natural forest management. The latter preserves and enriches the natural forests while producing fuelwood and other forest related products at a much lower costs than is the case in plantation forestry. The Koulikoro Village Reforestation Project (natural forest management), for example, estimates the cost of standing wood in managed forests at only 4 FCFA/kg.

2.22 The increasing preference for charcoal in Bamako and the northern urban areas means that relatively more charcoal will be produced and marketed in these regions where wood is most scarce. It is important, however, that there be some kind of control, since: (i) without Forest Service control and supervision, continued and increasing conversion of wood from the already degraded natural forests to charcoal will only exacerbate their environmental degradation; (ii) with Forest Service control and supervision, charcoal production can be oriented towards depleting the large dead wood reserves currently stored in the many "wood cemeteries" throughout the regions.

2.23 Neither of these options are available to rural populations, who more or less must make do with the available resources. In the northern delta regions in particular, the poorest households often resort to "emergency" fuels -- agricultural and animal residues, straws, etc. -- as a complement to wood during certain times of the year. Instead, an

appropriate option in these areas may be to make agricultural residues into briquettes for use as energy. A preliminary market potential study for agricultural residues in the form of briquettes will be undertaken under the project.

G. INSTITUTIONAL, REGULATORY AND FISCAL FRAMEWORK IS ILL-ADAPTED TO MANAGING WOOD RESOURCES

2.24 Faced with formalization of commercial wood production on a national scale and with the enforcement requirements of a restrictive forestry code (particularly against illegal wood harvesting), the NWFD does not have the personnel or other resources needed to manage the approximately 10 million ha of forests under its jurisdiction. The Forest Service must, therefore, opt for a different management approach -- delegating the management and control of protected forests to the local population. In other protected land areas (the remaining wooded surfaces, including long-term fallow lands), woodfuel production occurs on an even larger scale and is poorly monitored. Management of such areas must occur within the larger context of natural resource management of village and inter-village territories which would require contractual arrangements between the Government and the local authorities whereby the control and management of the natural resource base would be transferred from the Government to the local authorities. Such arrangements were not possible under the old Land Use or Forestry Codes. Therefore, the Government has restructured the NWFD and has adopted a number of laws and regulations in December 1994, which encourage local villages to manage their natural resource base. Under the new regulations, the Forest Service has assumed a new role as supervisor of actions implemented jointly by the Forest Service and the local participants. Legislation for wood harvesting permits and for fiscal policy related to the forests has been modified accordingly. In particular, the rural communities have been given the financial means required to manage the use of their forest lands through the collection by the participating rural community of the tax on woodfuels.

2.25 The previous woodfuel fiscal policy, based on a uniform tax applied throughout the entire country, invited rather than discouraged overexploitation. Under the old system, exploitation of the scarce resource was taxed at a lower relative rate. The relation between the relative tax rate and the value of standing wood varied inversely to the distance between the production centre and the consumption centre; i.e., the more intensively wood was exploited near consumption centers, the lower its relative tax rate. Furthermore, this relation varied directly with the retail price of wood which meant, for example, that a producer who supplied Gao, where resources are scarce, had a lower relative tax rate than a producer who supplied Koutiala, where resources are abundant. Thus, in order to provide incentives for conserving forest resources, the woodfuel fiscal policies have been reformed, including the development of strategies to relocate forestry exploitation where production of woodfuel is more economically viable and environmentally sound.

2.26 Woodfuel transport and marketing largely remain traditional, with the exception of Bamako. Results of the market study for forest products conducted as part of the Second

Forestry Project confirm that the woodfuel supply systems for urban areas are rigid, informal, and in need of revision. Carriers need to be organized and modernized, transport methods must be improved, and the urban marketing structure needs to be modified. As a first step, sector participants qualifying for this kind of assistance (carriers who are willing to participate, who are engaged in relatively large-scale activities within the sector, and have a high potential for improving their efficiency relative to the cost of provided assistance) have been identified, and will be assisted under the project.

2.27 At the marketing level, the effectiveness of the program to geographically reorient wood off take, will require that the mechanisms for monitoring and controlling woodfuel transport be strengthened. At present, the Forest Service can only keep track of less than 25% of the wood and 10 % of the charcoal entering Bamako, with no means of tracking its origin. There are no woodfuel monitoring stations in other urban areas. The effectiveness of existing stations must be strengthened and similar check stations installed in interior urban areas to monitor woodfuel entries. The check stations should be provided with adequate personnel (with training) and equipment. Mobile teams could be used to minimize efforts to circumvent the check stations. Sanctions will be established which are sufficiently dissuasive to fraud.

2.28 Only a limited number of household energy related projects were and are being implemented in Mali. On the demand side the main activity is the German financed DNAS/GTZ improved woodstoves project, whose planned third phase will become one of the components of the proposed project. On the supply side there is the Bank financed Natural Resource Management Project whose objectives include to bring about village-level investments to stop the degradation of soil, water, and natural vegetation and set up and implement community natural resource management plans, but whose intervention is limited to three administrative regions of Mali.

THE PROJECT

A. PROJECT OBJECTIVES

3.1 The long-term development objectives are the reduction of CO₂ emissions, the abatement of forest resources depletion and the increased participation of the private sector in the management of the household energy sector. The main implementation objectives of the project are to promote popular participation in household energy activities, rational use of household energy resources and improved end-use of household fuels. Specific objectives are: (i) to create an enabling regulatory and policy environment for project implementation; (ii) to provide technical assistance and training to peasants, charcoal makers, producers and sellers of stoves as well as urban consumers to respectively efficiently harvest and carbonize fuelwood, to manage the natural forest in a sustainable manner, to effectively market new energy end-use equipment and to rationally use improved biomass and kerosene stoves. The basic principle underpinning this project is that the Government establishes the policy environment, but commercial decisions are left to private economic agents.

B. PROJECT DESCRIPTION

3.2 The project would consist of two main components covering demand and woodfuel supply of household energy. On the supply side, the main focus of the project will consist of mobilizing popular participation in the management of the natural forest, and restructuring the fuelwood trade so that woodfuel traders increasingly get their supplies from managed rather than from mined forests. On the demand side, the focus of the project will consist of enhancing the role of the private sector in marketing a variety of fuel efficient end-use appliances. Thus, the project focuses on three important elements of the CAS, to wit: environment, private sector involvement and popular participation, which are part of an integrated approach in this project to bring about sector efficiency. The project will be mainly executed by private sector actors. However, for critical reasons, in particular the environmental and social dimension and weak private sector institutions, the Government's role as a catalyst is important to stimulate private sector development in the household energy sector. Consequently, a large part of the project's activities are decentralized to the private sector, while public sector involvement will decline over time. To assist poor consumers to overcome market barriers to energy products that would greatly benefit them, subsidies will be made available on a temporary basis and in a transparent manner. Reducing the market price of improved kerosene and charcoal stoves, both unknown products to the Malian consumer, can help overcome consumer perception that the new product is out of her reach and expand the market in the long run, which in turn will reduce the cost to the consumer. Despite the good solar regime in Mali a solar component has not been included in the project. However, work has been initiated in Mali with a view to explore the scope for a full-scale solar project for the household, agricultural, health and education sectors.

3.3 The woodfuel supply component. The component consists of the following interventions: (i) design of woodfuel supply master plans for the main towns and determine the maximum annual sustainable wood supply in the catchment areas of the towns concerned; (ii) preparation of and assistance to implement village forest management plans in about 260 villages in five administrative regions of Mali; (iii) identification, design and implementation of an improved carbonization program for existing charcoalers as well as assist interested local private entrepreneurs to carbonize and compress cotton stalks which could replace charcoal; (iv) provision of institutional support for central and local government authorities to help with project management and assist rural communities in implementing their forest management plans; and (v) launching of a comprehensive training, client consultation, and Information, Education and Communication (IEC) program on forest management. The project would supply the financing of civil works, chimneys for improved charcoal kilns, a briquetting machine, cars, office supplies and other equipment as well as of services such as technical assistance, consultant services, audits, and studies required for project implementation. The estimated cost of the woodfuel supply component, net of taxes and duties, is about US\$7.7 million of which US\$1.1 million will be financed by GEF, US\$2.9 million by the Netherlands (DGIS), US\$3.3 million by France, and about US\$700.000 by the Government.

3.4 The demand side. The component would consist of the following interventions: (i) identification, design and assistance to implement a marketing program for the sale of these improved biomass and kerosene stoves; (ii) provision of institutional support for central government authorities to help with project management and assist private sector entrepreneurs with the production and sale of improved stoves; (iii) support for a comprehensive IEC program and systematic consumer consultation, executed by private sector operators, on the importance of the rational use of energy through the purchase and proper use of the improved stoves. The project would supply the financing of civil works, kerosene stoves, improved biomass stoves, cars, office supplies, other equipment as well as technical assistance, consultant services, audits, and studies required for project implementation. The estimated cost for this demand component, net of taxes and duties, is about US\$3.2 million of which US\$1.4 million will be financed by GEF, US\$0.1 million by the Netherlands (DGIS), US\$1.2 million by Germany, and about US\$500.000 by the Government.

C. DETAILED FEATURES

1. Woodfuel Supply Master Plans.

3.5 The project would finance and contract out the design of urban woodfuel supply master plans for Bamako, Mopti, Koutiala, Segou and Kayes. The purpose of these master plans is to identify the priority intervention zones as well as their appropriate management systems. The development of the masterplan rests on three pillars: (i) a forest resource base assessment; (ii) an analysis of the fuelwood market chain; and (iii) an agro-socio-economic zonation of the urban catchment area. These data will be obtained

through satellite imagery, areal photography and ground-truthing for (i); through fuelwood market-chain surveys, targeted interviews with market-chain actors, and surveys of rural and urban wood sales points for (ii); and through village surveys, desk-studies and analysis of demographic data for (iii).

3.6 The forest resource assessment aims at determining, as reliably as possible, whether in 1995 the standing woodstock, taking into account annual productivity, is sufficient to harvest fuelwood without cutting into the existing capital stock. The analysis of the fuelwood market chain aims to quantify the annual fuelwood flows into the cities, to identify the main sources of fuelwood and its supply routes, and to describe the socio-economic dynamic of the market chain. The purpose of the agro-socio-economic zonation of the catchment area is to identify the main ways in which the natural forest cover is currently being managed as well as to hierarchize the environmental and socio-economic factors that determine fuelwood exploitation and woodfuel transportation to the cities.

3.7 Based on the analysis of the Master Plan data the priority areas and means of intervention for each catchment area will be determined. Thus, the Master Plans allows the Government to reorient forest exploitation spatially, qualitatively and quantitatively and to bring about rational forest management in the catchment areas of the cities concerned.

2. Village Forest Management Plans.

3.8 The project would finance the development of some 260 management plans in the participating villages, which will be a joint effort of project staff, forestry service, consultants and the villagers themselves. The process of establishing a village forest management plan entails three phases:

preliminary interdisciplinary studies of villages, identified through the Master Plan, such as:

- land tenure study to agree on the village borders;
- pastoralists study to take pastoral needs and constraints into account;
- interviews with woodcutters to establish existing exploitation patterns;
- simple village forest inventory to establish the annual quota and management scheme;
- cartographic work and synthesis to establish the file to get approval for the rural market.

organizational activities including:

- information campaign to inform the villagers of their right and duties;
- creation of the management structure of the village association and of rural fuelwood market;

- training of the rural market manager and woodcutters; and literacy training of villagers.

sensitization of peasants, through regular visits, to ensure the proper operation of the rural woodfuel market and the village management plan during the first two years after its creation.

3. Carbonization Program.

3.9 The project would finance and contract out the improvement of carbonization techniques as well as the introduction of carbonized briquets through the following activities:

- (a) training of trainers and charcoalers in improved charcoal techniques;
- (b) assistance to trained charcoalers to constitute themselves into professional groups;
- (c) ICE campaign to sensitize charcoalers and peasants to use wood resources in an efficient manner. In the cotton zone, this campaign will be aimed in particular at peasants to carbonize the post-harvest cotton stalks and sell the carbonized product to designated entrepreneurs;

4. Kerosene, Charcoal Stoves and Briquets Dissemination Program.

3.10 To encourage consumers to start using charcoal stoves and kerosene stoves and help consumers overcome their perception of high entry cost and get accustomed to a new and unfamiliar product the project would temporarily subsidize up to 50% of their cost (to a total amount of US\$1 million). Because these products are unknown to the consumer and need to be market-tested the project also will finance and contract out market-testing and, if required, product adaptation. This work will be carried out by project staff assisted by short-term technical assistance. Once the period of market-testing and product adaptation has been completed training of charcoal stove makers will take place. Similar training will take place when the Government and THE BANK will decide to make part of the kerosene stoves in Mali itself. This will be followed by a sustained ICE campaign for both the charcoal and kerosene stoves. The Household Energy Unit will contract out the implementation of a briquetting pilot project, including purchase of briquetting (agglomeration) equipment, production and market testing of briquets, and training of interested entrepreneurs in the use of the equipment with a view to develop a sustainable commercial operation.

3.11 In general, subsidies should not be financed, because the subsidized product often is diverted for other uses and does not necessarily reach the targeted group. However, when it is necessary to assist poor consumers to overcome market barriers to a product that would greatly benefit them, subsidies, provided they are temporary and transparent and do not negatively effect the market in which they are used, can be a positive element.

Reducing the market price of improved kerosene and charcoal stoves, both unknown products to the Malian consumer, can help overcome consumer perception that the new product is out of her reach and expand the market in the long run, which in turn will reduce the cost to the consumer. To make this process transparent, contracts will be signed with private sector operators (after local bidding) to import and produce respectively kerosene stoves, charcoal stoves and kiln chimneys. These contracts will not be for the total number of stoves that are expected to be disseminated during the lifetime of the project, but for a limited number, that will be renewed when the stocks are being drawn down. In addition, to make consumers aware of the subsidized market price of the stoves concerned these will be publicized in the media as well through posters at their sales points.

5. Institutional Support for Government Services.

3.12 In addition to salaries for contractual staff, the proposed project would also cover investment and operating cost, including the construction of new office space and woodfuel control-posts, aerial photography, satellite imagery, office equipment (including computers, software, photo-copying machines, type-writers, and fax), garage, four-wheel drive vehicles for the support teams, and motor-cross cycles for forest-guards. On the basis of the master plans, these cars and motor-cycles would be partly distributed among the regional forestry directorates for the implementation of these plans. Funding would also be provided for the operation and maintenance of these vehicles, equipment and field allowances of the technical staff and drivers.

6. Skills Development and ICE.

3.13 To provide the villagers, technical and administrative staff and the urban consumers with the information and skills necessary to the success of the program, the proposed project would finance:

- (a) the design and implementation of promotional and awareness campaigns for both the forest management and the energy conservation activities by a private public relations firm and their dissemination by TV, radio and in the written media (including posters);
- (b) the cost of implementing a village population sensitization, alphabetization and training program by contractants (extension staff, NGOs, other projects); and
- (c) the cost of specialized training of technical staff both in Mali and abroad in required techniques and methodologies.

7. Technical Assistance.

3.14 All activities would be implemented by both national staff and by nationally and internationally recruited expertise in accordance with the Project Implementation Manual (see Annex V for terms of reference). Generally, short-term technical assistance will be required only, with one exception. On the basis of the Niger project experience it is considered vital that one long-term technical assistant be recruited for three years to assist in the launching and realization of the urban woodfuel master plans and the village forest management plans. Terms of reference as well as the distribution between national and international specialists have been drawn up, discussed and agreed upon during project preparation and constitute a part of the project's four-year implementation plan. All consultants, for whom special terms of reference will be drawn up each time they will visit the project to perform a well-defined task, will transfer their knowledge to the local counterparts (who could either be project staff and/or private sector operators) through on-the-job training, where feasible. The project would provide a total of 93 person-months of technical assistance, of which 57 months are short-term and 36 months long-term (forest management specialist). The short-term technical assistance will be distributed as follows among the two project components. The demand side component will be supported by an energy economist (6 pm), a marketing specialist (8 pm), a biomass engineer (8 pm) and a survey specialist (6 pm). The woodfuel supply component will receive support from a forest economist (5 pm), a forest management specialist (9 pm), a cartographer (3 pm), rural extension specialist (6 pm), a forest inventory specialist (4 pm), a lawyer (4 pm), a carbonization specialist (3 pm), and a forest exploitation specialist (3 pm).

D. PROJECT IMPLEMENTATION

There is a Project Implementation Manual of which we give the key elements here.

3.15 **Project Organization.** Overall project coordination will be the responsibility of a Project Steering Committee. This Steering Committee will be composed of senior staff from the Ministry of Energy and Hydraulics and the Ministry of Rural Development and will meet twice a year to evaluate and provide direction for the project. The project already represents a coordinated effort, combining the efforts of cofinanciers and parallel financiers. During the preparation phase of the project a special effort has been made to identify all potential partners and collaborators with whom contact has been established and with whom the project's objectives and methodologies have been discussed. In addition, there will be created a National Coordination Council for the household energy sector, in which the Government, all interested donors, NGOs and private sector representatives will participate to discuss and advise on policy, technical and coordination issues in the sector. Day to day project coordination, administration and financial management of the project will be the responsibility of an existing Project Coordination Unit (UPS), within the Ministry of Energy, which is composed of members from both Ministries. At the national level the demand component will be executed by the Household Energy Unit (Ministry of Energy and Hydraulics) and the woodfuel supply

component by the Woodfuels Unit (Ministry of Rural Development). To make the process of subsidization of energy appliances transparent, contracts will be signed with private sector operators (after local bidding) to import and produce respectively kerosene stoves, charcoal stoves and kiln chimneys. These contracts will not be for the total number of products that are expected to be disseminated during the lifetime of the project, but for a limited number, that will be renewed when the stocks are being drawn down. In addition, to make consumers aware of the subsidized market price of the stoves concerned these will be publicized in the media as well through posters at their sales points.

3.16 At the regional and district level, project implementation of the supply side component would be supervised by the regional directorates of both NEHD and NWFD. To ensure good acceptance and "ownership" of the project by the technical and administrative staff at regional and district levels, they will be part of the team that designs the urban fuelwood master plans. Further, the CCL will provide support to these regional directorates (vehicles, operation and maintenance cost) to enable them to supervise the implementation of these master plans as well as to assist in the design and supervision of the village forest management plans. Thus CCL staff itself will solely play a role in the management of the design and development of the master and management plans, while their execution and supervision will be entirely the affair of respectively the village forest management associations and the regional directorates of NWFD. The CCL will continue to provide incidental technical assistance, but this will be in support of the line operators as well as provide monitoring and evaluation of the project's activities. Annex I provides a Supervision Plan, Annex II a Project Implementation Plan, Annex III Annual Monitorable Indicators, and Annex IV an organization chart.

3.17 Implementation of demand side activities will be carried out in collaboration with the regional directorates of NEHD, various ongoing (and planned) projects, private sector operators, and NGO's. In all cases, close contact will be established with the regional and district administrative authorities. The UPS will be responsible for the selection and the completion of contractual arrangements with interested entrepreneurs, who wish to distribute kerosene stoves or produce charcoal stoves. These entrepreneurs will organize the import of the kerosene stoves, will stock and distribute the stoves. UPS will also issue a tender for the production of improved charcoal stoves and the charcoal kiln chimneys. Monthly monitoring of prices and sales of energy equipment as well as spot checks by the CED will determine whether these entrepreneurs, who have signed a contract with the Project Coordination Unit (UPS), stipulating the price level and structure as well as the procedures for marketing the stoves, will perform as required and agreed upon.

3.18 At the village level, once a village has been selected by the CCL, based on its interest to be involved in forest management and having sufficient forest resources, village associations will be established by the villagers, unless such a voluntary association already exists. After the creation of this association and its necessary administrative framework, the CCL through the regional directorate of NWFD would provide technical assistance and training to the members of the village association in such subjects as: alphabetization, simple book-keeping, forest management, wood cutting, and where appropriate carbonization and tree-planting. Special attention will be paid to adapt the management

system to the needs of pastoralists and other forest users, inter alia, by having representatives of groups other than agriculturalists represented in the council of the village association. The CCL would further, in collaboration with the village association, design and develop the village forest management plan, of which the village association is the exclusive executor. Consequently, any problems that may arise as a result of the implementation of these management plans, such as a conflict about land tenure or other rights, will also be the sole responsibility of the village association concerned. The regional directorate of NWFD will provide technical assistance to the village associations as well as supervise the implementation of the management plans.

3.19 Staff recruitment would take place in accordance with the staffing plan agreed upon. The project coordinator (UPS) has been appointed. The recruitment of the remaining staff of UPS, CCL and CED is a condition of grant effectiveness. The recruitment of additional extension staff would precede the formulation of the village management plans. Care will be taken to make use of existing extension staff, such as employed by the Natural Resource Management project, who work in villages targeted by the project. Assurances were obtained that the staffing plan would be implemented in a manner satisfactory to the Bank, including the provision by the Grantee of a short list of candidates for all technical personnel.

3.20 Recruitment for positions under the credit would be publicized and open to all qualified candidates, including Government staff willing to separate from administrative service. Terms of reference (included in the project's implementation plan), qualifications and conditions of selection have been agreed upon between the Bank and NWFD and MME (see Annex I). Assurances have been obtained during negotiations that for purposes of project implementation, the Borrower would employ and maintain staff with qualifications, experience, terms and conditions of employment satisfactory to the Bank. The level of remuneration would be commensurate with the temporary nature of the contract, but should not result in a disincentive to Government officials with similar qualifications and responsibilities.

3.21 **Village participation.** The selection of villages that will participate in the project will be on a voluntary, i.e. demand driven basis. The main selection criterion will be (a) its inclusion in the urban woodfuel master plan, and (b) its commitment to forest management. Villages may be excluded by the project if there is a major dispute within the village or with neighboring villages.

3.22 After their selection, establishment of the village association and development of the management plan by the CCL and the villagers, which will be preceded by an information and sensibilization campaign in the relevant national languages, a rural woodfuel market will be created by the CCL as the focus of the village association's marketing function. This will be followed by training of the members of the village association, given by the CCL, and the beginning of forest exploitation and management by the village associations. Given the large number of villages involved, the necessary start-up period of the project staff, and the need to develop the urban woodfuel master

plans, village participation will start during the second year of the project and gradually in phases extended to other villages during the remainder of the project's existence.

3.23 Coordination With Other Projects. The proposed project would be closely coordinated with other ongoing projects, either similar or complementary. For example, there will be about 50 villages that are in an area that will be both covered by this project and that of the natural resource Management Project. The latter project also has already developed a forest management manual that could be made use of. Thus, the purpose of this coordination is to (a) take advantage of the experience gained; (b) build on the facilities and services (staff, equipment) available at the field level (Natural Resource Management Project, Agricultural Services Project); and (c) ensure that the village communities covered by the project have access to the services and inputs provided by these projects.

3.24 Mechanisms for Evaluation. The Project includes a mechanism for evaluation and control because: (i) it will deal with a wide diversity of components and many participants which need coordination and follow-up; (ii) it is based on continuous dialogue between and feed-back to the participants: sector professionals (from small peasant wood choppers to directors of petroleum companies) and consumers; (iii) the CCL and the CED need to brief the Government and project donors on the progress of actions taken within the framework of the Project; and (iv) the MMEH and the MRD must follow closely the evolution of the household energy sector, as well as the outcomes of implemented measures, in order to adjust project interventions if necessary, and to measure the greenhouse gas emissions avoided and carbon storage achieved through the Project's intervention. Close collaboration will exist with the Natural Resource Management project, in particular its national entity charged with monitoring and evaluation of desertification control and resource management.

3.25 NWFD and the Information and Evaluation Service of the NEHD will evaluate the Project results and inputs from the public and private sector operators affected by the projects. The evaluation process must quantify the actions taken, the impact of these actions, and their effects on different groups. In the case of woodfuel supply, results which can be quantified include the number of rural markets in operation, the surface area of land used to supply these markets or the number of managed forests and their surface areas. The effectiveness of new arrangements also must be estimated; for example, the quantities of wood originating from rural markets, quantities of wood originating from managed forests, additional fiscal resources, the proportion of regulated supply among the woodfuels entering the urban area, and fiscal fraud.

3.26 The CCL will analyze the impact on the general organization of woodfuel supply. Areas to be evaluated include the distribution of supply traffic by mode of transportation and by port of entry into the urban area; fuel prices in rural areas (market prices, producer prices, price of standing wood) and in urban areas. The CCL also will attempt to measure environmental impacts by comparing the evolution of the forest cover in depleted areas not under regulation, in supply areas for rural markets (referred to in the text as preferred exploitation areas, since these areas are not under regulation), and in managed forests.

3.27 The CCL will further measure the effects of the project on the different groups affected by woodfuel supply. These groups include: participating village communities and the various professionals in the sector, including producers, carriers and distributors.

3.28 On the demand side, the CED will quantify distribution of improved stoves and other popularized energy products. A principal measure will be the number of improved stoves, kerosene, gas cook stoves and PV systems marketed during project implementation. In addition, other indicators will provide more permanent information regarding the market structure and distribution potential for kerosene and butane: quantities imported and consumed, origin and destination of the fuel, price structures.

3.29 Consumer behavior also will be monitored by the CED. The CED will combine the preceding information with the results of regular, direct observations of consumer behavior. The latter will be achieved through focused beneficiary assessments and continuous client consultation. Consumers will be categorized according to stove type and fuels used (primary and secondary); specific consumption; attitudes and preferences (satisfaction indexes, planning to buy). This information will be gathered using specific surveys and through dialogue with permanent consumer panels. The CED will rely as much as possible on surveys which are already conducted regularly by the ANSI, and will try to "institutionalize" collection of the important data needed by the CED through use of these surveys. As a matter of course, all data generated by the monitoring and evaluation system also serve to adjust the project's interventions, when these data indicate such a need.

3.30 **Project Management, Auditing, and Accounting.** A computerized accounting system is currently already in use by UPS. This accounting system also has an accounting procedures manual. Assurances have been obtained at negotiations that for all expenditures for which the withdrawals from the Credit account were made on the basis of statements of expenditure (SOEs), the Borrower shall (a) maintain records and accounts reflecting such expenditures; (b) retain for at least one year all records evidencing such expenditures; (c) enable the Bank's representatives to examine such records, and (d) ensure that such records and accounts are included in the annual audit, and that the report of such audit contains a separate opinion as to whether the SOEs can be relied upon to support the related withdrawals. Based on the Implementation Manual, which contains detailed annual workprograms and budgets, every six months the UPS will submit (i) a detailed workprogram, including performance indicators, for the following six months and its budget; (ii) an evaluation of the execution of the workprogram of the preceding six months period and its budget; and (iii) a budget for the remaining project period. These reports will be discussed and the up-dated workprogram and budget approved by the Bank and its cofinanciers during the twice annual supervision mission. At negotiations a detailed workprogram and budget for the first year has been agreed upon.

3.31 During negotiations agreement has been reached that the Special Account of the project and Statement of Expenditures (SOE) will be audited annually and separately. All audits should be conducted by independent external auditors acceptable to the Bank and according to sound and internationally recognized auditing standards. The audited

accounts and the auditors' report will be submitted to the Bank within six months following the end of the fiscal year while SOE's will be reviewed by the Bank on a regular basis. The auditor's report will include a statement on the adequacy or otherwise of the accounting system and internal controls, the reliability of SOEs as a basis for credit disbursements, and compliance with financial covenants. Assurances have been obtained at negotiations that (a) the records and accounts will be audited for each fiscal year, in accordance with appropriate auditing principles consistently applied by independent auditors acceptable to the Bank; (b) the Borrower will furnish to the Association as soon as available, but in any case not later than six months after the end of each such year, a certified copy of the report of such audit by said auditors, of such scope and in such detail as the Association shall have reasonably requested; and (c) the Borrower will furnish to the Association such other information concerning such records, accounts and the audit thereof as the Association shall from time to time reasonably request. Prior to negotiations, the Malian delegation has submitted a short list of auditing firms to the Bank for approval, while a signed contract with an auditing firm acceptable to the Bank to audit project accounts based on a one-year automatically renewable contract, except in the case of poor performance will be a condition of effectiveness.

3.32 Project Supervision. Supervision would take place in close collaboration with other donor agencies to ensure consistency among the different parallel financing agencies. One joint donor supervision mission would be scheduled each year at the time of the annual review round table. In addition, other supervision missions would be carried out jointly or in a concerted manner with other cofinancing agencies. Supervision of the project's financial management, accounting and auditing follow-up would be undertaken as a separate exercise. Supervision missions would involve, in addition to the task managers, such experts as would be required for assessing the project's progress (Annex III).

E. PROJECT COSTS

3.33 As shown in the table below, total costs over the project period, including all incremental capital, personnel, and operating expenditures, are estimated to be US\$10,5 million (net of taxes and duties) of which US\$5.0 million (44%) is in foreign exchange. Total project cost, including taxes and duties which are financed under this project, amount to US\$11,2 million.

Project Estimated Costs (net of taxes and duties)
(in US\$ '000)

	Local	Foreign	Total
A. Fuelwood Master Plans	311	568	879
B. Village Forest Management Plans	1,000	1,000	2,000
C. Carbonization Program	838	262	1,100
D. Kerosene and Charcoal Stoves Program	660	340	1,000
E. Institutional Support and Monitoring Program	304	1,135	1,439
F. Skills Development and Public Awareness	1,300		1,300
G. T.A., Consultancies, and Studies	523	1,250	1,773
Base-line Costs	4,936	4,555	9,491
Physical contingencies	265	210	475
Price contingencies	299	235	534
TOTAL COST	5,500	5,000	10,500

F. PROJECT FINANCING

3.34 Project costs will be financed by GEF, cofinancier and parallel financiers in the following amounts and proportions as shown in the table below. The proposed GEF grant of US\$2.5 million will finance approximately 22% of the total project costs.

Financing Plan (including taxes and duties)
(in US\$ million)

	Local	Foreign	Total
GEF (C, D, F, G)	1.8	0.7	2.5
The Netherlands (DGIS) (A, B, E, F, G)	1.1	1.9	3.0
France (CFD) (B, E, G)	0.9	1.4	2.3
France (FAC) (B, E, G)	0.3	0.6	0.9
Germany (GTZ) (E, F, G)	0.8	0.4	1.2
Mali (E)	1.2		1.2
TOTAL	6.2	5.0	11.2

Letters in brackets correspond to components as indicated in the above table, financed by the respective donors

3.35 The GEF grant (US\$2.5 million) will finance the import and sale of kerosene stoves at a reduced retail price, including information campaigns aimed at consumers and retailers (US\$1.4 million), the purchase of equipment to modernize kilns and training of charcoalers (US\$800,000), the purchase of equipment and training of operators to carbonize and compress cotton stalks (US\$300,000). The Netherlands (DGIS) will cofinance the preparation and implementation of the urban woodfuel supply master plans, the plans for recovery of dead wood reserves, and the development and implementation of

forest management plans outside the Bamako and Sikasso areas (US\$3 million). Germany will finance all wood stove activities, including promotional and marketing activities, the monitoring and evaluation system for stoves dissemination, training, and technical assistance (US\$1.2 million). France will finance the design, development and implementation of village management plans in the gazetted forests around Bamako (US\$2.3 million), as well as in the Sikasso area (US\$0.9 million). The Government will contribute approximately US\$1.2 million equivalent to cover local personnel costs over the four-year implementation period and payment of taxes, for taxes and duties will not be financed by the donors.

G. PROCUREMENT

3.36 As shown in the table below, the following arrangements have been established for civil works, goods and services to be procured under the project.

Summary of Proposed Procurement Arrangements
(net of taxes and duties, including contingencies)
(US\$ million)

Category of expenditures	ICB	NCB	Other (a)	Parallel Financing (b)	Total
1. Civil Works	-	0.3 (0.3)	-	0.8 (-)	1.1 (0.3)
2. Goods	0.6 (0.6)	1.2 (1.2)	0.2 (0.2)	2.8 (-)	4.8 (2.0)
3. Consultant services	-	-	1.8 (1.8)	0.8 (-)	2.6 (3.1)
4. Service contract (c)	0.1 (0.1)	-	-	-	0.1 (0.1)
5. Incremental Operating Costs	-	-	1.3 (1.3)	0.6 (-)	1.9 (1.0)
TOTAL	0.7 (0.7)	1.5 (1.5)	3.3 (3.3)	5.0 (-)	10.5 (5.5)

Note: Figures in brackets refer to amounts financed by the GEF grant and the Netherlands.

(a) Refers to procurement through national and international shopping, limited international bidding and procurement of consultancies including technical assistance and training.

(b) Refers to items financed on a parallel basis (France, Germany), as well as Government's contribution to the financing of incremental operating costs..

(c) Aerial photographs and satellite imagery to be financed by the Netherlands.

3.37 **Civil Works.** The infrastructure to be provided by the project consists of the construction of two small buildings in Bamako to house the Household Energy Unit and the Woodfuels Unit as well as 12 woodfuel control posts. The total cost is estimated at US\$364,000. These works would be financed by the Netherlands but managed by the Bank under Bank's Procurement Guidelines and procured through National Competitive Bidding (NCB) using procedures and standard bidding documents developed by the local

contract management agency (AGETIPE) established under a Bank-financed project (Cr. 2371-MLI), acceptable to IDA.

3.38 Goods. Goods financed under the Project would include vehicles, office equipment, audio-visual equipment and materials, and spare parts. Most of the vehicles would be procured in the first year of the project, except for replacement vehicles, and could be grouped into packages of at least US\$200,000 and procured on the basis of ICB for an estimated total cost of US\$583,000, in accordance with the Bank's Guidelines for procurement. Goods procured under contracts estimated to cost less than US\$200,000 equivalent each would be suitable for procurement through NCB under procedures acceptable to the Bank provided the aggregate amount of such procurement does not exceed US\$1.2 million equivalent. The remaining goods, which cannot be grouped into bid packages of at least US\$200,000 equivalent, would be procured on the basis of price quotations from at least three suppliers, provided the aggregate amount of such procurement does not exceed US\$0.2 million equivalent.

3.39 Service contracts for aerial photographs and satellite imagery of an estimated value of US\$100,000 would be purchased through ICB.

3.40 Services. Consultants and other experts for the project (about US\$3.1 million), excluding those financed by the parallel financiers who will follow their own procurement guidelines, would be selected in accordance with Bank Guidelines for the use of consultants (August 1981), and would be employed on terms and conditions satisfactory to the Association.

3.41 GEF-financed contracts for works and goods above a threshold of US\$200,000 equivalent each and contracts for firms and for individual consultants, respectively, above a threshold of US\$100,000 and US\$50,000 equivalent each would be subject to prior review. However, for firms and individual consultant contracts below, respectively, the US\$100,000 and US\$50,000 thresholds, the Bank would review the terms of reference, single source hiring, assignments of a critical nature as determined by the Bank and amendments of contracts raising their value above these thresholds.

3.42 Procurement information will be collected and recorded as follows:

- (a) prompt reporting of contract award information by the Grantee;
- (b) comprehensive semi-annual reports to the Bank by the Grantee indicating:
 - revised cost estimates for individual contracts and the total project including best estimates of allowances for physical and price contingency.
 - revising timing of procurement actions, including advertising, bidding, contract award, and completion time for individual contracts;

- compliance with aggregate limits on specified methods of procurement; and
- use of standard bidding documents.

3.43 Disbursements. The proposed grant would be disbursed by the end of fiscal year 1999 in accordance with the estimated schedule shown in the table below. Disbursement of the GEF grants will be fully documented except for expenditures valued at less than US\$100,000 equivalent which will be disbursed against Statement of Expenditures (SOEs). To expedite project implementation, a special account will be opened in a commercial Bank acceptable to the Bank and maintained and operated on terms and conditions acceptable to the Bank. The authorized allocation for the special account would be US\$250,000. All GEF-financed expenditures of less than US\$100,000 equivalent will be financed from a Special Account that will be submitted with an up-to-date Bank statement, reconciliation statement and full documentation, except for expenditures below US\$100,000 which the Grantee will be permitted to submit on the basis of SOEs. SOE documents will be kept in the project office for immediate inspection by Bank staff during supervision missions and for annual audits. No direct payment request under the equivalent of US\$100,000 will be accepted. A regional disbursement seminar held early in 1994 evaluated special accounts, resolved outstanding disbursement problems and advised and guided personnel on Bank disbursement practices and procedures. The purchase of the kerosene and charcoal stoves as well as for the charcoal kiln chimneys will be done by one or more private sector entrepreneurs who have been selected based on their financial and technical offers to participate in the project. The temporary GEF subsidy for these products will be passed on to the consumer through a corresponding lower retail price.

Proposed GEF Grant Allocation
(in US\$ million)

Category of Expenditures	GEF	Total	% of expenditures to be financed
1. Vehicles, Equipment, Materials	1.3	1.3	100% of foreign expenditures; 90% of local expenditures
2. Incremental Operating Cost (local temporary staff, promotional campaigns)	0.8	0.8	90%
3. Consultant Services	0.4	0.4	100%
TOTAL	2.5	2.5	

Estimated GEF Grant Disbursements
(in US\$ million)

Bank FY	1996	1997	1998	1999
Annual	0.3	0.7	0.7	0.8
Cumulative	0.3	1.0	1.7	2.5

BENEFITS, ENVIRONMENTAL IMPACT AND RISKS

A. BENEFITS

4.1 The main benefits of the project are the protection of the fragile environment around urban areas and a reduction in CO₂ emissions. An attempt has been made to quantify some of the costs and benefits. The targeted promotion of 160,000 improved wood, 68,000 improved charcoal stoves and 17,000 kerosene stoves under the project will result in savings in firewood consumption that could amount to about 330,000 tons a year by 1999.

	1996	1997	1998	1999	Total
Improved woodstoves	23,000	34,000	45,000	58,000	160,000
Improved charcoal stoves	10,000	15,000	21,000	27,000	68,000
Kerosene stoves	2,000	4,000	5,000	6,000	17,000

4.2 In addition, the project aims to bring 720,000 ha of natural forest under management and recover 200,000 tons of dead wood. Assuming the economic value of wood to be between CFAF 26 -39/kg and taking into account only firewood savings, the rate of return on the household energy component is calculated to be over 30%. This is a conservative estimate, and takes into account neither the increase in forest cover yields, nor the reduction in CO₂ emissions, or the major long-term ecological benefits, such as the positive effects on agricultural production, the fodder situation, and soil fertility. The household energy component would improve living standards of rural populations in affected areas and stabilize employment opportunities in the firewood trade. The increased use of kerosene and LPG stoves would also reduce cooking time and make food preparation easier.

	Managed forests ('000 ha)	No. rural markets	Dead wood recovery
1996	30	10	35,000
1997	140	70	45,000
1998	300	80	60,000
1999	350	100	60,000
Total	720	260	200,000

B. RISKS

4.3 The project is new and innovative in Mali and will encounter technical and institutional obstacles. The Government has structurally reorganized its forestry service and formulated a transparent regulatory framework for the sector to reduce these obstacles. The major risks therefore are:

complex coordination and implementation arrangements;

uncertainty whether consumers will accept and buy the new kerosene and charcoal stoves; and

uncertainty whether the villages are willing to participate in management of the natural forest.

The following actions will be taken to minimize the above-mentioned risks:

- (a) a national coordination committee will be established to monitor and evaluate coordination and implementation of all activities in the household energy sector ;
- (b) during project preparation, detailed market studies were conducted to determine the market profile for the new stoves, while during project execution consumer consultation, beneficiary assessment and feed-back from the monitoring and evaluation system will provide information that will alert project management to lack of progress and allow adjustments to be made in the project's approach; and
- (c) a national ICE campaign, including visits by extension agents, will ensure the villagers' participation.

ASSURANCES AND RECOMMENDATION

5.1 During negotiations, agreement has been reached on the following matters:

- (a) for purposes of project implementation, the Grantee will employ and maintain staff (Marketing Specialist, Technologist, Agro-economist, Rural Sociologist and Pastoralist) with qualifications, experience, terms and conditions of employment satisfactory to the Bank. The level of remuneration will be commensurate with the temporary nature of the contract, but should not result in a disincentive to Government officials with similar qualifications and responsibilities.

- (b) for all expenditures for which the withdrawals from the Credit account were made on the basis of statements of expenditure (SOEs), the Grantee shall (a) maintain records and accounts reflecting such expenditures; (b) retain for at least one year all records evidencing such expenditures; (c) enable the Bank's representatives to examine such records, and (d) ensure that such records and accounts are included in the annual audit, and that the report of such audit contains a separate opinion as to whether the SOEs can be relied upon to support the related withdrawals
- (c) (i) the records and accounts will be audited for each fiscal year, in accordance with appropriate auditing principles consistently applied by independent auditors acceptable to the Bank; (ii) the Grantee will furnish to the Bank as soon as available, but in any case not later than six months after the end of each such year, a certified copy of the report of such audit by said auditors, of such scope and in such detail as the Bank shall have reasonably requested; and (iii) the Grantee will furnish to the Bank such other information concerning such records, accounts and the audit thereof as the Bank shall from time to time reasonably request.
- (d) each year, by December 31 at the latest, the Borrower will convene a project implementation review meeting with the Bank, and other co- and parallel-financiers.
- (e) after completing the mid-term review in July 1997, the recommendations resulting from this review as agreed upon between the Bank and the Grantee, will be promptly carried out.
- (f) the Government will submit to the Bank: (i) semi-annual reports within 60 days at the end of June and December providing information on progress of the project; (ii) copies of all consultants' reports on studies financed under the proposed credit; and (iii) a project completion report within six months of implementation of all project components.

5.2 Conditions of Grant Effectiveness. Conditions precedent for the release of incremental funding are that the Government agrees to: (i) appoint following members of the project staff: Marketing Specialist, Technologist, Agro-economist, Rural Sociologist and Pastoralist; and (ii) submit a timetable for the increase of the stumpage fees for charcoal and fuelwood, respectively to FCFA 6 and FCFA 2 per kg, by December 1996.

REPUBLIC OF MALI

HOUSEHOLD ENERGY PROJECT

Supervision Plan

Bank Staff Inputs for Project Supervision

Approximate Date	Activity	Skill Requirements	Staff Weeks
Fiscal 1996	Two Supervision Missions. Review Year 1 performance indicators	Energy Specialist	6
		Forester	6
		Sociologist	6
		Financial Analyst	4
		Sub-total	22
Fiscal 1997	Two Supervision Missions. Review Year 2 performance indicators	Energy Specialist	6
		Forester	6
		Sociologist	6
		Financial Analyst	4
		Sub-total	22
Fiscal June 1998	Mid-Term Review Mission. Review Year 3 performance indicators	Energy Specialist	6
		Forester	6
		Sociologist	6
		Financial Analyst	4
		Sub-total	22

The cost of supervision by the energy specialist and the forester will be borne by GEF, the cost for the sociologist and financial analyst will be financed by the Dutch Government from the Trust Fund.

Government of Mali
Private Sector Development Project in the Household Energy Sector
Project Implementation Plan

A.	Household Energy Demand Component	Year 1	Year 2	Year 3	Year 4	Agency Responsible
1.	Establishment of the "Cellule Energy Domestique"					National Energy and Hydraulics Department
2.	Revision of the Fiscal Laws					Ministry of Energy/Ministry of Finance and Plan
3.	Decision on the range of "improved stoves to be distributed					Project Steering Committee/Consultants
4.	Definition of framework for cooperation of private & public sector partners					Project Steering Committee/Consultants
5.	Elaboration of Marketing Action Plan					Household Energy Cell/Consultants
6.	Market Tests of Improved Stoves					Household Energy Cell/Consultants
7.	Evaluation of Market Tests					NEHD/HEC/Consultants
8.	Establishment of Network for Import, Manufacture and distribution of stoves in Bamako, Gao and Sikasso					Private Sector Operators
9.	Technical and Financial Audits					Project Steering Committee - auditors
10.	Establishment of Micro-credits					Private Sector Operators
11.	Implementation of New Publicity Campaign					Various media - project staff
12.	Evaluation of Results					Household Energy Cell

B.	Household Energy Supply Component	Year 1	Year 2	Year 3	Year 4	Agency Responsible
1.	Establishment of Wood Fuels Unit					National Waterways and Forestry Department (NWFD)
2.	Revision of Fiscal Laws and Establishment of Firewood Control Points					Ministry of Finance and Ministry of Rural Development
3.	Establishment of an Information and Evaluation System					Wood Fuel Unit (CCL)
4.	Readjustment of Fuelwood taxes					Ministry of Finance and Plan/Ministry of Rural Development
5.	Annual Evaluation of Program					Wood Fuel Unit (CCL)
6.	Improvement in Firewood Control Points					NWFD
7.	Preparation of Wood Fuel Supply Master Plans					Wood Fuel Unit (CCL)/Consultants
8.	Official Adoption of Master Plans for Bamako, Segou, Koutiala, Mopti and Kayes					NWFD
9.	Update of Master Plans					CCL/Ministry of Rural Development/Consultants
10.	Define Action to help Wood Fuel Professionals					CCL/Ministry of Rural Development/Consultants
11.	Provision of Assistance to Wood Fuel Professionals					CCL/Ministry of Rural Development/Consultants
12.	Define Program for Modernizing Charcoal Processing					CCL/NWFD/Consultants
13.	Implementation of Program for Modernizing Charcoal Processing					CCL/Consultants/Private Entrepreneur
14.	Promotion of Private Enterprises Active in Charcoal Making					CCL/Consultants/Private Entrepreneur
15.	Preparation of Schemes to recover dead wood					CCL/Consultants
16.	Implementation of Schemes to recover dead wood					CCL/Consultants/Villagers
17.	Revegetation of dead wood zones after recovery					CCL/Consultants/Villagers
18.	Definition of Methodology to create Rural Firewood Markets					CCL/Consultants
19.	Establishment of the First Firewood Rural Market					CCL/Extension Agents/Villagers
20.	Further Development of Rural Markets					CCL/Extension Agents/Villagers
21.	Development of Village Forests					CCL/Villagers
22.	Establishment of Rural Market Associations					CCL/Villagers

REPUBLIC OF MALI**HOUSEHOLD ENERGY PROJECT****Quantified Annual Monitorable Indicators - 1996-99*****1. Demand Component**

	1996	1997	1998	1999	Total
Improved woodstoves	23,000	34,000	45,000	58,000	160,000
Improved charcoal stoves	10,000	15,000	21,000	27,000	68,000
Kerosene stoves	2,000	4,000	5,000	6,000	17,000

2. Supply Component

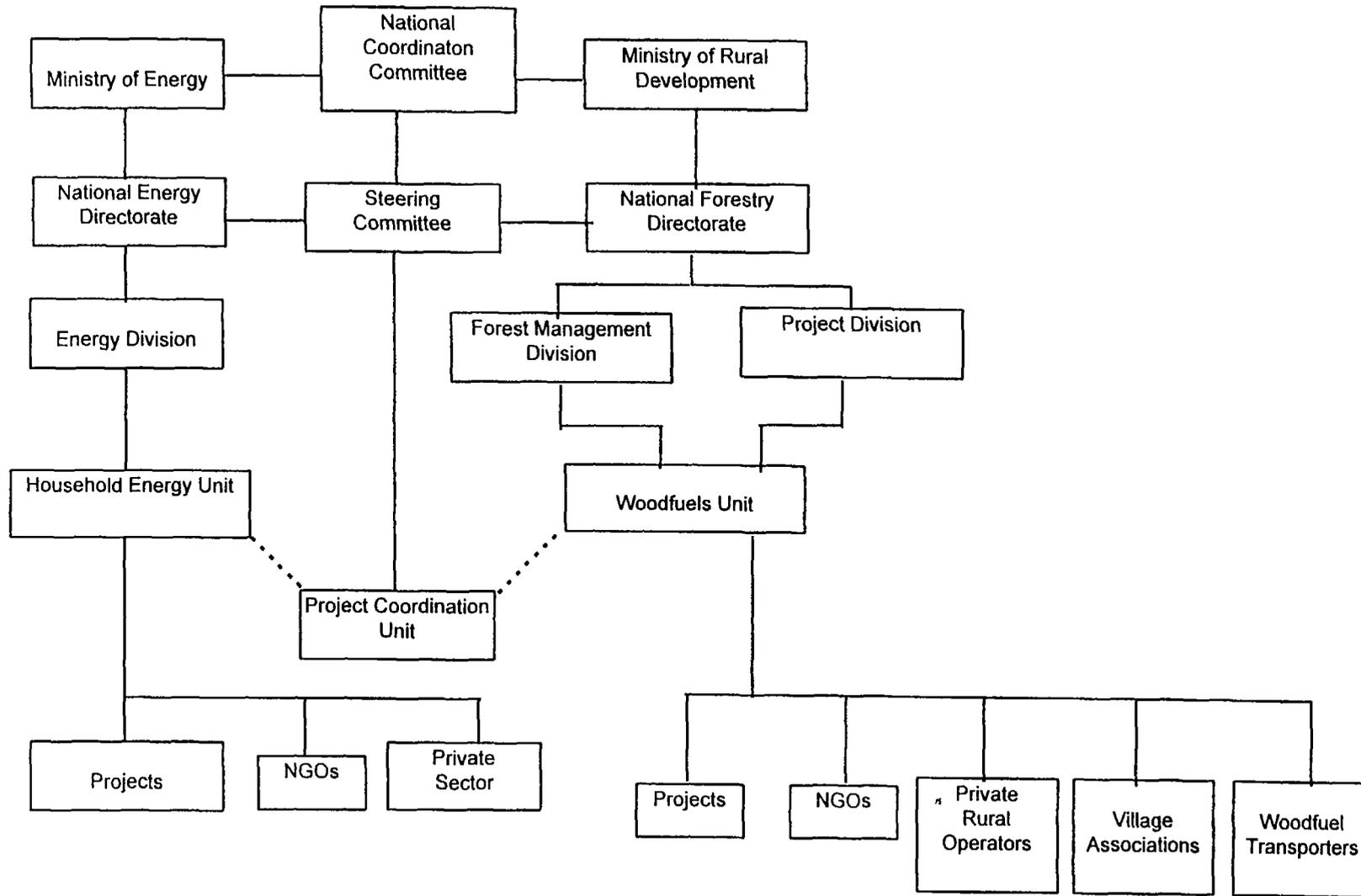
	Managed forests ('000 ha)	No. rural markets	Dead wood recovery
1996	30	10	35,000
1997	140	70	45,000
1998	300	80	60,000
1999	350	100	60,000
Total	720	260	200,000

* All indicators will be reviewed and updated during the mid-term review planned in December 1997.

Monitoring Indicators Per Year

<u>Objectives</u>	<u>Indicators</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>
[a] develop urban woodfuel supply schemes	Number of operational woodfuel supply master plans	Studies completed in Bamako, Segou, Koutiala	Implementation of existing plans; studies for Mopti and Kayes	Implementation of plans for Mopti and Kayes	Master plans fully operational
[b] improve carbonization systems	Number of charcoalers adopting new kilns	Training program operational	Policy and support measures in place	progress report	400 efficient charcoal kilns operational
[c] better use of forest resources	volume of dead wood recuperated	development of harvesting plans	development of harvesting plans	development of harvesting plans	quantified goal achieved
[d] promoting rural participation in sustainable forest management	number of rural markets established and ha under management; start training program	markets and mgmt plans under dvlpmnt in Bamako, Segou, Koutiala	markets and mgmt plans under development in Mopti and Kayes	training program fully operational	260 markets established and operational and 720.000 ha under management
[e] reduce demand for woodfuels	number of improved stoves sold	progress report	progress report	progress report	300.000 tons of wood savings
[f] promote fuel substitution	number of kerosene stoves sold	study on partial local production	report on promotion campaign	report on promotion campaign	17.000 kerosene stoves in use
[g] increase access to modern and new energy	quantity of carbonized cotton stalks sold and number of private entrepreneurs operating	review of relevant policy, institutional and credit systems	development of new product	sale of new product	market established for private sector operation
[h] reinforcing Govt's capacity to plan, coordinate and implement projects	semi-annual workprograms; satisfactory annual audits; monitoring system in place	semi-annual workprograms; satisfactory annual audits; monitoring system in place	semi-annual workprograms; satisfactory annual audits; monitoring system in place; mid-term review	semi-annual workprograms; satisfactory annual audits; monitoring system in place	semi-annual workprogram; satisfactory annual audits; monitoring system in place; PCR

Organization Chart



C. TACHES ET PROFILS DES EXPERTS

Remarques préliminaires

Tous les experts devront tenir compte dans l'accomplissement de leurs tâches des travaux déjà réalisés ou en cours par ailleurs au Mali. En particulier, ils devront s'assurer que les approches, les méthodologies, les activités et les mesures qu'ils proposent tirent le meilleur parti de l'expérience acquise et sont cohérentes avec celles développées dans le cadre des projets suivants:

- *Volet Demande: Projet Foyers Améliorés (3ème phase) financé par la GTZ; Programme Régional Gaz et Programme Régional Solaire du CILSS financés par le Fonds Européen de Développement;*
- *Volet Offre: Projet d'appui à l'Opération Aménagement et Production Forestière (OAPF) financé par la Caisse Française de Développement; Programme de Gestion des Ressources Naturelles (PGRN).*

Tous les experts internationaux devront avoir une grande expérience des pays en développement en général et du Sahel en particuliers. Ils devront maîtriser parfaitement la langue française parlée et écrite.

VOLET DEMANDE

Experts internationaux

Expert court terme économiste de l'énergie

Tâches à accomplir

L'expert court terme économiste de l'énergie apportera un appui au coordonnateur de l'UPS et au chef de la CED de la DNHE dans la supervision et la coordination de l'exécution de l'ensemble des activités du Volet Demande (VD).

Il sera plus particulièrement chargé des tâches suivantes:

- . appui à la préparation des réunions du Comité Directeur de la SED;
- . coordination des missions d'expertise court terme concernant le VD: programmation, élaboration des projets de termes de référence, contrôle de la qualité des rapports produits, intégration des résultats d'expertise dans la mise en oeuvre des activités;
- . appui à l'élaboration des projets de textes législatifs et/ou réglementaires nécessaires au succès des composantes, notamment en matière de politique des prix et de fiscalité des combustibles et des PEP;
- . appui à la négociation avec les opérateurs des filières gaz et pétrole lampant en matière d'amélioration des systèmes d'approvisionnement, de stockage et de distribution des produits;
- . appui à la conception des systèmes de crédit à mettre en place;
- . appui méthodologique au responsable du PPE en matière d'analyses économiques et financières.

Profil requis

Ingénieur économiste, il aura plus de 15 ans d'expérience professionnelle dans le domaine de l'énergie domestique et déjà géré plusieurs équipes pluridisciplinaires de consultants.

Durée estimée des services: 6 hommes x mois

Expert court terme en stratégie marketing

Tâches à accomplir

L'expert court terme en stratégie marketing apportera un appui méthodologique au chef de la CED et aux responsables des PPP et PPE pour la définition et l'exécution des activités des 3 composantes du VD.

Son appui concernera plus particulièrement les tâches suivantes:

- . modes de sélection et principes de développement des PEP à diffuser;
- . conception des stratégies marketing relatives à chaque PEP: identification des groupes cibles, élaboration des argumentaires, choix des modes de commercialisation, définition des politiques de promotion et de prix, etc.;
- . établissement des termes de référence des campagnes d'information/promotion des PEP et définition des modalités de leur mise en oeuvre;
- . mise en place de panels de consommateurs et conception des tests et enquêtes y afférents.
- . identification des besoins en crédit au niveau des importateurs, fabricants et commerçants des PEP: montants, critères d'attribution, formules de remboursement, etc.;
- . identification des besoins en micro-crédits à l'équipement destinés aux consommateurs: montants, critères d'attribution, formules de remboursement, etc.;
- . appui à la conception des systèmes de crédit à mettre en place: évaluation des filières de crédit (formelles et informelles) existantes, définition des cadres de collaboration avec ces filières, conception éventuelle de nouveaux systèmes, etc.;
- . évaluation périodique du fonctionnement des systèmes de crédit mis en place.

Profil requis

Spécialiste en marketing, il aura plus de 5 ans d'expérience professionnelle et des références solides en matière de marketing de produits grands publics en Afrique.

Durée estimée des services: 8 hommes x mois

Expert court terme en développement de produits énergie domestique

Tâches à accomplir

L'expert court terme en développement de produits énergie domestique apportera un appui méthodologique au chef de la CED et au responsable du PPP pour la mise en oeuvre de la composante "Développement des PEP".

Son appui concernera plus particulièrement les tâches suivantes:

- . procédure de mise au point des PEP: protocoles de tests de performances, mise en place d'un banc d'essais, formation des techniciens du Projet, conception des adaptations à réaliser, cahiers des charges techniques, etc.;
- . choix des options de fabrication/adaptation locale: évaluation des possibilités des entreprises locales, conception des gammes de fabrication/adaptation, identification des besoins en équipements et outillages complémentaires, etc.;
- . conception du système de contrôle de qualité;
- . conception du système de service après vente des PEP: réseaux à mettre en place, formation des techniciens de service après-vente, etc.

Profil requis

Ingénieur technologue, il aura plus de 10 ans d'expérience professionnelle et de solides références en matière de développement de réchauds à pétrole lampant et à gaz, et de systèmes solaires photovoltaïques.

Durée estimée des services: 4 hommes x mois

Expert national

Expert court terme spécialiste d'enquêtes

Tâches à accomplir

L'expert court terme spécialiste d'enquêtes apportera un appui méthodologique au chef de la CED et au responsable du PPE en matière d'enquêtes et de traitement statistique.

Il sera plus particulièrement chargé des tâches suivantes:

- . formation des cadres du PPE à la conception, la conduite et le traitement des enquêtes dans le domaine de l'énergie domestique: notions de statistiques, échantillonnage et sondage, élaboration de questionnaires pré-codés, encadrement des enquêteurs, utilisation d'un logiciel de traitement statistique, etc.;
- . appui à l'élaboration des guides de recueil, de saisie et de traitement des données et de présentation des résultats du Système d'Information et d'Evaluation Permanent (SIEP);
- . appui à la mise en place et au suivi de panels de consommateurs.

Profil requis

Démographe-statisticien ou économiste spécialisé dans les enquêtes sur le sous-secteur énergie domestique, il aura plus de 5 ans d'expérience professionnelle dans ce domaine.

Durée estimée des services: 2 hommes x mois

VOLET OFFRE**Experts internationaux****Expert court terme économiste forestier****Tâches à accomplir**

L'expert court terme économiste forestier apportera un appui méthodologique au coordonnateur de l'UPS et au chef de la CCL de la DNEF dans la conception et la coordination des activités des 5 composantes du Volet Offre (VO).

Il sera plus particulièrement chargé des tâches suivantes:

- . coordination des missions d'expertise court terme concernant le VO: programmation, élaboration des projets de termes de référence et contrôle de la qualité des rapports produits;
- . encadrement, appui technique et logistique au conseiller technique du chef de la CCL;
- . appui à la conception des réformes législatives et réglementaires nécessaires au succès des composantes, notamment en matière de réglementation et de fiscalité de l'exploitation des combustibles ligneux;
- . appui méthodologique aux responsables du PSCA et du PORA concernant l'ensemble des activités du VO relatives aux filières d'approvisionnement en bois énergie;
- . appui méthodologique concernant l'organisation de groupements d'exploitants forestiers, transporteurs et commerçants dans le cadre de la création des marchés ruraux;
- . appui méthodologique concernant l'organisation de groupements de charbonniers et du commerce et du transport du charbon de bois;
- . appui au chef de la DPP pour la conception des composantes du SIEP concernant le VO.

Profil requis

Economiste forestier, il aura plus de 15 ans d'expérience professionnelle dans le domaine des combustibles ligneux et de solides références en matière d'études des filières combustibles et produits forestiers.

Durée estimée des services: 6 hommes x mois

Conseiller technique du chef de la CCL

Tâches à accomplir

Le conseiller technique sera placé sous l'autorité du chef de la CCL, qu'il assistera dans la supervision et la coordination de l'exécution de l'ensemble des activités des composantes du VO.

Il sera plus particulièrement chargé des tâches suivantes:

- . coordination avec le VD;
- . coordination avec les différents projets de développement rural, en particulier avec le Projet d'appui à l'OAPF et le PGRN;
- . planification, coordination et suivi de l'exécution des activités du PSCA et du PORA;
- . suivi des missions d'expertise court terme concernant le VO et intégration de leurs résultats dans la mise en oeuvre des opérations;
- . suivi des réformes structurelles et réglementaires concernant le transfert de responsabilité en matière de gestion des ressources et l'exploitation des combustibles ligneux;
- . appuis méthodologiques divers aux responsables du PSCA et du PORA et formation "sur le tas" des cadres forestiers du VO;
- . mise en place des composantes du SIEP concernant le VO, en étroite collaboration avec le PPE de la CED/DNHE;
- . relations avec les différents projets liés à la SED et leurs bailleurs de fonds: préparation des réunions du Comité directeur de la SED et des missions de supervision conjointes des bailleurs de fonds.

Profil requis

Spécialiste en économie forestière, il aura plus de 10 ans d'expérience professionnelle et de solides références en matière d'aménagement forestier et/ou d'exploitation rationnelle des ressources ligneuses ainsi qu'une bonne connaissance des zones sèches de type sahélien.

Durée estimée des services: 3 ans

Expert court terme en gestion des ressources ligneuses

Tâches à accomplir

L'expert court terme en gestion des ressources ligneuses apportera un appui méthodologique au chef de la CCL et au responsable du PORA dans la mise en oeuvre de la composante "Schémas directeurs d'approvisionnement en combustibles ligneux" (SDA).

Il sera particulièrement chargé des tâches suivantes:

- . développement des outils méthodologiques pour l'élaboration des SDA;
- . zonage agro-socio-économique des bassins d'approvisionnement des villes couvertes par la SED;

UPPS/Termes de référence assistance technique

- . synthèse des travaux d'élaboration des SDA: établissement des grilles de décision, animation des ateliers de synthèse, mise en forme finale des documents;
- . contribution au développement des outils méthodologiques pour la création des marchés ruraux.

Profil requis

Agro-socio-économiste ou géographe-aménagiste, il aura plus de 10 ans d'expérience professionnelle et de solides références en matière d'aménagement de l'espace ou de planification de la gestion des ressources naturelles.

Durée estimée des services: 5 hommes x mois

Expert court terme cartographe

Tâches à accomplir

L'expert court terme cartographe apportera un appui méthodologique aux chefs de la CCL et de la DPP concernant l'ensemble des travaux de cartographie des différentes composantes du VO.

Il sera plus particulièrement chargé des tâches suivantes:

- . choix des méthodes de télédétection, d'interprétation et de cartographie des ressources ligneuses les mieux adaptées aux besoins des différentes composantes et au contexte malien, sur la base des travaux déjà réalisés dans ce domaine au Mali, notamment dans le cadre du PIRL;
- . formation des cadres de la CCL et de la DNEF chargés de la cartographie à l'utilisation de ces méthodes;
- . programmation des activités de cartographie liées à la SED.

Profil requis

Ingénieur cartographe ou géographe, il aura plus de 10 ans d'expérience professionnelle et de solides références en matière de télédétection, d'interprétation d'imagerie satellite et de couverture aérienne et d'utilisation de logiciel de cartographie.

Durée estimée des services: 3 mois

Expert court terme en aménagement forestier

Tâches à accomplir

L'expert court terme en aménagement forestier apportera un appui méthodologique au chef de la CCL et au responsable du PORA pour la mise en oeuvre de la composante "Aménagement forestier de terroirs villageois".

UPPS/Termes de référence assistance technique

Il sera plus particulièrement chargé des tâches suivantes:

- . diagnostic écologique des principaux types d'écosystème forestier couverts par la SED: état de la ressource, possibilité de régénération naturelle, impact prévisible de l'extraction de bois énergie, etc.;
- . détermination des modalités techniques des aménagements forestiers de terroirs et d'inter-terroirs villageois sur la base de l'expérience acquise au Mali et dans les pays voisins;
- . définition des travaux à effectuer pour mettre en place ces aménagements;
- . formation des cadres de la CCL et de la DNEF.

Profil requis

Ingénieur forestier, spécialisé en aménagement forestier et en agroforesterie, il aura plus de 10 ans d'expérience professionnelle et de solides références en matière d'aménagement de formations forestières de type sahélien à l'échelle villageoise.

Durée estimée des services: 4 hommes x mois

Experts nationaux

Expert court terme en animation rurale

Tâches à accomplir

L'expert court terme en animation rurale apportera un appui méthodologique au chef de la CCL et au responsable du PORA sur les aspects information, communication et vulgarisation auprès des populations rurales.

Il sera plus particulièrement chargé des tâches suivantes:

- . conception des campagnes de communication/information des populations rurales sur les réformes mises en oeuvre concernant la réglementation de l'exploitation forestière et les marchés ruraux;
- . conception des techniques d'animation rurale en vue de la création des marchés ruraux et des aménagements forestiers;
- . appui à l'organisation de groupements d'exploitants forestiers, transporteurs et commerçants dans le cadre de la création des marchés ruraux;
- . appui à l'organisation de groupements de charbonniers et du commerce et du transport du charbon de bois;
- . appui au responsable du PORA concernant la vulgarisation des techniques d'exploitation et de carbonisation améliorées;
- . formation des animateurs et instructeurs ruraux.

UPPS/Termes de référence assistance technique

Profil requis

Sociologue ou spécialiste de la communication, il aura plus de 10 ans d'expérience professionnelle et de solides références en matière d'organisation de campagnes de communication/vulgarisation en milieu rural africain.

Durée estimée des services: 6 mois

Expert court terme juristeTâches à accomplir

L'expert court terme juriste apportera un appui au chef de la CCL concernant les réformes structurelles et réglementaires de base sur l'exploitation et le commerce du bois-énergie.

Il sera chargé des tâches suivantes:

- . animation des groupes de travail et/ou ateliers sur les réformes structurelles, réglementaires et fiscales concernant le transfert de responsabilité en matière de gestion des ressources ligneuses et l'exploitation des combustibles ligneux;
- . appui à l'élaboration des projets de textes législatifs et réglementaires relatifs à ces réformes, notamment en vue d'assurer leur cohérence et leur compatibilité avec la législation et la réglementation maliennes en matière de décentralisation et de droit foncier;
- . appui à l'élaboration des documents contractuels concernant les marchés ruraux et les aménagements forestiers.

Profil requis

Juriste, il aura plus de 5 ans d'expérience professionnelle et une grande connaissance du droit malien et des réformes en cours dans le domaine de la décentralisation et du foncier en milieu rural.

Durée estimée des services: 4 hommes x mois

Expert court terme en inventaire forestierTâches à accomplir

L'expert court terme en inventaire forestier apportera un appui méthodologique au chef de la CCL et au responsable du PORA pour la détermination des ressources en bois énergie exploitables.

UPPS/Termes de référence assistance technique

Il sera chargé des tâches suivantes:

- . conception de la méthodologie d'inventaire des ressources ligneuses qui sera utilisée pour l'établissement des SDA, sur la base des travaux d'inventaires déjà réalisés au Mali notamment dans le cadre du PIRL;
- . conception d'une méthodologie d'inventaire spécifique pour la détermination des quantités de bois mort exploitables en 5ème région pour l'approvisionnement de Mopti, Gao et Tombouctou;
- . conception des méthodologies simplifiées d'inventaire des ressources ligneuses utilisables dans la détermination des quotas pour les marchés ruraux et de la mise sous aménagement forestier;
- . formation des cadres concernés de la CCL à l'utilisation de ces méthodologies.

Profil requis

Spécialiste d'inventaire forestier, il aura plus de 10 ans d'expérience professionnelle et de solides référence concernant les formations forestières des zones sèches de type sahélien.

Durée estimée des services: 4 hommes x mois

Expert court terme en carbonisation

Tâches à accomplir

L'expert court terme en carbonisation apportera un appui méthodologique au chef de la CCL et au responsable du PORA pour la mise en oeuvre de la composante "Modernisation du secteur charbonnier".

Il sera chargé des tâches suivantes:

- . diagnostic des modes actuels d'organisation des charbonniers et des techniques de carbonisation existantes;
- . sélection de techniques de carbonisation plus performantes et adaptées au contexte malien;
- . conception d'un système de formation des charbonniers à l'utilisation de ces techniques;
- . appui à l'organisation de groupements de charbonniers dans le cadre de la création des marchés ruraux.

Profil requis

Ingénieur, spécialiste de la carbonisation, il aura plus de 10 ans d'expérience professionnelle et de solides référence en matière de vulgarisation de techniques améliorées de carbonisation en Afrique.

Durée estimée des services: 3 hommes x mois

Expert court terme en exploitation forestière

Tâches à accomplir

L'expert court terme en exploitation forestière apportera un appui méthodologique au chef de la CCL et au responsable du PORA dans la mise en oeuvre des composantes "Récupération du bois mort en 5ème région" et "Aménagement forestier de terroirs".

Il sera chargé des tâches suivantes:

- . diagnostic des modes actuels d'organisation des exploitants forestiers et des techniques d'exploitation existantes;
- . sélection de techniques d'exploitation plus performantes et adaptées aux formations forestières rencontrées dans les différentes zones couvertes par la SED;
- . conception d'un système de formation des exploitants à l'utilisation de ces techniques;
- . appui à l'organisation des filières (exploitation, commerce primaire, transport et vente en ville) de récupération de bois mort en 5ème région, depuis les zones d'exploitation jusqu'aux centres urbains de consommation.

Profil requis

Ingénieur forestier, spécialiste en mobilisation de la ressource, il aura plus de 10 ans d'expérience professionnelle et de solides références en matière de chantier d'exploitation forestière en forêt sèche.

Durée estimée des services: 3 hommes x mois

III.**PROFILS ET TACHES
DES SPECIALISTES NATIONAUX
A RECRUTER SUR CONTRATS
INDIVIDUELS**

Remarques préliminaires

Les spécialistes nationaux seront recrutés sur appels de candidatures largement diffusés dans la presse nationale et par les radios et suivant les procédures habituellement utilisées au Mali pour le recrutement des personnels techniques contractuels des projet de développement.

Ils feront l'objet de contrats de service individuels d'une durée d'un an qui pourront être renouvelés 2 ou 3 fois en fonction de l'évolution des besoins au cours de la mise en oeuvre de la SED.

Une première estimation de ces besoins est proposée au Tableau 3 ci-après.

Tableau 3: Estimation des besoins en spécialistes nationaux

Qualification	Composantes concernées	Durée prévue * d'intervention
Volet Demande:		
Spécialiste réseaux commerciaux	C2, C3	3 ans
Technologue	C1	3 ans
Volet Offre:		
Agro-socio-économiste	toutes	4 ans
Socio-aménagiste	toutes	4 ans
Pastoraliste	toutes	4 ans

A. VOLET DEMANDE

Spécialiste en réseaux commerciaux

Tâches à accomplir

Le spécialiste en réseaux commerciaux assistera le responsable du PPP dans la mise en oeuvre de la composante "Promotion des PEP" et sera lui-même responsable de la composante "Micro-crédit aux PEP", sous l'autorité du chef de la CED.

Il sera plus particulièrement chargé des tâches suivantes:

- . relations avec les importateurs, fabricants et commerçants de PEP;
- . appui à la mise en place des réseaux de commercialisation des PEP: conception, négociations et formalisation contractuelle des relations entre importateurs, grossistes, fabricants et revendeurs, formation à la vente, etc.;
- . appui à la mise en place des systèmes de micro-crédits aux consommateurs: mise en place des cadres de collaboration avec les filières de crédit existantes, mise en place éventuelle de nouveaux systèmes, etc.;
- . suivi des réseaux de commercialisation, des systèmes de micro-crédits et des ventes de PEP.

UPPS/Profils et tâches spécialistes nationaux

Profil requis

Diplômé d'une école de commerce, il aura plus de 5 ans d'expérience professionnelle comme responsable des réseaux commerciaux et/ou des ventes dans une entreprise. Une expérience en matière de micro-crédits à l'équipement sera particulièrement appréciée.

Durée estimée des services: 3 ans

TechnologueTâches à accomplir

Le technologue sera responsable de la composante "Développement des PEP" au sein du PPP, sous l'autorité du chef de la CED.

Il sera plus particulièrement chargé des tâches suivantes:

- . mise au point des PEP, en étroite collaboration avec le spécialiste marketing: tests de performances, réalisation des adaptations, etc.;
- . mise en oeuvre des options retenues de fabrication/adaptation locale: conseil aux entreprises, formation du personnel de production, appui à l'acquisition et l'installation des équipements et outils, fabrication des gabarits, etc.;
- . mise en place du système de contrôle de qualité;
- . appui à la mise en place des réseaux de service après vente des PEP, en étroite collaboration avec le spécialiste marketing.

Profil requis

Ingénieur ou technicien supérieur en mécanique, électro-mécanique ou électronique, il aura plus de 5 ans d'expérience professionnelle dans le domaine des équipements photovoltaïques et, si possible, des réchauds à gaz ou à pétrole pour la cuisine.

Durée estimée des services: 3 ans

B. VOLET OFFRE**Agro-socio-économiste**Tâches à accomplir

L'agro-socio-économiste sera placé sous l'autorité du chef de la CCL. Il assistera les responsables du PSCA et du PORA dans la mise en oeuvre des différentes composantes du VO, notamment "Schémas directeurs d'approvisionnement en combustibles ligneux" (SDA) et "Appui aux professionnels du bois de feu".

UPPS/Profils et tâches spécialistes nationaux

Il sera plus particulièrement chargé des tâches suivantes:

- . organisation et suivi de l'élaboration des SDA;
- . contribution à la création des marchés ruraux et suivi de leur fonctionnement;
- . définition des modalités pratiques concernant le transfert de responsabilité en matière de gestion et d'exploitation des ressources naturelles aux collectivités locales;
- . identification des techniques d'exploitation et de carbonisation adaptées aux différents contextes rencontrés;
- . soutien à la création d'organisations professionnelles d'exploitants et producteurs ruraux de produits forestiers.

Profil requis

Ingénieur agronome, ayant reçu une formation complémentaire en socio-économie rurale, il aura 3 à 5 ans d'expérience professionnelle de terrain dans le cadre d'un projet de développement rural intégré.

Durée estimée des services: 4 ans

Socio-aménagisteTâches à accomplir

Le socio-aménagiste sera placé sous l'autorité du chef de la CCL. Il assistera les responsables du PSCA et du PORA dans la mise en oeuvre des différentes composantes du VO, notamment "Appui aux professionnels du bois de feu" et "Aménagement forestier de terroirs".

Il sera plus particulièrement chargé des tâches suivantes:

- . animation et suivi de la mise en place des réseaux de marchés ruraux: information/formation et conseil auprès des collectivités locales et des villageois, formation et suivi des équipes de terrain de l'administration forestière en matière de création de marchés ruraux, transfert des méthodes développées aux autres opérateurs (projets, ONG, etc.);
- . animation et suivi de la mise en place des aménagements forestiers de terroirs: information/formation et conseil auprès des villageois, formation des équipes de terrain de l'administration forestière, transfert des méthodes développées aux autres opérateurs (projets, ONG, etc.);
- . développement d'outils et supports pédagogiques pour la diffusion des techniques améliorées d'exploitation et de carbonisation dans le cadre des marchés ruraux;
- . réalisation des études complémentaires sur les zones actuelles et potentielles de production de charbon de bois approvisionnant Bamako et les villes du nord.

Profil requis

Diplômé d'études supérieures en sociologie ou géographie, ayant de préférence reçu une formation complémentaire en économie rurale, il aura un minimum de 5 ans d'expérience professionnelle de terrain dans le cadre d'un projet de développement rural intégré.

Durée estimée des services: 4 ans

Pastoraliste

Tâches à accomplir

Le pastoraliste sera placé sous l'autorité du chef de la CCL. Il assistera le responsable du PORA dans la mise en oeuvre des différentes composantes du VO.

Il travaillera en étroite collaboration avec les ingénieurs forestiers du PORA, l'agro-socio-économiste et le socio-aménagiste à l'accomplissement des tâches dont ils ont la charge. Sa fonction principale sera d'assurer:

*

- . une bonne prise en compte des aspects élevage au niveau des outils méthodologiques développés et de leur utilisation dans le cadre de l'élaboration des SDA et de la création des marchés ruraux;
- . les relations/négociations avec les éleveurs dans le cadre du transfert de responsabilité en matière de gestion et d'exploitation des ressources naturelles aux collectivités locales.

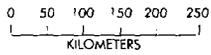
Profil requis

Ingénieur agronome, vétérinaire ou sociologue, spécialisé dans le domaine du pastoralisme, il aura un minimum de 5 ans d'expérience professionnelle de terrain dans le cadre d'un projet de développement rural intégré ou d'un projet d'élevage.

Durée estimée des services: 4 ans

MALI HOUSEHOLD ENERGY PROJECT

- CERCLE CAPITALS
- ⊙ REGION CAPITALS
- ★ NATIONAL CAPITAL
- CERCLE BOUNDARIES
- REGION BOUNDARIES
- INTERNATIONAL BOUNDARIES



The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

