MOZAMBIQUE
Energy Reform and Access

GEF Project Document

Africa Regional Office
AFTEG

Date: June 5, 2003
Sector Director: Praful C. Patel
Country Manager/Director: Darius Mans
Project ID: P069183
Lending Instrument: Adaptable Program Loan (APL)

Team Leader: Reynold Duncan
Sector(s): Power (78%), Renewable energy (16%), Central government administration (6%)
Theme(s): Rural services and infrastructure (P), Infrastructure services for private sector development (P), Access to urban services for the poor (P), Regulation and competition policy (S)

Global Supplemental ID: P071942
Sector Manager/Director: Praful C. Patel
Lending Instrument: Adaptable Program Loan (APL)
Focal Area: G
Supplement Fully Blended? Yes

Team Leader: Reynold Duncan
Sector(s): Renewable energy (100%)
Theme(s): Climate change (P)

Program Financing Data

APL	Indicative Financing Plan				Estimated Implementation Period (Bank FY)		Borrower
	IDA US$ m	%	Others US$ m	Total US$ m	Commitment Date	Closing Date	
APL 1 Loan/ Credit	40.30	49.4	41.26	81.56	09/01/2003	12/31/2007	Government of Mozambique
APL 2 Loan/ Credit	40.00	47.1	45.00	85.00	01/01/2007	12/31/2011	Government of Mozambique
Total	80.30		86.26	166.56			

[ ] Loan **[X] Credit** **[ ] Grant** **[ ] Guarantee** **[ ] Other:**

For Loans/Credits/Others:
Amount (US$m): 40.26

Proposed Terms (IDA): Standard Credit

Years to maturity: 40

Financing Plan (US$m): Source	Local	Foreign	Total
BORROWER	8.48	0.00	8.48
IDA	5.01	35.25	40.26
AFRICAN DEVELOPMENT FUND	2.59	12.60	15.19
GLOBAL ENVIRONMENT FACILITY	0.49	2.60	3.09
NORDIC DEVELOPMENT FUND	0.70	6.40	7.10
FOREIGN PRIVATE COMMERCIAL SOURCES (UNIDENTIFIED)	1.74	5.66	7.40
Total:	19.01	62.51	81.52

Borrower/Recipient: GOVERNMENT OF MOZAMBIQUE

Responsible agency:

National Directorate of Energy (DNE)

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Other Agency(ies):

Electricidade de Mozambique (EdM)

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Fundo Nacional da Energia (FUNAE), Ministries of Health (MISAU) and Education (MINED)

Estimated Disbursements (Bank FY/US$m):

FY	2004	2005	2006	2007					
Annual	3.00	11.32	17.14	8.80					
Cumulative	3.00	14.32	31.46	40.26					

Project implementation period: 2003 - 2007

Expected effectiveness date: 10/15/2003 **Expected closing date:** 12/31/2007

OPCS APL PAD Form: Rev. March, 2000

A. Program Purpose and Project Development Objective

1. Program purpose and program phasing:

The program will increase access to modern energy in peri-urban and rural areas, thereby facilitating improved quality of life of the respective communities and generating income. It will comprise: (i) reforms necessary for improved performance of the energy sector (in particular electricity) and accelerated access to electricity, in rural and peri-urban communities; and (ii) investments in electricity supply infrastructure (including renewables).

The program will support the effort towards achievement of at least four of the Millennium Development Goals (MDGs). Provision of electricity in at least 150 rural health facilities will help improve rural health services (such as enable night time delivery and better vaccination storage) and thus support the effort in reducing child mortality and improving maternal health. Provision of electricity in at least 150 rural schools will enable evening classes to take place and improve the living condition of teachers, thus reducing their turnover. It will therefore support the effort in achieving universal primary education. The use of renewable energy sources for production of electricity will help ensure environmental sustainability, by displacing about 440,000 tons of carbon dioxide over the life of the program.

Phasing. The program will comprise two phases over a maximum period of 8 years; each for 4 years. Should the triggers for the first phase be achieved before the first four-year period, the second phase will commence earlier. The first phase will create a conducive environment for commercially viable acceleration of access to modern energy to rural and peri-urban communities and businesses. It will finance some investments and actions necessary to restructure the grid- and non-grid- based sectors for maximum sustainable involvement of and investment by the private sector. The second phase will comprise scale-up of the investment activities commenced in the first and transmission rehabilitation and expansion, based on the outcome of the ongoing African Development Fund (AfDF)-funded Transmission Masterplan study. The second phase will be triggered if the reforms planned in the first phase, including the measures required to improve the power sector's performance, are adequately implemented.

2. Project development objective: (see Annex 1)

The development objectives are to: (a) accelerate, in a commercially viable manner, the use of electricity for economic growth and social services and thus improve the quality of life in un-served and under-served areas (peri-urban and rural); and (b) strengthen Mozambican capacity to increase access to modern energy. It seeks to achieve these objectives via supporting the implementation of the Government of Mozambique (GoM) National Energy Strategy of October 2000 that, inter alia, aims at reforming the country's energy sector and implementing an enabling environment for private sector participation in the sector.

3. Global objective: (see Annex 1)

The proposed project’s global objective [for the Global Environmental Fund (GEF) part] is to initiate the process of eliminating the barriers that impede the development and use of renewable energy, in particular solar photovoltaic (PV) systems, and develop micro-hydro and other renewables' capacity. The global objective will contribute to the reduction of Greenhouse Gases (GHG) as some of the use of diesel for power generation, and kerosene and candles for household lighting, will be displaced by renewable energy.

4. Key performance indicators: (see Annex 1)

Key performance indicators for the program are as follows:

(i) *Increased direct access to electricity in peri-urban and rural areas*, by providing reliable, affordable and sustainable electricity supply to an additional 1 million people (400,000 in the first phase, 1 million over the program) in rural and peri-urban areas of the country. This will increase direct access by about 20% in the first phase, in which most of the connections (about 80%) will be from the main grid.

(ii) *Private sector involvement in the power sector*, measured by: (i) the involvement of a strategic private partner in Electricidade de Mozambique's (EdM's) distribution business; and (ii) the establishment of at least 3 isolated grid private power supply businesses by the private sector.

(iii) *Improved performance of the power sector,* measured by the operational and financial performance of EdM, in that it will be able to generate a surplus and raise private capital for access expansion, increase its customer base (see (i) above), and reduce the average cost of connection to at least US$950 per customer.

For the global objective:

(i) Increase in the numbers of viable solar PV distributors, other renewable energy businesses, such as micro-hydro, and institutional users of solar systems (300 in the first phase; 1,075 over the program) and individual users of solar systems (2,500 in the first phase; 8,500 over the program).

(ii) Establishment of at least one isolated grid system based on a renewable energy source.

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)
Document number: 20521-MOZ **Date of latest CAS discussion:** June 14, 2000

The key approach adopted in the proposed program, to work with other donors to build public and private sector capacity to promote development of commercially-oriented expansion of access to modern energy, is consistent with the June 2000 CAS 2001-2004 strategic priorities. The priorities comprise: (i) maintaining an enabling private sector environment; (ii) developing infrastructure; and (iii) promoting rural development and agriculture (under CAS pillar "Increasing Economic Opportunities through Private Sector-led Growth"). The approach also conforms to the specific sectoral target of the Government's Poverty Reduction Strategy Paper: (a) to ensure that all district capitals and administrative posts are supplied with electricity; and (b) to expand the national grid to connect rural areas. In supplying electricity to rural service providers such as in health and education, the program supports efforts towards achievement of three MDGs: reduce child mortality, improve maternal health, and achieve universal primary education. Furthermore, the use of renewable energy by rural service providers and rural communities will help ensure environmental sustainability by reducing the amount of carbon dioxide resulting from current non-renewable energy sources.

The program approach enables the Government to adopt the most appropriate delivery systems for the country through the process of "learning by doing" (in the first phase).

GEF Operational Program supported by the project: (see Annex 1)

The proposed project is fully consistent with the GEF Operational Program 6: *Promoting renewable energy by removing barriers and reducing implementation costs*. GEF support would help to: (i) remove information and awareness barriers within Mozambique about solar PV systems; (ii) build up a commercial market and reduce the costs of renewable energy; and (iii) prepare a strategy for long-term development of renewable energy.

1a. Global Operational strategy/Program objective addressed by the project:

Underutilised renewable energy potential

To date little renewable energy exploitation has been done in Mozambique, yet both photovoltaic, mini- and micro-hydro systems have promising prospects for providing stand-alone power solutions in areas not covered by the main grid. A number of factors have prevented the widespread use of renewable energy resources, namely: (i) high capital cost of photovoltaic systems (on average, the costs in Mozambique are 30-35% higher than the world market average); (ii) lack of capacity in Government and the private sector to develop and implement mini- and micro-hydro schemes; (iii) absence of support mechanisms (financing & business development support) to develop the market of solar PV and attract investments in small isolated hydro schemes; and (iv) general lack of awareness about solar PV, its applications and the potential market.

Strategy: The Government recognizes the potential economic and environmental promise of renewables-based electricity technologies: (i) to serve small, disperse loads, for which it is not cost-effective to supply from the national grid or from isolated grids: and (ii) to augment the independent grid-connected generation capacity on a least cost basis. The Government has accordingly requested help to expand the renewable electricity sub-sector. It plans to remove the barriers to widespread use of RE technologies by implementing a few private sector-led projects, and assisting service providers, comprising Health and Education in the first phase, to better meet their energy needs. The project will address awareness, development of quality standards and creation of a conducive environment for private sector entry, including the provision of output-based subsidies and standardized small power purchase agreements. The renewable energy providers will include solar PV retailers, mini-grid concessionaires and project developers. The Government also plans to build upon previous isolated project experience with institutional solar PV systems, especially to address the lack of appropriate operation and maintenance arrangements.

2. Main sector issues and Government strategy:

The four primary issues facing the Mozambique energy sector are: (a) low access to modern energy, in particular electricity, and the poor reliability and efficiency of its supply; (b) the adverse environmental, livelihood, and health impacts of traditional biofuels production and use; (c) inadequate promotion and management of low cost export-oriented energy projects; and (d) inadequate staff and developing institutions, such as the National Electricity Council (CNELEC) and the Energy Fund (FUNAE). In recent years the Government, with the help of the Bank and other donors, has taken some significant steps toward adopting a legislative and policy framework to reform the sector to meet these challenges. For instance, the 1997 Electricity Law allows for private participation in business units created by unbundling EdM and for awarding concessions to the private sector to develop off-grid supplies. However, little implementation has occurred. All of these issues and Government's strategy for addressing each one, are discussed below.

2a. Low access to modern energy and poor reliability and efficiency of supply

Only about 6% of Mozambican households (about 220,000 or a population of about 2 million) have access to electricity, and over half of these are in the capital, Maputo, and its surrounding areas. Outside these main urban areas, electricity access is minimal, and there has been practically no increase in the last 25 years. Of the 120 or so "district capitals", over 50 are without any form of public electricity supply, or have sporadic supplies from small diesel-fueled generating sets (gensets) to a handful of customers via old and poorly maintained small grids. All the provincial capitals besides Maputo, and most of the other 20 or so municipalities, are served by the national grid or isolated diesel-based grids. Even in these areas, supply reliability is low, the household electricity access rate is only 15-20%, and the implicit cross-subsidies (from the Maputo area to the rest of the country) are heavy. The planned pace of access expansion along the main grid is woefully slow. For instance, only 31,000 new customers were added between 1996 and 2000, and less than 50,000 are targeted for the next four years, compared to more than 100,000 new households that will be formed over the same period. The difficulty of EdM, the national utility, to raise the funds required to connect more customers and the high cost of electrification, are the main reasons for the slow growth.

Although the performance of EdM has shown some improvement since internal management contracting began in 1997 -- energy losses have been reduced to around 21% from over 30% in 1998, sales per employee have increased from 4.75 MWh in 1998 to 5 MWh and the rate of return has become positive -- its current performance cannot be said to be satisfactory. For instance, the ratio of payroll to operating expenses has increased from 18% to 24%, the level of receivables has deteriorated from 123 days to 147 days and its contribution to investment has reduced from over 50% to negative. Although the problems can be partly attributed to calamities such as the floods of 1999/2000, much under the control of EdM and the Government could be done to improve the utility's performance, including better recurrent expenditure control, better capital expenditure planning, and more timely approval of tariff adjustments.

***Strategy*:** To expand electricity access and improve the quality of supply, the Government plans to supplement the traditional approach of main grid expansion with a package of technical and institutional changes that lower the costs of service, enhance affordability, employ performance-oriented subsidies, and bring in competitive participation by the private sector, through public-private partnerships.

The Electricity Law of 1997 opened the power sector in Mozambique for participation of new entrants, through concession contracts. Implementing regulations to permit private sector participation in all stages of the electricity business were passed in April, 2000. Since then, the GoM: (i) has passed a decree establishing a power sector advisory body, CNELEC, with the aim of transforming it into a regulatory body within 5 years; (ii) is in the process of separating generation, transmission and distribution/supply functions of EdM in order to run them as separate business lines; and (iii) has established an “energy fund” (FUNAE) to collect specific levies, and to channel subsidies to specific projects to expand access to modern energy or for demonstration projects.

Subsequent to the separation of EdM's functions and the creation of business centers, the Government plans to commercialize the utility and invite strategic private investment and management in Distribution. It should be noted that EdM-owned and operated Generation is insignificant as most of the power is either imported from South Africa or purchased from the Cahora Bassa plant, and that future generation capacity will be implemented by the private sector. Furthermore, the Government intends to develop future transmission assets jointly with the private sector but to retain management of the transmission assets. The transmission company will also be the single buyer.

Government is also in the process of concessioning out the North Inhambane mini-grids which were constructed under the IDA-funded Urban Household Energy Project (UHEP). This model, of decentralized energy supply through an off-grid system, could be replicated in other parts of the country which cannot be economically connected to the national power grid.

2b. Adverse environmental, livelihood, and health impacts of traditional biofuels production and use

Most of Mozambique's primary energy consumption is met by traditional biofuels (wood, charcoal, and agro/animal wastes) that are produced and used inefficiently. Work done under the Urban Household Energy Project (UHEP), including the Energy Sector note, has shown that heavy urban reliance on woodfuels, while a significant source of income and employment to the supplying communities in rural areas, imposes significant environmental costs. On the supply side, the growing demand for charcoal and fuelwood in the principal cities (Maputo, Beira, Nampula and Quelimane), combined with inefficient charcoal production practices, has led to a significant depletion of the forest stocks around those cities and in some cases as far away as 200 kms. As such stocks are depleted, supplying communities lose a significant source of their cash incomes and risk a loss of land productivity. On the end-use side, traditional combustion technologies and practices cause significant indoor air pollution, with adverse health consequences, particularly for women and children. The transition to modern cooking fuels is hampered, even in urban areas, by limited access to such fuels or high initial costs. Most of the kerosene the poor purchase is used for lighting purposes due to lack of access to electricity.

Strategy: To mitigate these adverse impacts, the Government plans to: (a) reform the legal and regulatory framework for land use, wood extraction and charcoal production, including allowing for land ownership by the communities; (b) strengthen the resource management capabilities of rural communities and create substitute means of income generation, other than woodfuels exploitation, for them (based on a pilot implemented under the UHEP, which included brick-making, charcoal production, oil extraction, pottery and nurseries for medicine extraction); (c) expand access to modern cooking fuels (LPG and gelfuel); and (d) employ more efficient and/or cleaner technologies of woodfuels use, such as the more efficient wood/ charcoal stoves.

2c. Inadequate promotion and management of export-oriented energy projects

Mozambique is rich in modern energy resources such as hydropower, natural gas, and coal, and can exploit them for exports and for domestic use. Currently, the largest part of the power sector in Mozambique is the "export-oriented" market, centered around Cahora Bassa hydro power plant. In addition, GoM has recently reached agreements with foreign companies for the development of Pande and Temane gas fields, and building a gas pipeline for exports to South Africa, for which an IDA Partial Risk Guarantee is planned. ERAP will also fund technical assistance related to this project. A number of other export-oriented, private sector-led energy projects, based on hydroelectricity, coal for energy, and other minerals such as titanium, are at various stages of planning or implementation. Prudent management of these energy and industrial projects via careful contracting and fiscal policies can yield significant revenues for macroeconomic stability and developmental expenditures, and provide an impetus for other foreign direct investments. Conversely, inappropriate management can expose the country to significant adverse risks, such as contract disputes, delays in financial closures and project investments and potential adverse environmental and social impacts of project development.

Strategy: The Government realizes that building internal capacity to effectively negotiate the concessions and contracts will be a long-term process and its strategy is to seek external assistance while

such capacity is being built. The ongoing Gas Engineering project is providing support in this respect and in connection with the Mozambique-South Africa gas pipeline project.

2d. Inadequate institutional and human resource capacity

While in some respects Mozambique has gone far in legislative changes to liberalize the energy sector, the pace of implementation, and of showing concrete results on the ground, has been slow because of limited institutional and human resource capacity. For instance, CNELEC was provided for in the Electricity Law of 1997, yet its board members were only appointed in November 2001 and to-date they have not begun to operate because of the lack of various resources. Due to a shortage of sufficient trained personnel in DNE, the institution has had to rely heavily on advisors provided by bilateral donors, and the transfer of knowledge has not been effective due to a shortage of graduate staff to understudy the advisors.

Strategy: The Government realizes that the development of local staff is a long-term process and that the energy sector will continue to rely on external assistance for a long time to come. In line with recommendations of the Institutional Diagnostic Study, GoM plans to develop and utilize more efficiently the limited capacity in the public sector and wherever possible, the local private sector. GoM plans to take advantage of this and other projects to selectively provide hands-on and classroom training for existing and new staff. Furthermore, GoM plans to be more careful in its selection of donor-funded technical assistance and investments (as is evident on this project and the DANIDA-funded Energy Sector Program Support project where coordination will be done jointly), as well as provide better coordination of its donor aid program.

3. Sector issues to be addressed by the project and strategic choices:

The main issues facing the energy sector have been discussed in Section 2 above; this section addresses the issues to be addressed by the project. The project concept outlined here reflects several strategic choices to address these issues. The alternatives considered and the reasons for rejecting some of them are given in Section D1.

The *first* strategic choice is to apply a hybrid approach in restructuring EdM. It emphasizes three parallel activities: assistance in implementing a new corporate structure to modernize EdM management systems and financial controls; selected investments that would make new connections and demonstrate low-cost approaches in parts of EdM's distribution network; and introduction of a private sector operator for the EdM distribution system. This hybrid approach will achieve at least some private investment in the integrated distribution network, allowing broader impact on the distribution network as a whole and, critically, moving at a pace that is seen as realistic by the authorities. The three activities would be completed within the first phase of the proposed program.

The *second* strategic choice is to develop a private sector-led, commercially-oriented and institutionally viable program to expand electricity access specifically targeted at underserved areas, which is a break from the "business-as-usual" approach relying exclusively on high-cost transmission line extensions by the national utility, and heavy implicit cross-subsidies. Nevertheless, keeping in mind that EdM will continue to play a major role in the sector until there is significant and credible private sector involvement (which the program will assist in achieving), the strategic choice does not preclude the involvement of EdM provided it can effectively contribute to the objectives of the program (see third strategic choice). Furthermore, with liberalization of the power sector, the need for an independent regulator will increase, and the decision to take a stepwise approach in establishing the regulator has been made. The first step is to operationalize CNELEC so that it effectively plays the mediatory role

envisaged in the 1997 Law. The second step is to develop CNELEC into an independent regulatory body. This approach will enable capacity to be built over time, through learning-by-doing in the first phase of the program, to meet the more demanding requirements of a regulator by the second phase. Both steps would be completed in the first phase of the proposed program.

The *third* strategic choice is to begin to forge selective links with non-energy sectors, commencing with those where the needs are the greatest and where there is readiness to commence. In the first phase, therefore, links will be developed with Health and Education, and extended to Water in the second phase. This forging of cross-sectoral links is consistent with the Country Assistance Strategy (CAS) and the Poverty Reduction Strategy Paper (PRSP). A major implication of this choice is that in this project, the Bank would function as a "knowledge bank" as well as the "lending bank". This approach also reflects the judgment that electricity alone is insufficient to catalyze economic growth and improvements in the quality of livelihoods, but that together with other infrastructure investments (physical or social), synergistic benefits can be expanded and electricity service can be made commercially viable by exploiting opportunities of further load growth. The project will thus work with these other sectors to assist them in improving their service delivery through improved access to electricity and more effective use of the resource.

The *fourth* strategic choice is to use competitive output-based subsidy award mechanisms, and the outputs will be the number of customers connected, which will be agreed upon at the award of the concession and/or qualified installation of individual solar PV household systems. The results of the financial analyses of the isolated grid schemes already prepared show that fully commercial rural electrification is not feasible but that the issue of affordability can be tackled by subsidizing only the capital cost. The results also show that most of the schemes will require capital subsidies exceeding 50%. The adoption of competitive output-based subsidy mechanisms will ensure the transparency of subsidy award and disbursal, more deeply involve the private sector in project selection and design, achieve efficiency, enable economies of scale to be realized and facilitate regulatory processes. The Government's role will be, in the first instance, enabling the market in subsidy support, and secondly, regulating, monitoring, and enforcing the resulting contracts. The structure of the competitions envisioned is designed to lower entry costs and maximize transparency and competition for the subsidy so as to minimize the public contribution per customer connection. It is also designed so that GoM institutions, principally DNE, FUNAE, and CNELEC, can realistically build up the capacity to reform their roles effectively.

The Government has decided to operate a subsidy transfer mechanism recommended by the Private Sector Participation in Energy (PSPE) study -- the Modern Energy Challenge Scheme (MECS), presented in detail in Annex 12. Under the scheme, *FUNAE* will be responsible for maintaining a database of rural electrification opportunities and for operating the MECS, comprising structured and open competition. *DNE*, including its regional offices, private companies, and NGOs will identify potential schemes.

The *fifth* strategic choice is to accelerate the use of renewables-based electricity technologies in the Mozambican market and initiate the process of eliminating market barriers to these technologies, with a focus on solar PV, mini- and micro-hydro schemes. This reflects the judgment that decentralized, renewables-based electricity technologies are an economically and environmentally superior choice for certain end-users, but that their market development is constrained by low levels of awareness, significantly higher prices compared to other countries in Africa or other parts of the world, and the use of inefficient supply chains. The strategy includes the award of output-based subsidies as for isolated grids, as well as a pre-determined level of GEF subsidies for incremental costs.

4. Program description and performance triggers for subsequent loans:

PHASE 1

The main objectives of the first phase are to build both Government and local private sector capacity for commercially viable expansion of access to modern energy, and to commence implementation on a small scale, by building on the regulatory and institutional developments that have already taken place. The first phase will also support preparation of the second phase.

The project will finance technical assistance as well as investments, and support GoM's strategy to increase access to electricity to 20% by 2015. Investments, to be implemented by both public and private sectors, will be directed at expanding electricity access via the main grid, independent grids, and individual and institutional solar PV systems. Technical assistance will consist of various discrete elements that will collectively aim to: (i) strengthen the Government's capacity to effectively manage the access expansion program; (ii) assist the Government in commercializing and inviting private sector participation in the currently wholly Government-owned power utility; and (iii) build the domestic private sector's capacity to scale-up electricity access.

A. Power Sector reforms

This component will involve transaction advice on EdM Distribution public-private partnership and assistance in the creation of a separate transmission public-owned company.

Subsequent to a consultancy report of EdM restructuring and private participation, an internal task force appointed by the Government and consisting of several stakeholders has recommended private sector participation in EdM's power distribution and supply business as the most appropriate strategy for the country. This is in view of: (i) current legislation, which does not allow for private sector involvement in the currently vertically-integrated utility but in its subsidiary businesses; (ii) the fact that Generation and Transmission already involve independent ownership/management; and (iii) since the main issues responsible for poor performance of the sector (high costs of supply, low penetration, high losses, poor collection) are in Distribution. The consultant will advise the Government on implementation of the agreed option.

The Government has already commenced with the separation of transmission from other engineering functions. The project will support the Government in this effort and ensure proper (legal and operational) establishment of a fully functional public-owned entity, with possibly an interim role as single buyer, and support institutional strengthening of the new entity.

B. Grid Electrification

This component will consist of main grid and independent grid investments.

Main grid investments will demonstrate that main-grid based access can be made more commercially attractive in areas close to the national grid via use of appropriate low-cost standards, construction and management procedures. This should prove to be highly beneficial in Mozambique where the cost per connection (about US$2,000) is the most expensive in the region and the population density is about the least. The component will be implemented primarily by EdM and will include Distribution investments on a supply and install basis, in peri-urban areas, comprising about: 500 km of medium voltage lines, 1100 km of low voltage lines and 240 distribution substation, to connect approximately 40,000 new

consumers at about 265 sites (see Annex 2). It will aim to:

- introduce, (with the goal of main-streaming), proven lower-cost distribution network designs standards (such as the selective use of 3-phase and single phase, longer span lengths and smaller conductor sizes), and construction/management procedures (such as turnkey contracting and outsourcing revenue collection), in order to substantially reduce the cost per new customer connection and per unit load (kW) served; and

- employ more effective connection financing and power marketing strategies including supplier financing of household meters and connection fees, and increased proactivity on the part of EdM to better identify pockets of affordability and thus increase its customer base in peri-urban areas.

GoM and EdM requested technical assistance during the course of project preparation, for cost reduction in access expansion, especially in connection with procurement, design standards and construction practices. The study has identified a cost reduction potential of at least 20% in various parts of main grid distribution extension, and EdM has expressed interest in implementing the recommendations of the study in supplying peri-urban consumers.

Output indicators for this component will be: (a) percentage reduction in cost per household connection and per kW served; and (b) percentage increase in household access to electricity.

Independent grid investments, will demonstrate that it is possible to interest private businesses (investors and commercial financial institutions) to accept the commercial risks of independent grid electrification investments, while the Government provides the appropriate enabling environment. In such an environment: (i) concessions will be awarded to private sponsors for greenfield sites; (ii) EdM will sell in bulk to independent distributors; (iii) the Government will provide transparent capital subsidies (on a competitive OBA basis) for otherwise commercially unviable schemes; and (iv) there will be a mediation and regulatory entity (CNELEC) acceptable to the private sector.

The Government will ensure that the schemes to benefit from the subsidies can be self-sustaining after the subsidies have been provided and that in the event that additional subsidies shall be required, they shall be purely for expansion. Based on the schemes that have been prepared, a subsidy level of at least 50% is expected over the first phase of the program and the total average annual subsidy amount is estimated at US$2.5 million.

The first set of sites earmarked for concessioning out in the first phase of the program includes: North Inhambane and Mocimboa da Praia (see Annex 2 for details). These were selected due to their being district capitals with comparatively higher economic activities and population levels than other candidate sites, and therefore requiring less subsidies. Furthermore, the four allow the two delivery methods -- bulk supply from the grid and isolated grids -- to be tested. Pre-qualification is in progress for North Inhambane, and its financial and economic evaluation are provided in Section E.

Output indicators for this sub-component will be: (a) percentage reduction in cost per household connection or per kW served (compared to the national level of about US$2,000); (b) percentage increase in household access; and (c) number of private rural distribution concessions.

Productive Uses of Electricity. This study will identify productive uses of electricity for income generation, with particular attention to women and the young unemployed in the rural areas. This is aimed at direct poverty alleviation in the rural areas which will in turn help improve the viability of the

electrification program.

Transaction advice for independent grids. To operate the MECS detailed in Annex 12, a consultant will be retained to assist FUNAE prepare new sites to be taken to the market for bidding, in consultation with DNE and its regional representatives (DIPREMEs), in vetting unsolicited proposals, and in negotiating the transactions, up to financial close.

C. Renewable Energy Promotion and Cross-sectoral Linkages

The component contributes to the overall objectives of the Project in providing electricity generated by renewable energy systems for rural transformation through improved services in the health, education and water sectors; improved productive uses and income generating activities; and further private sector and entrepreneurial development. The means to this objective is to create, in four to eight years, a sustainable market for renewable energy systems. The incremental costs of the renewable energy systems will be funded out of a GEF grant and disbursed on a performance basis. This component will be implemented by the private sector, communities, and line ministries. The strategies for action comprise:

- *Working with line ministries* to provide electricity to Government service centers like schools, clinics, and agricultural centers – mainly through solar PV systems. In the first phase the project will focus on the Ministry of Education (MINED) and Ministry of Health (MISAU), which are ready to forge energy links. The systems will be procured on a batch basis by the line ministries (through DNE) following minimum technical specifications. The line ministries will remain responsible for the operation and maintenance but will outsource the day to day activities under a management contract on a competitive basis to a private firm which will be required to establish a local outlet in the region.

- *Working with independent grid concessionaires* to provide electricity to those willing to lease-purchase a solar PV system. The systems will be procured on a batch basis by the concessionaire following minimum technical specifications. The size of the batch depends on the total number of households to be served under the concession. It is expected that the solar systems will be least cost for 10% of the households in the communities (those with no access to isolated grids). The concessionaire will be responsible for maintenance during the lease period. After the lease period, it will provide the after sales service on a commercial basis through its regional office. Co-financing GEF grants will be provided on a Watt-peak (Wp) performance basis and will be in addition to the IDA subsidy funds provided through the bidding process.

- *Working with dealers* to provide electricity to isolated households that have the capacity to pay for these services either on a cash or credit basis. The procurement will take place under normal commercial practices where the qualified dealer will purchase the system – mainly solar PV -- on a competitive basis on the open market. Systems supported by the program need to comply with technical specifications. Dealers will need to be qualified by the program which will include a business plan as well as an approval from a commercial bank for debt financing. Co-financing GEF grants will be provided on a Wp basis.

- *Working with EdM and DNE* to ensure that renewable energy generation is open for supply in the same way as other technologies by supporting the development of a standardized small power purchase agreement. Procurement of the systems will be done by the project promoters making use of normal commercial practices, on a competitive basis on the open market. Project

promoters will need to be qualified by the program which will include a business plan as well as an approval from a commercial bank for debt financing. Co-financing GEF grants will be provided on a Wp basis.

Technical assistance. The technical assistance program will support the objective of creating a sustainable market for renewable energy systems. Any barrier for achieving the objective that is identified by the local key stakeholders or individual participants in the program and for which a resolution is proposed could in principle tap into two technical assistance windows. The first is a cost-shared financing window which will require a twenty to eighty percent contribution of the company. The trigger for support will be the clearances of: (i) an independent two person panel; and (ii) FUNAE. The second is a full-cost coverage window which focuses on the "bigger picture issues" that are constraining the rate of growth of the industry. The trigger will be the clearances of: (i) an independent panel; (ii) three practitioners in the sector; and (iii) FUNAE. Greater emphasis will be on cost-shared activities, with full-cost activities only rewarded in exceptional cases. Several activities for both windows have been identified during preparation (see also Annex 2).

Investments. This component will provide support for investment in renewable energy activities in two ways. The first way is through a *performance based co-financing grant facility*, managed by FUNAE. The co-financing grant will be disbursed after the systems have been installed satisfactorily, and written proof of this with the client's signature has been provided to FUNAE. Complementary financing for the investment projects will be raised through private equity and debt financing. A World Bank-supported private sector development project (PODE) already provides debt financing to local businesses and entrepreneurs and it has indicated interest in financing private sector-led energy investments. It is estimated that 2,500 individual household systems and 1.5 MW in grid-connected renewable energy systems will be supported during the first phase of the Project. The second way is through IDA support to the line ministries of Health and Education for the installation of 300 institutional systems as detailed in Annex 2. The energy systems for these ministries will be supplied and maintained by the private sector. The ministries will be responsible for covering the recurrent costs of the operations.

D. Institutional Strengthening and Capacity Building

This component aims to strengthen the energy institutions under the Ministry of Mineral Resources and Energy (MIREME) by delineating their responsibilities and appropriate coordination mechanisms to ensure their optimal working relationships. Furthermore, it aims to provide both on-the-job and classroom training to staff in the energy institutions, and support preparation of the second phase of the program.

The project will help operationalize CNELEC, whose role is to provide legal advice on energy concessions and to mediate in the case of disputes. It will complement support by donors, such as USAID, to transform CNELEC into an independent regulator over the first phase of the program. The support will be in training as recommended by the Institutional Diagnostic report, once the staff has been recruited, and the provision of a resident advisor in mediation, legal and contractual matters to assist in the operationalization process. In order to transform CNELEC into a regulator, the project will support consultancy services to assess the steps required, including changes to the Electricity Law of 1997.

To strengthen environmental management capacity necessary for the effective implementation of the investment components, the project will support the establishment of the environmental unit already envisaged in DNE's organizational structure, and that recently established in EdM. It will support training of members of the unit and other staff involved in the project, who will be responsible for

ensuring that environmental considerations are incorporated into all project components. It will also finance a technical advisor who will help set up the unit and provide on-the-job training to local staff.

To assist the Government in negotiating concessions and contracts for mega-projects, the project will support technical assistance required for the Gas Pipeline project, expansion of the local gas market, as well as other projects currently under discussion, including coal and hydropower.

PHASE 2

The triggers for Phase 2 will be linked to the accomplishment of the objectives of Phase 1, and comprise the following *(GEF-related triggers are presented in italics)*:

- Operationalization of CNELEC and its transformation into a regulatory body.
- Separation of EdM's core functions of Distribution, Transmission and Generation and implementation of a private participation option in EdM's Distribution business, with independent management control.
- Successful completion of at least three independent grid concessions, one of which will be based on a renewable energy source, and another be bulk-supplied from the national grid.
- *Successful sustainable operation of at least two solar PV dealers that have been supported under the first phase of the program.*

The creation of a regulatory body will be required for any of the Phase 2 components to be triggered, whereas the other three triggers will each be for the corresponding Phase 2 components.

Phase 2 will comprise scale-up of the investments commenced in the first phase, using the most appropriate delivery mechanisms, as determined in the first phase. The activities specific to renewable energy will follow from those initiated in the first phase, and consist of building in-country capabilities, resource data dissemination, continuing dissemination and promotion of international best practices, and scaling up. For the cross-sectoral links, it is expected that two more provinces will be included in Health and Education and links to the Water sector will be included. Transmission rehabilitation and expansion will be included for the newly-created Transmission company and OBA for the public/private Distribution company.

C. Program and Project Description Summary

1. Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

PHASE 1

Project activities will be clustered around the following five main components: (i) Power Sector Reform; (ii) Grid Electrification; (iii) Independent Grids; (iv) Renewable Energy and Cross-Sectoral; and (v) Institutional Development and Capacity Building.

	Indicative		Bank	% of	GEF	% of

Component	Costs (US$M)	% of Total	financing (US$M)	Bank financing	financing (US$M)	GEF financing
1. Power Sector Reform 1.1 Private Sector Participation in EdM's Distribution and Supply business (4.12) 1.2 EdM Transco Creation (2.00)	6.12	7.5	2.65	6.6	0.00	0.0
2. Grid Electrification (41.00) 2.1 Peri-urban Investments (38.00) 2.2 Technical Assistance (3.00)	41.00	50.3	17.35	43.1	0.00	0.0
3. Independent Grids 3.1 Independent Grid Investments (15.00) 3.2 Technical Assistance (1.38)	16.38	20.1	10.60	26.3	0.00	0.0
4. Renewable Energy and Cross-sectoral 4.1 Cross-sectoral investments (2,47) 4.2 SHS - grid concessionaires (0.72) 4.3 SHS - dealers (0.98) 4.4 Grid connected renewable energy (1.80) 4.5 Technical assistance (3.58)	9.55	11.7	4.12	10.2	3.09	100.0
5. Institutional Strengthening & Capacity Building 5.1 Regulatory Studies & CNELEC Advice (0.90) 5.2 Training (0.50) 5.3 Motor Vehicles and Office Equipment (0.35) 5.4 Project Coordination, M & E (1.40) 5.5 Preparation of Phase 2 (0.60) 5.6 Environmental Management (0.76) 5.7 Mega-projects TA, including Natural Gas (3.86) 5.8 Audits (0.1)	8.47	10.4	5.54	13.8	0.00	0.0
	0.00	0.0	0.00	0.0	0.00	0.0
Total Project Costs	81.52	100.0	40.26	100.0	3.09	100.0
Total Financing Required	81.52	100.0	40.26	100.0	3.09	100.0

Phase 2

Component	Indicative Costs (US$M)	% of Total	Bank-financing (US$M)	% of Bank-financing
1. RE Investments (Independent Grids & Grid-based)	40.0	47.1	17.2	38.2
2. Transmission Rehabilitation & Expansion	25.0	29.4	18.0	40.0
3. Renewable Energy and Cross-sectoral	13.2	15.5	5.8	12.9
4. Institutional Strengthening & Capacity Building	6.8	8.0	4.0	8.9
Total Project Costs	85.0	100.0	45.0	100.0
Total Financing Required	85.0	100.0	45.0	100.0

2. Key policy and institutional reforms supported by the project:

The key reforms aim to facilitate and accelerate private sector involvement in provision of modern energy, especially to the rural population. They consist of: (i) operationalization of CNELEC and its transformation into an independent regulator over the first phase of the program; (ii) the involvement of the private sector in EdM Distribution; (iii) the involvement of the private sector in new Distribution concessions -- both isolated and grid-based; and (iv) removal of barriers for renewable energy development.

Key to success of the program is the policy change that allows explicit subsidies to be provided to private sector-led operations for schemes that would not otherwise be financially viable, and for the majority of such subsidies to be output-based.

3. Benefits and target population:

The project will target rural and peri-urban communities. The grid-based intensification component will cover most provinces, whereas the candidate sub-components so far earmarked for the independent grid and renewables components cover the provinces of Cabo Delgado, Nampula, Inhambane, Tete, Zambezia and Maputo.

Being one of the most sparsely populated and poorest countries in Africa, the expansion of modern energy supply in rural Mozambique poses a major challenge, and selectivity is important if economic viability and sustainability are to be ensured. During preparation, surveys were carried out to assess household incomes and the peoples' willingness to pay for electricity. The surveys included six peri-urban areas, currently without any form of electricity supply, in Tete and Maputo. The results in these areas showed an average monthly household income of US$58 and a willingness to pay of about US$5 per month. On the other hand, in areas with some form of electricity, but where supplies are not continuous or are unreliable, such as North Inhambane, Mocimboa da Praia, Malema, and Morrumbala, it was found that customers actually pay between 10 and 20 US cents per kilowatt-hour or a flat monthly rate of US$10, yet the average monthly household incomes are about the same (US$60). In the more rural areas, (Derre in Zambezia and Quixaxe in Nampula were surveyed) the average monthly household income was found to be US$15. Although those surveyed said they would be willing to pay between

US$3.50 and US$7.50 per month for electricity, their actual average expenditure on lighting was found to be only US$0.89. In such areas the benefits will be indirect, via rural public institutions such as health clinics and schools. Other major beneficiaries will be commercial and industrial enterprises in the areas to be electrified, including Mozambican businesses that will participate in the electricity supply business.

The benefits of the project are therefore: (i) improvements in the productivity and quality of life for communities that directly get electricity access (400,000 rural and peri-urban dwellers in the first phase and 1 million over the life of the program); (ii) improvements in the quality of life of households that get electricity access indirectly via rural public institutions such as health clinics, schools, and via public lighting (this is estimated to amount to at least double the number of those with direct access); (iii) increases in the viability of small and medium rural enterprises who use electricity in their operations; and (v) improvement in the quality of governance (by Government agencies and energy parastatals).

The global benefit will be the displacement of about 440,000 tons of carbon dioxide over an 8-year life by replacing kerosene, diesel and gasoline use by solar, mini- and micro-hydro-based electricity, yielding a cost-effectiveness of US$14 per ton.

4. Institutional and implementation arrangements:

Core at the implementation of the program are the community leaders, private developers, local entrepreneurs, rural community groups, and other organizations that directly interact with the rural poor the program is aiming to serve. To facilitate the involvement of these group, the following institutions have an implementing responsibility within the Project: DNE, FUNAE, EdM, Ministry of Health (MISAU) and Ministry of Education (MINED). PODE, even though not a formal signatory to the project, is a critical partner in providing debt financing as well as technical assistance funds for private parties.

DNE will be responsible for overall coordination, through a Project coordination Unit (PCU). It will facilitate regular meetings with all involved stakeholders as well as liaise with the inter-ministerial committee on rural development (chaired by the Minister of Agriculture). In addition, it will have primary responsibility for implementing the off-grid and renewable components. The coordination unit will complement the day-to-day duties of DNE and FUNAE, in particular with facilitation of the market development process as well as administration and other fiduciary requirements. In line with the objective of building capacity within the energy institutions, priority will be given to utilizing existing and new regular staff for the coordination work. However, due to shortage of such staff, it will be necessary to also employ external staff to be dedicated to the project.

DNE will also implement the technical assistance components concerning DNE, FUNAE and the other Energy institutions (excluding EdM), and Power Sector Reform.

A key issue that needs to be resolved during the first phase of the APL is the level of implementation authority that will remain within DNE. Over time its mandate clearly states that it will focus on policy, strategy and coordination of energy in the country. It will facilitate the implementation and allow the financing of projects to be the full responsibility of FUNAE and commercial financiers.

FUNAE will have primary responsibility for operating the MECS. In coordination with DNE, it will: (i) identify potential activities for implementation under the Project, and make such information publicly available; and (ii) use the information obtained to identify area concessions to be let out to bid, with the

support of a transaction advisor, and a trust agent that will disburse the subsidies to project sponsors on achievements of the agreed outputs..

MISAU and MINED (through existing PIUs) will be the lead agencies for the cross-sectoral component, and they will be provided technical support by DNE and the PCU.

EdM (through its PCU) will implement the Grid Intensification component and provide support to DNE on the Power Sector Reform component.

PODE may provide credit for investments to and support technical assistance required by the private sector (concessionaires and dealers).

Financial Management

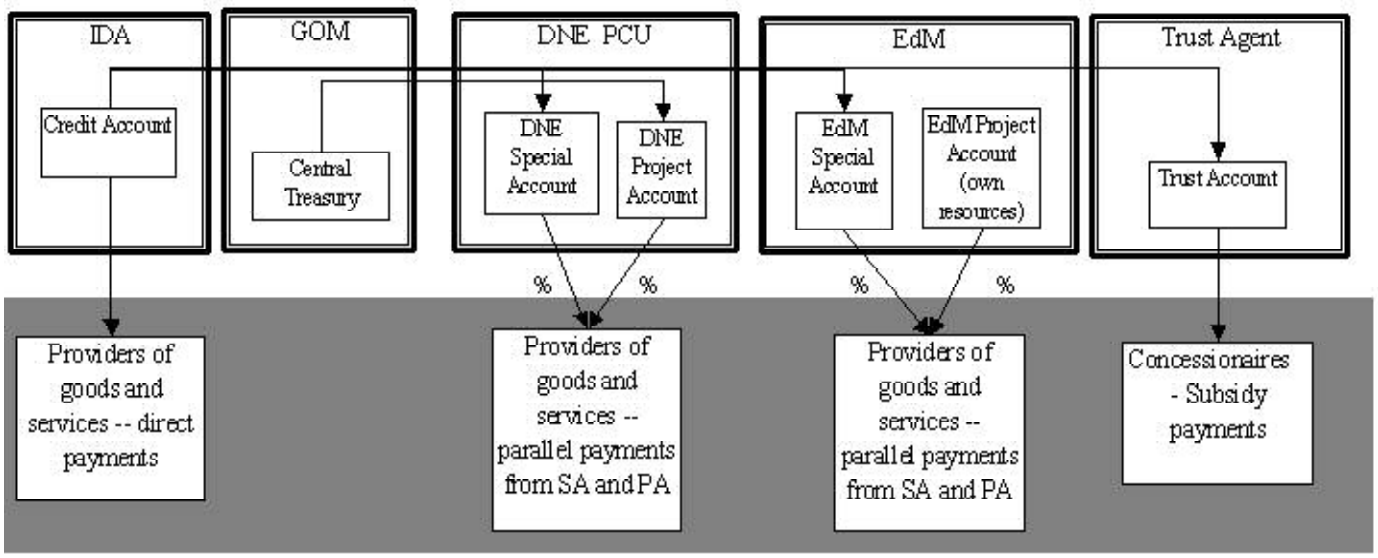
The principal objective of the Project's Financial Management System (FMS) will be to support management in their deployment of limited resources with the purpose of ensuring economy, efficiency and effectiveness in the delivery of outputs required to achieve desired outcomes, that will serve the needs of the people of Mozambique. Specifically, the FMS must be capable of producing timely, understandable, relevant and reliable financial information that will enable management to plan, implement, monitor and appraise the Project's overall progress towards the achievement of its objectives.

Relevantly qualified, experienced and independent auditors will be appointed on approved terms of reference. The external audit will cover all World Bank funds and Counterpart funds at all levels of Project execution.

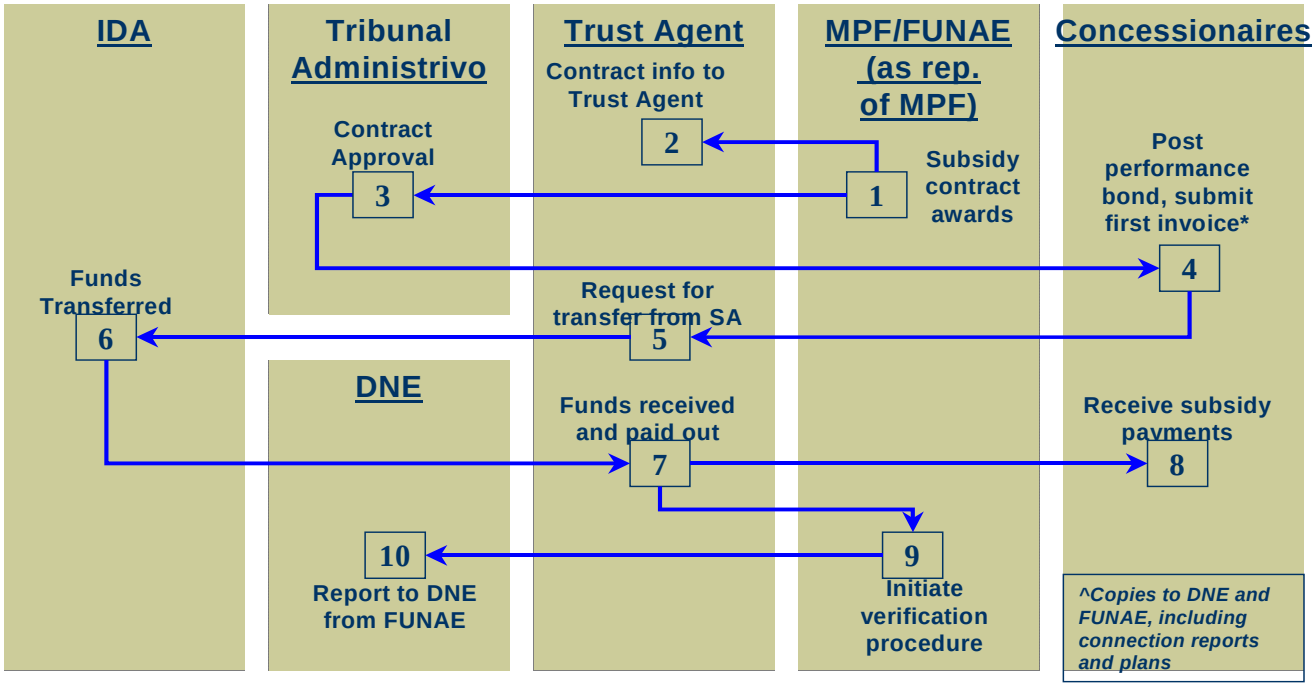
Disbursement Arrangements and Flow of Funds

World Bank credits in Mozambique are generally controlled through separate bank accounts (Special Accounts {SA}), each managed by a Project Coordinating Unit (PCU). In World Bank credit management in Mozambique, GoM agrees to open separate Project Accounts (PA) where counterpart funds are deposited in agreed amounts and managed by the PCU to fulfill counterpart financing requirements.

This Project will adopt the SA and PA structure. IAs will manage Special Accounts and Project Accounts for counterpart funds. The following chart illustrates the banking and flow of funds arrangements for general project management.



The additional chart below shows the flows of funds for the subsidy mechanism disbursed by the Trust Agent.



The Government will on-lend part of the *IDA* Credit (about US$17.35 million) to EdM to implement the Peri-urban Electrification component. It will provide US$1.2 million for the Cross-sectoral components implemented by MISAU and MINED and US$9.25 million for the Sector Reform, Institutional Development and Capacity Building components implemented by MIREME. The balance of the Credit will be administered by FUNAE and DNE (through a Trust Agent) for the MECS.

The *GEF* Grant (US$3.09 million) will be administered by FUNAE (through a Trust Agent) and renewable energy developers will be able to draw on the Grant on an output basis. The Grant will also be available for specific technical assistance with respect to the Renewable Energy component.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

The option of pursuing only the conventional rural electrification approach – national grid extensions over long distances to serve very small demands under a regime of uniform national tariffs (and thus heavy implicit cross-subsidies) -- was rejected for the reason that such investments are unsustainable.

The option to limit the project strictly to technical assistance and institutional strengthening for sector reforms and postponing investment financing to a later date was also considered and rejected, mainly because Mozambique is further along the reform process than most other countries, having achieved the legislative change for demonopolizing the electricity business and permitting private sector participation. GoM has also passed the secondary legislation for competitive award of electricity concessions. The stage has been set for pursuing the next round of reforms -- in a "learning by doing" manner, finance both EdM as well as non-EdM investments as the rules for cost-based tariffs are devised and implemented, and implicit cross-subsidies are gradually replaced by "smart" subsidies.

The option of a Learning and Innovation Loan (LIL) was considered, but found unsuitable for an environment where one of the main imperatives is policy changes for sector reform and capacity building in both public and private sectors. In addition, the smaller size of a LIL would have made it difficult to exploit the economies of scope in an operation that included components related to investments in electrification, and technical assistance to support sector reforms and institutional strengthening.

The option of a Sector Investment Credit was also considered. It was found less appropriate for the required long-term engagement by the Bank, to lay foundations for accelerated access, adopt the most appropriate delivery systems through the process of learning by doing, and commence to make significant progress on access expansion.

2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed			
Rural Electrification	Ghana National Electrification (P000953)	S	S
Urban & Rural Energy	Mozambique Urban Household Energy	S	S
Solar PV	Indonesia Solar Home Systems (P035544)	U	U
Renewable Energy	China Renewable Energy (P046829)	S	S
Rural Energy	Laos Southern Province Rural Energy	S	S
Rural Energy, Renewable and Isolated Grids	Uganda Energy for Rural Transformation (P069969)	S	S
Rural and Renewable Energy	Sri Lanka Energy Services Delivery (P076702)	HS	HS
Other development agencies			
Rural Energy	Mozambique Energy Sector Program Support -- DANIDA		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

3. Lessons learned and reflected in the project design:

Main-grid based rural electrification. In recent years, development agencies have supported few utility-executed main-grid rural electrification projects, primarily because of the generally poor past performance. In Africa, few power utilities have had any significant success in rural electrification. In general, grid-based rural electrification executed by state-owned power utilities, coupled with a uniform national tariff to cross-subsidize rural consumers, as has been common in the Bank's client countries, rarely delivers any significant development impact. It frequently leads to extension of the grid to rural areas, but without actually connecting any significant number of households or small and medium enterprises or providing reliable services. Thus, one of the key lessons is that it is best to shift to commercially-oriented rural electrification, employing cost-based, regionally differentiated distribution tariffs that provide market signals for expansion and scale-up. One implication of this approach is that subsidies should be directed at expanding access – they should finance initial capital costs rather than consumption, which tend to limit benefits to a privileged few "first-comers". The project's design thus provides for capital subsidies, which will be mainly output-based.

A second key lesson is that it is possible to reduce the costs of rural electrification significantly with little, if any, loss in quality of service. The standards and procedures utilized by most power utilities are mostly too costly for rural or peri-urban conditions, and often reflect past practice in developed countries. It is possible to introduce lower-cost technical standards and operational procedures that have already been tested and found acceptable in other places in the world, including some countries in Africa, such as

Ghana and South Africa. However, state-owned utilities are frequently unenthusiastic about such changes. Greater reliance on the private sector or some incentives to the utility, is therefore required. Studies on low-cost electrification have been conducted during preparation, with the full engagement of EdM, and it has been established that a reduction in capital cost of at least 20% is possible. Experts on specific low-cost technologies have also made presentations to EdM staff. EdM has agreed to adopt the recommendation of the studies in the detailed project design, for which implementation will be through supply and installation contracts instead of force account.

Independent grids. This is still an emerging option for rural electrification, with only limited experience available, which has so far been favorable. In any case, it is clear that in a number of circumstances, independent mini-grids are not only lower cost than grid extension, but also that Government find it easier to permit cost-based tariffs for these mini-grids. Here also it is important to introduce lower cost designs, technical standards and operational procedures, so that the cost-based tariffs are affordable for a larger segment of the population. Consultations with Mozambican and foreign private companies has suggested that with the sector reforms and regulatory approaches contemplated under the proposed project, they would be interested in equity and debt participation if the "rules of the game" provide sufficient incentives and protection against risks. Experience in other parts of the world has shown that even in the absence of a regulatory and financing framework, small-scale entrepreneurs often do engage in electric service business to serve small loads, provided the supply and financing chains for equipment and fuel exist, and there is little risk of confiscation by the Government.

***Solar PV systems*.** It is clear that solar PV systems are technically suitable for, and workable in, the rural areas of developing countries, where grid supply is not available. However, prices in Africa remain far higher than in Asian countries, where systems that meet international standards (such as those specified in Bank-supported projects) are available at prices that are up to 50% lower. Thus, better linkages between Asian and African markets would reduce prices in Africa.

Another key lesson is that significant resources are required initially to lower the barriers that impede greater use of solar PV systems. These include, for instance, preparation of standardized small power agreements, resource assessments, preparation of business plans, training for technicians and managers, preparation of technical standards and general awareness creation. At the same time, these "upstream" activities, if carried out in isolation and without links to actual investments, do not lead to market development. To the contrary, a viable investment financing program helps "learning by doing" and improves the quality and impact of such "upstream" activities.

Different institutional models have been used in disseminating solar PV systems, among them: the *vendor* model in which the end-user (e.g., household) owns the system and after-sales service is provided by the vendor, the *fee for service* model, in which an energy service company owns the system and the end-user simply pays a periodic (e.g. monthly) fee for the energy provided, and the *institutional model*, in which line ministries own the systems and operate and maintain them through service contracts with the private sector. The vendor model has been used in Bank-supported projects in Asia, the fee-for-service model has been used in Bank-supported projects in Argentina and Laos, and the institutional model has been used in Uganda. In sub-Saharan Africa, the vendor model has emerged spontaneously in countries such as Kenya, which has a vigorous solar PV market, and Zimbabwe, while the Government of South Africa has opted for a fee-for-service model. The project design allows for either model to be used as appropriate. The fee-for-service model in an adjusted format -- with transfer of ownership after about three years from the concessionaire to the household -- may be adopted where concessions are awarded for independent grid supply. The vendor model could be adopted in parts of the country where extension of the (mini/main) grid is not feasible. The institutional model will be used in remote areas where

(main/mini) grid extension is not viable and a certain density of schools and health clinics allow for a rural business anchor for the solar dealers.

4. Indications of borrower and recipient commitment and ownership:

The Government has accepted the recommendations of the Private Sector Participation in Energy study, upon which a major part of the project is designed. It had also endorsed private sector participation in EdM's distribution and supply business. Furthermore, consultations for the solar PV component elicited considerable interest from the Mozambican NGOs active in rural development.

5. Value added of Bank and Global support in this project:

One of the main contributions of the Bank to this project is its ability to function as a "knowledge bank". This brings to Mozambique fresh approaches to solving its problems, taking account of Mozambique's current situation and growth potential, while incorporating the experience of and key lessons learned in other countries. Much of the sector reform work to date – preparation of 1997 electricity and petroleum laws, concessioning decrees and national energy strategy – has been financed by the Bank. Looking forward, the Bank's knowledge assistance will be geared at fostering a consensus among the various stakeholders toward new approaches to sector development and maximizing aid effectiveness, in order to achieve a broad, sustainable development impact of aid-financed investments.

A second major contribution of the Bank will be in donor coordination - by providing donors with effective grant funding channels *and* building selective cross-sectoral partnerships in the context of the Poverty Reduction Strategy Paper. Such cross-sectoral activities are planned to be targeted at helping meet the energy needs of rural health and educational facilities and improving the quality of social services delivery.

The GEF's value-added goes beyond the grant support provided by it. While there have been a number of donor-supported renewable energy activities in Mozambique, their impact has been generally limited to the actual projects supported. GEF's support will make it possible to develop a more programmatic approach, within which individual projects could be developed.

E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

1. Economic (see Annex 4):

○ Network operation did not complete in a reasonable amount of time; please retry NPV=US$26 million; ERR = 27 % (see Annex 4)

The economic analysis was conducted separately for the representative components described in Annex 2: (i) EdM grid based electrification; (ii) independent grids; and (iii) solar PV. The analysis confirms that the components are justified for financing as the present value of their net benefits are positive. A quantitative risk analysis indicates that the results are robust to changes in key assumptions and that the risk of failure is at an acceptable level. For instance, the probability of a positive NPV of the project's largest component - the EdM grid-based electrification - is about 90 percent.

1. EdM grid-based electrification

This component will connect about 61,000 new residential consumers in 265 sites to grid supply. The sites are a mixture of peri-urban neighborhoods close to the provincial capitals and larger rural villages close to larger towns. Out of the total number, at least 40,000 consumers will be

connected by the end of year 2006. EdM cannot currently connect these consumers due to lack of network extensions. As EdM's electricity supply is already available in close proximity to these neighborhoods, the required investments consist of distribution network extensions and reinforcements at the economic cost of less than US$700 per connection. The estimate of the average incremental cost of supply is about US$0.065/kWh.

EdM, in collaboration with COWI Consultants, selected the neighborhoods to be electrified using the following criteria:

- The site is close to an existing electrified area.
- The site has a sufficient number of potential consumers who are interested in a grid connection.
- The site has a promising socio-economic profile when compared with already electrified sites with respect to income levels and economic development potential.

The economic benefits consist of the incremental electricity sales to new residential consumers the project investments make possible. The analysis calculates the value of the benefits for new household connections as the area under the consumers' estimated demand curve for electricity services. Since the true shape of the demand curve is not observable, the benefits are valued on the assumption of a semi-log demand curve of the form: Q=A+B*lnP that passes through two known points: the lower case point represents the substitution of existing methods of lighting and is a saving in resource costs. Field observations indicate that the majority of unelectrified households use kerosene for lighting and that they use the equivalent of between 12 and 24 kWh per month at an average cost of US$0.21 per kWh. The upper case point is the consumption rate of an electricity consumer at the EdM tariff plus VAT. To take into account the income effect, the analysis estimates the benefits separately for households with three income levels – low, medium and high. The economic investment cost is about US$38 million.

The cost benefit analysis confirms that the planned investments are justified for financing. The expected EIRR is 27 percent, which is above the estimated opportunity cost of capital of 12 percent. The table below shows that the results are not overly sensitive to changes in the main assumptions. The risk analysis, discussed below, confirmed the robustness of the economic return. Annex 4 discusses the details of the analysis.

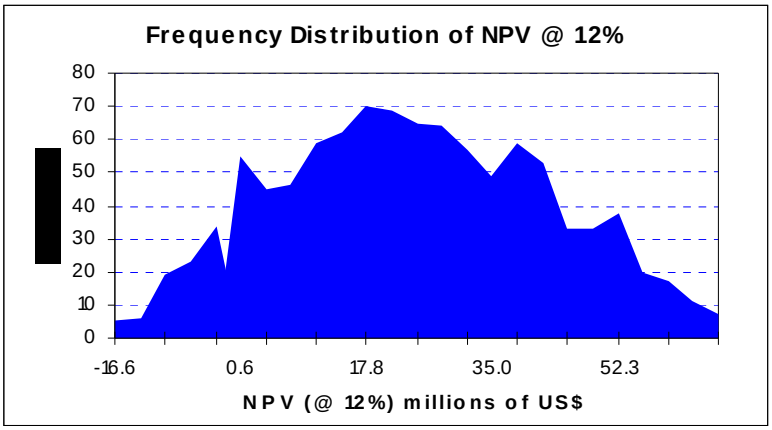
Expected EIRR	27%
+20% investment cost & -20% less connections	17%
Monthly average consumption per connection not exceeding 90 kWh	16%

Risk Analysis

The quantitative risk analysis of the EdM component assessed the impact on the component's economic returns of uncertainty in underlying assumptions and predictions. To deal with this uncertainty, the analysis assigned probabilities to the values of the key variables. The key variables and the probabilities of the values these variables will assume in the future, emerged from the Bank's and Government's estimates. These include: (i) the level of electricity consumption of new connections; (ii) project cost estimates; (iii) international oil prices; and (iv) scheduling. The stochastic nature of the project's outcome was modeled using a commercially available risk analysis program. The model determined the expected EIRR and NPV with their

probability distributions through a "Monte Carlo" simulation process. Chart 1 below shows the resulting probability distribution of the expected NPV.

Chart 1. Frequency Distribution of NPV.



The risk analysis indicates that the range of the NPVs is rather broad, ranging from a negative US$16 million to a positive US$52 million with an expected value of US$26 million. This broad range reflects the impact of the demand projections and project cost estimates. However, the analysis validated the robust economic return of the EdM component and indicated that reasonable changes in the key variables and assumptions pose small risks to achieving the project's benefits. The probability of a positive NPV (at 12%) is about 90%.

Variations in the viability of the individual sites. The COWI consultant's analysis revealed wide variations in the viability of the selected sites, mainly because of expected electricity demand. The consultant concluded that out of the 265 sites, 184 sites would be clearly financially viable on the basis of financial costs and EdM's current tariffs.

Since it was not possible for the appraisal mission to visit all the 265 sites or carry out a separate economic evaluation of each of them, it was agreed with EdM and the Government that the economic evaluation would be done for the combined component. This approach will average the costs and benefits of the sites and may result in cross-subsidization among them. Both EdM and Government are comfortable with the potential cross-subsidization.

To approximate the extent of the cross subsidization, the mission estimated separately the economic viability of some of the least financially viable sites. For instance, the Chiduachine neighborhood in Chokue resulted in an EIRR of 10 percent and the Mutivaze site in Nampula in an EIRR of 8 percent. These are clearly below the estimated opportunity cost of 12 percent for Mozambique. These are also some of the smallest among the 265 sites with a total estimated investment cost of less than US$200,000 (the total investment cost of the 265 sites is about US$38 million).

2a. North Inhambane Mini-Grid

The project supports the concessioning to a private operator of the three existing mini-grids in the towns of Vilankulos, Inhassaro, and Nova Mambone in the North Inhambane Province. All three

systems use natural gas to generate electricity and require additional investments in generating capacity and network extensions in the near future. The demand in Vilankulos already exceeds available capacity, while the demand in Inhassaro and Nova Mombane is forecast to exceed the installed capacity in the coming years.

The existing mini-grids, which have been in operation since 1998 in Vilankulos and Inhassaro and since 2001 in Nova Mombane, supply 333 households and 267 commercial enterprises. There is significant potential for increased electricity sales in the area, which is rapidly developing its tourism potential and fish processing industries. Currently, 132 households and 39 commercial enterprises are waiting for a connection. In the absence of adequate mini-grid supply, industries and commercial enterprises operate their own costly diesel generators. There are several reasons why the mini-grids have not been able to meet the consumers' demand for electricity: (i) supply capacity constraint because FUNAE has been unable to finance system expansion; and (ii) the deficient incentive structure of the mini-grids' present contract operator: the increased electricity sales raise the operator's revenue only marginally although the operator incurs additional costs related to new connections, such as meter reading and billing.

To increase access to electricity and to improve operational efficiency, the Government has decided to invite private firms to bid for the operation and expansion of the mini-grids. The Government prefers a centralized generation option with a 3 MVA gas turbine in the Temane natural gas field to supply the nearest towns - Vilankulos and Inhassoro - as this option is least-cost when compared to the alternative of retaining the two decentralized supply systems. Nova Mambone will be part of the concession but will continue to be supplied locally. The design of the proposed concession contract will provide adequate incentives for access expansion.

The affordability of electricity supply is a concern to the Government. Analyses carried out during the preparation of this project indicate that the concession arrangement may require a significant increase in tariffs for viability unless the Government is prepared to subsidize some portion of the costs. To moderate the required tariff increases while at the same time increase the attractiveness of the concession for bidders, the Government has decided to provide capital cost subsidies through output-based-aid (OBA) to the future concessionaire. The economic analysis assumes that with the OBA subsidy, tariffs could be maintained at around US$0.12-0.13/kWh (excluding VAT). The actual level of subsidy will be defined during implementation, on the basis of bids received.

The project's goal is to connect 2,500 new customers; increasing the total number of customers to about 3,100. This will lift the electrification rate of households in the three towns from the current 5-6 percent to more than 30 percent. The total economic investment cost is just above US$4 million.

The Bank's economic analysis calculates the component's EIRR at about 17 percent, which is above the estimated 12 percent opportunity cost of capital in Mozambique. The NPV is just above US$1 million.

2b. Mocimboa da Praia Mini-Grid

The economic activities of Mocimboa da Praia - the administrative and economic center for the districts in the north of Cabo Delgado Province - focus on fishing and seafood processing. These sectors, along with tourism are said to have a large development potential. The town has 10 large

industrial and commercial establishments with their own diesel gensets. Of the town's 6,400 residential houses, 143 obtain electricity supply from the Municipality, which operates a 15 year old diesel generator. Supply is limited to 4 hours per day, typically from 6 p.m. to 10 p.m. The generator cannot provide reliable supply during 24 hours and the supply is also not sufficient to meet increased demand. Electricity use is not metered and the annual tariff revenues do not cover the system's operation and maintenance costs.

The project will support the concessioning of the Mocimboa da Praia mini-grid to a private operator. Initially, the operator will upgrade the thermal generating capacity and the distribution network to supply new customers. Later, in around the year 2009, the mini-grid will connect to the EdM grid supply, while maintaining the diesel generator for back-up purposes. This is the only feasible option available for the town to increase grid supply.

The project's goals are to connect the existing large industrial and commercial establishments to the mini-grid to reduce their cost of electricity, increase the number of residential electricity connections from the current 143 to about 2,000 by the year 2015, and connect new industrial and commercial consumers to strengthen the area's economic expansion. The household electrification ratio will increase from 2 percent to about 23 percent in 2015. The economic investment cost is about US$1.4 million.

The EIRR at about 20 percent and the NPV (@12% discount) at around US$0.5 million are acceptable and justify the investments for financing.

3. Solar PV

This component will install 1,600 solar home systems of 40 Wp capacity and 900 small mobile systems of 12 Wp capacity. The project will subsidize the cost of the systems through a GEF grant that will amount to US$2.6 per Wp. There will be no additional Government subsidies.

Studies in countries such as the Philippines and elsewhere find that solar PV systems can be the least cost solution to providing basic electricity services for lighting, communications, and other household needs in areas with dispersed populations and remote from the grid. The economic benefits include: (i) the avoided costs, in which the economic costs of the PV system are compared against the economic costs of substitutes (kerosene, battery charging, etc.) that the PV systems replace; (ii) the gains in consumer surplus; and (iii) environmental benefits.

The economic analysis of the solar homes component of this project shows high economic returns. The ERR and the NPV (@12%) for the 40 Wp solar home systems, are estimated at about 27 percent and US$286,000 prior to consideration for environmental externalities. These results are consistent with estimates for similar projects in other countries. They reflect the high willingness to pay for the improved levels of lighting service, and the significantly higher levels of radio listening and TV viewing.

A sensitivity analysis showed that the results are robust to reasonable changes in the values of the key variables. A switching value analysis indicated that the initial system cost and the cost of replacement parts (battery, controller, and light bulbs) would have to increase by 40 percent for the project's benefits to evaporate. Overall, this component has few implementation risks. With 1,600 systems as the goal, the risk for overestimating the market size is small. The risk of the GEF supporting uneconomic investments is small since GEF subsidies are linked to the actual

installation of the systems after the customer has revealed its willingness to pay for the system with an out-of-pocket down payment.

2. Financial (see Annex 4 and Annex 5):
NPV=US$ 1 million; FRR = 13 % (see Annex 4)

The above FRR is for the EdM grid intensification component, the largest project component. There is a 60 percent probability that the FRR will exceed 12 percent.

Past Performance of EdM

EdM's financial performance for the past 4 years (FY1998 to FY2001) is shown in the attached tables. The company achieved favorable operating income both in 1999 and 2001. The year 2000 was atypical for EdM, because the heavy flooding that devastated the country had a direct impact on the overall performance of the company. It not only caused prolonged outages of power lines and substations and therefore loss of electricity sales, but also caused considerable damage on its fixed assets, therefore increasing maintenance and repair costs. These repairs had to be extended through 2001 and part of 2002.

Income Statement

US$ thousand

	1998	1999	2000	2001
Average Exchange Rate (000' MT/US$)	10	13.2	17	23
Operating Revenues	**79,353.5**	**65,468.3**	**60,623.8**	**54,742.1**
Electricity Revenues	78,481.8	64,717.0	60,196.0	53,985.4
Other Revenues	871.7	751.2	427.8	756.7
Operating expenses	**81,234.9**	**63,918.4**	**62,545.4**	**53,857.7**
Purchased Energy	12,000.0	8,518.5	11,142.5	8,669.7
Fuels	6,000.0	3,540.0	5,192.0	5,223.1
Materials and Equipments	6,407.9	4,055.2	5,296.4	4,740.7
Personnel	14,411.3	15,023.9	13,080.8	13,048.7
Maintenance and Services	12,065.6	9,567.1	7,296.3	7,439.7
Other	2,377.3	2,183.4	3,722.5	3,103.5
Depreciation	27,972.8	21,030.4	16,814.9	11,632.3
Operating Income	**(1,881.4)**	**1,549.8**	**(1,921.6)**	**884.4**
Extraordinary Result	13,483.1	6,776.6	843.3	14,344.6
Other Income	840.8	334.7	866.5	682.2
Extraordinary Profit (Loss)	(6,298.6)	(3,453.1)	(2,617.3)	(3,000.1)
Income Before Interest and Taxes	**(7,339.2)**	**(1,568.6)**	**(3,672.5)**	**(1,433.5)**
Interest	**3,006.9**	**3,288.0**	**3,408.6**	**4,339.0**
Interest During construction	0.0	0.0	0.0	0.0
Operating Interest	3,006.9	3,288.0	3,408.6	4,339.0
Income Taxes	641.6	174.5	264.1	86.8
Net Profit	**(10,987.7)**	**(5,031.1)**	**(7,345.2)**	**(5,859.2)**
Prior Year Results	0.0	(92.7)	(221.2)	(675.5)
Profit (Loss) for theYear	**(10,987.7)**	**(4,938.4)**	**(7,124.0)**	**(5,183.7)**

	US$			
	885.4	996.2	1013	1074
	88.6	65.0	59.4	50.3

Statement of Sources and Application of Funds

	US$ thousand			
	1998	**1999**	**2000**	**2001**
Average Exchange Rate ('000 Metical/US$)	10	13.2	17	23
SOURCES				
Internal Generation	34,629.9	26,063.9	12,035.1	(4,232.5)
Income Before Interest	5,502.3	5,033.6	(4,779.8)	(15,864.8)
Depreciation	27,972.8	21,030.4	16,814.9	11,632.3
Other	1,154.8	0.0	0.0	0.0
Debt Service	3,006.9	3,310.0	3,437.4	4,371.0
Amortization	0.0	22.0	28.7	32.0
Interest	3,006.9	3,288.0	3,408.6	4,339.0
Internal Net Generation	31,623.0	22,753.9	8,597.7	(8,603.5)
Net Borrowings	21,929.1	18,750.0	24,017.6	17,404.3
World Bank	0.0	3,030.3	2,352.9	3,913.0
Other Banks	0.0	15,151.5	21,058.8	13,043.5
Others	21,929.1	568.2	605.9	447.8
Equity Contributions (including Revaluation)	0.0	13.5	0.0	1.7
TOTAL SOURCES	**53,552.1**	**41,517.5**	**32,615.4**	**8,802.6**
APPLICATIONS				
Investments	62,340.3	41,568.2	27,666.6	37,391.3
Plant In Service	43,566.3	34,090.9	11,882.4	1,739.1
Work In Progress	1,918.8	4,825.8	15,784.2	35,260.9
Financial Investments	16,855.2	2,651.5	0.0	391.3
Working Capital Increase	(8,524.6)	265.2	4,994.1	(28,750.4)
Unrealized Differences	(263.6)	(315.9)	(45.3)	161.7
TOTAL APPLICATIONS	**53,552.1**	**41,517.5**	**32,615.4**	**8,802.6**

Profitability Analysis. For over five years EdM has been constantly increasing its power sales. Sales in 1996 amounted to 662.4 GWh, 885.4 GWh in 1998 and 1,074 GWh in 2001, an overall growth of 21% or about 7% average per year from 1998 to 2001. Sales revenues (in current meticais) also increased: by some 9% from 1998 to 1999, 20% from 1999 to 2000 and 21% from 2000 to 2001. This was due both to a tariff increase of 33% in September 2001, and to a considerable increase in the number of customers from 186,000 (1998) to 212,000 in 2001. On the Operating expenses side, EdM had a sharp increase in purchased energy both in 2000 (about 77%) and again in 2001 since its own plant operation was negatively influenced by the flooding mentioned above. Personnel costs also increased by a yearly average of about 25% between 1998 and 2001; they are now at about 24% of total operating expenses. As a result, EdM only reached a modest 1% rate of return on its average assets in 2001. The income before interest and taxes (IBIT) is further influenced by "extraordinary results". This account includes donations for investments and operating costs (on the income side) and the revaluation of the debt (on the expense side). Due to a 6% inflation rate and an appreciation of the US dollar and related currencies of about 66%, in 2001, this revaluation alone was valued at 330 billion meticais, about 25% of EdM's operating revenues, and according to International Accounting Standards (IAS) had to be recognized during the current year without any possibility of shifting this burden to the following years. The yearly profit during the last years has been further eroded through increasing financial costs, while taxes had only a minor impact.

Liquidity Analysis. EdM's liquidity position has improved from 1988 to 2000, with a decrease in 2001 due to higher liabilities to suppliers and short-term bank commitments. The debt service coverage ratio was also satisfactory until 2001, when EdM had to rely on larger than average external financing and higher financial costs.

Financial Policy. EdM's financial policy, as shown in its capital structure and indebtedness indicators from 1998 to 2001, needs some improvement. Its equity situation has been eroded over the last year. Furthermore, EdM has relied heavily on foreign financing for its expansion program. Its external debt has increased by some 75% between 1998 and 2001. Although the debt/equity ratio (long-term debt/debt + equity) was kept below the 40% range, EdM's total debt (including the short-term portion) has deteriorated during this period. The number of days in receivables increased from 123 to 147 days between 1998 and 2001, and a substantial amount of the arrears are owed by Government institutions. The company took a number of administrative and managerial steps aiming at improving the collection procedures in several areas of the country. Among these is the decentralization of commercial functions, including the establishment of additional payment points.

Key Past Financial Performance Indicators

(US Dollar Values)

	1998	1999	2000	2001
I. OPERATIONAL INDICATORS				
Losses (GWh)	372.0	387.1	438.0	254.0
Technical	299.6	298.3	306.4	137
Non-technical	72.4	88.8	131.6	117
Loss Percentage	31%	32%	36%	21%
Number of employees	2,799	2,860	2,774	2,774
Number of customers	186,208	189,269	202,001	212,011
Sales (GWh)	885.4	996.2	1013	1063
Sales/employee (MWh)	4.75	5.26	5.01	5.01
Revenue/employee ('000 US$)	28.0	22.6	21.7	19.5
System load factor (%)	67	70	71	
Outage frequency				
II. FINANCIAL INDICATORS				
Contribution to investment (%)	51%	55%	31%	Neg
Average sales price (UScents/kWh)	8.9	6.5	5.9	5.1
Rate of return (%)	Neg	0.88%	Neg	0.92%
Labor/Gross plant in service(%)	6%	9%	10%	12%
Labor/Operating revenues (%)	Neg	969%	Neg	1475%
Labor/Operating Expenses (%)	17.7%	23.5%	20.9%	24.2%
Debt service coverage (times)	11.5	7.9	3.5	Neg
Debt/Debt + Equity	36%	33%	36%	41%
Indebtedness	61%	60%	77%	99%
Collection period (days)	123	129	203	147
Current ratio (times)	0.65	0.93	1.21	0.88
Working ratio (%)	33%	34%	25%	23%
Depreciation rate (%)	12.1%	11.9%	12.2%	10.7%

Future Prospects

Profitability Analysis. EdM's financial projections for the next 6 years, FY2003 to 2008 (for 2002 estimated values based on mid-year figures were used) are predicated on strong sales and sales revenue averaging about 8% per annum. This figure is consistent with past sales increases and takes into account the new connections under the project as well as predictable new large consumers. The load forecast for 2003 is somewhat distorted because of delayed (to 2004) initial sales to a large industrial consumer (MOMA). Operational expenses will follow a similar growth pattern, with the exception of fuel expenses -- a number of isolated systems in the north of the country now served by diesel units (Pemba,

Lichinga and others) are expected to be connected to the central grid by 2005. Therefore the profit before interest and taxes is forecast to increase from 5% in FY2003 to about 36% in 2008. The impact of higher costs in financing on operating profits will become more significant as the differential between profit before interest and taxes as a percentage of sales revenues is felt after 2005. The two major assumptions determining the financial projections are: (a) retail tariff increases of about 9% in real terms in the years 2005, 2006 and 2007, bringing the average tariff from the present US cents 6.7/kWh to US cents 8.7/kWh (the last value being close to the calculated LRMC of US cents 9.1/kWh for Mozambique); and (b) the large investment program of US$280 million over the period 2003-2008, with an average of almost US$50 million per year. The bulk of the investment (50%) will be in distribution, with transmission taking 32%, generation just over 3%, and studies, capacity building and other activities the remaining 15%. The distribution investment covers rehabilitation, reinforcement, as well as expansion of the network to connect new customers both in urban and rural areas, while the transmission component accounts for a number of extensions from the southern and central grids. Only small thermal generating plants are included in EdM's investment plan. Any possible major additions to the generating capacity are excluded from EdM's financial projections on the assumption that they will be implemented by the private sector. The increasing internal cash generation in the years after 2005 would allow EdM to reach high self-financing ratios until the end of the projection period, starting from a low 8% in 2003 and reaching close to 100% by 2007. At the same time, EdM's profitability (return on net fixed assets) is expected to grow from about 1% in 2003 to 15% in 2008. The following table contains both operational and financial performance indicators.

Key Projected Financial Performance Indicators

OPERATIONAL INDICATORS

	Estimate	Forecast					
Year	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Total Losses (GWh)	271.2	271.9	305.0	320.0	330.0	345.0	357.0
Total Losses (%)	18.1%	18.1%	17.4%	16.9%	16.2%	15.7%	15.0%
Non-technical Losses	150.2	150.6	175.1	189.0	204.1	220.4	237.9
Technical Losses	121.0	121.3	129.9	131.0	125.9	124.6	119.1
Number of employees	2580	2580	2580	2580	2580	2580	2580
Number of customers	229551	244000	266539	291122	292322	293522	294722
Total Demand (GWh)	1501.7	1506.0	1751.0	1890.0	2041.0	2204.0	2379.0
Total Sales (GWh)	1094.5	1094.9	1272.9	1374.0	1483.8	1602.2	1729.4
Average sales price (UScent/kWh)	6.74	6.74	6.74	7.35	8.01	8.73	8.73
Sales/employee (MWh)	4.8	4.5	4.8	4.7	5.1	5.5	5.9

FINANCIAL INDICATORS

	Estimate	Forecast					
Year	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Debt Service Coverage Ratio	0.8	1.3	2.3	2.7	3.0	3.6	4.6
Self Financing Ratio (%)	-2%	8%	34%	51%	130%	106%	51%
Operating Ratio (%)	86%	95%	91%	82%	76%	67%	82%
Current Ratio	0.75	1.09	1.50	1.33	1.75	1.74	1.33
Debt Ratio (%)	82%	89%	90%	88%	84%	78%	88%
Return on Net Fixed Assets (%)	4%	1%	2%	5%	9%	13%	15%
Labour/Net Assets in Service (%)	14%	10%	8%	8%	8%	7%	7%
Labour/Operating Revenues (%)	21%	23%	21%	19%	18%	15%	14%
Working Ratio (%)	69%	69%	65%	56%	52%	45%	56%
Depreciation Rate	8%	9%	9%	9%	10%	10%	11%
Accounts Receivable Turnover (days)	173	120	90	60	60	60	60

Liquidity Analysis. In line with its projected increasing profit performance, EdM's liquidity will also improve in the next six years to 2008. Cash balances are projected to remain about constant during the period, at the level of about one month of electricity sales, a sufficient amount to cover current expenses. Similarly, current assets, which accounted for about 21% of total assets at the end of 2001, will decrease gradually reaching about 15% of total assets by FY2008. Within this trend, EdM's liquidity position will remain strong with current ratios increasing from a low 0.75 to about 1.75 at the end of the projection period. A precondition for this is the effort in EdM's collection of receivables, gradually bringing the average collection period to 60 days by 2005. This could be achieved by: a clearing-house mechanism of compensating accounts payable to the Government against accounts receivable from the Government and its departments, as well as other suitable mechanisms. A classical case is EdM's debt of 27.5 billion meticais to Customs Administration for non-payment of import duties against EdM's credit of 36 billion meticais at the Maputo Water Authority for unpaid electricity bills; (b) the expansion of the existing "Galatee" system (sales and collectibles management) by extending it to all of EdM's customers; and (c) follow-up of insolvent (non-paying) customers and writing-off of unpaid and/or non-collectable balances.

Financial Policy. EdM's investment program for the next six years (FY2003-2008), along with the corresponding financing plan, are summarized in the table below. This program totals US$282 million equivalent. The financing plan is based on disbursements from committed long-term loans (US$110 million), internal cash generation (US$114 million) and financing deficit/new loans (US$58 million). Therefore, about 20% of the financing plan represents loans yet to be secured. A key challenge for EdM will be to mobilize this amount of financing for the next six years. The main possibilities are to: (i) generate more resources internally through tariff adjustments; (ii) improve operational efficiency thereby unlocking resources for investment; (iii) obtain additional grants from donors for specific high priority programs; and (iv) mobilize private sector financing. With respect to private sector financing, the only possibility considered at this time would be selected distribution areas with sufficient economic growth potential and therefore demand growth to attract private investments.

Investment and Financing Plan (MUS$)

Investment Plan (Summary)	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**TOTAL**	**%**
Distribution	25.7	31.6	27.1	20.6	17.8	21.1	21.1	165.0	48.8%
Transmission	29.9	26.5	11.0	14.8	3.9	16.5	16.5	119.1	35.3%
Generation	0.0	0.0	0.0	3.8	3.8	0.9	0.9	9.4	2.8%
Other (Studies, Regional Projects)	0.5	12.3	11.3	11.3	0.0	4.4	4.4	44.1	13.1%
TOTAL	**56.1**	**70.3**	**49.3**	**50.4**	**25.5**	**43.0**	**43.0**	**337.8**	**100.0%**
Financing Plan									
Internal Cash Generation	0	5.6	17	27.5	35	46.1	43.0	174.2	45.2%
Committed Loans	56.1	65.3	46.3	9.8	2.1			179.6	46.6%
Onlent IDA Loan	0.0	0.0	3.0	8.2	13.2	7.6		32.0	8.3%
African Development Bank									0.0%
New Loans									0.0%
TOTAL	**56.1**	**70.9**	**66.3**	**45.5**	**50.3**	**53.7**	**43.0**	**385.8**	**100.0%**

Tariff adjustments will be needed, not only to support EdM's financial strength, but also to finance an adequate share of the investment program than currently envisaged, if the projected borrowings do not materialize. It is important to ensure that approval is given without delay and the tariff adjustments are implemented as recommended. This will allow EdM to achieve a self-financing ratio of over 50% in each year and to achieve a healthy debt service coverage and current ratio.

With regard to operational efficiency improvements, an important aspect is a need for reducing system losses, which were about 18% in FY2002. The rehabilitation of the urban and peri-urban distribution system will help to reduce technical losses, while the implementation of the Galatee system for the whole of EdM's operational area would help reduce the non-technical losses. The combination of these measures will result in an overall loss reduction of 3% over the 6-year implementation period. Another aspect will be continued sound management of the working capital. EdM's ability to meet debt maturities as they fall due should be monitored, so that an adequate debt service ratio of at least 2.0 is achieved in 2004. The projected new loans for the present expansion program, as well as the expected tariff increases, would keep the debt service ratio well within this limit.

On-lending Terms. The Government would on-lend US$17.35 million to EdM. The interest rate would be 5.0 percent, and the repayment period would be 20 years including a grace period of 5 years. EdM would bear the foreign exchange risk on the on-lent amount.

Fiscal Impact:

The fiscal impact on central Government revenue of the EdM component, the project's largest component, is positive. Table 1 below shows the revenue flows accruing to the Government.

Table 1. Revenue flows accruing to Government

	NPV@12%	2003	2004	2005	2006 -->	2010 -->	2014 -->	2023	2024
Additional tax revenue accruing to government									
Government 17% VAT on billed EdM electricity sales million US$:	$3.49	0	0	0.27	0.56	0.61	0.66	0.73	0.73
Gov loss of tax revenue on EdM investm+O&M mil US$	($4.7)	-0.04	-1.17	-2.83	-1.74	-0.12	-0.12	-0.13	-0.13
Loss on kerosene taxes	($0.18)	0	0	-0.01	-0.03	-0.03	-0.03	-0.04	-0.04
Total government tax intake	($1.34)	-0.04	-1.2	-2.6	-1.2	0.5	0.5	0.6	0.6
Debt service - Net additional revenue									
Commitment fee to IDA			-0.10	-0.08	-0.03	0.00	0.00	0.00	0.00
Service charge to IDA				-0.02	-0.07	-0.15	-0.15	-0.11	-0.10
Service charge to AfDF				-0.01	-0.05	-0.10	-0.10	-0.07	-0.06
Service charge to NDF				-0.01	-0.02	-0.05	-0.04	-0.03	-0.03
EdM interest payment to Gov on IDA credit						0.95	0.75	0.28	0.23
EdM repayments to Gov on IDA credit (starting 2009)						1.03	1.03	1.03	1.03
EdM interest payments on AfDF credit						0.60	0.47	0.18	0.15
EdM repayments to Gov on AfDF credit (starting 2009)						0.65	0.65	0.65	0.65
EdM interest payments to Gov on NDF loan						0.28	0.22	0.08	0.07
EdM repayments to Gov on NDF loan						0.30	0.30	0.30	0.30
Government repayments to IDA (starting 2014)							-0.69	-0.69	-0.69
Government repayments to AfDB (starting 2014)							-0.43	-0.43	-0.43
Government repayments to NDF(starting 2014)							-0.20	-0.20	-0.20
Net debt service revenue to government	$8.20	0	-0.10	-0.12	-0.17	3.52	1.80	1.00	0.91
Net revenue accruing to Government from the EdM component	$6.87	-0.04	-1.27	-2.69	-1.38	3.98	2.31	1.56	1.47

The table above indicates that the EdM component will provide the Government with revenues of more than US$6 million at a 12% present value basis. These revenues are available to finance social programs that benefit the poor. The table shows that even as Government will forego tax revenue from the project investments and kerosene sales, it will gain VAT revenue from additional electricity sales and the interest spread on the IDA, AfDF, and NDF credits that it will on-lend to EdM. The net present value of the incremental VAT revenue to Government on electricity sales is estimated at about US$3.5 million or more than US$0.5 million per year on average. The loss of taxes and duties on kerosene that electricity will replace is minimal as kerosene only commands a 5 percent import duty and no taxes.

3. Technical:

The key technical issue is the introduction of low-cost designs and equipment for grid distribution and standards for solar PV systems. Studies conducted during preparation have confirmed that, by using designs, equipment standards, procurement, installation, and maintenance procedures already tested and proven in other parts of the world (including Ghana and South Africa) the costs of grid distribution in Mozambique can be reduced by 20% without any compromise in performance. To counteract the

possible supply of substandard equipment, especially by private project sponsors, minimum requirements will be established which each concessionaire or retailer will be required to meet.

4. Institutional:

4.1 Executing agencies:

See also Section C4. The executing agencies are: the National Directorate of Energy (DNE), the National Energy Fund (FUNAE), the Electricity Company of Mozambique (EdM), the Ministry of Education (MIRED) and the Ministry of Health (MISAU).

4.2 Project management:

The Government institution for overall coordination, as well as overall monitoring and evaluation, is DNE, and will be assisted by a dedicated coordination unit, the Project Coordination Unit (PCU). Each of the implementing agencies has created an implementation unit that will have direct responsibility for implementing its part of the project in accordance with the PIP. The implementing agencies will be strengthened through the provision of training, equipment, and short- and long-term advisors, under the project. The long-term advisors will be provided by bilateral donors, such as DANIDA under the Energy Strategy Program Support (ESPS) program.

4.3 Procurement issues:

The Country Procurement Assessment Review (CPAR) of Mozambique which was carried out by IDA in cooperation with the technical unit of the Inter-ministerial Commission for the Reform of the Public Sector and participation of other donors was finalized in May 2002. The major findings of the CPAR showed that the Mozambican procurement system has serious institutional, legislative and manpower weaknesses which have a negative impact on the use of Government funds and those from donor and international agencies. These weaknesses affect every sector of procurement and commercial activities including imports and banking services. To correct some of these weaknesses in the system, the CPAR recommended the following:

- Reform of procurement regulations.
- Establishment of new policy directorate.
- Long-term capacity building programs and assistance to training institutions; and
- Addressing corruption issues.

The overall procurement capacity of DNE and FUNAE is **low** and the risk assessment is **high**. The capacity was strengthened with the appointment of a Procurement Specialist and an Accountant for the PCU. In addition, some staff in FUNAE and DNE are familiar with WB procurement guidelines and procedures from their involvement in the procurement processing of the IDA-funded Urban Household Energy Project (Cr. 2033-MOZ) which closed in 1999, and a minor component of the ongoing Gas Engineering Project (Cr. 2629-MOZ).

The overall procurement capacity of EdM is **average** and the risk assessment is **average.** EdM has some familiarity with WB procurement procedures and guidelines as it was responsible for the procurement processing for a component of now closed IDA-funded Urban Household Energy Project (Cr. 2033-MOZ). The project implementation unit has also handled procurement processing for DANIDA, NORAD, SIDA, AfDB and AfDF, applying bilateral procurement procedures.

The overall procurement capacity of MINED is **high** and the risk assessment is **low**. The project unit staff is familiar with WB procurement guidelines and procedures due to its implementing an ongoing

IDA project (Cr. 3172-MOZ), which has not faced any procurement problems. A Post Procurement Review (PPR) was conducted on March 6, 2003, which concluded that MINED generally complied with the agreed provisions.

The overall procurement capacity of MISAU is currently **low** and the risk assessment is **high.** The Procurement Unit (GACOPI) will be responsible for handling the procurement of the cross-sectoral component of the project. GACOPI is familiar with WB procurement guidelines and procedures due to its implementing an ongoing IDA-funded project (Cr. 2788-MOZ). Of concern is the fact that two key staff of GACOPI who were responsible for fiduciary matters, resigned from MISAU recently.

The following actions are recommended for the PCU and other relevant stakeholders of the project:

- Assign experienced staff who have been working for the AfDF-financed power projects as PCU team members prior to negotiations.
- Update the knowledge of the procurement staff through participation in regional Bank procurement workshops; and provide all relevant SBDs, RFPs, Guidelines and Manuals to the PCU and stakeholders prior to project effectiveness.
- Recruit qualified and experienced consultants to assist the PCUs in supply and installation and equipment design, and construction supervision.
- Provide internal and external procurement training to the PCU staff, and other stakeholders where found necessary, throughout the project implementation period; and
- Ensure that the PCU staff acquaint themselves with the nation-wide initiatives for procurement reform and follow the recommendations of the recent Country Procurement Assessment Report (CPAR) for Mozambique.

4.4 Financial management issues:

An assessment of the financial management arrangements of the project included a review of the systems of accounting, reporting, auditing, flow of funds and internal controls. The implementing agents' arrangements are acceptable if they are considered capable of recording correctly all transactions and balances, supporting the preparation of regular and reliable financial statements, safeguarding assets, and are subject to auditing arrangements acceptable to the Bank.

The Project is at high risk until the FM and other operational systems are well defined and documented, and personnel are trained. However, the Project FM risk in implementation is assessed as moderate once this critical set up phase is passed. The client has been tasked with producing an FM timeline to effectiveness that is realistic and includes realistic timing for the procurements being started in April 2003, namely: (i) Trust Agent; (ii) FM Accounting System at DNE; (iii) External Auditors; (iv) transaction agent (who will design operations and produce procedures manuals for the subsidy mechanism), as well as the preparation of manuals and staff training.

The FM team will return for a review once the systems are more developed and the Trust Agent has been appointed.

For the Project to fully deliver on its objectives, a FMS will be developed in accordance with the Financial Management Assessment Report presented in Annex 6B.

The overall conclusion of the financial management assessment is that the current financial management arrangements in the implementing agencies do not satisfy the World Bank's minimum financial management requirements. In order to establish an acceptable control environment and to mitigate financial management risks the measures outlined in the Action Plan in Annex 6B should be

implemented.

5. Environmental: Environmental Category: B (Partial Assessment)

5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

An environmental and social impact analysis (ESIA) for Phase I of the proposed APL has been prepared with a view to identify potential environmental and social impacts of future sub-projects (distribution networks and sub-stations; diesel and gas-powered generators; solar PV systems; mini- and micro-hydropower systems) and to propose measures to mitigate such impacts (loss of vegetation, habitat disturbances, soil erosion, soil and noise pollution, and land acquisition).

The ESIA report concluded that: (i) negative impacts on natural habitats would be unlikely given that the proposed project will be implemented in small rural towns or centers and in peri-urban areas where few, if any, critical habitats are remaining; and (ii) the construction of distribution lines, sub-stations, generation plant and other project-related infrastructure is unlikely to involve land acquisition; the permanent loss of infrastructure and other assets is likely to be minor. Wherever possible, future sub-stations will be located on public land or unused "waste" lands. Nonetheless, sub-project proposals will be screened for potential safeguards issues (see 5.2 below) and appropriate measures will be taken as required to ensure compliance with safeguard policies. For example, if a sub-project would result in the significant conversion of a natural habitat, this sub-project would not be funded under the proposed project.

Since the sites for future sub-projects have yet to be finalized and no design details (i.e. distribution network plans) are available, a generic rather than a site-specific approach to preparing the ESIA report had to be adopted. Towards this end, the ESIA report outlines processes for: (i) environmental and social screening of sub-projects; (ii) the environmental management of sub-projects; (iii) the implementation of sub-projects; and (iv) monitoring. It also: (i) identifies the needs and cost estimates for capacity building and training; and (ii) includes a Resettlement Policy Framework to address potential social impacts due to land acquisition.

The above processes would be applied to Phase II of the APL if it were decided to finance the second tranche. In the event that Phase II includes the rehabilitation and expansion of transmission lines or other activities not included in Phase I, separate EAs would be carried out to address their environmental and social impacts.

5.2 What are the main features of the EMP and are they adequate?

Given that the sites of future sub-projects are unknown at this time, the ESIA report for Phase I outlines a generic Environmental Management Plan (EMP) which will require the proponent to: (i) describe potential environmental and social impacts; (ii) propose mitigation measures and cost estimates for their implementation; (iii) describe the responsibilities, qualifications, and lines of communications of staff responsible for implementation of the EMP; (iv) outline detailed plans and method statements for the elements of construction for which such information is required; (v) prepare a monitoring plan, including institutional arrangements and cost estimates; and (vi) prepare monitoring indicators. The generic EMP also outlines the institutional responsibilities for preparation and implementation of the sub-project EMPs, and provides sample specifications for inclusion in sub-project EMPs.

In addition to the preparation and implementation of sub-project EMPs, the ESIA report outlines the role

and responsibilities of a Safeguards Working Group - to be supported by the Environmental Unit in the National Energy Directorate (DNE) - which will include representatives of DNE, Electricidade de Mozambique (EdM) and the Ministry for Coordination of Environmental Affairs (MICOA) to manage compliance with environmental and social safeguards. For the purposes of quality assurance and assessment of capacity building needs, the first six sub-projects will also be reviewed and cleared by the World Bank prior to approval.

5.3 For Category A and B projects, timeline and status of EA:
Date of receipt of final draft: January 2003

The ESIA report has been finalized.

5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

Discussions were held with representatives of DNE and EdM regarding the selection of representative sub-project sites. It was ascertained that although general areas for project implementation had been considered, no specific details were available. Nevertheless, a number of possible reference sites were selected together with DNE to serve as a basis for carrying out the ESIA. Sub-project preparation will include consultations with potentially affected people.

5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

A monitoring plan has been prepared for the various types of sub-projects. The ESIA report recommends that DNE be responsible for the coordination of the monitoring activities and the preparation of regular monitoring reports. It is further recommended that technical assistance be provided to DNE through: (i) the contracting of a Technical Advisor who will assist in the establishment of the Environmental Unit, ongoing training of staff through "on-the-job" training; and provide assistance to DNE to implement the environmental management and monitoring plan; and (ii) the provision of backstopping expertise.

6. Social:

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

There are two key social issues. First, some uncertainty remains about the willingness of communities to accept commercially-oriented rural electrification schemes because it is likely that their tariffs will be higher than EdM's under the existing regime of uniform national tariffs, even though three independent mini-grids with higher tariffs are already operational. This is being addressed by discussing the commercial concepts with the community during the process of selecting the sites for independent mini-grids, and incorporating their suggestions and chosen compromises into the project's design. Conversely, areas where communities are more willing to accept the commercial approach, local entrepreneurs or anchor customers are interested in investing in the distribution business, and/or where communities make "in-kind" contributions to project costs, will be stronger candidates for project investments.

A related concern with the commercial approach may arise from the proposed cost-based, regionally differentiated tariffs on the main grid. These would entail that EdM customers outside the Maputo area pay higher tariffs than they do now, while those in the Maputo area may see a lowering of the tariffs. The proposed solution to the perceived regional inequity is as follows: higher-use customers in the

Maputo area would continue to pay about the same average price, but a portion of it in an explicit surcharge or electrification levy that would be transparently allocated for access expansion in the rest of the country. Population in the Central and Northern regions would be offered a regulatory bargain – in return for an increase in the average tariffs, they would get a substantial increase in access to electricity, partially grant-financed by the levies from the higher-use customers (most of whom are in the South). In other words, the system of cross-subsidies would move away from implicit taxation of Southern customers' consumption to finance the current consumption in the rest of the country toward an explicit taxation of the former to finance greater expansion of connections in the latter.

A Resettlement Policy Framework outlining the principles to be applied in the event that future sub-projects require land acquisition has been prepared.

6.2 Participatory Approach: How are key stakeholders participating in the project?

For the electrification investment components, there have been extensive discussions with service providers (EdM, potential private investors/financiers/retail dealers) and potential customers, which would be continued during the course of project preparation. Visiting missions have traveled to all three of the functioning independent mini-grids under UHEP to assess their operations, and the views and needs of consumers.

Other key stakeholders: Extensive discussions have been held with bilateral donors who have shown support for the proposed project concept and are happy with the Bank taking the lead in advancing both sector reforms and new approaches to electrification tailored to the Mozambican context. The project team has had one or more meetings with other GoM ministries/agencies with some responsibilities in rural development – Ministries/Directorates of Agriculture and Rural Development, State Administration, Health, Education, Water, and Environment – or in investment promotion – Ministries of Industry, and of Planning and Finance, and CPI (Center for Promotion of Investments). In addition, several NGOs attended a meeting on renewable energy options and another workshop on solar PV meetings have also been held with provincial administrators, local entrepreneurs and local residents, all of whom have requested urgent support in providing access to modern energy (electricity, in particular).

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

Apart from the institutions directly involved in implementing the project, the project team has worked closely with a number of other agencies representing the beneficiaries of the project and the potential consumers themselves. One of the project preparation activities concerned market assessment and stakeholder consultations. Furthermore, the role of NGOs, micro-credit institutions and cooperatives in the supply of Solar PV systems has been examined and the views of these institutions have been sought.

6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

A committee comprising the key stakeholders would be established to provide advice to the implementing agencies.

6.5 How will the project monitor performance in terms of social development outcomes?

Monitoring and evaluation plans have been outlined for each component and are being detailed in each PCU. The results of the monitoring and evaluation (see Annex 2) would be made available for inclusion

in a household survey, which will be carried out outside the project/program. The baseline data will come from a household survey planned for 2003.

7. Safeguard Policies:

7.1 Are any of the following safeguard policies triggered by the project?

Policy	Triggered
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	● Yes ○ No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	○ Yes ● No
Forestry (OP 4.36, GP 4.36)	○ Yes ● No
Pest Management (OP 4.09)	○ Yes ● No
Cultural Property (OPN 11.03)	○ Yes ● No
Indigenous Peoples (OD 4.20)	○ Yes ● No
Involuntary Resettlement (OP/BP 4.12)	● Yes ○ No
Safety of Dams (OP 4.37, BP 4.37)	○ Yes ● No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	○ Yes ● No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	○ Yes ● No

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

To ensure that potential environmental and social impacts of the proposed project are addressed, an Environmental and Social Assessment Report and a Resettlement Policy Framework have been prepared (see 5.2 above).

F. Sustainability and Risks

1. Sustainability:

The sustainability of *specific* investments depends on whether the geographic area in question has reasonable potential for catalyzing economic growth and expanding the market for electricity. For example, whether some "anchor customers" (such as an agro-industrial enterprise or some public service institutions) exist, and whether the rules for cost recovery and performance targets for subsidies are complied with. This is being ensured by carefully selecting areas of demonstrated ability and willingness to pay at least the operating costs of electricity provision.

The adoption of a program approach with a small "learning by doing" first phase ensures gradual nurturing of the local markets and capacities so as to ensure the long-term sustainability of rural electrification investments under the project and acceleration of these investments beyond the period when grants cease. Over time, sustainability will come from barrier removal, cost reductions, rising incomes, and declining grants. Furthermore, as the Government plans to finance the electrification fund via a levy on energy mega-projects and grid-based electricity, the need for external grants to support electrification will decline.

For solar PV systems, the decline in costs will come from: (i) economies of scale – which are often realized when a credible expectation of a large market has been created; (ii) formation of links to lower-cost suppliers abroad; and (iii) rising incomes, which will increase the affordability of the systems. Furthermore, the GEF grant per unit for solar PV systems is also expected to decline over time.

1a. Replicability:

The key assumptions underlying viability and replicability are that cost-reductions will be realized and

incomes will rise. For the renewables component, given the GEF share of 20-25% in total costs, it is reasonable to expect that cost reductions and income increases over a number of years will offset the need for such support after the project is over. For the independent grids, the output-based grants will help accelerate expansion and commercial viability so that the businesses are able to generate surpluses to contribute towards further expansion after the project is over. Subsidies will, however, be required for new schemes, and these will be provided through levies as well as external funding. The planned TA/CB activities will support "learning by doing" and incorporating mid-term revisions and corrections along the way taking care to reduce grant dependencies of individual sub-projects.

The sub-component to identify productive uses of electricity for income generation, especially in the rural areas, will further help ensure sustainability and replicability, in that it will identify areas where energy (especially electricity) is a barrier to increasing income generating activities in the communities, and recommend ways of removing such barriers. The Government will disseminate the recommendations, as well as information on the overall electrification program, to the public and energy service providers.

2. Critical Risks (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

The highest risk is associated with the investments in private-sponsored independent grids and renewables, in the first phase of the program. This is due to limited capacity on the part of the Government, a weak regulatory set-up and, consequently, the investment risk perceived by the private sector. For the first phase, therefore, the value of these components has been kept relatively low, compared to the lower risk national grid-based (EdM) component, which is designed to provide the largest impact in this phase.

For the EdM component, use will be made of supply and installation contracts and the work will be divided into several lots, with subsequent lots commencing only upon EdM's satisfactory previous performance. This component stands alone and would not be affected by failure of the other components.

For the private-sponsored components, substantially large amounts have been provided for technical assistance in this "learning-by-doing" phase in order to ensure their success. Furthermore, with implementation of the proposed reforms, EdM is expected to be better-placed by the second phase to scale up access expansion.

The reform component is not without risk, and the risk is due to the utility's and other stakeholders' resistance to change and the possibility of lack of interested private sponsors. However, the Government has shown its commitment to reforming EdM by agreeing to have Cabinet approval of the Distribution public/private partnership proposal prior to Negotiation, and the private participation option allows for flexibility.

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective		
1. Government and other stakeholders are not committed to sector reforms and the policy/regulatory changes.	S	Provide support to help Government overcome obstacles, and ensure that future support will be contingent on steady advancement on the reforms front.
2. There is limited affordability and resistance to commercial approaches.	M	Affordability will be enhanced by promoting income-generating uses of electricity, and

		acceptability of commercial approaches will be enhanced through consensus-building programs.
3. Institutional capacity of MIREME is weak.	S	The recommendations of a recently carried out institutional diagnostic study will form part of the project scope; technical support will be provided by bilateral donors and short-term consultants.
4. Procurement capacity of the implementing agencies is weak.	S	Ensuring the PCU staff acquaint themselves with the nation-wide initiatives for procurement reform and follow the recommendations of the recent Country Procurement Assessment Report (CPAR) for Mozambique.
From Components to Outputs		
1. There is limited potential to use electricity productively.	S	Project sites have been/will be carefully selected to ensure there is potential; the project also aims to promote productive uses and indirect benefits.
2. Private sector and financial institutions are not interested in participating; cost-based tariffs are not accepted.	S	Output-based grants, and possibly a credit enhancement facility, will be provided; the private sector will have access to funds from the IDA-financed PODE project.
3. Institutional users are unable to pay for PV systems and maintenance.	S	The capital cost will be paid by the project; commitment will be sought from local authorities to create a budget line for maintenance, which is expected to be less than the current expenditure on energy.
4. Financial Management Control Risks: Illiquidity delaying project implementation through lack of counterpart funds in fiscal year 2003. Delays in implementation due to poorly defined procedures for inter-agency cooperation in financial management and reporting. Delays in implementation due to the need to design the subsidy mechanism only after the transaction agent is mobilized.	M	The proposed financial management (FM) arrangements are properly implemented, the FM action plan satisfactorily addressed in practice and a separate Project Coordination Unit is set up at central and provincial levels.
Overall Risk Rating	S	An advisory body, consisting of the various stakeholders, will be established to oversee the implementation of the project, and it will be able to call on experts for assistance. Furthermore, the program is designed so that failure of one component has minimal impact

		on the rest of the program.

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N(Negligible or Low Risk)

3. Possible Controversial Aspects:

(i) Provision of subsidies to the private sector.
(ii) Private participation in EdM.

G. Main Loan Conditions

1. Effectiveness Condition

(a) Measures taken to meet IDA's financial management requirements, comprising: (i) design and installation of financial management systems at the DNE PCU and the EdM PCU, including Information System, the preparation of Procedures Manuals and Training; (ii) appointment of a qualified Trust Agent and finalization of a Trust Procedures Manual; (iii) training of EdM and DNE Financial Managers in World Bank FM and Procurement procedures; (iv) training of Trust Agent, DNE and FUNAE in subsidy procedures; (v) opening of Project Accounts by DNE and EdM; (vi) ability to prepare FMRs demonstrated at each IA and the Trust Agent; and (vii) appointment of a relevantly qualified external auditor for the project, on approved terms of reference.

(b) Execution of the Loan Agreements with NDF and AfDB.

(c) Reduction of EdM arrears to at least 120 days of annual revenue.

(d) Government approval of a decree to increase EdM’s average electricity tariff levels, taking into account the recommendations of the tariff study of 2001.

(e) EdM has employed a consultant with qualifications and experience satisfactory to the Association, to review its assets and current policy on insurance, and subsequently propose a suitable insurance strategy for EdM.

2. Other [classify according to covenant types used in the Legal Agreements.]

Financial Performance

(i) EdM shall maintain a ratio of current assets to current liabilities equal to or greater than 1.3 from 2004.

(ii) EdM shall reduce the level of receivables to 90 days by December 2004 and 60 days by December 2005.

Accounts/Audit

(i) The accounts for each of the implementing agencies shall be audited by auditors acceptable to IDA, and shall be submitted to IDA within 6 months of the end of the fiscal year.

Management Aspects

(i) The implementing agencies shall retain professional management and staff, and shall inform IDA of any changes in the top management.

Implementation

(i) The Government shall implement an EdM restructuring plan as agreed with IDA.
(ii) The implementing agencies shall implement the project in accordance with the agreed Implementation Plan (including the Environmental Management Plan and the Resettlement Framework).
(iii) Each implementing agency shall maintain a project coordinating unit with qualified personnel, including an accountant and a procurement specialist; the coordinating units in DNE and EdM shall also include an electrical engineer.
(iv) The implementing agencies shall carry out a mid-term review under ToR acceptable to IDA.

Monitoring and Reporting

(i) The implementing agencies shall prepare quarterly project management reports and annual progress reports, which they shall review with IDA.

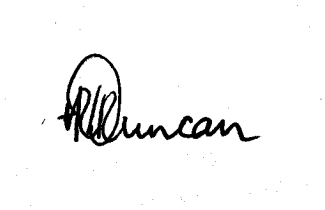
H. Readiness for Implementation

☐ 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
☒ 1. b) Not applicable.

☒ 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
☒ 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
☐ 4. The following items are lacking and are discussed under loan conditions (Section G):

I. Compliance with Bank Policies

☒ 1. This project complies with all applicable Bank policies.
☐ 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.



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Annex 1: Project Design Summary
MOZAMBIQUE: Energy Reform and Access

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Sector-related CAS Goal:	**Sector Indicators:**	**Sector/ country reports:**	**(from Goal to Bank Mission)**
• Developing infrastructure.	• Investments in domestic energy infrastructure and export-oriented energy projects.	• Utility/GoM annual reports.	• Infrastructure investments expand economic growth opportunities and contribute to poverty alleviation.
• Promoting rural development and agriculture.	• Increase in rural access to, and consumption of, modern energy. • Increase output from productive use of modern energy. • Improved delivery of social services.	• Household income or expenditure surveys. • Enterprise surveys. • Surveys of social service institutions.	• Broad-based rural development, and sharing of aid benefits reduce rural poverty.
GEF Operational Program:			
• Promote the adoption of renewable energy technologies.	• Size of renewable electricity sector (excluding large hydro).	• Enterprise surveys.	• Greater use of renewable energy helps mitigate global warming.
Program Purpose:	**End-of-Program Indicators:**	**Program reports:**	**(from Purpose to Goal)**
• Improvement in the quality of life of peri-urban and rural communities is facilitated through the provision of modern energy.	• Number of households and institutions with access to modern forms of energy (about 1 million people will have direct access).	• Household survey reports. • Impact evaluation reports.	
• Support the effort towards achievement of four MDGs -- reduce child mortality, improve maternal health, achieve universal primary education, ensure environmental sustainability.	• Improved health facilities and services due to electricity provision. • Improved teacher living conditions due to electricity provision. • Increased adult classes due to electricity provision. • Reduced carbon dioxide emissions (estimates based on number of renewable systems installed).	• Surveys of the relevant social service institutions. • Project supervision reports.	• Modern energy is essential for improved delivery of social services.

GEF Operational Program: • Barriers are removed and implementation costs of renewable energy are reduced.	**Outcome / Impact Indicators:** • Reduced cost of renewable systems, in particular solar PV. • More rapid growth of the solar PV market.	• Project supervision reports. • Enterprise surveys.	• Barrier removal and local capacity building are effective ways of promoting renewable energy.
Project Development Objective: • The use of electricity for economic growth and improved quality of life in underserved areas is accelerated in a commercially viable manner.	**Outcome / Impact Indicators:** • Viable electricity providers, including EdM (based on their profitability and their ability to connect the estimated 60,000 consumers).	**Project reports:** • Project supervision reports and impact evaluation reports.	**(from Objective to Purpose)** • Private sector can bring in additional capital and use it more efficiently.
• Mozambican capacity to expand the energy sector is strengthened.	• Effective negotiation of at least 3 private sector concessions and private partnership in EdM.	• EdM operational reports. • Performance audit of MIREME. • Reports by participating financial intermediaries. • Regulatory reports.	• Staff is available and can be retained.
	• EdM's operational performance improves (it becomes profitable and is able to contribute substantially towards investments).	• EdM financial and performance audits.	• Cross-sectoral links are established to ensure electricity is used to increase productivity and to improve social services.
Global objective: • The elimination of barriers that impede renewable energy development is initiated.	• Increase in the numbers of viable solar distributors and other renewable energy businesses (by at least 2), including micro hydro. • GoM adoption of a renewable energy development plan.	• Impact evaluation report.	• The progress achieved will be sustained.

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Output from each Component:	**Output Indicators:**	**Project reports:**	**(from Outputs to Objective)**
1. Power Sector Reform			
• EdM is reorganized along profit centers. • There is private sector investment in EdM's Distribution business. • A regulatory framework is established.	• New EdM structure. • Private partner in Distribution. • Published decrees. • Separate public-owned transmission company.	• Consultant and quarterly progress reports. • GoM decrees.	• The new sector structure is attractive to the private sector and there is credible private sector interest in EdM.
2. Main Grid Electrification			
• Expanded customer base on the main grid in several parts of the country.	• Number of new connections (40,000 in the first phase and 60,000 in the second phase). • Extent of cost reductions (at least 20%).	• EdM project reports. • Customer satisfaction surveys. • Customer satisfaction surveys.	• Low-cost options and other efficiency improvement measures are mainstreamed. • Acceptability of commercial approach can be increased by promoting indirect benefits of electricity access.
3. Independent Grid Electr.			
• 3 new independent grids are established by the private sector.	• Minimum number of concessions awarded. • Number of new connections (10,000 in the first phase and 20,000 in the second phase).	• Quarterly progress reports and operators' annual reports. • Customer satisfaction surveys.	
4. Renewable Energy and Cross-sectoral links			
• Increased use of solar PV systems in rural areas. • Prices of solar PV systems come down. • A renewable energy development plan is prepared, along with a market development and outreach program. • There is greater awareness of renewable technologies and supply chains. • A program for micro-hydro	• Number and total size (kWp) of solar PV systems sold/installed in rural institutions (300/1075) and households (2500/ 8500). • Minimum number and geographic dispersion of retail solar PV distributorships. • Preparation and adoption of future plans acceptable to the Bank and other donors.	• Implementation and supervision reports for the institutional market program. • Market surveys for solar PV system prices in Mozambique and comparisons with price trends in other countries. • Distributor/customer satisfaction and preference surveys.	• Action plan for renewable energy capacity building is realistic and has strong Government commitment.

development exists. **5. Institutional Strengthening and Capacity Building** ● MIREME staff are better trained, and prepare and execute properly formulated work plans in a timely manner. ● There are successful negotiations on private concessions.	● Minimum number of trained staff. ● Minimum number of concessions successfully negotiated and awarded.	● Quarterly progress report. ● External performance reviews.	● Transparency in the award of concessions.

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Project Components / Sub-components:	**Inputs: (budget for each component)**	**Project reports:**	**(from Components to Outputs)**
1. Power Sector Reform	US$6.12 million	• Consultant and quarterly progress reports.	• There is consensus among stakeholders on the proposed reform program. • GoM is committed to private sector involvement in EdM.
2. Main Grid Electrification	US$41.00 million	• Consultant and quarterly progress reports.	• In peri-urban areas and small towns there are pockets of affordability to use electricity productively.
3. Independent Grid Electrification	US$16.38 million	• Consultant and quarterly progress reports.	• Private investors and financial institutions are interested in participating. • Cost-based tariffs are acceptable and affordable in private sector concession areas. • In rural areas and small towns there are pockets of affordability to use electricity productively.
4. Renewable Energy and Cross-sectoral Links	US$9.55 million	• Consultant and quarterly progress reports. • Business plans for solar PV dealers.	• Institutional users are able to pay for their solar PV systems and their maintenance. • Retail distributors are interested and can import and stock solar PV systems without grant financing of working capital. • Awareness campaign successful, and pockets of affordability exist.
5. Institutional Strengthening & Capacity Building	US$8.47 million	• Consultant, training and quarterly reports.	• MIREME employees can take advantage of training opportunities and continue to work for MIREME. • Private businesses need and can take advantage of the support offered.

Annex 2: Detailed Project Description
MOZAMBIQUE: Energy Reform and Access

By Component:

Project Component 1 - US$6.12 million

Power Sector Reform

This component will consist of three parts: (i) separation of EdM into several business units, which is ongoing with financing from DANIDA; (ii) Private Sector Participation (PSP) in EdM's Distribution and Supply business by a strategic private investor; and (iii) creation of separate corporate public entity to provide transmission assets and perform system operation, with a possible interim role as single buyer.

A preliminary report on EdM's Separation of Accounts was issued in December 2001. It recommends the separation of EdM into several business centers, including Distribution, Transmission and Generation. The remaining consultancy work on the separation (US$2 million) and roll-out of the recently installed information systems to the regions (US$1 million), will be supported by AfDF, DANIDA under the Energy Strategy Program Support, and directly by EdM.

For the Private Sector Participation (PSP) in EdM's Distribution and Supply business, the project will fund several pre-investment activities, including revaluation of assets, environmental analysis, drafting of concession agreements, tariff studies, as well as assist in stakeholder consultations. The work will be led by a transaction advisor who, in the bidding phase, will assist with the preparation of a request for proposals, negotiations and financial close.

The third sub-component (funded by AfDF) will involve assistance to the Government in legal and operational establishment of a fully functional public-owned transmission company and system operator, with possibly an interim role as single buyer. Unlike Distribution capitalization, it will also support institutional strengthening of the new entity.

Monitoring and Evaluation. The output indicator will be percentage completion and the impact indicator will be efficiency of the power sector (measured by the operational performance of EdM).

Project Component 2 - US$40.30 million

Grid-based Peri-Urban Electrification

In the first phase, the project will finance: (i) technical assistance to develop and mainstream lower cost standards and designs appropriate for rural and peri-urban areas, where the demand and level of affordability are lower than in urban areas; (ii) consultancy services for design, bid preparation and evaluation, construction management and supervision; (iii) construction of about 500 km of medium voltage lines and 1,100 km of low voltage line and erection of about 240 distribution substations; (iv) updating of the distribution planning facilities and provision of the required training; (v) supply of vehicles, tools and specialized equipment for operating and maintaining the extended distribution network, and for planning and project management; and (vi) construction of operational facilities at some of the sites.

Implementation will be through turnkey contracts. However, owing to the wide spread of the sites and small size of some of them, the selected contractor(s) may have to subcontract some of the work to local contractors. The preparatory studies have shown that savings can be realized by using, for instance: (i) single-phase or 3-phase designs selectively dependent on load; (ii) dual construction for low voltage and medium voltage lines; (iii) longer span lengths; (iv) flat rate meters; and (v) pre-assembled wiring. The studies have demonstrated that reductions of at least 20% in the average infrastructure cost, are possible.

Preliminary designs have been prepared for 6 sites in Maputo and Tete. It is estimated about 40,000 new connections will be made in the first phase of the program, and a further 16,000 twelve years thereafter with minimal reinforcement to the network. The following provinces will benefit from this component: Nyasa, Zambezia, Tete, Manica, Nampula, Sofala, Inhambane, Cabo Delgado and Maputo. In the second phase, after a strategic private partner is in place in EdM Distribution, the financing of access expansion out of the credit (where subsidies are required) shall be through the established subsidy mechanism.

Monitoring and Evaluation

The output indicators will be percentage completion, including the number of new customers connected (about 40,000 in the first phase) and change in the cost of electrification (estimated to be reduced by at least 20%). The impact indicator will be the customers' revealed willingness to pay for improved energy services (measured by the level of arrears and also the number of customers connected).

Project Component 3 - US$ 16.38 million

Independent Grid Rural Electrification

In the first phase the project will support a few investments to test the viability of the concession arrangements and of competitive subsidy mechanisms. Implementation will be by private sponsors.

Due to the non-viability of most rural schemes and the implication of this on tariff levels, the National Energy Fund (FUNAE) will channel capital subsidies through the private sector. The institutional and financing arrangements for the rural electrification and renewable energy fund are presented in Section C4. A credit enhancement facility intended to encourage local and regional commercial banks to provide commercial loans at competitive rates to private sponsors to carry out small to medium-sized energy investments may be provided under the first phase as a pilot and rolled out in the second phase. Another source of debt funding will be the IDA-funded PODE project, which is already in place and provides debt financing to SMEs at more favorable terms than the commercial banks.

The bulk of the sub-projects to be supported under this component will be developed during the first phase of the program. The two that have been prepared are presented below. The capital costs included in the project cover investments over the first phase of the APL.

Northern Inhambane Power System Concession (US$5 million)

A concession will be granted to a private operator to supply electricity at the end of the current three-year management contract. Pre-qualification of potential concessionaires is underway.

The natural gas-based, state-owned but privately managed mini-grids are the result of a pilot effort in the late 1990s, which provided power to Vilankulo, Inhassoro and Nova Mambone, in northern Inhambane. There are over 500 customers connected to the mini-grids. The demand growth for several months since

the commencement of operation in 1998 was about 10% per month. The peak demand has now reached the installed capacity at Vilankulo and the existing system cannot supply additional customers.

The concessionaire will be expected to invest in system expansion. The total investment requirements for the next five years is estimated at US$5 million, as shown in the following table. Approximately 50% of this is in generation expansion and 50% in distribution expansion. Most of the investment (75%) will be required at Vilankulo. Over the 5-year period the number of consumers is expected to increase to 5,000.

		2003	2004	2005	2006	2007	Total
Vilankulo	Generation	397000	271000	434000	487000	434000	2005000
	Distribution	136931	315365	454172	454172	454172	1814813
	Subtotal	515931	586365	888172	941172	888172	3819813
Inhassoro	Generation	0	0	163000	0	108000	271000
	Distribution	39005	124372	85469	91474	85469	425788
	Subtotal	39005	124372	248469	91474	193469	696788
Mambone	Generation	0	0	163000	0	0	163000
	Distribution	63361	118367	110350	104345	110350	506771
	Subtotal	63361	118367	273350	104345	110350	669771
Total Investments (US$)		618297	829103	1409991	1136991	1191991	5186372

Mocimboa da Praia (US$0.40 million)

The town is currently supplied from a diesel-fueled genset, which the concessionaire will be expected to replace. It will also need to rehabilitate and expand the distribution network. Within the next 8 years the national grid will reach Mocimboa da Praia, at which time the concessionaire will switch to grid supply. The table below shows the estimated demand growth and capital requirements of the site.

Year		2003	2005	2007	2009	2011	2013	2015
Number of Customers	Residential	195	441	998	1716	2141	2572	3010
	Commercial/Industrial	54	70	96	122	146	174	208
Demand (MWh)	Residential	519	918	1718	3002	3939	5049	6379
	Commercial/Industrial	416	973	1200	1514	1619	1738	1874
Capital Cost (US$)		246,000	94,500	140,000	215,500	154,000	157,700	162,200

Montepuez also has an independent power system, currently under a management contract. Both Montepuez and Mocimboa da Praia are in Cabo Delgado Province and the two could be combined to form a larger concession area.

TA for Preparation of Other Schemes (US$1.38 million)

Transaction advice is already being provided by NORAD for the North Inhambane mini grids, the first that are to be concessioned out under the project, while information packages have been prepared for the other three schemes -- Morrumbala, Malema, and Mocimboa da Praia. A consultant will be retained for the preparation, marketing, bidding, negotiation support, and assistance in financial close for other sites the Government intends to bring to the market in the first phase of the program. The consultant will also

assist in vetting unsolicited proposals.

Productive Uses of Electricity and Information Dissemination (US$0.2 million)

This will involve a study to identify productive uses of electricity for income generation, with particular attention to women and the young unemployed in the rural areas. The study will identify areas where energy is a barrier to increasing the income generating activities in the communities, and recommend ways of removing those barriers. The recommendations of the study will be disseminated to the public and to potential and existing concessionaires. The component will also support dissemination of information on the overall electrification program.

Monitoring and Evaluation

The output indicators will be the number of concessions awarded, percentage completion, and the number of connections. The outcome indicators will be customer revealed willingness to pay and economic growth. The latter will be assessed through independent impact evaluation reports.

Project Component 4 - US$9.55 million

Renewable Energy and Cross-sectoral Linkages

Investments (US$5.97 million)

The renewable energy component will provide support for investment in renewable energy activities through a performance based co-financing grant facility managed by FUNAE. Similar to the independent grid rural electrification component, the co-financing grant will support the investment on an output basis which, for the renewable energy system, will materialize in disbursement of the funds after the systems have been installed satisfactorily and written proof of this with the client's signature has been provided to FUNAE. Complementary financing for the investment projects will be raised through private equity, private/Government debt financing (including from PODE), or additional subsidy provision through bidding for the concessional and cross-sectoral packages (see below).

Co-financing GEF grants will be provided on a Wp basis, as follows: US$2.9 per Watt for institutional systems (US$5.1 per Watt for first phase; US$1.7 per Watt for second phase), US$2.5 per Watt for home and mobile systems (US$5.5 per Watt for first phase; US$1.8 per Watt for second phase), and US$0.4 per Watt for micro-hydro, biomass, or other renewable energy system that is near commercial and has the promise of developing a sustainable commercial market in the country and (US$0.6 per Watt for first phase; US$0.3 per Watt for second phase).

For the **Health** sector the project will finance, in two provinces, 83% of the capital cost (IDA + GEF) of the energy packages (including solar fridges) for Health Centers Type 1-3 that meet the eligibility criteria established by MISAU. The energy packages will be supplied and maintained by the private sector and MISAU will be responsible for covering the annual recurrent cost of maintenance contracts.

For the **Education** sector the project will finance, in two provinces, 83% of the costs (IDA + GEF) of energy packages for secondary schools, existing ZIPs and resource centers, and for primary schools that meet the eligibility criteria established by MINED. The energy packages will be supplied and maintained by the private sector and MINED will be responsible for covering the annual recurrent cost of maintenance contracts.

The scope of the Health and Education Cross-sectoral components is summarized in the following tables.

Capital Costs US$	Number of Health facilities	Approximate cost per Energy Package	Total Cost
Nampula	50	12,920	646,000
Zambezia	50	12,920	646,000
Nation wide	50	12,920	646,000
Total			1,938,000

Financing US$	IDA	GEF Grant	GOM
Nampula	374,680	161,500	109,820
Zambezia	374,680	161,500	109,820
Nation wide	374,680	161,500	109,820
Total	1,124,040	484,500	329,460

Annual Recurrent Costs US$	Number of health facilities	Indicative O & M cost per Energy Package	Total Cost
Nampula	50	350	17,500
Zambezia	50	350	17,500
Nation wide	50	350	17,500
Total			52,500

Capital Costs US$	Number of Schools	Approximate cost per Energy Package	Total Cost
Nampula	50	5,320	266,000
Zambezia	50	5,320	266,000
Nation wide	50	5,320	266,000
Total			798,000

Financing US$	IDA	GEF Grant	GOM
Nampula	154,280	66,500	45,220
Zambezia	154,280	66,500	45,220
Nation wide	154,280	66,500	45,220
Total	462,840	199,500	135,660

Annual Recurrent Costs US$	Number of Schools	Indicative O & M cost per Energy Package	Total Cost
Nampula	50	350	17,500
Zambezia	50	350	17,500
Nation wide	50	350	17,500
Total			52,500

Technical Assistance (US$3.58 million)

The technical assistance program will support the objective of creating a sustainable market for renewable energy systems which in turn will contribute to the overall objective of achieving rural

economic transformation through targeted, least-cost electricity provisions. Any barrier for achieving the objective that is identified by the local key stakeholders or individual participants in the program and for which a resolution is proposed could in principle tap into two technical assistance windows. The first window will be a cost-shared financing window, and the second the full cost window. Greater emphasis will be on cost-shared activities, with full-cost activities only rewarded in exceptional cases. Awarded assignments will be linked to key deliverables that are derivatives of the above-stated objectives.

The cost-shared technical assistance scheme will require a 20 to 80 percent company contribution. The trigger for support of a proposal will be the clearances of: (i) an independent two/three persons panel; and (ii) FUNAE. Prior review from IDA/GEF will be required for all proposals during the first two years of operation. The following activities have been identified during preparation: (a) solar PV: business plan preparation, training of staff, promotion activities; (b) hydro: detailed feasibility studies, training of staff; (c) biomass: detailed feasibility studies for bagasse and other biomass-based proposals; (d) wind: resource analysis; and training of technicians and management; (e) building of capacity: organizing industry association; and (f) rural transformation and income-generating activities. Most of the awarded technical assistance support will fall under this window.

The full-cost technical assistance scheme focuses on the "bigger picture issues" that are constraining the rate of growth of the industry or renewable/rural energy sector. The trigger for support of a proposal will be the clearances of: (i) an independent panel; (ii) FUNAE; and (iii) three key stakeholders in the sector. Prior review from IDA/GEF will be required for all proposals during the first two years of operation. The following activities during preparation have been identified: (a) solar: international exchange of technologies; (b) wind: macro-level mapping; (c) rural transformation and income-generating activities; (d) quality control and consumer protection; (e) local private sector support (market study, business to business support and other technical assistance); (f) rural outreach and consumer awareness; and (g) development of financing instruments. Also, new companies in the sector could receive an one-off preparation grant up to US$10,000 for business plan development -- and an additional US$4,000 if a productive uses program is integrated -- which will be for the largest part disbursed after a commercial finance institution has approved the companies' requested debt.

T*echnical Assistance (TA) for the cross-sectoral components* will be provided to operationalize the ERAP health and education component. This will include the development of the energy guidelines & criteria for eligibility, and develop the energy packages as well as information kits on energy packages for the provinces. In addition, the TA will be used for capacity building and monitoring and evaluation.

Monitoring and Evaluation

The PCU will provide quarterly progress reports as the main instrument of monitoring progress. Performance formats and indicators as currently agreed (see Annex 1), will be employed for all renewable energy and cross-sectoral projects. During implementation of the first year of operation a detailed monitoring and evaluation program will be designed that will, in particular, address the energy and impact issue.

Project Component 5 - US$8.50 million

Institutional Development and Capacity Building

The component will comprise the strengthening of the energy institutions under the Ministry of Mineral Resources and Energy (MIREME) and helping establish/operationalize others that were provided for in the 1997 Electricity Law. It will help ensure optimal working relationships between the energy institutions and provide the necessary training, hardware and software. The following are the proposed sub-components:

Operationalizing CNELEC & Creation of an Independent Regulator (US$0.90 million)

The project will help establish CNELEC to carry out its responsibilities of dispute resolution and mediation, and at the same time prepare for its transformation into an independent regulator. It will support a specialist in mediation, legal and contractual issues, training of CNELEC staff (included under Institutional and Capacity Building) and the provision of some office hardware and software (included under Hardware and Software).

Furthermore, the Government plans to transfer the regulatory duties, currently carried out by DNE, to CNELEC, in 2005. As a prerequisite, the following work will be done, in two phases:

Phase 1: A study to assess and recommend specific steps to transform CNELEC into an independent regulator.

Phase 2: Revisions to the Electricity Law, including enabling legislation to empower the regulator, in accordance with the recommendations of the above study.

Training of Energy Staff (US$0.50 million)

The amount will finance training as recommended in the Institutional Diagnostic Study report, for staff in the key Energy institutions of MIREME. It will include short management courses, as well as courses in Energy Planning, Energy Conservation, Renewable Energy, Rural Electrification, Subsidy Administration, Regulation and Administration. The training will be provided through local workshops or seminars, and by local regional and international institutions. A detailed first year training program will be provided in the Project Implementation Plan.

Motor Vehicles, Office Equipment, Hardware and Software (US$0.35 million)

The amount will finance office equipment and motor vehicles required by the Project Coordination Unit, including FUNAE and DNE, as well as support the implementation of an IT strategy for the key energy institutions.

Preparation of Phase 2 (US$0.60 million)

The amount will finance consultancy work needed to prepare the second phase of the program.

Environmental Management (US$0.76 million)

The project will support the following recommendations of the ESIA report in order to strengthen the environmental management capacity necessary for the effective implementation of the investment

components of the project.

Environmental Unit. Establish a small Environmental Unit in the National Directorate of Energy (DNE), comprising existing staff. These core staff will be responsible for ensuring that environmental considerations are incorporated into all components of the proposed project.

Environmental Management Training. Training in environmental management will be provided not only to the staff members who are part of the Environmental Unit, but also to heads of departments as well as technical staff of various sectors involved in the project. Of particular importance are the Rural Electrification, Solar, Licensing and Inspection, and Energy Conservation Sectors of DNE. This training should be provided to both DNE and EdM staff, as the latter agency is also currently establishing an Environmental Unit. The training will be in the form of local short courses designed by independent consultants and tailored to environmental conditions and problems specific to the project components.

ESIA Technical Assistance. The ESIA report recommended that technical assistance be provided to DNE through the contracting of a Technical Advisor. The Technical Advisor will: (i) assist in the establishment of the Environmental Unit; (ii) provide ongoing training of staff through "on-the-job" training; (iii) identify other suitable training courses for key staff; and (iv) provide continuous assistance to DNE in implementing the environmental management and monitoring plans. The Technical Advisor will be contracted for a 3-year period. In addition, backstopping expertise will be provided to monitor and measure specific components of the socio-economic and biophysical environment.

TA for Gas and other Mega-projects (US$3.86 million)

To assist the Government in negotiating concessions and contracts for mega-projects, the project will support technical assistance required for the Gas Pipeline project as well as other projects currently under discussion, including coal and hydropower.

To maximize the value of natural gas resources through generation of export earnings and domestic uses, the GoM requires technical assistance and training to support policy formulation, institution building and negotiation of contracts with private sector parties. The project will provide the following technical assistance and training:

(a) *DNE*: Since Mozambique will receive higher benefits from marketing its royalty gas in the domestic market than selling it to Sasol Gas of South Africa, it is important for DNE to articulate appropriate gas policies and strategies to create an enabling framework for private investments in domestic gas infrastructure, consistent with both public interest, and the generation of adequate returns to investors. The project will provide consultants and advisory services to assist DNE with formulation of appropriate gas sector policies and negotiation of individual transactions for use of gas in the domestic market. The project will also finance consultants' services to assist MIREME in analyzing options for privatization of ENH subsidiaries and recommending specific options for implementation.

(b) *DNCH:* Given the importance of accelerating oil/gas exploration, the project will finance consulting services and training to help DNCH build up and maintain a digital data base of all the petroleum data available in the country; articulate fiscal and other policies to attract private investors; build up skills in negotiating petroleum concessions; and efficiently monitor the activities of companies under concession contracts. In the short-term staff training and consultants support will be required to enable the DNCH to monitor the proposed Southern Africa Regional Gas Project under which

Mozambique will export gas to South Africa in accordance with contractual obligations.

(c) *ENH:* Since the Government is a 30% partner (through ENH) in the field development and central processing facility and participation in the pipeline is envisaged under the gas export project to South Africa, it needs to have at its disposal, adequate skills and systems (including data processing equipment) to manage its share in the project. Thus the project will finance: (i) international and local legal advisers to assist with the completion of negotiations of outstanding agreements under the project; (ii) a resident legal adviser to assist in addressing legal issues arising during the implementation phase; and (iii) international financial advisors to advise with the project financing arrangements and an international/local financial expert to develop and operate the financial accounting, management and reporting systems. Financing will also be provided for training of ENH technical, legal and finance staff to enable them to effectively participate in the various management committees established under the contracts for the project.

Project Coordination (US$1.40 million)

The amount will finance the operational costs of the coordination units, including staff and short-term consultants that will assist with monitoring and evaluation.

Annex 3: Estimated Project Costs

MOZAMBIQUE: Energy Reform and Access

Project Cost By Component	Local US $million	Foreign US $million	Total US $million
Power Sector Reform	1.01	4.33	5.34
Grid-based Peri-urban Electrification	8.11	28.31	36.42
Independent Grid Rural Electrification	3.73	10.91	14.64
Renewable Energy & Cross-sectoral Links	2.45	7.10	9.55
Institutional Development & Capacity Building	2.04	6.43	8.47
Total Baseline Cost	17.34	57.08	74.42
Physical Contingencies	1.26	4.19	5.45
Price Contingencies	0.41	1.24	1.65
Total Project Costs[1]	19.01	62.51	81.52
Total Financing Required	19.01	62.51	81.52

Project Cost By Category	Local US $million	Foreign US $million	Total US $million
Goods	0.48	1.32	1.80
Works	9.93	32.65	42.58
Services	4.05	13.67	17.72
Training	0.58	2.46	3.04
Sub-projects funded by the MECS	3.97	12.41	16.38
Total Project Costs[1]	19.01	62.51	81.52
Total Financing Required	19.01	62.51	81.52

[1] Identifiable taxes and duties are 4.91 (US$m) and the total project cost, net of taxes, is 76.61 (US$m). Therefore, the project cost sharing ratio is 56.59% of total project cost net of taxes.

Annex 4: Cost Benefit Analysis Summary
MOZAMBIQUE: Energy Reform and Access

[For projects with benefits that are measured in monetary terms]

	Present Value of Flows		Fiscal Impact	
	Economic Analysis	Financial Analysis[1]	Taxes	Subsidies
Benefits: US$ million	63	44	4	
Costs: US$ million	39	43	4	
Net Benefits: US$ million	24	1		
IRR: %	27	13		

- The above flows relate to the EdM grid intensification component, the largest project component.
- The difference between the present value of economic and financial benefits is large because the economic benefits include the estimated consumer surplus, while the financial benefits derive from EdM's tariffs including VAT.
- Present values are calculated at 12% discount rate.

[1] If the difference between the present value of financial and economic flows is large and cannot be explained by taxes and subsidies, a brief explanation of the difference is warranted, e.g. "The value of financial benefits is less than that of economic benefits because of controls on electricity tariffs."

Summary of Benefits and Costs:

Table 4.1. EdM Grid Intensification Component

Year	No of consumers	Incremental energy demand MWh	Energy supply requirement MWh	Investments Million US$	O&M Million US$	Energy purchases Million US$	Total incremental costs Million US$	Benefits Million US$	Net benefits Million US$
2003	0	0	0	0.7	0.0	0.0	0.7	0.0	-0.7
2004	0	0	0	7.4	0.0	0.0	7.4	0.0	-7.4
2005	22,538	37,848	43,071	16.8	0.3	0.4	17.5	4.8	-12.7
2006	47,122	79,292	90,234	10.1	0.8	1.0	11.9	10.0	-1.8
2007	48,144	81,088	92,278	0.2	1.0	1.0	2.2	10.3	8.1
2008	49,165	82,884	94,322	0.2	1.0	1.1	2.3	10.5	8.2
2009	50,187	84,681	96,366	0.2	1.0	1.1	2.3	10.7	8.4
2010	51,209	86,477	98,411	0.2	1.0	1.2	2.4	10.9	8.5
2011	52,231	88,273	100,455	0.2	1.0	1.3	2.5	11.2	8.7
2012	53,253	90,069	102,499	0.2	1.0	1.3	2.6	11.4	8.8
2013	54,274	91,865	104,543	0.2	1.1	1.4	2.6	11.6	9.0
2014	55,296	93,661	106,587	0.2	1.1	1.5	2.7	11.8	9.1
2015	56,318	95,458	108,631	0.2	1.1	1.6	2.8	12.1	9.2
2016	57,340	97,254	110,675	0.2	1.1	1.6	2.9	12.3	9.4
2017	58,361	99,050	112,719	0.2	1.1	1.7	3.0	12.5	9.5
2018	59,383	100,846	114,763	0.2	1.1	1.8	3.1	12.8	9.6
2019	60,405	102,642	116,807	0.2	1.1	1.9	3.2	13.0	9.7
2020	60,405	102,642	116,807	0.0	1.1	2.0	3.1	13.0	9.9
2021	60,405	102,642	116,807	0.0	1.1	2.1	3.2	13.0	9.8
2022	60,405	102,642	116,807	0.0	1.1	2.1	3.2	13.0	9.8
2023	60,405	102,642	116,807	0.0	1.1	2.1	3.2	13.0	9.8
2024	60,405	102,642	116,807	0.0	1.1	2.1	3.2	13.0	9.8
NPVs @ 12%:				26	6	7	39	63	24
NPVs @ 10%:				27	7	9	43	75	32
EIRR:									**27%**
AIC @ 12%:							0.069	US cents/kWh	
Investment cost/connection:							619	US $/connection	

Main Assumptions:

1. EdM Grid-Intensification

Economic benefits. The economic benefits consist of the incremental electricity sales to new residential consumers made possible by the project investments. The analysis derived the value of the economic benefits for new residential consumers by estimating a semi-log demand curve with the shape of the following form: Q=A+B*Ln(P), where A and B are constants and are derived from observed behavior of households with and without access to electricity supply. To take into account the income effect, the analysis estimated the benefits separately for households with three income levels – low, medium, and high. The low income is taken as the minimum wage, the middle as the consultant's estimated average income of a sample neighborhoods, and the high based on Government and EdM estimates. On the basis of these incomes the actual expenditure of the connected households for electricity would account for between 7 and 17 percent of the households' income. This expenditure is in line with the surveys of selected sites by the COWI consultant that revealed that unelectrified households currently pay between 5 and 11 percent of their income on kerosene and battery charging. The average electricity consumption per connection in this analysis is about 140 kWh/month. This is considered reasonable when compared to the average consumption of EdM's current domestic consumers of almost 200 kWh/month. The 140

kWh/month is, however, somewhat lower than that proposed by COWI. The reduction in the monthly consumption was agreed with EdM as there was little evidence to verify the existence of the high incomes required to be able to afford the highest levels of consumption in the consultant's analysis. In sum, the analysis estimated the weighted average economic benefit at about US$0.13 per kWh.

In addition to the above benefits, there is likely to be additional benefits in the form of increased small business activity, as well as health and education benefits as clinics and schools are connected to grid electricity in some areas. There is no data available to quantify these benefits at this stage; hence they are not included in the analysis. It is also likely that consumption per connection will increase with the increase in household incomes over time.

Economic costs include capital investment and incremental operation and maintenance costs, incremental energy purchases exclusive of taxes, and environmental mitigation and resettlement costs (about US$1.5 million). Costs are in constant 2002 prices. Since the local cost component is less than 10% of the total capital costs, the analysis did not shadow price it as it does not have a major impact on the results.

Other assumptions:

- International crude oil price: US$21 per barrel as per World Bank's forecast (base case).
- Network energy losses: 12% of generation.

- EdM tariffs: $/kWh
  - Social tariff < 50 kWh/month: 0.037
  - 50 - 85 kWh/month: 0.040
  - 86 - 165 kWh/month: 0.066
  - 166 - 330 kWh/month: 0.072
  - 331 - 496 kWh/month: 0.093

- Monthly service charge if consumption >50 kWh/month: $2.6.
- VAT at 17 % is levied on 62% of electricity consumption.
- Kerosene use according to COWI: Cost Reduction Strategy Study, October 2002: 4.6 liters/month/household on average.
- Kerosene price build-up as per DNE price formula of February 2003.
- O & M cost: 2% of investments annually plus US$6.2 per new connection.
- Energy cost: US cents 1/kWh initially; increasing to US cents 2/kWh by 2024.

Sensitivity analysis / Switching values of critical items:

EdM Grid Intensification Component

Sensitivity Case	**EIRR**
Base case	27%
+20% increase in capital and O & M costs	22%
-10% decrease in benefits	20%
+20% increase in capital and O & M combined with 20% decrease in benefits	16%

Switching values

The NPV @ 12% switches from positive to negative if:

- Benefits are 40% lower or
- Investment costs double.

Risk Analysis:

The quantitative risk analysis of the EdM component assessed the impact on the component's economic returns of uncertainty in underlying assumptions and predictions. To deal with this uncertainty, the analysis assigned probabilities to the values of the key variables. The key variables and the probabilities of the values these variables will assume in the future, emerged from the Bank's and Government's estimates. The stochastic nature of the project's outcome was modeled using a commercially available risk analysis program. The model determined the expected EIRR and NPV with their probability distributions through a "Monte Carlo" simulation process. Chart 4.1 below shows the probability distribution of the expected EIRR. Table 4.2 shows the list of the risk variables and the probabilities assigned to them.

Chart 4.1. Frequency Distribution of EIRR

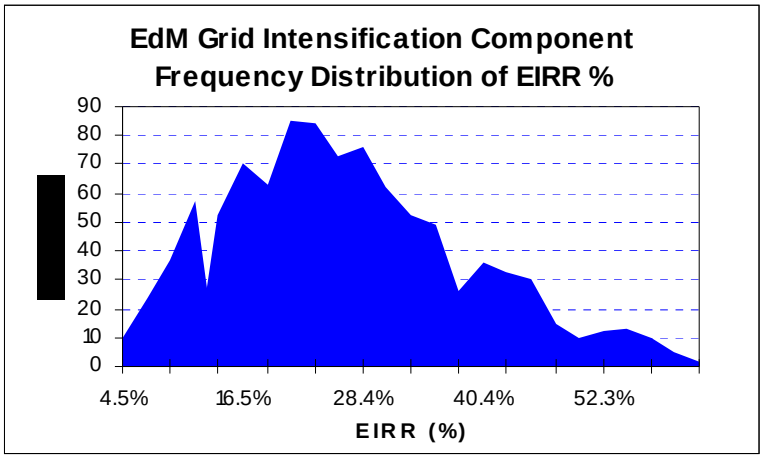


Table 4.2 Assumptions in risk analysis

Variable	**Form of probability distribution**	**Values**
Investment cost	Triangular	-50%, base cost, +50%
Crude oil price	Triangular	16$/bbl, 21$/bbl, 25$/bbl
Delay in project start	Discrete	25% probability of one year delay
Average monthly electricity consumption per new household connection - Low	Discrete	-30 kWh, 50 kWh, 60 kWh -60 kWh, 100 kWh, 150 kWh

- Middle - High		-100 kWh, 300 kWh, 450 kWh Correlation: Low to middle: 0.5 Low to high: 0.5

2. North Inhambane Mini-grid

The economic analysis of the North Inhambane mini-grid uses demand forecasts agreed with FUNAE as those prepared by the consultant (SAD-ELEC) who carried out the feasibility study in 2001 were considered somewhat optimistic. It was agreed with FUNAE that a realistic connection target for the area is about 2,500 new customers by the end of year 2008. Table 4.3 below shows the forecast number of new connections from 2004 to 2008.

Table 4.3. Forecast of new connections in North Inhambane mini grid

North Inhambane	2004	2005	2006	2007	2008
Vilankulos					
New residential	125	375	675	975	1,275
New commercial & Industrial	11	36	45	54	63
Inhassaro					
New residential	50	125	225	325	425
New commercial & Industrial	2	10	12	15	17
Nova Mombane					
New residential	50	125	225	325	425
New commercial & Industrial	3	10	13	15	18
Developments along roads					
New residential	56	111	166	221	276
New commercial & Industrial	2	4	6	7	8
Total	299	796	1,367	1,937	2,507

The existing mini-grids, which have been in operation since 1998 in Vilankulos and Inhassaro and since 2001 in Nova Mombane, supply less than 600 customers of which 267 are commercial enterprises. The forecast rate of connections is higher than in the past because of the estimated significant unmet demand in the area, which is rapidly developing its tourism potential and fish processing industries. Overall, there are 171 consumers waiting for a connection, of which 39 are commercial enterprises. Many of the commercial enterprises operate their own diesel generators. The reasons why the mini-grids have been unable to meet the consumers' demand for electricity are discussed in Section E.

FUNAE's consultant, SAD-ELEC has prepared demand forecasts and electrification costing for the towns of Vilankulos, Inhassaro and Nova Mambone in the North Inhambane Province and evaluated the financial viability of the proposed concession agreement. The consultant concluded that the concessionaire would require an average revenue of US$0.21/kWh for financial viability. Given that the existing average tariff is about US$0.07/kWh (before VAT), this would result in a substantial tariff increase. To increase the attractiveness of the concession while at the same time maintaining the affordability of electricity supply, Government has decided to provide OBA based subsidies to the future

concessionaire to moderate tariff increases. It is clear, however, that the tariffs have to increase from their current levels. This analysis assumes that with the OBA subsidy, tariffs could be maintained at around US$0.12 - 0.13/kWh (excluding VAT). The actual level of subsidy will be defined during implementation on the basis of bids received.

Benefits. The economic analysis defines the component's benefits in terms of the incremental demand that is met under the "with the project" case relative to the much lower level of demand that could be served if no new supply capacity was added to the system. The analysis values the benefits of incremental demand using a similar approach to the EdM grid intensification component. The analysis estimates the benefits separately for newly connected household, existing households, and commercial/industrial enterprises. Also, it estimates the benefits separately for the towns of Vilankulos, Inhassaro, and Nova Mombane because of their different demand and income characteristics.

The benefits for new household connections are calculated as the area under the consumers' estimated demand curve for electricity services. Since the true shape of the demand curve is not observable, the benefits are valued on the assumption of a semi-log demand curve of the form: Q=A+B*lnP that passes through two known points: the lower case point represents the substitution of existing methods of lighting and is a saving in resource costs. Field observations indicate that the majority of unelectrified households use kerosene for lighting and that they use the equivalent of between 12 and 24 kWh per month at an average cost of US$0.21 per kWh. The upper case point is the consumption rate of an electricity consumer at the mini-grid tariff plus VAT. For a new consumer in Vilankulos, this is defined as about US$0.145 per kWh (the forecast tariff including monthly service fees and VAT in 2002 prices) and 1,650 kWh/year consumption (which is half of the average household consumption in Vilankulos in 2002 because of the projected increase in tariffs and the observation that new consumers will take a few years to build up their consumption levels to those of the existing consumers). The consumption level of a new consumer in Nova Mombane is assumed to be lower - 600 kWh/year - because of the lower existing consumption and generally lower incomes. The analysis assumes further that households will increase their consumption to the level of the existing consumers in four years. On this basis, households would allocate between 12 and 18 percent of their estimated expenditures to electricity payments. This is a little higher than the estimates in the 1996/97 Household Survey: Understanding Poverty and Well-being in Mozambique: The First National Assessment, which calculated that between 11 and 12 percent of the average household's expenditure goes to energy. Given the uncertainty in the demand and expenditure data, the somewhat higher proportion electricity in the consumption bundle is not expected to skew the results. The benefits for existing consumers increasing their consumption is valued at the forecast tariff (about US$0.145/kWh, including VAT).

For new commercial consumers, the economic benefits are valued at the avoided financial cost of self generation, which is a resource saving. The estimate of the avoided cost varies with the size of the diesel generator. Based on the data from diesel suppliers in Mozambique, the analysis has estimated the cost of owning and operating a 50 kVA diesel set at about US$0.21/kWh of which US$0.16 is for fuel. Smaller sets could cost about US$0.29/kWh. The smaller sets generally have higher investment costs per kWh and higher specific fuel consumption. The costs include local taxes on fuel and the capital cost of equipment (diesel sets below 75 kVA are exempt from VAT). The economic cost of gasoline and gasoil include local taxes of an equivalent of US$0.19 and US$0.13 per liter, respectively (at a crude oil price of US$21/barrel).

Costs. Economic costs are the difference between power system costs for meeting the forecast demand with this project and the system costs without the project. The analysis assumes that if this project did not materialize, the Inhassaro and Nova Mombane mini-grids would continue supplying the existing

consumers and some additional demand with investments already in place, while FUNAE would need to invest in some rehabilitation of the Vilankulos mini-grid to improve the reliability of its supply to the existing consumers. The following assumptions are made; all costs are in constant 2002 prices:

- Total investment cost: US$4.3 million. This cost includes a 2.4 MW gas turbine and distribution extension.
- Gas cost: price of gas exports to RSA (about US$ 0.74/GJ) plus 70% of gas transport costs (to take account of transfers). At a crude oil price of US$21/barrel, the total gas cost is US$1.15/GJ.
- Fuel efficiency of gas turbines: 69.4 kWh/GJ.
- Annual O & M: 2% of investment cost.
- Distribution losses 10% of generation.

Sensitivity Analysis:

Table. 4.4

Sensitivity Case	**EIRR**
Base case	17.3%
+20% increase in capital and O & M costs	14.1%
-20% decrease in benefits	15.8%
+20% increase in capital and O & M combined with 20% decrease in benefits	12.7%
Crude oil price US$16/barrel	16.0%

The results of the sensitivity analysis indicate that project outcome is sensitive to demand levels foremost. A lower than expected demand combined with increases in investment costs can switch the project's NPV from positive to negative. These two variables should be monitored closely during implementation.

The case with the lower crude oil price is interesting since the lower crude oil price will result in lower gas costs (the export price of gas is pegged to the international crude oil price) and hence lower system operating costs. However, lower crude price could also lower kerosene prices. This would result in lower avoided costs and hence lower economic benefits. The net result in this case is a reduced EIRR.

Table 4.5. Summary of Benefits and Costs of North Inhambane Mini-grid Component

	North Inhambane Mini-Grid									
				Capital costs						
	Demand	Generation	Incremental Generation	Distribution	Generation & Trans.	Incremental O&M	Incremental Gas	Total cost	Total benefits	Net benefits
	MWh	MWh	MWh	US$ '000	US$ '000	US$ '000	US$ '000	US$ '000	US$ '000	US$ '000
2003	3,230	3,585	0	297	1,880	0	0	2,177	0	-2,177
2004	3,978	4,416	831	624	0	14	15	653	135	-518
2005	5,104	5,666	2,081	462	167	29	38	696	340	-355
2006	6,209	6,892	3,308	445	0	41	60	547	530	-17
2007	7,595	8,431	4,846	445	0	56	88	589	762	173
2008	9,227	10,242	6,658	0	0	72	121	193	1,030	837
2009	10,059	11,165	7,580	0	0	79	138	217	1,154	937
2010	10,891	11,165	7,580	0	0	79	138	217	1,274	1,057
2011	10,891	11,165	7,580	0	0	79	138	217	1,373	1,156
2012	10,891	11,165	7,580	0	0	79	138	217	1,388	1,172
2013	10,891	11,165	7,580	0	0	79	138	217	1,404	1,187
2014	10,891	11,165	7,580	0	0	79	138	217	1,404	1,187
2015	10,891	11,165	7,580	0	0	79	138	217	1,404	1,187
2016	10,891	11,165	7,580	0	0	79	138	217	1,404	1,187
2017	10,891	11,165	7,580	0	63	79	138	279	1,404	1,125
2018	10,891	11,165	7,580	0	1,191	79	138	1,407	1,404	-3
2019	10,891	11,165	7,580	0	627	79	138	843	1,404	561
2020	10,891	11,165	7,580	0	-1,639	79	138	-1,422	1,404	2,826
	NPV @ 12%:		$1.4	million						
	NPV @ 10%:		$2.1	million						
	IRR:		17.3%							

Mocimboa da Praia

The economic cost benefit analysis for this component calculated the incremental costs and benefits as the difference between the "without the project" and "with the project" cases. In the without the project case, the municipality would upgrade the 15 year old 400 kV diesel generator so that the system could continue supplying the existing 170 consumers with electricity four hours a day. In the with the project case, the concessionaire will upgrade both the generating capacity and the distribution network during the period 2004-2008 to supply an increasing number of consumers. From 2009 onwards, the concessionaire will connect the mini-grid to EdM's national grid, and retire the diesel generators for back-up duty. Since the interconnection will allow the concessionaire to reduce consumer tariffs, the analysis assumes that the rate of household connections will increase at that time and also that the large industries will connect to grid supply. There are currently about 10 large and medium industries and commercial establishments which when combined, have some 300 kW installed capacity of diesel generators and generate about 800 MWh annually. The number of connections in 2015 will be about 2,200 of which 2,060 are households. The estimate of electricity demand will increase from 200 MWh in 2002 to about 4,000 MWh in 2015. In the immediate future, the construction of the Multifunctional Market, which is scheduled to open in 2004, will boost electricity demand. Similarly the hotel, restaurant, seafood processing and other developments currently underway will require a reliable supply of electricity. The demand forecast is based on the study by IED in September 2002 but reduced somewhat after discussions with DNE and taking into account estimates of household incomes in the area by Austral Consutatoria e Projectos Lda in November 2002 and data on households' consumption levels collected in the 1996/97 Household Survey.

Benefits. Following the approach for the EdM and the North Inhambane component, the analysis of the Mocimboa da Praia calculates the benefits separately for new households, existing households, and industrial/commercial establishments. The difference in the approach is that the benefits for new

household consumers have to be calculated separately for households connecting to electricity supply before and after the mini-grid is connected to EdM because the electricity tariffs change. Before interconnection, the tariffs will be high on account of high supply costs when power has to be generated from diesel generators. IED consultants calculated that Government needs to subsidize the investment costs by 30 percent to 50 percent to achieve a reasonable tariff level, i.e., about US$0.15/kWh (before VAT) for medium and large domestic consumers and industries. After interconnection in 2009, the tariffs will be closer to EdM's at about US$0.10/kWh (projected tariff before VAT) for large household consumers and US$0.04/kWh for consumers using less than 50 kWh/month.

The analysis assumes moreover that after the interconnection, households will increase their demand for electricity to compensate for the "increased income" they receive as a result of the tariff reduction. Since there is limited data available on the current household electricity demand (electricity is currently not metered) and the households' income levels, the analyses takes guidance from the 1996/97 Household Survey and electricity consumption in other mini-grids in Mozambique. A field survey by Austral Consutatoria e Projectos Lda in November 2002 also provides guidance on households' consumption preferences and their willingness to pay for electricity. The modeling of the residential benefits result in 15-17 percent share of estimated households consumption going to electricity.

The benefits from existing consumers' increasing demand is valued first at the high mini-grid tariff and then after interconnection at the lower tariff of about US$0.11/kWh (including VAT). Kerosene usage and its cost are the same as in the analyses for EdM and North Inhambane, discussed above.

For commercial and industrial consumers the analysis uses the avoided financial cost of diesel generation as the value of benefits. For those large commercial and industrial enterprises connecting to the mini-grid that currently operate a diesel genset, the value of the substitute demand includes the cost of diesel fuel, and operation and maintenance of the genset (i.e., about US$0.17/kWh at a crude oil price of about US$21/barrel). This figure is close to the results of a field survey of a number of existing industries that indicated that they would be willing to pay about US$0.16/kWh for mini-grid supplied electricity. For other industries the value includes also the investment cost of a diesel genset, increasing the value to almost US$0.25/kWh. This value assumes that the new industries will be smaller than the existing ones; hence their genset efficiencies will be lower.

Costs. Economic costs are the difference between power system costs for meeting the forecast demand with this project and the system costs without the project. The analysis assumes that if this project did not materialize, the Mocimboa da Praia municipality would rehabilitate the generators and the network so that it could continue supplying the existing consumers 4 hours per day with a satisfactory reliability. The following assumptions are made; all costs are in constant 2002 prices:

- Total investment cost: US$1.4 million. This includes two diesel generators, distribution network extension and rehabilitation and a portion of the EdM investment in the 11 kV and 33 kV transmission line connecting Mocimboa da Praia to the national grid.
- Annual O & M: 3% of investment cost.
- Distribution losses 10% of generation.
- Transmission losses 4% of supply.
- Electricity purchase cost: starting at US$0.01/kWh and increasing to US$0.02/kWh in real terms.
- Fuel efficiency of diesels: 0.33 l/kWh for new diesels and 0.37 l/kWh for the existing ones.

Table 4.6. Summary of benefits and Costs of Mocimboa da Praia mini-grid component

Year	No of consumers	System Energy demand MWh	Energy supply requirement MWh	Incremental Investments '000 US$	Incremental O&M '000 US$	Incremental Fuel '000 US$	Energy purchases '000 US$	Total incremental costs '000 US$	Residential Benefits '000 US$	Industrial & commercial Benefits '000 US$	Net benefits '000 US$
2003	170	200	222	235	0	0	0	235	0	0	-235
2004	180	206	229	21	7	0.4	0	28	1	0	-27
2005	306	401	446	8	8	18	0	34	30	0	-3
2006	370	562	624	45	10	36	0	90	37	28	-25
2007	447	739	821	145	10	52	0	207	46	54	-107
2008	542	841	934	378	15	62	0	455	57	62	-337
2009	784	1,358	1,509	128	26	64	7	226	97	100	-29
2010	1,027	2,535	2,816	49	30	-18	36	97	173	166	241
2011	1,272	2,957	3,285	78	32	-18	43	136	217	173	254
2012	1,518	3,347	3,718	79	34	-18	51	146	261	174	289
2013	1,766	3,738	4,152	79	37	-18	59	157	305	176	324
2014	2,016	4,131	4,589	80	39	-18	67	168	350	177	358
2015	2,268	4,524	5,027	52	41	-18	76	152	394	179	421
2016	2,268	4,524	5,027	0	41	-18	79	102	394	179	470
2017	2,268	4,524	5,027	0	41	-18	82	105	394	179	468
2018	2,268	4,524	5,027	0	41	-18	85	108	394	179	465
2019	2,268	4,524	5,027	0	41	-18	88	111	394	179	462
2020	2,268	4,524	5,027	-365	41	-18	91	-251	394	179	824
NPV@12%								$1,064	$971	$594	$501
NPV@10%								$1,190	$1,199	$722	$731
EIRR %											20.9%

1) negative investment cost in 2020 is a residual value of investment.

Table 4.7. Sensitivity Analysis

Sensitivity Case	**EIRR**
Base case	20.7%
+20% increase in capital and O & M costs	15.5%
-20% decrease in benefits	17.2%
+20% increase in capital and O & M combined with 20% decrease in benefits	12.1%
Industrial demand -50%	16.7%

Solar PV Component

This component will install about 1,600 solar home systems (SHS) of 40 Wp capacity and 900 small mobile systems of 12 Wp capacity. The project will subsidize the cost of the systems through a GEF grant that will amount to US$2.6 per Wp. There will be no additional Government subsidies.

Experience in other countries shows high willingness to pay for the improved level of lighting that solar PV systems provide compared to kerosene lighting. These benefits are represented by the increase in consumer surplus (this analysis draws from the economic analysis of the Philippines solar PV system project by Peter Meier in October 2002). To calculate the consumer surplus, the analysis estimates demand curves for lumen-hours and radio/TV listening/viewing-hours, since their true shape is not known. The lower-case point of the demand curve is represented by the quantity-price pair of lumen-hours from a kerosene lamp consumed at the prevailing price of kerosene. The upper-case point is represented by the quantity-price pair of lumen hours from electric lighting consumed at the prevailing electricity tariff. The demand curve for listening/viewing hours is constructed in a similar manner. In line with the analyses of the other project components, the shape of the demand curve is assumed to be semi-log of the form Q=A+B*lnP.

The analysis assumes that a typical kerosene lamp, a Petromax lamp, will deliver 400 lumens per hour and that households use the lamps an average of 4 hours per day. Survey data indicates that kerosene consumption in Mozambique varies with incomes and that the average consumption of households interested in solar home systems (SHS) could be in the order of 6 liters/month. For the SHS, the light output is about 60 lumens/W. Assuming 4.2 peak sunlight hours per day, the SHS is capable to provide 162 Wh per day. It is assumed that 60 percent are used for lighting and 40 percent for radio and TV. Table 4.8 shows the economic benefit and cost flows for the 40 Wp SHS. Again the model results in a somewhat larger electricity consumption than indicated by household surveys: lighting accounts for about 11 percent of the estimated average household income and radio/TV for an additional 7 percent. It is concluded that this is acceptable, given the quality of the available data (the results of a new household survey will be available in December 2003).

Table 4.8. Summary of benefits and costs of the 40 Wp solar home systems.

			NPV @ 12%	1	2	3	4	5 -->	10
Lighting costs PV									
Allocated cost of total PV cost	60%								
PV costs financial			$417	271	21	42	47	42	30
PV costs levelized			$417	74	74	74	74	74	74
PV lighting		1000 lumen hr.	10,023	1,774	1,774	1,774	1,774	1,774	1,774
$(PV)		$/1000 lumen hr.	$0.042						
PV price * PV lumen hr.		$/yr	$74						
Lighting costs, kerosene									
Kerosene consumption		litres		73	73	73	73	73	73
Kerosene consumption		$	$113	20	20	20	20	20	20
Petromax lamp		$/lamp	$209	70	0	70	0	70	0
Wick, gauzes		$/quarter	$23	4	4	4	4	4	4
Total financial cost of kero lighting			$344	94	24	94	24	94	24
Kero lighting		1000 lumen hr	3,300	584	584	584	584	584	584
$(kero lighting)		$/lumen hr.	$0.104						
Kero price *kero lumen Hr.		$/yr	$61						
Radio/TV: PV system									
Allocated costs of total PV cost	40%								
PV costs financial			$278	180	14	28	32	28	20
PV costs levelized		$	$278	49	49	49	49	49	49
PV non-lighting		hours/year	10,312	1,825	1,825	1,825	1,825	1,825	1,825
$(PV)		$/hr	$0.027						
PV price * PV lumen hr.		$/yr	$49						
Radio/TV: Battery									
Dry cell expenditure		$/yr	$10	2	2	2	2	2	2
Barrery charging & expenditure		$/yr	$113	20	20	20	20	20	20
TV/radio viewing hours		hours/year	4,125	730	730	730	730	730	730
$(battery)		$/hr	$0.030						
Battery price * battery hours		$/yr	$22						
Net flows for 1,600 SHS systems									
Benefits of PV lighting 1000 US$			$958	0	201	201	201	201	201
Benefits of PV radio 1000 US$			$166	0	35	35	35	35	35
Total economic costs 1000 US$			$837	503	46	93	105	93	66
Net consumer benefits 1000 US$			$287	(503)	190	143	131	143	170
NPV@12%		$287							
IRR		27.6%							

In addition to the monetary benefits, solar PV systems also avoid air-emissions and burn injuries associated with kerosene use. These avoided environmental and health damage costs represent benefits that increase the level calculated above.

Table 4.9. Make-up of the economic costs of a one 40 Wp SHS.

			NPV @ 12%	1	2	3	4	5	6	7-->	10
Cost of PV systems	40	Wp									
Down payment	50%		$201	226							
GEF	2.6	$/Wp	$93	104							
Loan principal			$108	122							
Financial cost			$403	**451**							
Finance			$131	0	164						
Loan repayments	35%		($131)	0	(164)						
less duty	13%		($26)	-29							
less VAT	17%		($55)	-61							
dealer margin											
less income tax on dealer margin	35%		($17)	-19							
less transfers			($24)	-27							
Economic capital cost $			**$281**	**315**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
O&M costs											
Bulbs			$73	0	0	35	0	35	0	35	0
Controller			$53	0	0	0	44	0	0	44	15
Battery			$167	0	35	35	35	35	35	35	35
Financial cost to consumer			**$292**	0	35	70	79	70	35	114	50
less VAT	17%		($50)	0	-6	-12	-13	-12	-6	-19	-8
Economic O&M cost $			**$243**	**0**	29	58	66	58	29	95	41
Total Economic Cost $			**$523**	**315**	**29**	**58**	**66**	**58**	**29**	**95**	**41**

The analysis also reconciled the economic and financial flows of the SHS component to allocate the costs and benefits of the component among the consumer, the solar PV dealers, local financial institutions, and GEF. This reconciliation shows that the Government will be among the winners. This is due to the taxes and duties it will collect from the SHS systems. This revenue more than compensates the revenue loss from kerosene taxes that are much smaller than taxes on PV systems and components. The team recommends that the Government review the taxation of solar PV systems during the project's first phase with the objective of achieving a more level playing fields between the different energy systems.

Annex 5: Financial Summary

MOZAMBIQUE: Energy Reform and Access

Years Ending June

	IMPLEMENTATION PERIOD						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Total Financing Required							
Project Costs							
Investment Costs	4.0	19.1	35.5	23.0	0.0	0.0	0.0
Recurrent Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Project Costs	4.0	19.1	35.5	23.0	0.0	0.0	0.0
Total Financing	4.0	19.1	35.5	23.0	0.0	0.0	0.0
Financing							
IBRD/IDA	3.0	11.3	17.1	8.8	0.0	0.0	0.0
Government	0.4	1.1	1.1	0.4	0.0	0.0	0.0
Central	0.4	1.5	1.6	0.4	0.0	0.0	0.0
Provincial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Co-financiers	0.3	3.1	10.5	8.2	0.0	0.0	0.0
User Fees/Beneficiaries	0.0	1.3	3.2	3.2	0.0	0.0	0.0
EdM	0.2	1.4	2.5	1.4	0.0	0.0	0.0
GEF	0.1	0.9	1.1	1.0	0.0	0.0	0.0
Total Project Financing	4.0	19.1	35.5	23.0	0.0	0.0	0.0

Main assumptions:

EdM Financial Summary

Historical Income Statement

US$ thousand

	1998	1999	2000	2001
Average Exchange Rate (000'MT/US$)	10	13.2	17	23
Operating Revenues	**79,353.5**	**65,468.3**	**60,623.8**	**54,742.1**
Electricity Revenues	78,481.8	64,717.0	60,196.0	53,985.4
Other Revenues	871.7	751.2	427.8	756.7
Operating expenses	**81,234.9**	**63,918.4**	**62,545.4**	**53,857.7**
Purchased Energy	12,000.0	8,518.5	11,142.5	8,669.7
Fuels	6,000.0	3,540.0	5,192.0	5,223.1
Materials and Equipments	6,407.9	4,055.2	5,296.4	4,740.7
Personnel	14,411.3	15,023.9	13,080.8	13,048.7
Maintenance and Services	12,065.6	9,567.1	7,296.3	7,439.7
Other	2,377.3	2,183.4	3,722.5	3,103.5
Depreciation	27,972.8	21,030.4	16,814.9	11,632.3
Operating Income	**(1,881.4)**	**1,549.8**	**(1,921.6)**	**884.4**
Extraordinary Result	13,483.1	6,776.6	843.3	14,344.6
Other Income	840.8	334.7	866.5	682.2
Extraordinary Profit (Loss)	(6,298.6)	(3,453.1)	(2,617.3)	(3,000.1)
Income Before Interest and Taxes	**(7,339.2)**	**(1,568.6)**	**(3,672.5)**	**(1,433.5)**
Interest	**3,006.9**	**3,288.0**	**3,408.6**	**4,339.0**
Interest During construction	0.0	0.0	0.0	0.0
Operating Interest	3,006.9	3,288.0	3,408.6	4,339.0
Income Taxes	641.6	174.5	264.1	86.8
Net Profit	**(10,987.7)**	**(5,031.1)**	**(7,345.2)**	**(5,859.2)**
Prior Year Results	0.0	(92.7)	(221.2)	(675.5)
Profit (Loss) for the Year	**(10,987.7)**	**(4,938.4)**	**(7,124.0)**	**(5,183.7)**

	US$			
	885.4	996.2	1013	1074
	88.6	65.0	59.4	50.3

Historical Sources and Application of Funds

US$ thousand

	1998	1999	2000	2001
Average Exchange Rate ('000 Metical/US$)	10	13.2	17	23
SOURCES				
Internal Generation	34,629.9	26,063.9	12,035.1	(4,232.5)
Income Before Interest	5,502.3	5,033.6	(4,779.8)	(15,864.8)
Depreciation	27,972.8	21,030.4	16,814.9	11,632.3
Other	1,154.8	0.0	0.0	0.0
Debt Service	3,006.9	3,310.0	3,437.4	4,371.0
Amortization	0.0	22.0	28.7	32.0
Interest	3,006.9	3,288.0	3,408.6	4,339.0
Internal Net Generation	31,623.0	22,753.9	8,597.7	(8,603.5)
Net Borrowings	21,929.1	18,750.0	24,017.6	17,404.3
World Bank	0.0	3,030.3	2,352.9	3,913.0 .
Other Banks	0.0	15,151.5	21,058.8	13,043.5
Others	21,929.1	568.2	605.9	447.8
Equity Contributions (including Revaluation)	0.0	13.5	0.0	1.7
TOTAL SOURCES	**53,552.1**	**41,517.5**	**32,615.4**	**8,802.6**
APPLICATIONS				
Investments	62,3 40.3	41,568.2	27,666.6	37,391.3
Plant In Service	43,566.3	34,090.9	11,882.4	1,739.1
Work In Progress	1,918.8	4,825.8	15,784.2	35,260.9
Financial Investments	16,855.2	2,651.5	0.0	391.3
Working Capital Increase	(8,524.6)	265.2	4,9 94.1	(28,750.4)
Unrealized Differences	(263.6)	(315.9)	(45.3)	161.7
TOTAL APPLICATIONS	**53,552.1**	**41,517.5**	**32,615.4**	**8,802.6**

Historical Balance Sheet

	US$ million			
	1998	**1999**	**2000**	**2001**
Aver.Exchange Rate ('000 MT/US$)	10	13.2	17	23
ASSETS				
Fixed Assets in Operation	274.4	300.9	237.9	187.6
Less Accumulated Depreciation	0.0	99.8	91.8	77.8
Net Fixed Assets in Operation	274.4	201.1	146.2	109.8
Work in Progress	37.2	51.8	55.4	76.2
Other assets	18.6	14.8	13.7	10.1
Total Net Fixed Assets	330.2	267.7	215.3	196.1
Current Assets				
Cash and Banks	7.2	5.4	8.7	10.0
Accounts receivable	26.4	23.3	33.5	21.7
Inventory	19.3	20.0	21.1	16.7
Accounts Prepaid	0.0	16.5	11.9	15.8
Other	14.4	0.0	0.0	0.0
Total Current Assets	67.3	65.1	75.3	64.3
TOTAL ASSETS	**397.5**	**332.8**	**290.5**	**260.4**
EQUITY AND LIABILITIES				
Equity				
Capital	25.6	33.4	25.6	18.9
Retained Earnings	(42.9)	(31.3)	(32.4)	(46.8)
Capital Revaluation	170.6	131.2	100.4	75.9
Total Equity	153.3	133.3	93.5	47.9
Long-Term Debt				
World Bank	20.0	18.6	17.9	15.2
Bank Loans	118.7	86.0	85.5	90.2
Others	2.6	2.6	2.6	2.4
Total Long Term Debt	141.2	107.2	106.0	107.7
Current Liabilities				
Short-Term Debt	0.0	7.7	5.9	6.5
Current Portion of LT Debt	0.0	22.3	28.7	32.0
Accounts Payable	51.6	49.5	25.7	31.7
Other	51.4	12.8	30.7	34.6
Total Current Liabilities	103.0	92.3	91.1	104.7
TOTAL EQUITY AND LIABILITIES	**397.5**	**332.8**	**290.5**	**260.4**

Projected Income Statement

	Estimate	Forecast					
Year ending Dec. 31	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Exchange Rate (1000 Meticals)	24.1						
Operating Revenues	**74.325**	**74.355**	**86.352**	**101.501**	**119.378**	**140.407**	**151.509**
Electricity Revenues	73.766	73.796	85.793	100.942	118.820	139.848	150.951
Other Revenues	0.559	0.559	0.559	0.559	0.559	0.559	0.559
Operating Expenses	**63.671**	**70.965**	**78.910**	**83.203**	**90.456**	**93.955**	**97.565**
Purchased Energy	7.906	7.906	9.171	9.905	10.697	11.553	12.477
Fuels	3.944	4.220	4.524	1.388	1.508	1.512	1.517
Materials and Equipments	14.596	15.617	16.742	18.091	19.647	19.706	19.765
Labor	15.694	16.793	18.002	19.453	21.126	21.189	21.253
Maintenance and Services	6.645	7.110	7.622	8.236	8.945	8.971	8.998
Other	2.207	0.000	0.000	0.000	0.000	0.000	0.000
Depreciation	12.680	19.319	22.849	26.129	28.534	31.024	33.555
Operating Income	10.653	3.390	7.443	18.298	28.922	46.451	53.944
(+) Other Income (Expense)	-16.804	0.000	0.000	0.000	0.000	0.000	0.000
Income before Interest and Taxes	**-6.150**	**3.390**	**7.443**	**18.298**	**28.922**	**46.451**	**53.944**
(-) Interest	3.006	9.440	5.062	6.994	6.660	4.292	4.574
(-) Taxes	0.169	0.000	0.833	3.957	7.792	14.756	17.279
Net Income	-9.325	-6.050	1.547	7.348	14.470	27.403	32.090
(-) Dividends	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Retained Earnings	**-9.325**	**-6.050**	**1.547**	**7.348**	**14.470**	**27.403**	**32.090**

Projected Sources and Application of Funds

	Estimated	Forecast						TOTAL
Year ending Dec. 31	2002	2003	2004	2005	2006	2007	2008	2002-2008
SOURCES								
Internal Generation	**6.361**	**22.709**	**29.458**	**40.471**	**49.664**	**62.719**	**70.220**	**281.602**
Income Before Interest After Taxes	(6.319)	3.390	6.609	14.342	21.130	31.695	36.664	107.512
(+) Depreciation	12.680	19.319	22.849	26.129	28.534	31.024	33.555	174.090
(-) Debt Service	**(7.756)**	**(17.130)**	**(12.830)**	**(14.837)**	**(16.469)**	**(17.345)**	**(15.237)**	**(101.604)**
Amortization	(4.750)	(7.690)	(7.768)	(7.843)	(9.809)	(13.053)	(10.663)	(61.576)
Interest	(3.006)	(9.440)	(5.062)	(6.994)	(6.660)	(4.292)	(4.574)	(40.028)
Net Internal Generation	**(1.395)**	**5.579**	**16.628**	**25.634**	**33.195**	**45.374**	**54.983**	**179.998**
Net Borrowings	**84.800**	**97.220**	**52.430**	**30.140**	**15.560**	**10.600**	**1.800**	**292.550**
IDA (World Bank) Loan	0.000	0.320	3.630	8.340	5.060	0.000	0.000	17.350
Other Loans	84.800	84.500	5.000	9.800	2.100	0.000	0.000	186.200
Future Borrowing	0.000	12.400	43.800	12.000	8.400	10.600	1.800	89.000
Equity Contributions	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL SOURCES	**83.405**	**102.799**	**69.058**	**55.774**	**48.755**	**55.974**	**56.783**	**472.548**
APPLICATIONS								
Investments	**56.100**	**70.400**	**49.400**	**50.500**	**25.500**	**42.900**	**42.900**	**337.700**
Distribution	25.700	31.600	27.100	20.600	17.800	21.100	21.100	165.000
Transmission	29.900	26.500	11.000	14.800	3.900	16.500	16.500	119.100
Generation	0.000	0.000	0.000	3.800	3.800	0.900	0.900	9.400
Other	0.500	12.300	11.300	11.300	0.000	4.400	4.400	44.200
Working Capital Increase (Decrease)	**27.305**	**32.399**	**19.658**	**5.274**	**23.255**	**13.074**	**13.883**	**134.848**
TOTAL APPLICATIONS	**83.405**	**102.799**	**69.058**	**55.774**	**48.755**	**55.974**	**56.783**	**472.548**

Projected Balance Sheet

	Estimate	Forecast					
Year ending Dec. 31	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
ASSETS							
Fixed Assets in Operation	253.715	321.984	380.818	435.485	475.569	517.060	559.256
Accumulated Depreciation	(90.462)	(109.781)	(132.630)	(158.759)	(187.293)	(218.317)	(251.872)
Net Fixed Assets in Operation	163.253	212.203	248.188	276.726	288.275	298.743	307.384
Work in Progress	66.137	68.268	58.834	54.667	40.084	41.492	42.196
Other Assets	10.000	10.100	10.100	10.100	10.100	10.100	10.100
Total Net Fixed Assets	**239.390**	**290.571**	**317.122**	**341.493**	**338.459**	**350.335**	**359.680**
Current Assets							
Cash and Banks	10.436	7.995	7.864	8.412	9.902	11.654	12.579
Accumulated Surplus	0.200	0.145	0.063	0.075	0.048	0.020	0.003
Accounts Receivable	35.216	24.599	21.448	16.824	19.803	23.308	25.158
Inventory	16.341	14.854	17.373	19.371	20.179	20.912	21.517
Other	0.772	0.000	0.000	0.000	0.000	0.000	0.000
Total Current Assets	**62.964**	**47.592**	**46.749**	**44.682**	**49.933**	**55.894**	**59.258**
TOTAL ASSETS	**302.354**	**338.163**	**363.871**	**386.174**	**388.391**	**406.229**	**418.937**
EQUITY AND LIABILITIES							
Equity							
Capital	18.906	18.906	18.906	18.906	18.906	18.906	18.906
Retained Earnings	(56.166)	(62.216)	(60.669)	(53.321)	(38.851)	(11.448)	20.643
Capital Revaluation	75.884	75.884	75.884	75.884	75.884	75.884	75.884
Revaluation Surplus	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Equity	**38.624**	**32.574**	**34.121**	**41.469**	**55.939**	**83.343**	**115.433**
Long-Term Debt	**180.096**	**261.858**	**298.677**	**311.165**	**303.863**	**290.747**	**281.884**
Current Liabilities							
Short Term Debt	6.500	6.630	6.763	6.898	7.036	7.177	7.320
Current Portion of Long Term Debt	7.690	7.768	7.843	9.809	13.053	10.663	0.000
Accounts Payable	34.444	29.333	16.467	16.833	8.500	14.300	14.300
Other Current Liabilities	35.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Current Liabilities	**83.634**	**43.731**	**31.072**	**33.540**	**28.589**	**32.140**	**21.620**
TOTAL EQUITY AND LIABILITIES	**302.354**	**338.163**	**363.871**	**386.174**	**388.391**	**406.229**	**418.937**

Annex 6(A): Procurement Arrangements
MOZAMBIQUE: Energy Reform and Access

Procurement

General

Procurement of all Supply and Installation of Plant and Equipment, Goods and Works to be financed under the IDA Credit will be in accordance with the appropriate Bank's *Guidelines: Procurement under IBRD Loans and IDA Credits*, (January 1995 and as revised in January and August 1996, September 1997 and January 1999). Consulting services by firms or individuals to be financed by IDA will be awarded contracts in accordance with the Bank's *Guidelines: Selection and Employment of Consultants by World Bank Borrowers*, (January 1997 and as revised September 1997, January 1999, and May 2002). The appropriate World Bank's Standard Bidding Documents for all International Competitive Bidding (ICB) and National Competitive Bidding (NCB) with any appropriate modifications, will be used. The World Bank's Standard Request for Proposals (RFP) will be used for the selection of consultants. For details on project costs by procurement arrangements refer to **Table A.**

Project Components:

There are five main components under this project. The output from each component is as follows:

- **Power Sector Reform** (to be implemented by DNE) is estimated to cost US$6.12 million (IDA US$2.65 million). It consists of three parts and will allow: (i) EdM to be organized along business centers (US$2 million -- financed by AfDF and DANIDA); (ii) private sector partnership in EdM's Distribution and Supply business; and (iii) the establishment of a separate transmission company (AfDF-funded). A Transaction Advisor will be procured under IDA financing to carry out all activities up to financial close of the transaction (US$2.65 million).

- **Grid-based Peri-Urban Electrification** (to be implemented by EdM) is estimated to cost US$41.00 million (IDA: US$17.35 million) and will finance expansion of the electricity network to connect more consumers. The following will be procured: consultancy services, comprising design, bid preparation and evaluation, construction supervision, and technical assistance (US$3 million); supply and installation (US$36.3 million); civil works (US$1 million); and goods (US$0.7 million).

- **Independent Grid Rural Electrification** (to be implemented by DNE) is estimated to cost US$16.38 million (IDA: US$10.6 million) and will allow the private sector to establish three or four new independent grids. The following will be procured out of the IDA amount for consultancy services contracts: transaction advice (US$1 million), technical advisory services (US$0.4 million), and a study to identify productive uses of electricity for income generation purposes (US$0.2 million). The rest of the amount will finance subsidies, based mainly on outputs (the number of connection achieved). Annex 12 provides details of the OBA scheme.

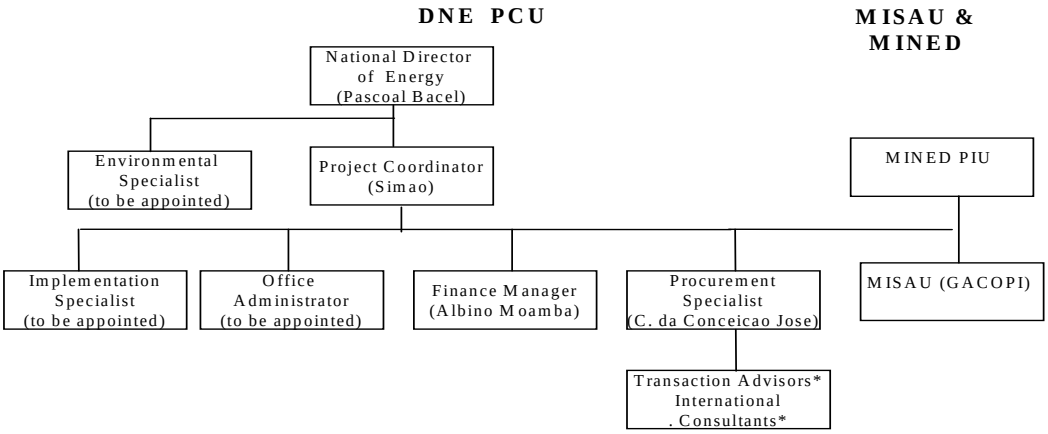
- **Renewable Energy and Cross-Sectoral Linkages** (to be implemented by DNE, MISAU and MINED) is estimated to cost US$9.55 million (IDA: US$4.12 million, GEF: US$3.09 million). Of this amount, US$2.7 million will be used to procure solar PV systems for MISAU and MINED, on a supply and installation basis; US$3.58 million will be used for various technical assistance (consultancy and training) required to create a sustainable renewable energy market; and US$3.27 million, comprised of private equity, debt and GEF-funded output-based grants on a per Watt basis,

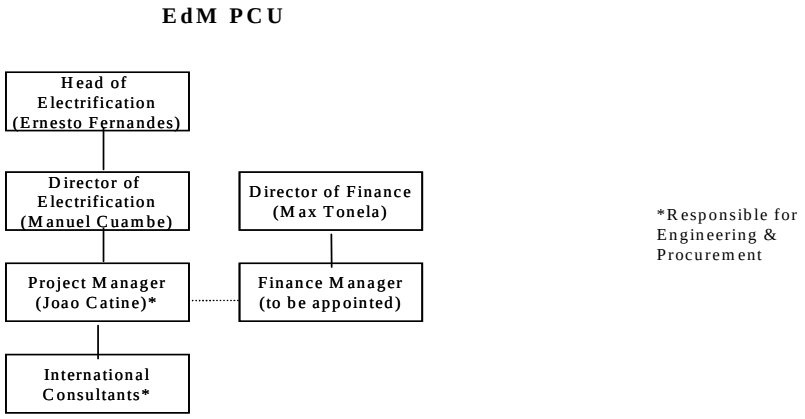
will finance the supply of renewable energy systems by private sector suppliers. Prospective suppliers will be pre-qualified based on minimum technical and financial criteria.

- **Institutional Development and Capacity Building** (to be implemented by DNE) is estimated to cost US$8.50 million (IDA: US$5.54) and will be used to procure: (i) consultancy for regulatory and technical advisory services; (ii) legal and financial advisory services for the natural gas pipeline project and other mega-projects; (iii) various training courses; (iv) individual consultants for the DNE PCU, including a consultant to assist in preparing an M & E plan; (v) consultants to assist in preparing the second phase of the program; and (vi) motor vehicles and office equipment for the PCU.

Procurement Organization and Capacity Assessment

The project organization structures are shown below:





The Overall coordination of the project will be handled by the PCU in DNE. Procurement of all supply and installation of plant and equipment, goods and civil works, and consultant services under the project will be handled by four Project Coordinating Units (PCUs) formed by the five agencies that will be responsible for implementing the program (see Annex 2 for detailed implementing arrangements). They

are: the EdM for the Intensification Component, the Ministries of Health (MISAU) and Education (MINED) for the Cross-sectoral components and DNE for all other components.

Other arrangements are as follows: Funds out of this Credit will be channeled from IDA either directly to suppliers, to implementing agencies (public entities) through Special Accounts or to private project sponsors through a trust account that will be managed by a commercial bank. The funds to public entities will be used for procuring works, various consultancy services for managing the program, for providing advisory services to the private project sponsors, as well as for procuring office equipment, furniture and vehicles.

A formal procurement capacity and summary risk assessments of the five agencies that will be responsible for implementing the project has been carried out by IDA. It depicts salient features of the procurement arrangements, controls systems and procurement methods and procedures, applicable to each component and the overall project.

During the appraisal mission, a World Bank Basic Operations Procurement training was conducted. About 12 staff members from all the five agencies participated in the training. This included the Director of the DNE, the PCU Coordinator and the newly recruited Procurement Specialist. At the end of the training, the PCU Coordinator was given a document on procurement filing guidelines and checklist for PIUs and the updated WB procurement planning tools as guidance for the agencies to prepare their first year procurement plans. To update the procurement knowledge of the agencies, the website of the latest versions of the applicable WB-SBDs guidelines and manuals was given to the PCU Coordinator to be disseminated to the agencies that will be implementing the project.

In summary, the procurement capacity and risk assessments are rated fair (for the DNE, FUNAE and the Ministry of Health) and satisfactory (for the EdM and the Ministry of Education).

The summaries of the procurement capacity assessments of the five agencies to implement the project are as follows:

Electricidade de Mozambique (EdM)

The Electrification and Projects Directorate (DEP) will manage the components to be implemented by EdM. A Project Coordinator has already been appointed. He will be responsible for the intensification component. He will be assisted by an engineer dedicated to the project, a financial manager, an accountant, and staff from a recently established environment unit of EdM.

The overall procurement capacity of EdM to implement IDA-funded procurement is rated **average** and the risk assessment is **average**. Two key staff who will be involved in processing procurement are familiar with World Bank procurement procedures and guidelines. They were responsible for executing a component of the IDA-funded Urban Household Energy Project (Cr. 2033-MOZ), which was closed about five years ago. According to the Implementation Completion Report No. 19449 dated June 17, 1999 factors external to the energy sector contributed to the slow pace of project implementation and credit disbursement such as the weak banking sector, the cumbersome and lengthy Government review and approval procedures for procurement of goods and recruitment of consultants. The DEP has also handled procurement processing for DANIDA, NORAD, SIDA, AfDB and AfDF, applying bilateral procurement procedures.

The National Directorate of Energy (DNE) and Energy Fund (FUNAE)

The overall procurement capacity of DNE and FUNAE is **low** and the risk assessment is **high**. A Project Coordinator, Accountant and Procurement Officer have been appointed. There is inadequate procurement management capacity within the agencies; however most procurement will be handled by international consultants. A few staff are familiar with WB procurement guidelines and procedures due to their involvement in the procurement processing of the IDA-funded Urban Household Energy Project (Cr. 2033-MOZ) which closed in 1999, and a minor component of the ongoing Gas Engineering Project (Cr. 2629-MOZ).

The Ministry of Health (MISAU)

The overall procurement capacity of MISAU is currently **low** and the risk assessment is **high.** The Procurement Unit (GACOPI) which is managed by a Procurement Assistant and assisted by a Procurement Consultant, and a Procurement Secretary from Crown Agents, will be responsible for handling the procurement of the cross-sectoral component of the project. MISAU is in the process of hiring a consulting firm/procurement agent to handle goods contracts.

The Procurement Unit (GACOPI) is familiar with WB procurement guidelines and procedures due to their implementing an ongoing IDA-funded project (Cr. 2788-MOZ). A matter of concern is the fact that two key staff of GACOPI who were responsible for fiduciary matters, resigned from MISAU recently.

The Ministry of Education (MINED)

The overall procurement of MINED is **high** and the risk assessment is **low**. The Procurement Unit is headed by the Director of Administration and Finance. A Procurement Advisor, Procurement Assistant, Administrative Assistant and Logistics Assistant work in coordination with the head of the department of internal administration who reports to the Director of Administration and Finance. The Procurement Advisor of the Administrative and Finance Department who will be responsible for handling the procurement of the cross-sectoral component of the project, has good knowledge of international procurement and IDA rules.

The Procurement Unit is familiar with World Bank procurement guidelines and procedures due to its implementing an ongoing IDA project (Cr. 3172-MOZ), which has not faced any procurement issues. A Post Procurement Review (PPR) was conducted on March 6, 2003, which concluded that MINED had generally complied with the agreed provisions.

Other Arrangements

It is highly recommended that staff who will be involved in the implementation of the various components of the project are sponsored by the project to attend one or more of the World Bank external procurement workshops/seminars held in the region, ESAMI in Arusha, Tanzania. During the first phase of implementation, the PCU should hire international consultants to assist in processing procurement.

Summary Risk Assessment and Action Plans

The overall assessment indicates that the procurement system has serious institutional, legislative and manpower weaknesses which have a negative impact on the use of Government funds and sometimes affect funds from donor agencies including the Bank. These weaknesses affect procurement processing

in the energy sector as a whole and also commercial activities, including imports and banking services.

An action plan to support the objectives to reform and achieve acceptable standards of transparency, economy and efficiency is proposed as follows:

- Appointment of suitably qualified personnel.
- Training of procurement staff.
- Recruiting procurement consultants to assist the PCUs in supply and installation of equipment design, and construction supervision.
- Assigning the EdM experienced staff who have been working for the AfDF financed power projects as PCU team members prior to project effectiveness.
- Updating the knowledge of the PCU and procurement staff through participation in regional Bank procurement workshops; and providing all the relevant WB-SBDs, RFP, Guidelines manuals to the PCU prior to project effectiveness; and
- Ensuring that the PCU staff acquaint themselves with the nation-wide initiatives for procurement reform and follow the recommendations of the recent Country Procurement Assessment Report (CPAR) for Mozambique.

Procurement Planning: A final Overall Procurement Plan (OPP) for all the components which forms part of the Project Implementation Plan (PIP) has been prepared by DNE, EdM, MISAU and MINED. The OPP includes relevant information on supply and installation of plant and equipment and consulting services as well as the timing of each milestone in the procurement process. The first year's Detailed Procurement Plan (DPP) is being prepared. The DPPs for the remaining years of the project, indicating the procurement method and processing time for each contract, will be submitted to IDA every year for its review and comments not later than three months before the end of each fiscal year.

Advertising: A General Procurement Notice (GPN) will be published in the UN Development Business (UNDB) in July 2003. It will indicate all the procurement contracts estimated to cost the equivalent of US$100,000 or more where the International Competitive Bidding (ICB) method of procurement will be used. All consultancy assignments estimated to cost the equivalent of US$100,000 or more will be advertised in an international newspaper and in the UNDB. In addition, expressions of interest may be sought from prospective consultants by advertising in a national newspaper or technical magazines. In the case of assignments estimated to cost US$100,000 or less the assignment may be advertised nationally and the short list may be made up entirely of national consultants, provided that at least three qualified national firms or individuals are available in the country and foreign consultants who wish to participate, are not excluded from consideration.

Procurement methods (Table A)

Table A: Project Costs by Procurement Arrangements
(US$ million equivalent)

Expenditure Category	Procurement Method[1]				Total Cost
	ICB	NCB	Other[2]	N.B.F.	
1. Works	19.98	2.00	1.60	20.00	43.58
1a. Supply & Installation (13.20) 1b. Civil Works (1.47)	(12.00)	(1.52)	(1.15)	(0.00)	(14.67)
2. Goods	0.70	0.60	0.50	0.00	1.80
2. Goods	(0.50)	(0.50)	(0.44)	(0.00)	(1.44)
3. Services	0.00	0.00	15.11	1.00	16.11
3. Consultants	(0.00)	(0.00)	(9.77)	(0.00)	(9.77)
4. Miscellaneous	0.00	0.00	16.38	0.00	16.38
Sub-projects funded by the MECS	(0.00)	(0.00)	(11.75)	(0.00)	(11.75)
3. Training	0.00	0.00	3.04	0.00	3.04
	(0.00)	(0.00)	(2.05)	(0.00)	(2.05)
4. Total Grants/PPF Advance	0.00	0.00	0.60	0.00	0.60
	(0.00)	(0.00)	(0.60)	(0.00)	(0.60)
(i) PHRD Grant (0.36) (Bank-executed)					
(ii) PHRD Grant (0.19) (Recipient-executed)					
(iii) PPF Advance (0.60)					
(iv) GEF PDF-B Grant (0.30)					
TOTAL Project Cost					
Of which IDA-funded Cost is					
Total	20.68	2.60	37.23	21.00	81.51
	(12.50)	(2.02)	(25.76)	(0.00)	(40.28)

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

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

3/ The numbers indicating IDA Credit financing include amounts advanced or expected to be advanced by the PHRD Grants (Bank-executed US$0.356 million; Recipient executed US$0.192 million and PPF Advance US$0.82 million).

4/ "N.B.F." means Not Bank-Funded.

Procurement Method: All contracts for supply and installation of plant and equipment, goods and works estimated to cost more than US$100,000 equivalent will be procured through International Competitive Bidding (ICB). This includes:

Goods and Works by Government Sponsors and others: All contracts for goods, works, and concessions estimated to cost US$100,000 or more will be procured through ICB in accordance with provisions of Section II of the Guidelines and paragraph 5 of Appendix 1 thereto. To the extent possible, contracts for similar goods and works will be grouped into packages of US$100,000 and more so that they can be launched using ICB to obtain more favorable prices. Contracts for goods and works estimated to cost US$30,000 equivalent or more, up to an aggregate of US$1.5 million may be procured through National Competitive Bidding (NCB) in accordance with the provisions of paragraphs 3.3 and 3.4 of the Guidelines. Goods estimated to cost US$30,000 equivalent or less per contract, up to an aggregate amount of US$1.5 million equivalent may be procured through shopping procedures by soliciting at least three quotations from different suppliers, in accordance with provisions of paragraphs 3.5 and 3.6 of the Guidelines and June 9, 2000 Memorandum "Guidance on Shopping" issued by the Bank. Procurement of goods and hiring of facilities for training purposes, such as workshops, will also be carried out through shopping procedures. Records of award decisions on the shopping procedure will be kept for Bank's ex-post reviews. All contracts for minor works estimated to cost less than US$30,000 equivalent may be procured under lump-sum fixed-price contracts awarded on the basis of quotations obtained from three qualified domestic contractors in response to a written invitation.

The above aggregate values for NCB and shopping methods for goods are limited and cannot be exceeded without prior Bank clearance. The procurement units responsible for the project will maintain a tracking system to monitor such procurement in order to alert the Bank in a timely manner when this occurs.

Procurement of Consultant Services

Procurement Methods: As a rule, consultant services will be procured through Quality and Cost Based Selection (QCBS) in accordance with the provisions of Section II of the Consultant Guidelines and provisions of paragraphs 3.13 through 3.18 of the Guidelines. All consulting service contracts costing more than US$100,000 equivalent for firms will be awarded using the QCBS method. For transaction advice, procurement will be through QCBS. Consulting service contracts estimated to cost less than US$50,000 for firms may be awarded through the Consultants' Qualifications (CQ) selection method in accordance with the provisions of paragraph 3.7 of the Guidelines. All consulting services of individual consultants will be procured under individual contracts in accordance with the provisions of paragraph 5.1 to 5.3 of the Guidelines. In exceptional cases, Single-Source selection will be used in accordance with the provisions of paragraphs 3.8 to 3.11 of the Guidelines. Single-Source selection could be used for contracts of US$10,000 equivalent or less subject to an aggregate ceiling of US$50,000. Procurement for subproject development by the sponsors for consultant services under US$50,000 can follow standard commercial practices. In particular, the consultant's qualifications must be adequate to perform the requested services, and the rates must be consistent with comparable consultants of similar capabilities and experience. The short list of consultants for services estimated to cost US$100,000 equivalent or less per contract, may comprise entirely national consultants in accordance with the provisions of paragraph 2.7 of the Guidelines.

Private Concessions (Sub-projects)

For the private concessions, whenever competitive procedures are used, the selected sponsors will be allowed to procure goods, works and services using established commercial practices. In cases where sponsors are not selected on a competitive basis (due to particular circumstances precluding a viable market response in remote areas), the sponsors will be required to procure goods, works and services in accordance with the Association's procurement guidelines and the agreed procurement arrangements for the project.

Training: The training activities will generally cover institutional and capacity building in all the project components. It is envisaged that there will be various training modules for operating staff, estimated to cost US$3.04 million equivalent in total. Also there will be: on-the-job training and hiring consultants for developing training materials, conducting training, and support for training activities through seminars, workshops and training in the region and abroad based on individual needs as well as group requirements. A detailed training program giving categories of training, number of trainees, duration of training, staff months, timing and estimated cost etc., will be submitted to IDA for review and approval prior to initiating the training process. The appropriate methods of selection will be derived from the detailed schedule. The procurement of these activities will also be in accordance with the provisions of paragraph 1.20 of the Guidelines.

Table A1: Consultant Selection Arrangements (optional)
(US$ million equivalent)

Consultant Services Expenditure Category	Selection Method							
	QCBS	QBS	SFB	LCS	CQ	Other	N.B.F.	Total Cost[1]
A. Firms	13.37 (9.42)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.21 (0.21)	0.05 (0.04)	2.00 (0.00)	15.63 (9.67)
B. Individuals	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.48 (0.10)	0.00 (0.00)	0.48 (0.10)
Total	13.37 (9.42)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.21 (0.21)	0.53 (0.14)	2.00 (0.00)	16.11 (9.77)

[1] Including contingencies

Note: QCBS = Quality- and Cost-Based Selection
QBS = Quality-based Selection
SFB = Selection under a Fixed Budget
LCS = Least-Cost Selection
CQ = Selection Based on Consultants' Qualifications
Other = Selection of individual consultants (per Section V of Consultants Guidelines), Commercial Practices, etc.
N.B.F. = Not Bank-financed
Figures in parentheses are the amounts to be financed by the Bank Credit.

Review by IDA

Table B provides the prior review thresholds. Each supply and installation of plant and equipment contract estimated to cost US$100,000 equivalent or more, each goods contract estimated to cost US$100,000 equivalent, and each civil works contract estimated to cost US$100,000 equivalent will be subject to IDA prior review as set forth in paragraphs 2 and 3 of Appendix 1 to the Guidelines. The first two private concessions (sub-projects) will be subject to IDA prior review. All other contracts will be subject to post review in accordance with paragraph 4 of Appendix 1 of the Guidelines. All terms of references, all consulting contracts exceeding US$50,000 for individuals and US$100,000 for firms, and all training will be subject to IDA prior review. All Single Source selection – regardless of value, assignments of a critical nature as determined by IDA or amendments of contracts raising the contract value above the prior review thresholds, will be subject to IDA prior review.

Table B: Thresholds for Procurement Methods and Prior Review[1]

Expenditure Category	Contract Value Threshold (thousands)	Procurement Method	Contracts Subject to Prior Review (US$ millions)
1. Works			
- Supply and Installation	equal or greater than 100,000	ICB	All contracts greater than 300,000
	Concessions equal or greater than 100,000	ICB	All contracts greater than 100,000
	less than 100,000	NCB	All post review
- Civil Works	equal or greater than 100,000	ICB	All contracts greater than 100,000
	Concessions equal or greater than 100,000	ICB	All contracts greater than 100,000
	greater than 30,000 and less than 100,000	NCB	All post review
	less than 30,000	minor works based on quotations	All post review
2. Goods			
- Office Equipment, Computers & Vehicles	equal or greater than 100,000	ICB	All contracts greater than 100,000
	equal to 30,000 or less	NCB	All post review

	than 100,000 Less than or equal to 30,000 Concessions equal or greater than 50,000 Less than 50,000	 Shopping ICB NCB	 All post review All contracts greater than 100,000 All post review
3. Services (Consultants) Firms Firms Individuals Individual/Firms	 Equal or greater than 100,000 Less than 50,000 No threshold (All)	 QCBS CQ IC SS	 All contracts greater than 100,000 All post review All contracts greater than 50,000 All contracts
4. Training	Various Training Modules	Various *	To be determined
5. Miscellaneous			

Total value of contracts subject to prior review: US$30 million
Overall Procurement Risk Assessment: **High**
Frequency of procurement supervision missions proposed: One every 6 months (includes special procurement supervision for post-review/audits)

*/ A detailed training program giving categories of training, number of trainees, duration of training, staff months, timing and estimated cost etc., will be submitted to IDA for review and approval prior to initiating the training process. The appropriate methods of selection will be derived from the detailed training schedule.

NOTE:

ICB	=	International Competitive Bidding
NCB	=	National Competitive Bidding
IS/NS	=	International Shopping/National Shopping
QCBS	=	Quality- and Cost-Based Selection
CQ	=	Consultants' Qualifications
IC	=	Individual Consultants
SS	=	Single Source

Agencies Risk Assessments

EdM	Average
DNE/FUNAE	High
MISAU	High
MINED	Low

Overall Procurement Risk Assessment: High

The frequency of procurement supervision missions proposed: Three in the first year of implementation and at least two in the subsequent years. (This includes special procurement supervision for post-review/audits).

[1] Thresholds generally differ by country and project. Consult "Assessment of Agency's Capacity to Implement Procurement" and contact the Regional Procurement Adviser for guidance.

Annex 6(B): Financial Management and Disbursement Arrangements
MOZAMBIQUE: Energy Reform and Access

Financial Management

1. Summary of the Financial Management Assessment

Organizational Structure. The Project has three main implementing agencies directly involved in component management: DNE through its PCU, EdM, and FUNAE. The Ministries of Health (MISAU) and Education (MINED) will be direct beneficiaries of project activities under the Renewable and Cross-Sectoral component. Through this component, electricity will be provided to Government service centers like schools, clinics and agricultural centers. These ministries will not be involved directly in funds management.

FUNAE will be involved as a management/implementing agent, but will not directly manage a Special Account. The Special Account for Component 3, Independent Grids, will be held by a Trust Agent acting for FUNAE and DNE.

The Project has five components as follows:

1	Power Sector Reform	6.12	2.65
2	Grid Electrification	41.00	17.35
3	Independent Grids	16.38	10.60
4	Renewable Energy, Cross-Sectoral (GEF: 3.09)	9.55	4.12
5	Institutional Strengthening and Capacity Building	8.47	5.54
	TOTAL	**81.52**	**40.26**

Accounting System, Accounting Policies and Procedures. The Government accounting system is based on manual, single entry, cash-based system. EdM uses the national corporate chart of accounts and a double-entry, accrual based system. Government and parastatal accounts are maintained on a variety of platforms, including accounting software, excel spreadsheets, and manual books of registry.

The PCU for this Project will invest in an accounting and financial management system, and install that system at the central PCU. EdM will rely on its own internal (excel-based) project management system to control funds and produce its required reports. The FUNAE/Trust Agent system will be defined only when the TORs of the Trust Agent are finalized.

The central PCU will use a double-entry cash-based system to produce financial data on the components it manages. This will be maintained on an information system as discussed above. The form of reporting to the PCU for consolidation that other IAs will be required to follow will be defined in the PCU Project Financial Procedures Manual.

Books of registry. In addition to any information system installed, and the books needed to maintain an accurate and complete record of transactions, the various implementing agents will maintain a set of additional books of registry, either within or outside their systems, for control purposes. These books include:

1. A Fixed Asset Register at each IA (Implementing Agency).
2. A Contracts Register at each IA.
3. Books of control for document deliveries and controlled stationery such as checks.

Budgeting. For the purposes of the credit, each IA will produce annual procurement and disbursement plans that will be consolidated at the PCU and used to monitor and plan cash flow needs. The PCU Coordinator and the Coordinators at the other IAs will be responsible for authorizing expenditures for their respective components in accordance with the agreed budgets.

Reporting (Financial Monitoring Reports). The following quarterly FMRs will be produced by each IA and consolidated by the PCU:

1. Sources and Uses of Funds by Project Category.
2. Uses of Funds by Project Component.
3. Physical Output Monitoring Report.
4. Procurement Monitoring Reports.

The formats were prepared by negotiations. Each IA of the Project must be capable of producing FMRs by effectiveness. In addition, the PCU must demonstrate its capacity to produce the consolidated reporting by credit effectiveness.

Project Financial Statements. In addition to the monthly reconciliations and quarterly monitoring reports, the Project will produce annual Project Financial Statements for analytical and audit purposes. These Financial Statements will be composed of:

1. A Consolidated Statement of Sources and Uses of Funds (showing IDA and Counterpart Funds as well as funds provided by donors).
2. A Statement reconciling the balances on all Bank Accounts to the bank balances on the Statement of Sources and Uses of Funds.
3. SOE Withdrawal Schedule, listing individual withdrawal applications relating to disbursements by the SOE Method, by reference number, date and amount.
4. A Cash Forecast for the next two quarters.
5. Notes on significant accounting policies and accounting standards adopted by management when preparing the accounts; and on any supplementary information or explanations that may be deemed appropriate by management to enhance the presentation of a "true and fair view".

Monitoring. Project monitoring will take the following forms:

- Management oversight by the PCU of other IAs.
- Annual external audit of the Project finances.

Impact of Procurement Arrangements on Financial Management. Procurement at the PCU for DNE-managed components and the FUNAE-managed components will be under the management of the Procurement Specialist. EdM will manage procurement of works and goods through its technical team.

Staffing and Training. The central PCU has a financial manager on staff. The manager has little WB experience, but has already been on one training course in Maputo on WB Financial Management and Disbursements and is aware that further training is necessary. This financial manager will also work closely with the financial management consultant being contracted to set up PCU financial management systems.

EdM has appointed a financial manager. The Trust Agent that will manage the FUNAE SA has not been appointed; therefore the Trust Agent and EdM staff qualifications could not be assessed.

Training Plan. All Accountants, and some administrative and procurement staff will be given training, as appropriate, in the following areas: (a) Financial Management, including internal controls, information systems and computer applications; and (b) Procedures relating to use of funds e.g. IDA (Special Account, SOEs, Procurement, FMR etc.) and Government regulations. On-the-job coaching will be provided. Training on the new financial management system must be completed before Project effectiveness. Additional on-the-job training will most likely be necessary.

Risk Assessment. The overall conclusion of the Country Financial Accountability Assessment (CFAA) dated December, 2001 is that "public sector financial management systems in Mozambique are very weak, as evidenced by the Report of the Tribunal Administrativo of the Government General Accounts Report for 1998. The Government General Accounts Report (Conta Geral do Estado, CGE) was published and audited by the TA for the first time during 1999 and 2000, and will require substantial strengthening over several years. In the interim, risk of waste, diversion and misuse of funds are assessed as high. The public sector financial environment in Mozambique denotes a situation of high fiduciary risk: material receipts and payments are excluded from the budget and from Government accounting and reporting system; accounting systems and standards are outmoded; internal and external auditing require substantial support; and parliamentary oversight requires strengthening**.** Efforts have been made in recent years to reduce the fiduciary risk through (among other measures) the strengthening of the internal audit capacity of the IAD, and the creation of external audit capacity within the AT. Both of these efforts (as well as others) need to be intensified, because there is still a lot of work to be done in this area."

Project Risks. Again from the CFAA: "Because of the high fiduciary risk, IDA has taken special measures to ensure adequate **financial management of its portfolio**. Project management units are often established to manage IDA-financed projects and Bank funding is "ring-fenced" to mitigate fiduciary risk. Accounting staff are hired as consultants, typically on salaries higher than civil service salaries, to work on projects, even when a Ministry implements those projects. IDA projects are invariably audited by one of the "Big Four" international audit firms."

Generally in Mozambique, there are high financial management risks due to a weak control and low capacity environment. Government accounts are regularly late and incomplete. Inter-agency reporting is slow and sometimes difficult to achieve, where hierarchical lines are blurred or are foreign to the day-to-day structures and management of the institution. Accountability chains are weak, and penalties are extremely light or non existent.

Specific Project risks here include:

1. Delays in the appointment of the Trust Agent due to delays in beginning the selection process.
2. Delays in implementation due to poorly defined procedures for inter-agency cooperation in financial management and reporting.
3. Delays in implementation due to the need to design the subsidy mechanism only after the transaction agent is mobilized.

Additionally, risks often faced by projects in Mozambique include:

(1) Illiquidity at the central treasury delaying project implementation through lack of counterpart funds and/or inability to access counterpart funds because the project is not "inscribed" in the national budget. For example, this project is scheduled to become effective mid-year. Counterpart funds should already have been authorized for this fiscal year. However, the Government will not authorize a project "inscription" into the national budget before the project is negotiated. If negotiations are after the beginning of the fiscal year, and the project effectiveness date is in the same year, IAs almost invariably find themselves unable to inscribe the project timely. They reach effectiveness without the required counterpart funds and have no prospect of accessing them, except through extraordinary measures, until the following calendar year.

(2) Weak financial management and procurement capacity at the PCU delaying implementation.

(3) Delays in implementation due to the time and capacity required to train staff to an adequate level to manage a ring-fenced Project management structure.

Conclusion. Based on the evaluation above, the Project does not currently satisfy minimum World Bank financial management requirements. In order to establish an acceptable control environment and to mitigate financial management risks the various measures should be taken by the due dates as indicated in the table below. The project financial management risk is assessed as being moderate provided that the financial management arrangements are properly implemented and the following financial management action plan satisfactorily addressed in practice.

Financial Management Action Plan

	Action	Due Date	Conditionality
1	Individual and Consolidated (if different) Financial Monitoring Report formats agreed. Report formats for EdM, FUNAE, and DNE must be compatible.	Negotiations	Condition of Negotiations
2	Qualified and experienced Financial Managers working at the Project Units at DNE and EdM.	Negotiations	Condition of Negotiations
3	Training for Financial Managers at EdM and DNE on World Bank FM and Procurement procedures.	Effectiveness	Condition of Effectiveness
4	Financial Management System (FMS) designed and installed at the DNE PCU and the EdM PCU. This includes: -- Procedures Manuals -- Information System -- Training	Effectiveness	Condition of Effectiveness
5	Qualified and experienced Trust Agent competitively appointed. Trust Procedures Manual finalized.	Effectiveness	Condition of Effectiveness
6	Trust Agent, DNE and FUNAE personnel trained in the subsidy mechanism and its procedures.	Effectiveness	Condition of Effectiveness
7	Counterpart Funds and US Dollar Accounts opened for Project funds at DNE and EdM	Effectiveness	Condition of Effectiveness
8	Relevantly qualified external auditors for the project appointed on approved terms of reference.	Effectiveness	Condition of Effectiveness
9	Ability to prepare FMRs demonstrated at each Project IA (or, in the case of FUNAE, at the Trust Agent managing the Trust Special Account). Ability to produce consolidated FMRs demonstrated by DNE in cooperation with all other Implementing Agents.	Effectiveness	Condition of Effectiveness

2. Audit Arrangements

Internal Audit. Taking into account that the internal audit functions are weak, there needs to be strong supervision and quality assurance at all IAs involved in the Project. The day-to-day supervision of accounting functions will be assured by the organization structure of the Project, which calls for a Financial Manager at each implementing agent. The Financial Manager will be responsible for direct operational supervision of the IAs special account, and the manager at the DNE PCU will be responsible for consolidated reporting.

External Audit. Relevantly qualified, experienced and independent auditors will be appointed on approved terms of reference. The external audit will cover all World Bank funds and Counterpart funds at all IAs. The IDA Credit Agreement will require the submission of audited financial statements (consolidated) to the Bank within six months after the year-end. The formats to be adopted will be documented in the Financial Procedures Manual.

Besides expressing a primary opinion on the audited financial statements in compliance with International Auditing Standards, the auditor will be required to include a separate paragraph commenting on the accuracy and propriety of expenditures withdrawn under SOE procedures and the extent to which these can be relied upon as a basis for loan disbursements. Regarding the Special Accounts, the auditor will also be expected to form an opinion as to the degree of compliance with World Bank procedures and the balances at the year-end.

In addition to the audit report, the auditor will be required to prepare a separate Management Letter giving observations and comments, and providing recommendations for improvements of accounting records, systems, controls and compliance with financial covenants in the IDA Agreement.

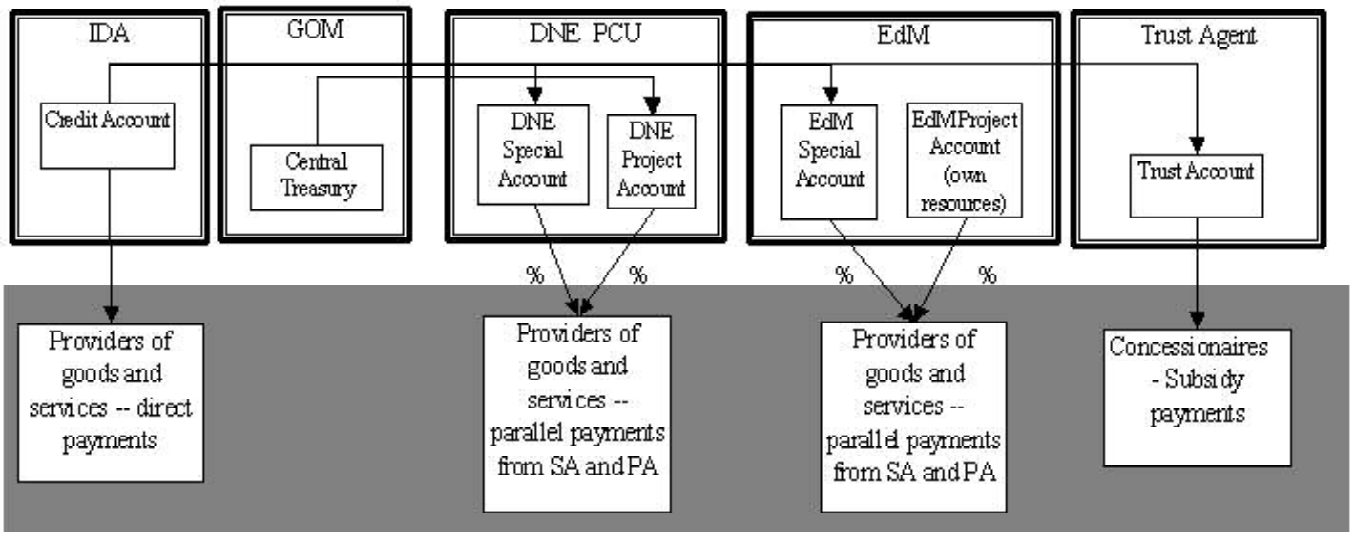
Supervision. Financial management supervision will be carried out regularly by the project FMS at least once a year. In addition, the project would be submitted to regular SOE reviews as required by the World Bank. The FMS will also:

- Conduct a FM supervision before effectiveness/disbursement.
- Review the financial component of the quarterly FMRs as soon as they are submitted to the World Bank.
- Review the annual Audit reports and Management letters from the external auditors and follow-up on material accountability issues by engaging with the TTL, Client, and/or Auditors.

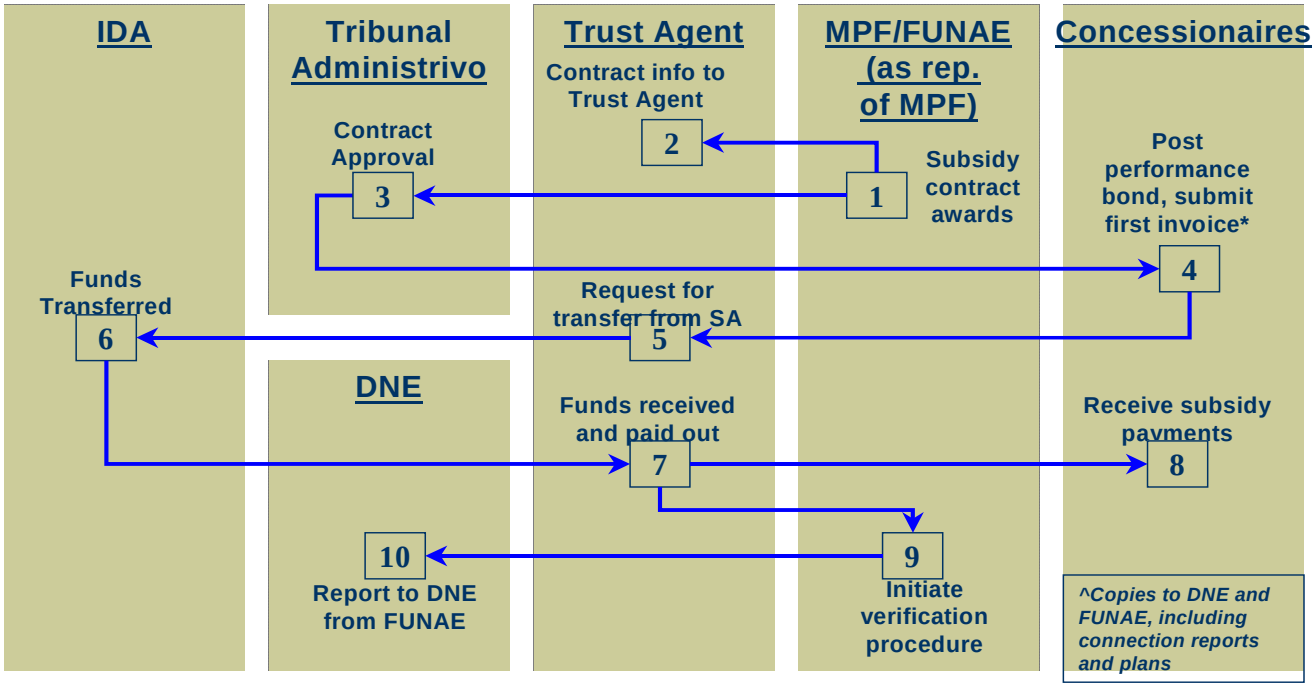
3. Disbursement Arrangements

World Bank credits in Mozambique are generally controlled through separate bank accounts (Special Accounts {SA}) managed by a Project Coordinating Unit (PCU). Normally, in WB credit management in Mozambique, the GoM agrees to open a separate Project Account (PA) where counterpart funds are deposited in agreed amounts and managed by the PCU to fulfill counterpart financing requirements.

This Project will adopt the SA and PA structure. IAs will manage Special Accounts and Project Accounts for counterpart funds. The chart below illustrates the banking and flow of funds arrangements for general project management, while the diagram that follows shows the flows of funds for the subsidy mechanism disbursed by the Trust Agent.



Financing and Replenishment of Trust Agent Account



Allocation of credit proceeds (Table C)

IDA Categories

Expenditure Category	Amount in US$ Million	Financing Percentage
1. Sub-projects funded by the MECS	11.75	100% of amounts disbursed
2. Works		100% foreign, 85% local
- Grid-based electrification (EdM)	11.10	
- Cross-sectoral links (MISAU)	0.91	
- Cross-sectoral links (MINED)	0.21	
3. Goods		100% foreign, 85% local
- Grid-based electrification (EdM)	0.50	
- Cross-sectoral links (MISAU)	0.05	
- Cross-sectoral links (MINED)	0.05	
- Institutional and capacity building	0.85	
4. Consultancy		86%
- Grid-based electrification (EdM)	2.30	
- Cross-sectoral links (MISAU)	0.15	
- Cross-sectoral links (MINED)	0.15	
- Institutional and capacity building	3.80	
- Sector reform	2.37	
- Independent grid electrification	1.20	
5. Training		100% foreign, 85% local
- Grid-based electrification (EdM)	0.30	
- Cross-sectoral links (MISAU)	0.05	
- Cross-sectoral links (MINED)	0.05	
- Institutional and capacity building	0.60	
6. Unallocated	3.87	
Total (IDA)	**40.29**	

GEF Categories

- Works (grants)	1.52	100% of grant amount
- Consultancy services	0.92	86%
- Training	0.35	100% foreign, 85% local
- Unallocated	0.30	
Total (GEF)	**3.09**	

Use of statements of expenditures (SOEs):

The threshold for SOEs will be set at US$300,000 for supply and installation; US$100,000 for goods, works, and consultancy contracts for firms; and US$50,000 for consultancy contracts for individuals.

Special account:

To facilitate disbursement of eligible expenditures, EdM and DNE will open accounts with a commercial bank to cover local and foreign currencies of IDA's share of eligible expenditures (for parts of the project as described in Schedule 2 of the Development Credit Agreement) as follows:

Special Account A (DNE): Denominated in US dollars, disbursements from IDA credit for Part A, C and D.

Special Account B (EdM): Denominated in US dollars, disbursements from IDA credit for Part B.

Special Account C (DNE): Denominated in US dollars, disbursements from GEF for Part D.

Project Account A (EdM): Counterpart funds for Parts A, C and D.

Project Account B (DNE): Counterpart funds for Part B.

Annex 7: Project Processing Schedule
MOZAMBIQUE: Energy Reform and Access

Project Schedule	Planned	Actual
Time taken to prepare the project (months)	32	
First Bank mission (identification)	09/18/2000	09/18/2000
Appraisal mission departure	02/10/2003	02/16/2003
Negotiations	05/19/2003	05/19/2003
Planned Date of Effectiveness	10/15/2003	

Prepared by:
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Annex 8: Documents in the Project File*
MOZAMBIQUE: Energy Reform and Access

A. Project Implementation Plan

Three PIPs: EdM, DNE, MISAU, MINED.

B. Bank Staff Assessments

Procurement Capacity Assessment, March 2003.
Financial Management Assessment, April 2003.

C. Other

Consultant Report

- Cost Reduction Strategy, Preparation and Commencement of Implementation, COWI, February 2003.
- Pre-feasibility Studies for Isolated Grid Electricity Supply Systems, Innovation Energie Développement, September 2002.
- Micro-hydro Scoping Study, ITC, October 2002.
- MIREME Institutional Diagnostic Study, Nexant, September 2002.
- Market Assessment and Stakeholder Consultations, Austral (Draft), January 2003.
- Private Sector Participation in Energy, Price Waterhouse Coopers, September 2002.
- Cross-sectoral Linkages, IT Power, February 2003.
- Inventory and Supply Chain Study for Small Solar PV systems, IT Power, January 2003.
- Customer and Business Protection Mechanisms, ESD, December 2002.

*Including electronic files

Annex 9: Statement of Loans and Credits

MOZAMBIQUE: Energy Reform and Access

21-May-2003

Project ID	FY	Purpose	Original Amount in US$ Millions					Difference between expected and actual disbursements[a]	
			IBRD	IDA	GEF	Cancel.	Undisb.	Orig	Frm Rev'd
P049878	2003	MZ-EMPSO	0.00	120.00	0.00	0.00	63.50	16.50	0.00
P072080	2003	PUBLIC SECTOR REFORM	0.00	0.00	0.00	0.00	26.59	0.00	0.00
P078053	2003	HIV/AIDS Response Project	0.00	0.00	0.00	0.00	57.15	0.00	0.00
P069824	2002	Higher Education Project	0.00	60.00	0.00	0.00	60.77	-3.30	0.00
P001806	2002	MZ-MUNICIPAL DEVELOPMENT PROJECT	0.00	33.60	0.00	0.00	30.27	5.07	0.00
P073479	2002	MZ - Communication Sector Reform	0.00	14.90	0.00	0.00	13.19	-0.44	0.00
P001785	2002	MZ-ROADS & BRIDGES MMP	0.00	162.00	0.00	0.00	174.33	45.11	0.00
P001808	2001	Mineral Resources Project (NRMCP)	0.00	18.00	0.00	0.00	16.25	2.24	0.00
P049874	2000	ENTERPRISE DEVELOPMENT	0.00	26.00	0.00	0.00	17.42	14.75	0.00
P070305	2000	Coastal and Marine Biodiversity MGMT	0.00	5.60	0.00	0.00	4.96	4.87	0.00
P042039	2000	RAILWAY & PORT RESTR	0.00	100.00	0.00	0.00	69.36	46.02	0.16
P035919	2000	COASTAL MANAGEMENT	0.00	5.60	4.11	0.00	3.48	3.47	2.26
P001786	1999	Education Sector Strategic Program(ESSP)	0.00	71.00	0.00	0.00	54.00	52.32	0.00
P001799	1999	AGRIC SECTOR PEP	0.00	30.00	0.00	0.00	18.97	19.56	0.00
P052240	1999	NATIONAL WATER II	0.00	75.00	0.00	0.00	66.25	33.75	0.00
P039015	1998	NATIONAL WATER I	0.00	36.00	0.00	0.00	23.23	20.80	0.00
P001759	1997	TRANSBORDER PARKS	0.00	0.00	5.00	0.00	0.22	5.00	0.00
P001792	1996	HEALTH SEC RECOVERY	0.00	98.70	0.00	0.00	11.33	21.85	0.00
P001804	1994	2ND ROAD AND COSTAL	0.00	188.00	0.00	1.66	14.03	15.56	15.44
P001780	1994	MZ GAS ENGINEERING (ENGY)	0.00	30.00	0.00	3.47	0.32	4.25	4.25
		Total:	0.00	1074.40	9.11	5.12	725.63	307.39	22.11

MOZAMBIQUE
STATEMENT OF IFC's
Held and Disbursed Portfolio
Jun 30 - 2002
In Millions US Dollars

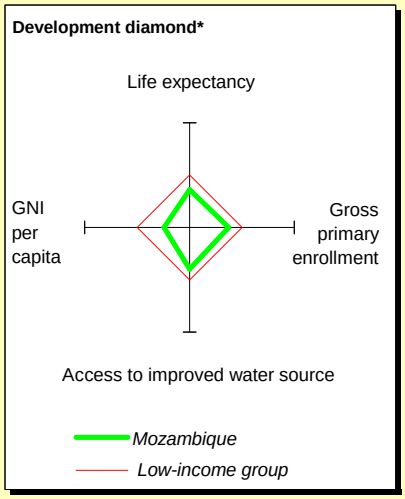
		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1996	AEF Cahora Bassa	0.18	0.00	0.00	0.00	0.18	0.00	0.00	0.00
1998	BIM-INV	0.00	0.30	0.00	0.00	0.00	0.30	0.00	0.00
2000	BMF	0.00	0.20	0.00	0.00	0.00	0.20	0.00	0.00
1997/01	MOZAL	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	Maragra Sugar	10.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	Polana Hotel	0.53	0.00	0.00	0.00	0.53	0.00	0.00	0.00
2000	SEF Ausmoz	0.72	0.00	0.00	0.00	0.45	0.00	0.00	0.00
1997	SEF CPZ	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
1997	SEF CTOX	0.73	0.00	0.00	0.00	0.73	0.00	0.00	0.00
2000	SEF Cabo Caju	0.58	0.00	0.00	0.00	0.51	0.00	0.00	0.00
1999	SEF ROBEIRA	0.13	0.00	0.00	0.00	0.13	0.00	0.00	0.00
	Total Portfolio:	39.17	0.50	0.00	0.00	3.53	0.50	0.00	0.00

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic
1999	Mozal Swap	9.00	0.00	0.00	0.00
2000	BIML	2.00	0.00	0.30	0.00
2001	SEF Grand Prix	0.44	0.00	0.00	0.00
	Total Pending Commitment:	11.44	0.00	0.30	0.00

Annex 10: Country at a Glance

MOZAMBIQUE: Energy Reform and Access

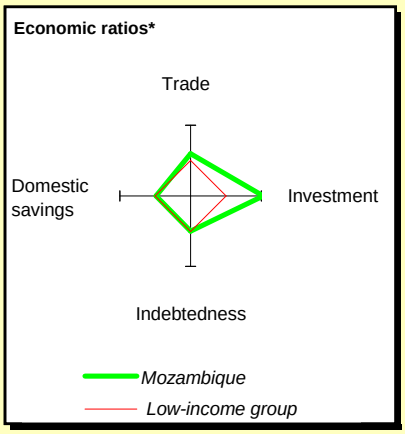
POVERTY and SOCIAL	Mozambique	Sub-Saharan Africa	Low-income
2001			
Population, mid-year *(millions)*	18.1	674	2,511
GNI per capita *(Atlas method, US$)*	210	470	430
GNI *(Atlas method, US$ billions)*	3.8	317	1,069
Average annual growth, 1995-01			
Population *(%)*	2.2	2.5	1.9
Labor force *(%)*	2.2	2.6	2.3
Most recent estimate (latest year available, 1995-01)			
Poverty *(% of population below national poverty line)*	..	..	..
Urban population *(% of total population)*	41	32	31
Life expectancy at birth *(years)*	42	47	59
Infant mortality *(per 1,000 live births)*	129	91	76
Child malnutrition *(% of children under 5)*	26	..	..
Access to an improved water source *(% of population)*	60	55	76
Illiteracy *(% of population age 15+)*	55	37	37
Gross primary enrollment *(% of school-age population)*	71	78	96
Male	83	85	103
Female	60	72	88



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

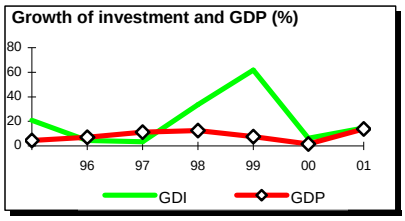
	1981	1991	2000	2001
GDP *(US$ billions)*	3.5	2.5	3.8	3.6
Gross domestic investment/GDP	6.0	16.0	39.6	41.6
Exports of goods and services/GDP	9.9	11.2	12.3	21.7
Gross domestic savings/GDP	-9.8	-11.2	11.9	19.2
Gross national savings/GDP	-8.6	-6.7	15.6	17.3
Current account balance/GDP	-13.2	-29.6	-27.7	-23.6
Interest payments/GDP	0.0	0.6	3.8	5.1
Total debt/GDP 1/	0.0	336.7	136.5	138.1
Total debt service due/exports 2/	0.0	15.5	9.1	3.5
Present value of debt/GDP 2/	..	..	24.6	25.3
Present value of debt/exports 2/	..	..	194.4	116.0

	1981-91	1991-01	2000	2001	2001-05
(average annual growth)					
GDP	1.2	7.3	1.6	13.9	9.0
GDP per capita	-0.1	4.9	-0.2	11.8	6.9
Exports of goods and services	-2.7	14.8	15.0	60.0	25.6

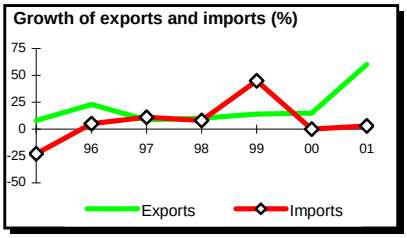


STRUCTURE of the ECONOMY

	1981	1991	2000	2001
(% of GDP)				
Agriculture	35.1	33.7	24.4	22.0
Industry	33.8	17.6	25.1	25.8
Manufacturing	..	9.2	12.6	11.5
Services	31.1	48.6	50.5	52.2
Private consumption	97.0	100.6	78.2	70.4
General government consumption	12.8	10.6	9.9	10.4
Imports of goods and services	25.8	38.4	40.0	44.0



	1981-91	1991-01	2000	2001
(average annual growth)				
Agriculture	5.4	5.9	-10.3	14.0
Industry	-3.9	17.2	4.3	34.1
Manufacturing	..	18.0	11.0	34.3
Services	9.4	1.2	11.3	-8.3
Private consumption	-0.2	3.9	-4.3	-2.2
General government consumption	-2.7	3.0	5.0	-4.4
Gross domestic investment	4.9	16.8	6.2	14.6
Imports of goods and services	-2.6	7.7	0.0	3.0

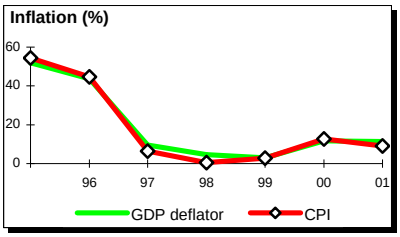


Note: 2001 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

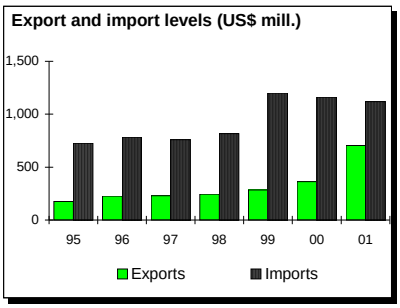
PRICES and GOVERNMENT FINANCE

	1981	1991	2000	2001
Domestic prices				
(% change)				
Consumer prices	4.2	33.3	12.7	9.0
Implicit GDP deflator	4.1	46.2	11.7	11.3
Government finance				
(% of GDP, includes current grants)				
Current revenue	15.4	16.6	17.8	17.8
Current budget balance	2.1	3.8	4.2	3.7
Overall surplus/deficit	-8.7	-10.1	-10.9	-12.9



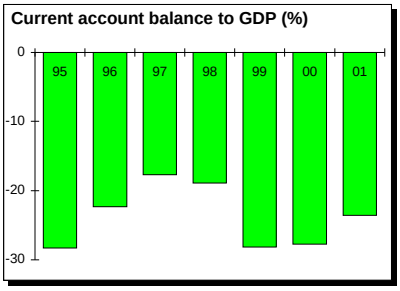
TRADE

	1981	1991	2000	2001
(US$ millions)				
Total exports (fob)	281	162	364	704
Cashew	55	16	28	31
Prawn	52	61	69	81
Manufactures	..	40	14	15
Total imports (cif)	..	791	1,162	1,117
Food	..	..	87	72
Fuel and energy	..	..	44	41
Capital goods and Mozal related imports	..	..	410	396
Export price index *(1995=100)*	91	99	77	90
Import price index *(1995=100)*	107	90	88	84
Terms of trade *(1995=100) 3/*	85	110	87	108



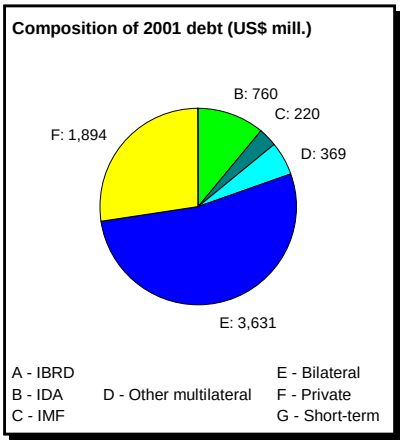
BALANCE of PAYMENTS

	1981	1991	2000	2001
(US$ millions)				
Exports of goods and services	395	310	732	1,022
Imports of goods and services	858	894	1,546	1,588
Resource balance	-464	-584	-814	-566
Net income	-1	-154	-228	-283
Net current transfers	0	0	0	0
Current account balance	-464	-738	-1,042	-850
Financing items (net)	398	751	1,235	853
Changes in net reserves	67	-13	-194	-4
Memo:				
Reserves including gold *(US$ millions)*	171	240	746	727
Conversion rate *(DEC, local/US$)*	35.4	1.462.9	15,447.1	20,703.6



EXTERNAL DEBT and RESOURCE FLOWS

	1981	1991	2000	2001
(US$ millions)				
Total debt outstanding and disbursed 4/	0	8,402	5,125	4,980
IBRD	0	0	0	0
IDA	0	328	760	760
Total debt service 5/	0	57	67	46
IBRD	0	0	0	0
IDA	0	2	9	4
Composition of net resource flows 4/				
Official grants	..	502	564	469
Official creditors	0	94	151	83
Private creditors excl. non-guarateed debt	0	-16	-1	-1
Foreign direct investment	0	23	139	183
World Bank program				
Commitments	0	53	62	229
Disbursements	0	56	98	51
Principal repayments	0	0	4	5
Net flows	0	56	94	47
Interest payments	0	2	5	5
Net transfers	0	54	89	42



Note: Private debt in chart includes non-guaranteed debt of US$,747 m.

4/ Public and publicly guaranteed. Data for 2000 reflects legal situation as at the end of 2000. Does not reflect full delivery of assistance under

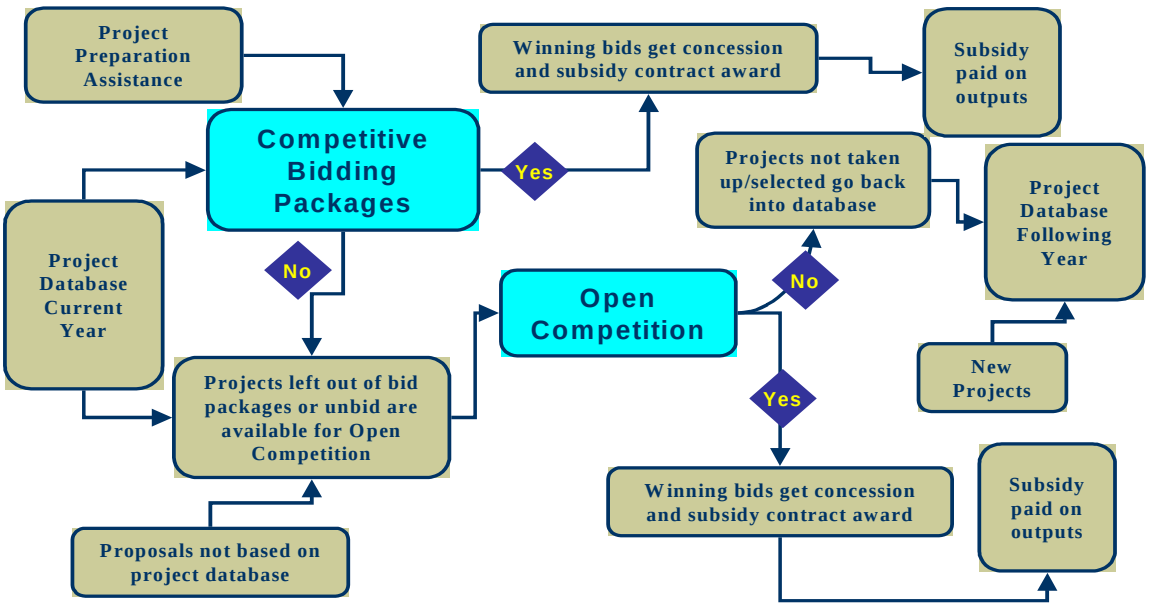
Additional GEF Annex 11:Draft Letter of Development Program
MOZAMBIQUE: Energy Reform and Access

Additional GEF Annex 12: Subsidy Transfer Mechanism
MOZAMBIQUE: Energy Reform and Access

Subsidy Transfer Mechanism

The transaction process is summarized in the following diagram.

Transaction Process



The subsidy mechanism will be competitive and mainly output-based, with most of the payout occurring after specific connection targets have been met. Two types of competitions will be used – structured transactions, using a "competition for the market" approach, and "project-on-project" competition to allow for unsolicited proposals to be considered in a fair and transparent manner. The subsidy mechanism will be based on concepts developed by the PSP study, but supplemented with structured transactions.

Database. FUNAE will further develop and maintain a database of rural electrification opportunities. It currently maintains one which consists of only very small potential schemes. Potential projects could be identified by DNE (through DIPREMEs), local governments, other government agencies, NGOs, private companies, donors, or operating companies in the energy sector. The database will be public information, available (including via the internet) to the public.

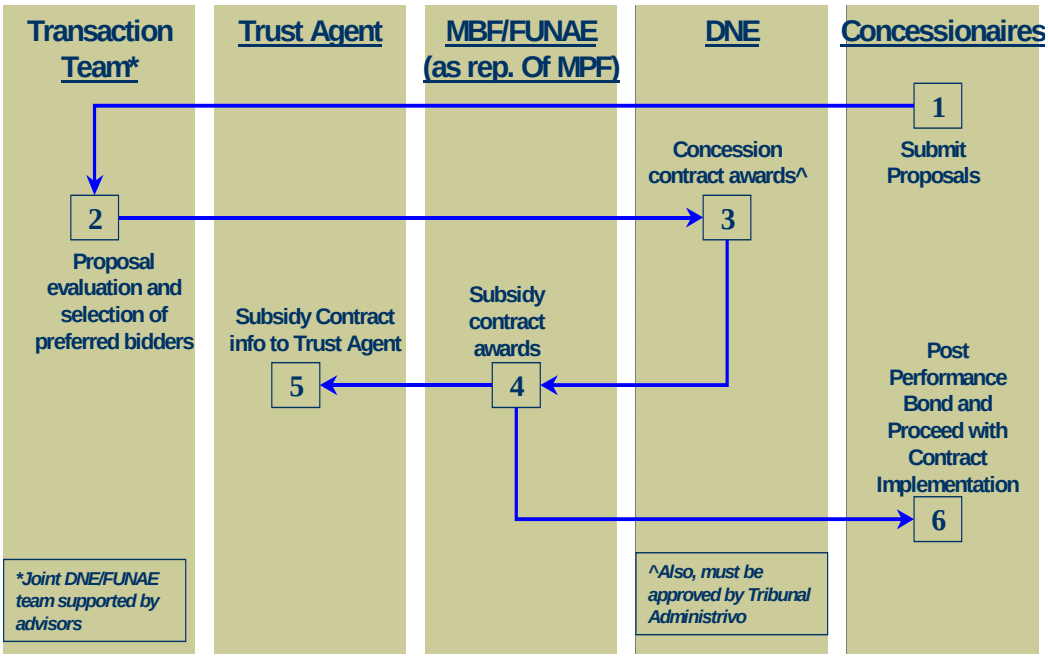
Structured Transactions. Every year FUNAE (supported by a transaction advisor) will use the database to identify a number of area concessions (such as Northern Inhambane). Depending on the least-cost approach, the concession will be based on either mini grids or line extensions off the integrated network. As appropriate, some solar home system obligations could also be included. The following steps will occur:

- Bid packages will be prepared in parallel; the packages will provide a description of the market, indicative technical plan, and will fix most parameters (e.g. connection targets, performance standards, concession fee, tariffs, subsidy per connection, etc.);
- Bid packages will include model documents (ideally based on those already developed in connection with the Northern Inhambane systems);
- Bidders will be prequalified;
- Bid packages will be issued as a set to prequalified bidders;
- Bidders could bid on one or more of the packages and could bid on them all if they so chose;
- Bids for each package will be evaluated, and a preferred bidder identified for each package;
- The selection could be made out on either a least-subsidy request (if tariffs are fixed) or lowest tariff bid (if subsidies are fixed);
- Winning bidders will be awarded a concession contract for the given area, and will get most of the subsidy award only when connection targets have been achieved; FUNAE will be responsible for monitoring this aspect of concessionaire performance and for approving disbursement of subsidy by a trust agent.

In the initial stages of this program, donors will play an important role in identifying bid packages and assisting with bid package preparation (including through funding of the transaction advisor).

Open Competition. Following issuance of the Bid Packages in the "Structured Transaction" round, FUNAE will announce a due date for unsolicited proposals. Proposals could be based on projects in the database or on projects that are identified by other means. Proposals could also be made for any bid package that did not receive any bids in the "structured transaction" round. It will also cover requests for support of expansion of existing private distribution businesses (whether these are mini grids, private line extensions, or privatized parts of EdM's distribution activities).

Concession and Subsidy Contract Award Process



Step 1: Competitive bidding processes will be used to select the project promoters and to award the subsidy contracts. A Bid Package comprising proposed concession and subsidy contracts will be issued to qualified bidders, inviting them to submit proposals according to rules established by the GOM's Transaction Team. Note: if Open Competition is used, minimum-subsidy bidding will be a requirement.

Step 2: The proposals will be evaluated by the Transaction Team; this unit will include DNE, CNELEC, and FUNAE personnel and be supported by consultants. Evaluation will be done according to pre-specified criteria with an emphasis on objective, quantitative parameters – least subsidy bid, lowest tariff offered, most connections, or some combination.

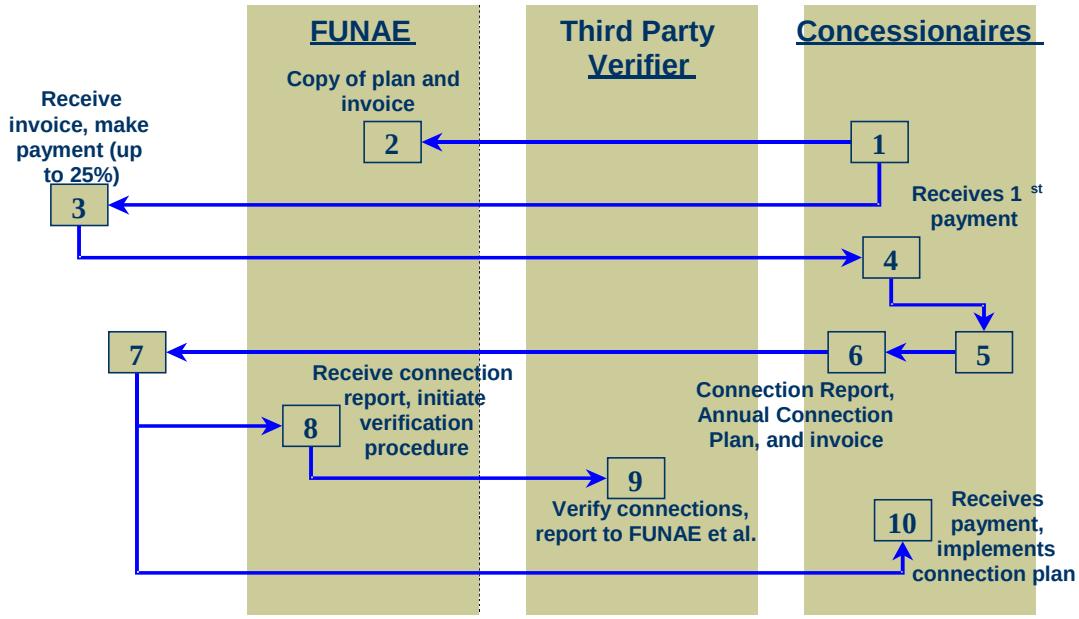
Step 3: Once the Transaction Team identifies the Preferred Bidder and successfully concludes negotiations, DNE awards the concession contract. Most terms and conditions of the concession contract should not be open for negotiation, with operating and financial parameters fixed in the Bid Package, other than those selected as bidding variables.

Step 4: Following concession contract award, FUNAE, on behalf of the Ministry of Planning and Finance, should issue the subsidy contract. The subsidy contract would specify the level of per connection subsidy, the overall connection target, the connection schedule, reporting requirements, monitoring and evaluation procedures, and invoice and payment process details.

Step 5: FUNAE provides key subsidy contract information to the Trust Agent. The Trust Agent is a commercial bank with a good reputation and operating record whose job is to receive, hold, and disburse subsidy amounts to eligible contractors. The Trust Agent disburses only on specific instruction to do so (see Subsidy Contract Monitoring Arrangements).

Step 6: Award of the Subsidy Contract, including notice that the contract information has been provided to the Trust Agent, is the trigger for initiation of the concession arrangement. Within [thirty] calendar days of Subsidy Contract award, the Concessionaire should start work and submit its Annual Connection Plan and 1st subsidy invoice.

Subsidy Contract Monitoring Arrangements



Step 1: On an annual basis, including at the outset of the concession period, the concessionaire prepares and submits a Connection Plan for the year. An invoice is also submitted for the agreed up-front subsidy payment.

Step 2: FUNAE reviews plan and approves invoice (assuming the plan is complete and complies with concession and subsidy contract).

Step 3: FUNAE instructs the Trust Agent to pay the Concessionaire the up-front component of the subsidy.

Step 4: The Concessionaire receives payment (Note: payment should be exclusively by electronic transfer).

Step 5: The Concessionaire implements the annual connection plan (at contract initiation, for green field sites, this will also include initial installation of generation and mini-grid).

Step 6: Near the end of the first year of operation, the Concessionaire prepares and submits a Connection Report for the year, recording how many connections were made, whether targets have been met, etc., and submits the Connection Plan for the next year. The Concessionaire submits the second invoice for the balance of the subsidy for those connections actually made, and for up-front component of next year's program.

Step 7: FUNAE receives and provides an initial review of the Connection Report. If the report is complete and complies in terms of format with contractual obligations, FUNAE sends the report to a Third Party for verification that the claimed connections were actually made.

Step 8: The Third Party Verifier audits the report through random site visits and other techniques, and reports back to FUNAE on his findings.

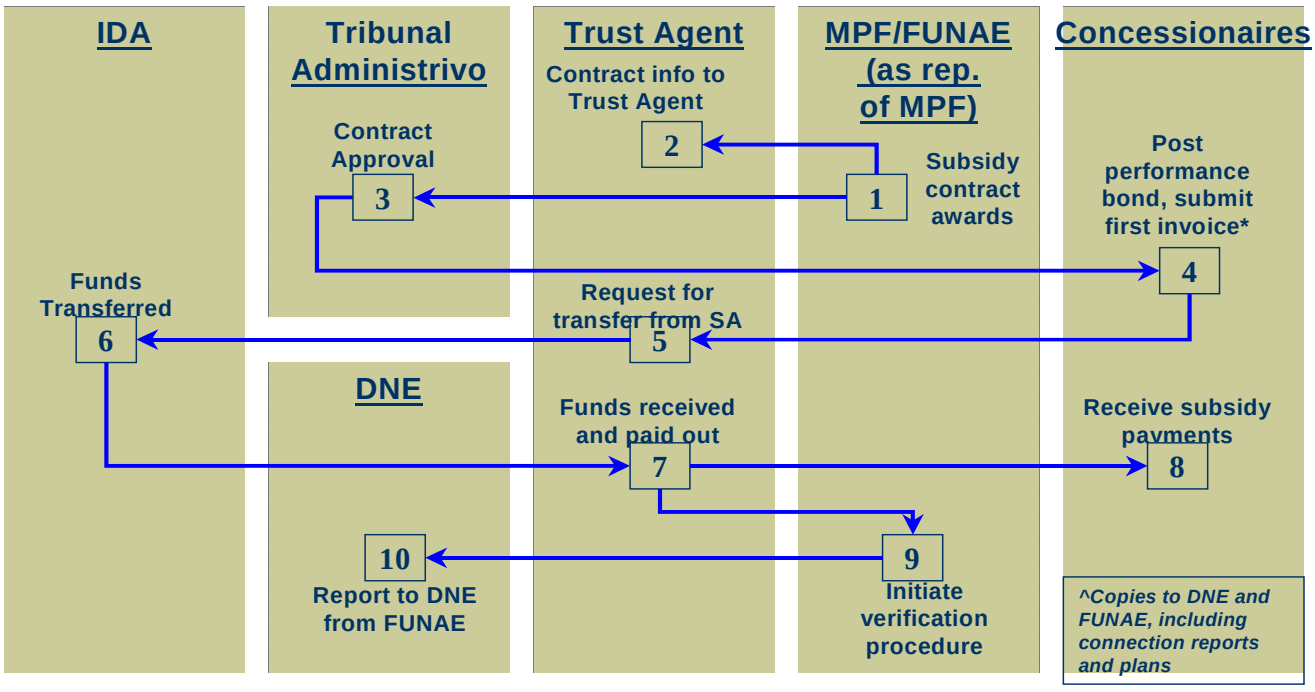
Step 9: If the Connection Report is certified as accurate by the Third Party Verifier, FUNAE approves the report and the invoice.

Step 10: A payment instruction is sent to the Trust Agent.

Step 11: The Concessionaire receives payment, and implements the following year's connection program.

NOTE: After the first year, procedures 5 – 11 repeat on annual basis, or more regularly if invoicing is done on a less than annual basis (e.g. every 6 months).

Financing and Replenishment of the Trust Agent Account



Step 1: FUNAE makes a Subsidy Contract award to a private concessionaire.

Step 2: FUNAE provides key contract information to the Trust Agent.

Step 3: The Contract information is also supplied to MPF, together with aggregated contractual commitments.

Step 4: MPF requests IDA for disbursement from ERAP.

Step 5: Upon review of the disbursement request, IDA deposits the requested amount into a Special Account managed by Trust Agent.

Step 6: The Trust Agent receives payment instructions and makes payments to concessionaires (See Subsidy Contract Monitoring Arrangements).

Step 7: Concessionaires receive subsidy payments (subsidy is disbursed to concessionaires fully or mostly on outputs, with up to 25% per connection paid up-front).

Step 8: FUNAE receives subsidy payment reports from Trust Agent.

Step 9: Periodically, FUNAE aggregates subsidy payment reports and reports to MPF on the performance of the contracts and the amount of subsidy actually disbursed.

Step 10: As necessary, MPF requests additional disbursements from IDA to ensure that the Trust Agent can meet subsidy payment obligations.

Additional GEF Annex 13: GEF Incremental Cost Annex
MOZAMBIQUE: Energy Reform and Access

Introduction and GEF Program Rationale

Mozambique is a low-income country struggling to rebuild after years of war and severe debt service burdens. Impressive economic growth of the last several years has been concentrated in or near urban areas, especially the south, in part because of limited or poor quality infrastructure. The government is gradually expanding the network of public services – especially in health and education sectors – and its recent Poverty Reduction Strategy Paper plans broad-based public investments in both social infrastructure (education, health) as well as physical (roads, water, energy).

Access to electricity is low, and commercial expansion of the main grid is not feasible in the foreseeable future for much of the large expanse of the country. Given its current and prospective claims on Cahora Bassa hydroelectric power, the opportunities to generate global environmental benefits via grid-connected renewable electricity (RE) technologies are also limited. The potential "workable entry point" for such technologies to generate greenhouse gas (GHG) reductions are therefore potential users in areas remote from the main grid. There is some experience with RE technologies – wind, PV, and micro-hydro – and the GoM has established a goal of electrifying all administrative centers, isolated health centers, and 'other social and economic important targets' with off-grid options over the coming ten years. (National Rural Electrification Strategy Plan November 2000).

The proposed two-phase program (APL) provides an opportunity to meet this key challenge via: (a) gradually removing information and awareness barriers, and gaining end-user confidence; (b) reducing the costs of RE - in particular solar photovoltaic (PV) - technologies via rapidly expanding the market size and establishing more efficient supply chains for products and services, both with the rest of the world and within the country; and (c) building the human resource and institutional capacity in public as well as private sectors to develop viable RE businesses. The proposed program's sector reform and access expansion objectives are centered on de-monopolization of electricity service, creation of a level playing field, unbundling of tariffs, cost-reflective price regulation, and use of "smart subsidies". These requirements are conducive to creating and supporting viable RE businesses under the program, which concentrates at first on remote PV applications, and then on independent mini-grids based on micro-hydro and wind.

The proposed program's RE component in part draws its inspiration from, and aims to learn from the Uganda Energy for Rural Transformation APL – supported by the Africa Rural and Renewable Energy Initiative (AFRREI) – with two distinctions, considering Mozambican conditions: a relatively greater focus on capacity building, and exclusion of GEF support for RE supplies into the main grid.

Compared to other GEF/Bank 'climate change' projects, the proposed program has several distinctive features:

- RE promotion is linked with sector reforms within the same project.
- Initial GEF and other donor support is directed mostly toward PV investments and technical assistance (TA)/capacity building (CB) activities (with the effect that the calculated incremental costs for Phase I of the APL are high); and

- Its PV component, in turn, is based on a philosophy of 'cross-sectoral' collaborations and donor partnerships leading first to investments in "large" or "institutional size" PV systems (which allow markets for retail PV systems – such as fixed solar home systems or mobile solar "lanterns" – to piggy back).

These features also entail a more rigorous and innovative approach to workable monitoring and evaluation (M & E) arrangements.

Broad Development Goals

As mentioned in the main text, the proposed program's development objectives are to: (a) accelerate, in a commercially viable manner, the use of electricity for economic growth and improved quality of life in underserved areas; and (b) strengthen Mozambican capacity to expand the energy sector. It seeks to achieve these objectives via supporting the design and implementation of the Government of Mozambique (GoM) National Energy Strategy that, inter alia, aims at reforming the Mozambican energy sector and implementing an enabling environment for greater private sector participation in the sector. The RE component of the proposed program supports these goals by introducing competitive off-main grid approaches to provision of electricity services via primarily private sector investors in the supply and service chains.

The proposed program's global objective is to initiate the process of eliminating the barriers that impede the development of renewable energy. Promotion of these RE technologies would provide rural institutional and household customers the direct benefits of increased access to electricity, in the form of direct current (DC) power produced by stand-alone solar PV systems or that of alternating current (AC) by independent RE-based grids. The provision of electricity to rural public institutional customers such as health and educational facilities and administrative posts will result in indirect benefits to the poorer households in the form of higher-quality public services, even when they themselves cannot afford electricity access in their homes.

Barriers to Renewable Energy Development and Barrier Removal Strategy

In the Mozambican context, the main rationale for supporting the development of RE industry is that RE technologies:

- Have a geographic and demographic market niche, now and for the foreseeable future.
- Offer opportunities for specific indirect benefits of electricity provision to public social infrastructure institutions; and
- When mature, can compete with grid supplies based on conventional large hydro or coal-fired electricity.

Such decentralized RE technologies are an economically and environmentally superior choice for certain end-users, but their market development is constrained by several factors:

1. Low levels of awareness and experience with RE technologies, in both public and private sectors, despite a small but unpredictable market (driven largely by donor grant programs

with limited attention to local market development or financial sustainability or scaling up);
2. Limited resource assessment;
3. Financing constraints at various levels – suppliers to end-users – and the inability of financial intermediation mechanisms to provide adequate risk management options;
4. Limited institutional capacity to mount and monitor a sizeable program of public investments and/or assistance to private business development in the form of a supportive regulatory environment and financial intermediation alternatives (debt or grant); and
5. Significantly higher domestic prices compared to other countries in Africa or other parts of the world, reflecting a lack of efficient supply and service chains, and limited human resource capacity (on technical, business or policy fronts).

The general misperception – in part a result of the GoM policy to apply "uniform national tariff" for EdM customers – that Cahora Bassa provides "very cheap" hydro-electricity also contributes to the potential for RE technologies and a neglect of niche service needs that can be – and often is – met by intermittent, non-grid electricity service (by batteries or gensets, which can be replaced by solar PV).

At the same time, there have been some investments in wind water pumping and solar PV systems for health clinics and water pumping, both financed by donor grants. There are also some private investments in solar home systems, water-pumping, wind-diesel hybrids, micro-hydro mostly providing shaft power and some electric power, and one also finds solar PV panels being used in small, informal commercial establishments by the roadsides. A number of local private companies have established themselves as suppliers/installers of solar PV systems or have shown interest in doing so. Mozambican migrant workers who work in South Africa (especially mines) have been a source of "cash sales" market for solar PV systems that can be expanded with greater attention to the maintenance and servicing aspects. The existing market for car batteries for household lighting purposes – about 20,000 to 30,000 a year, at a cost of US$35-65 each – suggests that solar PV systems, or at least solar battery-charging, could find a viable market with sufficient potential for scaling up as the awareness expands and as local costs are brought closer to the international levels.

It is recognized that even with more efficient supply chains and support of competitive distribution agents in the Mozambican market, renewable energy options will face a significant financing constraint, and that initially these technologies will have to be provided direct subsidies and other types of business support (e.g. marketing campaigns). The precise modalities of financing support will be developed during the course of additional project preparation.

There are three broad elements of the barrier removal strategy of the proposed program: (a) significant market expansion, led initially by PV systems for large public institutional customers, which would both lower costs and expand experience; (b) associated assistance in establishing a domestic commercial supply and service chain, led initially by PV markets and followed by micro-hydro and wind markets; and (c) technical assistance and capacity building for RE resource and market assessments, development of appropriate policy and regulatory environment, and institutional/business support. The last element of this strategy fits well with three separate elements of the rest of the program: (i) establishment of regionally differentiated grid distribution tariffs and 'light regulation' of independent grids (which reduce the market barriers against off-grid RE technologies); (ii) provision of 'smart subsidies' for all types of providers (grid distributors, independent grid operators, and off-grid RE businesses); and (iii) development of a comprehensive approach to policy and regulatory developments.

Phase I choices:

The details of specific Phase I and Phase II activities in line with this strategic vision are provided below. The tactical choices for Phase I are:

- Rather than initiate a broad, national program, to limit Phase I solar PV investments to a select number of provinces – Cabo Delgado, Nampula, and Zambezia – in order to generate a 'critical mass' of investment and service market for the large institutional PV systems and to correspond to investments in the main-grid and independent grids in Phase I;

- Rather than just 'open the window and wait to serve whoever that comes', to limit the choice of strategic 'partner' sectors in public investments to rural health, education, and local government (with a possibility for including rural water, and rural telecom – in combination with promotion of information and communication technologies (ICTs) for the main 'partner sectors' if and as appropriate) in order to work toward complementary, synergistic investments and build a framework for sustainable, expanding program of use of rather than just 'open the window and wait to serve whoever that comes';

- To work with other donors and leverage their grant resources to apply a "head start" approach to capacity building and technical assistance – i.e., linked to preparation for future investments – in both public and private sectors, rather than risk dissipation of such efforts in the absence of follow-up investment finance; and

- To utilize existing institutions and other development projects to build partnerships and leverage both funds as well as local human resource capacity.

Preparedness triggers for Phase II

Broadly, implementation progress of Phase I investments and technical assistance/capacity building (TA/CB) activities, and identification of Phase II investment and capacity needs, will be used as 'preparedness triggers' for Phase II. It is conceivable that different sub-components of the GEF-supported project component could be advanced into Phase II at different times. For example, if the independent grid operators in Phase I investments show an interest in providing solar home systems or "lanterns", or service and maintenance contracts for large PV systems as a part of their operating strategies, the solar PV sub-component may well be ready to transition into Phase II. On the other hand, if developments in the 'sector reform' portion of the program (e.g., establishment of unbundled tariffs and third-party access, corresponding regulatory structures, or financial intermediation mechanisms for private service providers) delay, so might main grid-connected RE investments.

A mix of the following specific indicators will be used to assess readiness for Phase II:

- Progress in 'cross-sectoral' activities for large institutional PV systems – namely, the preparedness of relevant ministries (of health, education, public administration) to: (a) incorporate 'electricity service' as a part of their routine capital and operating budgeting process; and (b) to routinely design their requirements and conduct procurement of RE equipment and services;

- Level of other donors' interest in expanding the 'public institutions' market for solar PV;

- Adequate output from the TA activities – resource assessment, market assessments, assistance with supply chain improvements;

- Identification of sites for grid-connected and independent grid RE investments, with potential private sector interest in equity and debt finance;

- Capacity and interest in the central and provincial ministries and directorates to implement and expand public sector investments;

- Capacity in the private suppliers businesses to expand competitively;

- Level of customer satisfaction (with direct benefits – of improved lighting – or indirect benefits – improvement in the quality of public service deliveries); and

- Development of indigenous M & E capability – in accordance with indigenously articulated objectives, criteria and methods – aimed at sustaining and expanding the RE market.

The Baseline

Without GEF participation, the Energy Reform and Access Program could still proceed; but (a) the focus on renewable energy promotion would be diffuse; (b) RE investments will not reach a 'critical mass' to mobilize local private sector capacity for competitive supplies; and (c) the justification to invest human and institutional resources into technical assistance and capacity building – in particular, aimed at a wider, systematic program of renewable energy industry development in Phase II – will be much weaker.

A. <u>Increased reliance on petroleum-based fuels – with associated carbon emissions – for small electricity markets</u>

- Rural public health and educational facilities will continue to rely on gasoline generators for the provision of electricity, and there will be no 'demonstration effects' on private customers – 'larger' commercial customers or individual households;

- Peri-urban and rural households that cannot be effectively served by the main grid or independent grid supplies will continue to rely mostly on kerosene lighting (with some use of automobile batteries or dry cells for small electrical appliances such as radios or flashlights);

- Private investors in independent grids (or for large private customers such as for farming estates) will for the most part neglect the potential for micro-hydro or wind technologies because of lack of awareness, absence of routine supply chains, and lack of financing;

B. <u>Limited capacity development in private and public sectors</u>:

- The domestic solar PV industry will remain small, serving an unpredictable and geographically spotty market, and its incentives to establish reliable supply chains externally or internally, or

invest in human resource capacity, will be sharply lower;

- There will be virtually no capacity in the public sector to help identify, design, and implement RE projects. In turn, the scale and experience base of technology adaptation and 'localization' will remain very low, and the pace of RE development will remain largely subject to small, uncoordinated projects of individual external grant donors;

- The potential benefits of 'sector reforms' – demonopolization of the grid electricity supply industry, establishment of third party access and unbundled tariffs, and transparent 'smart subsidy' mechanism – will not accrue to the RE industry (or will be sharply limited, and go to support unnecessarily higher costs);

- The volume of overall cost-effective investments over the longer-term will be lower. This is because, to the extent that RE technologies provide an opportunity to serve small, disperse markets more cost-effectively over the long-term, continued reliance on higher-cost options such as main grid extension or kerosene would necessarily imply an economic loss. Also, to the extent that continued reliance on low-quality lighting sources such as kerosene lamps involve higher costs (in the long-term), there is a corresponding loss in economic welfare, and the transition to modern lighting services would proceed slower.

The Alternative (The Project)

The proposed alternative consists of investments and technical assistance/capacity building (TA/CB) for two classes of RE technologies:

- Solar PV systems, initially focused on large institutional users in the public sector (rural health and educational facilities, and local administrative posts), but gradually building up larger market share for household-size systems; and

- Micro-hydro and wind power technologies, primarily for independent grids to serve local customers, but may also be used for large industrial or commercial users or to supply bulk power into the main grid.

In Phase I, solar PV investments and TA/CB activities dominate; micro-hydro and wind investments (or "grid renewables") are expected to be quite limited due to: (i) limited resource data; (ii) high transaction costs; and (iii) slow development of regulatory institutions for independent grids. In Phase II, the "grid renewables" market is expected to expand rapidly, and the use of GEF funds is increasingly shifted from direct subsidies to indirect 'business support', possibly in the form of contingent financing.

The project approach will:

- Establish a 'critical mass' of initial solar PV market and subject it to international competitive bidding in order to exploit the economies of scale and rapidly bring the domestic equipment prices in line with the world market levels as well as reduce the unit costs of local service and maintenance;

- Support and accelerate entry of private suppliers of RE equipment and services, and private entrepreneurs in RE-based 'independent grids', with technical and financial assistance; and

- Establish the regulatory and policy framework for a national RE program, and provide for institutional and human resource development to support such a program.

The overall program of costs and financing is as below:

INVESTMENTS - Phase 1 - Cost and Financing plan

	Total cost	GEF		IDA		Private		GOM	
Investments	**US$**	**US$**	**%**	**US$**	**%**	**US$**	**%**	**US$**	**%**
health	*1,938,000*	*650,250*	*34%*	*958,290*	*49%*			*329,460*	*17%*
education	*532,000*	*178,500*	*34%*	*263,060*	*49%*			*90,440*	*17%*
Cross sectoral	2,470,000	828,750	34%	1,221,350	49%			419,900	17%
Solar home systems - grid concessionaires	720,000	275,000	38%	100,000	14%	345,000	48%		
Solar home systems - dealers	975,000	412,500	42%	150,000	15%	412,500	42%		
Grid connected renewables	1,800,000	300,000	17%	900,000	50%	600,000	33%		
Total Investments - phase 1	**5,965,000**	**1,816,250**	**30%**	**2,371,350**	**40%**	**1,357,500**	**23%**	**419,900**	**7%**

TECHNICAL ASSISTANCE - Phase 1 - Cost and Financing

	Total cost	GEF		IDA		Private		GOM	
Items	**US$**	**US$**	**%**	**US$**	**%**	**US$**	**%**	**US$**	**%**
MINED/MISAU cross	915,000	264,750	29%	335,250	37%	-	0%	315,000	34%
DNE - policy development and M & E	765,000	310,000	41%	455,000	59%	-	0%	-	0%
FUNAE full cost window	950,000	335,000	35%	615,000	65%	-	0%	-	0%
FUNAE cost shared window	950,000	364,000	38%	347,000	37%	239,000	25%	-	0%
Total TA - phase 1	**3,580,000**	**1,273,750**	**36%**	**1,752,250**	**49%**	**239,000**	**7%**	**315,000**	**9%**

INVESTMENTS - Phase 2 - Cost and Financing plan

	Total cost	GEF		IDA		Private		GOM	
Investments	**US$**	**US$**	**%**	**US$**	**%**	**US$**	**%**	**US$**	**%**
health	*2,851,750*	*397,375*	*14%*	*1,969,578*	*69%*			*484,798*	*17%*
education	*2,135,000*	*297,500*	*14%*	*1,474,550*	*69%*			*362,950*	*17%*
Cross sectoral	4,986,750	694,875	14%	3,444,128	69%			847,748	17%
SHS - grid concessionaires	1,815,000	270,000	15%	225,000	12%	1,320,000	73%		
SHS - dealers	1,567,500	270,000	17%	225,000	14%	1,072,500	68%		
Grid connected renewables	3,780,000	1,080,000	29%	1,620,000	43%	1,080,000	29%		
Total Investments - phase 2	**12,149,250**	**2,314,875**	**19%**	**5,514,128**	**45%**	**3,472,500**	**29%**	**847,748**	**7%**

TECHNICAL ASSISTANCE - Phase 2 - Cost and Financing

	Total cost	GEF		IDA		Private		GOM	
Items	**US$**	**US$**	**%**	**US$**	**%**	**US$**	**%**	**US$**	**%**
Total TA - phase 2	**1,000,000**	**500,000**	**50%**	**250,000**	**25%**		**0%**	**250,000**	**25%**

Incremental Cost summary

The calculated incremental costs are based on the following scenarios for: (a) investments; and (b) technical assistance and capacity building.

Investments

Investments in institutional and household solar PV systems: The goal of the GEF alternative is to open up the institutional (health clinics, schools, NGO posts, and private businesses) market for solar PV systems to local competitive procurement, to establish the financial, technical, and business development intermediation mechanisms for local suppliers, and to 'piggy back' the marketing and market development of solar home systems and small/mobile solar systems. GEF grants would be used for direct subsidies – either as fixed unit price ($/Wp or $/unit) or competitively – via a National Rural Electrification Fund (possibly a window within FUNAE, for channeling GEF/bilateral grants). In particular, two distinct markets would be targeted (other markets may emerge as a result of "demonstration effects"):

- Cross sectoral institutional systems: The first program would be directed at meeting efficiently the modern energy needs of rural institutional consumers - such as health clinics, schools, and administrative posts, and possibly for water supplies (for general access or dedicated to the use of clinics or schools, say) in two or three provinces in Phase I and for additional three or four provinces in Phase II. Phase I would initiate the process by providing about 300 'large systems' for lighting, cooling for vaccines and electricity for other appliances (radio, telecom, TV). The typical system size would be about 700 Wp, and would cover basic electricity services for staff housing as well. This would be a "cash market" for private suppliers, with the bulk of financing coming from donor-supported investment programs in the education and health sectors (as well as GoM budgets for these sectors under the PRSP), and the remainder from GEF grant support under this project;

- Household systems (through grid concessionaires and through dealers): The second program would aim to provide "fixed" solar home systems (of about 40 Wp each) for lighting and TV, or small/mobile solar systems (or "lanterns", of about 12 Wp each) to rural households and small commercial users on a commercial basis with some subsidies from either the grid concessionaires or solar dealers. Phase I targets installation of about 1,600 SHS and 900 mobile systems. Phase I price reductions, service improvements, and increased awareness of (and confidence in) solar PV technologies are tentatively projected to lead to Phase II investments of about 6,000 SHS and 7,000 mobile systems. It is expected that during Phase I, a few reliable, competitive solar PV dealers emerge, who would be able to extend consumer credit (or 'hire-purchase' schemes) in Phase II and refinance it via commercial banks; if so, Phase II of the program would provide for an on-lending scheme for IDA/other credit sources.

Assuming that the relevant ministries – of, say, health, education, state administration, and perhaps water – have the relevant funds to procure electricity services for their facilities – the **'baseline'** for the large institutional customers (some of whom exist, and some expected to emerge as a result of rehabilitation and expansion of rural health and education networks) would be the use of gasoline gensets according to the types of service they are expected to provide. Some institutional systems would be installed with external grant funds, but with widely varying technical standards, and uncertain or inadequate attention to after-market services or to scaling up the market over time.

The **baseline** for the household customers is that some cash purchases from South Africa (via the miners' supplies companies) and Zimbabwe would continue, and local retail sales of modules and systems will grow somewhat. The prices will remain high, the quality unreliable, service unavailable or high-cost. The awareness of PV technology will remain low, and it would continue to be seen as 'risky' or 'inadequate'.

Under the GEF **alternative**, the annual PV market will be expanded to roughly US$1.3 million per year during Phase I and to US$2.2 million per year during Phase II, solar PV businesses would be assisted in finding best-price sourcing opportunities from around the world (including possibly local production of some components), and would be provided a per Wp subsidy to reduce first costs and enable expansion of sales and service networks. The businesses will also be given other direct assistance, as necessary, in strengthening their capacity to access commercial and quasi-commercial short- or long-term finance (including from SME development projects such as Bank-financed PODE program, or from foreign equipment suppliers and private grant donors).

This package of interventions to rapidly expand the market in a predictable manner and supporting the

entire delivery chain as well as pioneering institutional customers is expected to lead to significant cost and price reductions (via international competitive bidding) as well as greater awareness and acceptance – first for the larger institutional systems and gradually for the smaller systems. The GEF-financed up-front subsidy to the PV investment component is expected to be in the order of about US$5/Wp during Phase I and US$1/Wp during Phase II, and overall US$2/Wp for the entire program. These correspond to about US$30 per ton gross carbon dioxide abated in Phase I, US$10/t in Phase II and US$15/t overall (or about US$110/t, US$36/t and US$57/t respectively for gross carbon abated).

	PV Investments			GEF 'buy down'		
	Avg.size Wp	# of systems	Capital cost $/Wp	per Wp	per ton CO2	per ton CO2
Phase I						
Institutional systems	750	300	$ 15.2	$ 5.1	$ 31.2	$114
Home systems	40	1,600	$ 14.4	$ 5.4	$ 27.5	$101
"Small"/mobile systems	12	900	$ 11.6	$ 5.7	$ 26.1	$96
Total/weighted average			$ 14.9	$ 5.2	$ 30.0	$110
Phase II						
Institutional systems		550	$ 12.2	$ 1.7	$ 10.3	$38
Home systems		6,000	$ 12.1	$ 1.8	$ 9.4	$35
"Small"/mobile systems		7,000	$ 8.8	$ 1.8	$ 8.1	$30
Total/weighted average			$ 11.7	$ 1.8	$ 9.7	$36
Program						
Institutional systems		850	$ 13.2	$ 2.9	$ 17.7	$65
Home systems		7,600	$ 12.6	$ 2.6	$ 13.2	$49
"Small"/mobile systems		7,900	$ 9.1	$ 2.2	$ 10.2	$37
Total/weighted average			$ 12.7	$ 2.8	$ 15.4	$57

Investments in renewables connected to the grid (hydro/wind): This component would consist of investments in small hydro or wind electricity generating facilities, either for independent grids for local distribution or for self-generation by large industrial/agricultural users or for grid connected systems.

There has been some – albeit limited – assessment of micro-hydro potential in Mozambique, and significant efforts have been made over the years by NGOs working with various local stakeholders to demonstrate the viability of micro-hydro options. (Some micro-hydro generation sets owned by local governmental authorities date back to pre-independence period, and some private investors have also been using such systems).

On the wind technology option, no comprehensive resource assessment has been conducted but the general view has been that: (a) Mozambique's wind regime is probably not conducive to large-scale windfarm development for competitive supplies into the main grid; but that (b) pockets of appropriate wind regimes do exist, for small-scale generating options as proposed here, possibly also as 'hybrids' in combination with existing diesel generators in remote areas. (That is, it may be economically attractive to expand capacity via adding a wind turbine rather than replace with a new, larger diesel generator).

Unlike the PV investments, investments in micro-hydro and wind options are dependent on: (a) appropriate advances in power sector regulations for independent grid operators; and (b) detailed, site-specific resource assessment. However, it also appears – from current vantage point – that once a 'level playing field' is established (during Phase I, as part of the sector reforms process) for grid-based

supplies of RE and non-RE technologies, the 'incremental costs' for grid-based RE technologies at resource-favored sites will increasingly consist of only the initial high 'transactions costs' which can be better addressed via use of contingent financing rather than direct subsidies. (See below).

	Grid Renewables Investments			GEF 'buy down'		
	Avg.size kWp	Avg. # of systems	Capital cost $/kWp	per Wp	per ton CO2	per ton C
Phase I						
Wind	200	3	$1,650	$0.5	$20.8	$76
Micro-hydro	100	3	$2,530	$0.8	$17.3	$63
Total/weighted average		6		$0.6	$19.1	$70
Phase II						
Wind		15	$1,490	$0.3	$13.8	$51
Micro-hydro		15	$2,285	$0.5	$11.9	$44
Total/weighted average		30		$0.3	$12.9	$47
Program						
Wind		18	$1,517	$0.3	$15.0	$55
Micro-hydro		18	$2,326	$0.6	$12.8	$47
Total/weighted average		36		$0.4	$13.9	$51

Technical Assistance and Capacity Building

Technical Assistance in Phase I will support the preparation of Phase II design for: (a) up-scaling of the cross-sectoral energy/education/health solar PV initiatives started during the project: and (b) building a broader renewable energy sector development plan.

Together with local and international support the necessary background information will be collected, institutional arrangements and responsibilities discussed, pipelines for investments identified, energy need assessment models defined, suggestions for policy enhancements and a program for follow up activities described. The design of the subsidy release criteria, organizational responsibilities in relation to the subsidies and other related issues will be part of the activity but will receive separate attention.

Market Development activity will support the businesses in their market research, controlled test marketing, and outreach. The focus of the market research and the controlled test marketing is towards the more affordable smaller solar systems for households and optimal design for the larger scale institutional systems. The market research will clarify the profile of the potential buyers thereby establishing stronger focussed marketing strategies, product design and pricing policies. This activity will be developed and undertaken in close collaboration with the existing companies, and build on the experiences of some of the larger commercial companies (e.g., beverage makers) who use similar market development process. In the later stage of the project, specific marketing tactics like road shows, district demonstration centers and national awareness campaigns might be considered. To make sure that these activities are undertaken as part of the individual business strategies the activity will be designed on a cost-shared basis.

Capacity Building activity will focus on three main target groups: (i) the local renewable energy businesses; (ii) rural development organizations, commercial banks and government officials from energy as well as non energy sector ministries; and (iii) cross-sectoral working groups.

Local renewable energy businesses will receive support to prepare better business plans and implement them. Initially, SME development experts with the assistance of a solar PV market expert will develop criteria for a high quality business plan in the Mozambican context. Individual businesses will then be provided guidance and, as necessary, training, to prepare and execute such business plans. The activity will support businesses to build their capacity to improve products to meet the price/quality range expected by rural households and the health and education ministries. It will also support the businesses to improve and expand their current installation and after-sales services. These activities will be undertaken in collaboration with the CPI and may be achieved through established twining relations with high quality foreign businesses (e.g., promising south-south trade relationships).

Additionally, internationally available renewable energy training programs will be tailored to the Mozambican situation. It will contain teaching modules and extension materials that will strengthen the capacity of distributors as well as financiers and customers to make informed and reliable choices, and to own and operate the solar PV systems. Simple technology descriptions, data collection tools, and screening tools will be provided, as well as information on how to obtain the equipment. Particular attention will be given to a training module on the cross sectoral renewable energy options in the health and education sector, and build on lessons learned by the WHO (World Health Organization), NREL (National Renewable Energy Laboratories) and other international organizations that have worked with and tested the different options in other developing countries. The training material will also contain a module for government officials from energy and non energy sectors on renewable energy policy aspects, international agreements, and renewable energy program management. The material will be based on participatory training methodology. The activity will train local training institutions after which they will receive small financial support to train the different target groups in the rural and urban areas. The activities will be undertaken in collaboration with UEM, regional renewable energy institutes and the SADC (Southern African Development Community).

To implement the institutional systems will require cross sectoral collaboration among different ministries, accompanying experts and businesses. To facilitate this process one or two (health and/or education) working groups will be established. A professional facilitator will support the groups during the process of collaboration. In addition, technical support will be made available to support the groups on specific issues. The group(s) will support the government officers in establishing functional specifications, technology assessment tools, operation and maintenance schedules, fee collection mechanisms, definition of responsibilities, procurement guidelines etc..

Phase II of TA/CB

The needs for technical assistance and capacity building (TA/CB) activities in Phase II will become clearer during Phase I. In line with the proposed ‘preparedness triggers’ for Phase II, these TA/CB activities would build on experience gathered during Phase I both in the public and private sectors, and would be geared towards meeting specific local needs identified by the stakeholders. As the investment program gradually shifts more in favor of household solar PV systems and grid-connected renewables, the capacity building activities for the private sector would increasingly consist of business development assistance, and strengthening the supply chains for RE technology goods and services. In the public sector, TA/CB assistance to the power sector regulators would be aimed at continuing learning from ‘best practices’ in other parts of the world**.**

Use of Contingent Financing

Due primarily to the severe structural and capacity limitations of the commercial financial institutions in

Mozambique, the GEF grant in Phase I will be provided directly as a subsidy to the sellers of RE technologies (PV systems, wind and micro-hydro systems) under rules of competitive procurement. In Phase II, however, it is anticipated that direct subsidies to wind and micro-hydro, or other grid-connected RE investments, would be gradually eliminated, and other modalities such as partial guarantees would be applied; direct subsidies to non-solar PV technologies would thus be limited to technical assistance and capacity building activities. Direct subsidies to solar PV sellers would continue in Phase II but on a declining basis as the domestic market grows, costs and prices are closer to those in the world market (which are also expected to decline). Investors in wind and micro-hydro who distribute electricity to other customers would also qualify for the general rural electrification subsidy in both Phase I and Phase II, under the rules to be developed for the national rural electrification fund.

Global Environmental Benefits

The calculated gross avoided carbon dioxide emissions for the 300 kWp solar PV investments and 900 kWp grid-connected wind/micro-hydro investments in Phase I are 52,000 and 27,000 tons respectively over a 15-year lifetime. In Phase II investments of about 736 kWp solar PV and 4.5 MWp grid-connected RE technologies (mostly wind/micro-hydro, but may include other), the calculated gross avoided carbon dioxide emissions are 133,000 and 136,000 tons respectively over a 15-year lifetime.

Sustainability and Replicability

A key strategic reason to choose an APL instrument for a project that also combines sector reforms with RE promotion was to seek to ensure sufficient, gradual nurturing of the local markets and capacities so as to ensure the long-term sustainability of RE investments under the project AND acceleration of these investments beyond the period when GEF grants cease. The overall approach is that, over time, sustainability will come from barrier removal, cost reductions, rising incomes, and declining GEF grants. Also, as the Government plans to finance the electrification fund via, for example, a levy on energy mega-projects and grid-based electricity, the need for external grants to support electrification in general, or that via RE technologies in particular, will decline.

For solar PV systems, the decline in costs will come from: (i) economies of scale – which are often realized when a credible expectation of a large market has been created; (ii) formation of links to lower-cost suppliers abroad; and (iii) rising incomes, which will increase the affordability of the systems. Further, the GEF grant per unit for solar PV systems is also slated to decline over time.

Thus, the key assumptions underlying the viability and replication prospects are that cost-reductions will be realized and incomes will rise. Given the GEF share of 20-25% in total costs, it is reasonable to expect that cost reductions and income increases over a number of years will offset the need for such support after the project is over. Additionally, the planned TA/CB activities will support 'learning by doing' and incorporating mid-term revisions and corrections along the way; taking care to reduce grant dependencies of individual sub-projects.

A cost-benefit analysis was conducted for a 40Wp solar home system. The economic benefits in the analysis include: (i) the avoided costs, in which the economic costs of the PV system are compared against the economic costs of substitutes (kerosene, battery charging, etc.) that the PV systems replace; (ii) the gains in consumer surplus; and (iii) environmental benefits. The economic analysis of the solar homes component of this project shows high economic returns. The ERR and the NPV (@12%) for the 40 Wp solar home systems, are estimated at about 27 percent and US$286,000 prior to consideration for environmental externalities. The benefits are consistent with those estimated in other countries for similar projects. They reflect the high willingness to pay for the improved levels of lighting service, and

the significantly higher levels of radio listening and TV viewing. A sensitivity value analysis shows that the results are robust to reasonable changes in the values of the key variables. A switching value analysis indicated that the initial system cost and the cost of replacement parts (battery, controller and light bulbs) would have to increase by 40 percent for the project's benefits to evaporate. With 1,600 systems as the goal, the risk for overestimated market size is small. The risk of the GEF supporting uneconomic investments is small since GEF subsidies are linked to the actual installation of the systems after the customer has revealed its willingness to pay for the system with an out-of-pocket down payment.

As one of the least-developed countries, Mozambique is expected to remain dependent on grant support from donors in social sector investments – e.g., health and education. To that extent, the expansion of the 'public institutional market' will remain indirectly dependent on donor support. The major change this project proposes in this regard is to incorporate 'electricity (and perhaps ICT) provision' as a routine part of budgetary processes of individual line ministries. Initially the PV sellers take the usual commercial risk that this portion of their market depends on the ability of the GoM to fund public-sector social services. Over time, as their market grows and diversifies, this risk would become relatively smaller.

Apart from the techno-economic considerations, innovative financial engineering is adopted to match the payments for energy services with the willingness and ability of the consumers to pay. This includes output based co-financing so as to attract the private sector. Sales service and maintenance would be a necessary requirement irrespective of the mode of private sector involvement. The project would also strive to ensure that key stakeholders have the requisite capacity to handle pertinent tasks. All these considerations would ensure long-term sustainability of operations.

The project supports income generation activities to increase affordability of the systems. A study to identify productive uses of electricity for income generation will be conducted, with particular attention to women and the young unemployed in the rural areas. The study will identify areas where energy is a barrier to increasing the income generating activities in the communities, and recommend ways of removing those barriers. The recommendations of the study will be disseminated to the public and to potential and existing dealers and concessionaires. Secondly, the project will support new companies with an one-off preparation grant up to US$10,000 for business plan development -- and an additional US$4,000 if a productive uses program is integrated. Thirdly, the technical assistance windows invite the stakeholders to submit tailored proposals to address this issue.

It should also be mentioned here that in designing the activities for GEF support in Mozambique, lessons learned from the experience of the World Bank and other donors in supporting renewable energy technologies in countries in this region – Uganda, Ethiopia, Zimbabwe, etc. – as well as countries from outside the region - Vietnam, Indonesia, India, Sri Lanka, etc. – have been taken into consideration. Learning from other country experiences should contribute towards the sustainability of this project.

Also, the Technical Assistance included in the Project is specifically designed to enhance sustainability of the Project supported activities during and after the project period. In particular, there are several factors, which will contribute to this sustainability goal:

- A regime of declining GEF grants (see also below), with a transition to a more sustainable grant structure such as a Rural Electrification Fund.
- Explicit incorporation of renewable energy into power sector planning in general and in rural electrification in particular.
- A monitoring and evaluation program, which is aimed at quantitatively assessing the contribution of energy to rural development thus providing a clear indication of its value to

decision makers and civil society.

- Specific TA activities aimed at identifying potential barriers to sustainability and developing mitigation strategies.

Monitoring and Evaluation, and Dissemination

Monitoring and evaluation toward the GEF objectives would be coordinated to the maximum extent with the overall APL monitoring and evaluation (M & E), which will focus on three broad categories of impacts – direct and indirect benefits of electricity access; market viability of a variety of suppliers and technologies; and achievement of environmental objectives. GEF-specific indicators will be linked to the second and third of these categories, and are briefly described in the table below. Baseline levels will be established during initial poject implementation, using both quantitative survey techniques as well as participative techniques for qualitative data. It is also anticipated that, over time, some of the M & E will be increasingly 'mainstreamed' and 'localized' – so that the beneficiaries and market players themselves have an interest in providing, collecting, and reporting data. Dissemination of program results will be accomplished through regular reporting as well as contributions to international conferences and other such fora.

Responsibilities for overall M & E and its sub-components will be determined during the course of project preparation.

Component	**Market Development Indicators**
Solar PV Investments	● Sales not financed or subsidized by the project ● Performance and perceptions of market participants at different points in supply and service chains; foreign participants' interest ● Percentage cost/price reduction at various levels in the supply chains ● Cost/prices compared to regional and world markets ● Varieties of systems available outside the project ● Varieties of sales and financing terms offered ● Codes, standards, and certification ● Consumer protection mechanisms developed and accepted
Grid-renewables Investments	● Same as for PV investments plus ● Regulations development for independent grids and for bulk sales to the main grid or independent grids
Technical Assistance/Capacity building (TA/CB)	● Number of participants, duration and commitment, cost-sharing ● Studies completed and decisions taken by GoM ● Academic/training programs mainstreamed ● Utilities and distribution concessionaires adopt off-grid systems in their planning and marketing
	Market Intervention Indicators
PV Investments	● Direct sales (# of systems, kWp, $, terms of sales) ● Geographic spread of customers ● Size distribution of household PV systems ● Amount of subsidies disbursed ● Budgets of participating ministries for electricity services ● Amount and sources of supplier financing
Grid-renewables Investments	● same as for PV investments -
TA/CB	● to be developed
	Market Sustainability Indicators
PV Investments	● Consumer acceptance of PV systems as well as more generally of the criticality of electricity services in education, health, and local administration performance ● Incorporation of PV option in the business plans for grid electricity distributors (main or independent grids) ● Pipeline development for Phase II investments and beyond ● Localization of assembly and service
Grid-renewables Investments	● same as for PV investments -
TA/CB	● to be developed

Incremental Cost Matrix			
	Baseline	**Alternative**	**Incremental**
Domestic Benefits a. Investments	Rural and off-grid market grows, slowly, and primarily with diesel and kerosene Solar market small, product availability narrow, and near-exclusive dependence on imports for hardware and human capacity Private investors select diesel gensets for electricity provision to independent grids	**Phase I:** Expansion of large institutional PV market SHS and lanterns become available in several geographic markets Some private investors select wind and micro-hydro options for independent grids for public distribution or for private industrial uses	Awareness and information barriers removed Greater efficiency in supply and service Acceptance of PV technology by users and financiers Cost reduction in PV and other RE technologies, and narrowing of cost gap with international market
		Phase II: Growth of PV systems market Renewables-based independent grids (wind and micro-hydro, possibly bioenergy)	Successful demonstration of a range of technologies and business approaches Further cost reduction in PV technologies, and narrowing of cost gap with international market
b. Capacity	Reliance on imports for equipment supplies and services, for a small, unpredictable market Little specific attention to making RE options viable for retail or grid-based applications. Limited private sector development for RE supplies and services.	Development of local commercial supply chains Public sector policy and regulatory capacity Private sector business development	Same as in the "alternative" case

Global environmental benefits	None	Offset of GHG emissions via avoidance of gasoline, kerosene, and diesel	Phase I: About 130,000 gross tons of CO_2 avoided over project lifetime Phase II: About 310,000 gross tons of CO_2 avoided over project lifetime.

Cost by components (million US$)			
Phase I:			
Cross sectoral (solar)	1.6	2.4	0.8
SHS (grid- conces.)	0.4	0.7	0.3
SHS (dealers)	0.6	1.0	0.4
Grid renewables	1.5	1.8	0.3
Capacity building/technical assistance/M&E	2.3	3.6	1.3
Subtotal	**6.4**	**9.5**	**3.1**
Phase II:			
Cross sectoral (solar)	4.3	5.0	0.7
SHS (grid- conces.)	1.5	1.8	0.3
SHS (dealers)	1.3	1.6	0.3
Grid renewables	2.7	3.8	1.1
Capacity building/technical assistance/M&E	0.5	1.0	0.5
Subtotal	**10.3**	**13.2**	**2.9**
Total	**16.7**	**22.7**	**6.0**

GEF STAP Review and Comments

STAP Reviewer's Comments and Project Team's Response

Reviewer: Prof. Daniel M. Kammen, Professor of Energy and Society and Professor of Public Policy; Director, Renewable and Appropriate Energy Laboratory, University of California, Berkeley.

Summary:

This is an ambitious project, and the human capacity to build what are effectively three major new energy markets (solar, wind, and micro-hydro) all simultaneously is still somewhat problematic. It can be done, but an evaluation would be helpful that shows the current and future level of trained – local – trained facilitators and private-sector vendors, and how that resource base maps onto the demands that a project of this size will place on the industry.

Response: Agree. A PDF-B supported study 'Design of Capacity Building Program for Renewable Energy Industry' confirmed the relatively low institutional and human capacity for renewable energy implementation. It proposes that during the first phase of the program emphasis is placed on capacity building through training, exposure visits and "learning by doing". A plan of action has become available and is an integral part of the technical assistance to the different implementing agencies involved in the component (DNE, FUNAE, MICAO, MINED).

Extensive funds are allocated for development of the 'markets'. Added emphasis on technology and service evaluation, and even certification would be useful.

Response: Agree. A PDF-B supported study on 'Consumer Protection Mechanisms' explained a detailed set-up for a framework of quality control, certification and service evaluation. During the first year of implementation of the program, this framework will become operational with support of international consultants. The approach chosen is based on the successful model used in some of the Asia countries (Sri Lanka, China, Indonesia).

The scope of this project suggests that an international review board would be of use to not only the work taking place in Mozambique, but in other nations as well where renewable energy and/or rural transformation efforts are in effect, or are planned.

Response: The stakeholders of the program indicated that exposure to experiences in other countries is important through exposure visits, in-country training, and the possible establishment of an international network of specialists. Several of the key stakeholders have internal operations and frequently visit renewable energy projects in other African countries, while others have had training at international institutions (for example, Esami, Tanzania). It is expected that these international contacts and networks will support the program in improving its review process in deciding on strategic directions as well as day-to-day implementation issues.

The extended project duration is an important innovation.

The project is now sufficiently clear -- particularly the incremental cost analysis -- that it is ready for approval.

Comments on the ICA (9-18-01 version):

Notes Sheet: What is the sensitivity to the price fluctuations noted for the various fuels? In both the Kenyan and South African solar (PV) histories, PV demand was highly inelastic to changes in kerosene costs. This was apparently due to the dominance in importance to consumers of energy reliability over price, at least for the early adopters of PV. Early studies of the improved stove market in Maputo by A. Ellegard (Stockholm Environment Institute) indicated strong price sensitivity (as expected for low-cost cookstove technologies).

Response: Kerosene, gasoline and diesel price assumptions are critical to the estimated incremental costs. At the current world prices of oil products, estimated unit incremental costs are lower than what they would have been, say, two years ago. Alternatively, the estimated unit incremental costs would have been even lower if a real (i.e., net of inflation) price increase was assumed. (The prices assumed here are at the world market levels, with assumed adjustments for market size premium and domestic distances). On demand sensitivity to fuel prices, there are three distinct markets here, and the products/fuels competition varies by geography (within and across countries) and end use. It is probably the case that cross-price demand elasticities for the lighting market are low, and that the assumed oil products prices may matter less than the consumers' expectations of such prices and preference for higher quality lighting. (For PV, the consumer preference for electric lighting over kerosene is well-known, and it is understandable that PV system demand is relatively inelastic with respect to kerosene price). Incremental cost analysis here is not addressed to cooking fuels and technologies.

Summary Sheet: The selection of 'large' (40 Wp) versus small/mobile (12 Wp) solar systems for household users is interesting. In much of East Africa the SHS market has bifurcated (see Duke, Jacobson, Kammen, 2001, available online at: http://socrates.berkeley.edu/~rael/qualityshs.pdf) into sales of systems roughly > 40 Wp (largely to the affluent, and to businesses), and the current solar home system market, of < 40 Wp. The split of 'large' versus 'small/mobile' systems may be fine, but justification should be offered based on the current sales of these system types in Mozambique. Is this effort one that will require multiple training process, or can vendors selling one make a good case for the other as well?

Response: The primary justification for bifurcation is that sales of the 40 Wp fixed systems will be limited due to affordability constraints while the 12 Wp systems haven't yet been introduced and face some market risks. Also, the 40 Wp and 12 Wp sizes selected here are for illustrative purposes and represent a partial range of unit sizes that could be marketed under the project. Implications for training processes are not yet clear; controlled marketing and market tests – as proposed under PDF-B consultancies and Phase I TA - will clarify them.

Recommend using cost/ton carbon, instead of cost/ton carbon dioxide to conform to most international analyses of GHG offsets.

Response: Agree; both units given now in the Project Brief.

The incremental cost and cost/ton carbon is based on key assumptions about solar/kerosene substitutions. There are a number of questions about the degree to which this takes place (versus simply adding energy sources to the household mix. The importance of this is apparent in the calculations in **PV Systems and Alternatives** and in the kerosene lamps analysis). The project justification based on carbon offsets is more convincingly made if based around prevented future emissions.

Response: Project justification is indeed based on 'prevented future emissions' from the systems expected to be installed under the project and through removal of barriers to market growth. There is no a priori reason to expect that kerosene lighting use per household would increase over time. So what is assumed here - in line with other solar home systems projects - is that each 40 Wp system or 12 Wp system avoids 0.52 tons and 0.17 tons of carbon dioxide per year, based on estimates of per household kerosene use in the two market segments.

Summary (Table 3) & SHS Sheet: This table highlights a key issue in market development, particularly for PV systems. In a number of countries the evolution of the SHS PV market has been significantly driven by two factors: (1) the presence of TV as a high-valued application; and (2) quality standards, or at least discernible differences between products based on price/performance characteristics (Duke, et al., 2000). With a market intended to grow to > 15,000 systems during Phase II, greater attention is needed for module testing and education (irrespective if formal or informal standards prevail in the market in Mozambique. Again, Duke et al., 2000 provides a set of test procedures, recommendations on how to provide this information to the market, and approaches to working with vendors.

Response: Agree. TV access is being rapidly expanded in Mozambique, and will be a main driver for solar PV demand. Activities are planned in the preparation phase for testing as well as defining testing/certification needs during the program.

Small Systems: The comparison of the 'Base' and 'GEF' cases need to be clarified. No capital replacement costs appear to be included.

Response: It is assumed that battery and lamps are covered in the 'annual O & M' of US$20 per system.

Investment Calculation: This analysis, which is very clear, is highly conservative with respect to the renewable energy – solar, wind and hydro – options. Over a seven year project life, assuming that the renewable energy programs are even moderately successful, the total carbon savings will be considerably higher than indicated in the spreadsheet. The development of a PV market, for example, that grows to sales of > 3,000 units/year will have significant ancillary benefits in terms of future growth in energy use that is diverted from fossil fuels to renewable energy. An estimated growth coefficient of 3 percent/year would be reasonable, and with 50% of that met with renewables, the $/Carbon avoided values will decrease by over 20%. This calculation, while speculative, is recommended. This applies even more strongly to the Grid RE Summary analysis.

Response: We agree that the estimates are conservative and believe that such conservatism is prudent. The expectation of 50% of the marginal growth in kerosene lighting demand being met by PV is too optimistic at this stage. Besides, some of the electricity for lighting market will be captured by grid supplies. Two, grid-based renewables will incur 'carbon offsets' only insofar as they are used for 'independent' grids (because main grid marginal generation comes from hydro). This 'independent grids' market is also small, and even as it grows, some of it will be captured by the main grid.

Micro-hydro: An estimate of the river resource for micro-hydro systems should be included in an evaluation of the market potential, given the favorable economics indicated in the analysis of both $/ton carbon and in the project NPV. Expansion to the scale indicated suggests the potential to develop a micro-hydro industry, with regional sales. The Zimbabwean micro-hydro turbines produced until recently have left the market due to violence in that country. Mozambique could become a regional supplier, particularly if project funds are used from the 'market development' program to support this initiative.

Response: The estimate of river resource will be done as part of implementation of the program. Also, based on current indications, South Africa or Zimbabwe (once the violence ends) are probably better placed for capital goods production and regional distribution. Mozambican capacity for maintenance and repair are to be emphasized first.

Summary: The incremental cost analysis, despite inevitable problems and uncertainties in the assumptions that underlie the value of the GEF option in terms of carbon offsets ($/tC), is well argued and clear. With the NPV calculation already included in the analysis, it would be instructive to add an evaluation of the future offsets in carbon emission based on a partial conversion of adopters to a renewable energy component of future growth in energy use.

Response: As mentioned above, while there is a potential for significant 'spin-off', at this time we feel the implied conservatism is prudent. Monitoring and evaluation (M & E) during Phase I will provide a better basis for judging whether the potential for 'spin-off' is large enough so as to justify a more aggressive stance in Phase II.

Further Comments on the PCD:

As in the initial review, this project seeks to jump-start several distinct clean energy sectors in Mozambique. This is an excellent goal, but it remains unclear if sufficient human resources exists to develop these programs without over-reliance on a few key individuals. Are there more extensive ways to distribute the burden on building three new energy markets (to say nothing of the differences between small and large PV)? A process with a staggered phase-in of the PV, wind , and micro-hydro phases would make sense.

Response: Agree. This is indeed how it is planned --- large institutional PV systems initially, wind and micro-hydro later, household PV systems to build up gradually and escalate.

Why is biomass not a candidate here? There are extensive saw mills and timber plantations that may, like their counterparts in Zimbabwe (e.g. Border Timbers) have extensive biomass waste issues that could become a key fuel.

Response: The use of biomass is under consideration, but it is prudent to start on a small scale in view of the institutional and human resource capacity constraints already mentioned. Furthermore, the issue is electricity generation for own use (where gasoline and diesel compete) versus for sales to the main grid. The latter seems an unviable option while Cahora Bassa marginal cost is less than US1 cent/kWh. The former might be attempted. For now, the 'grid renewables' analysis covers wind and micro-hydro; biomass gasifiers may be piloted in Phase I.