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Report No: KH

GEF PROJECT DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF US$40 MILLION

AND A

GRANT FROM THE

GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US$5.75 MILLION

TO THE

KINGDOM OF CAMBODIA

FOR THE

RURAL ELECTRIFICATION AND TRANSMISSION PROJECT

October 28, 2003

Energy and Mining Sector Unit
East Asia and Pacific Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective September 30, 2003)

Currency Unit = Riels (Rs)
1 Rs = 0.000261
1US$ = Rs 3,835

FISCAL YEAR
Government: July 1 – June 30
EDC: January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
CAS	Country Assistance Strategy
EAC	Electricity Authority of Cambodia
EdC	Electricité du Cambodge
ESMAP	Energy Sector Management Assistance Program
EVN	Electricity of Vietnam
FMR	Financial Management Report
FRAP	Financial Recovery Action Plan
FY	Fiscal Year
GEF	Global Environment Facility
GMS	Greater Mekong Sub-Region
ICB	International Competitive Bidding
IDA	International Development Association
IPP	Independent Power Producers
IRC	Inter-Ministerial Resettlement Committee
kWh	kilowatt hour
GWh	Gigawatt hour
MEF	Ministry of Economy and Finance
MIME	Ministry of Industry, Mines and Energy
MOE	Ministry of Environment
MW	Mega Watt
MWh	Megawatt hour
NCB	National Competitive Bidding
NGO	Non-Governmental Organization
PAF	Project Affected Families
PIC	Project Implementation Consultant
PMU	Project Management Unit
PPIAF	Public-Private Infrastructure Advisory Facility
PPA	Power Purchase Agreement
RAP	Resettlement Action Plan
RE	Rural Electrification
REE	Rural Electricity Enterprises
REF	Rural Electrification Fund
RE&T	Rural Electrification and Transmission
RFP	Request for Proposals
ROW	Right-of-Way
SA	Special Account
SBD	Standard Bidding Documents
SHS	Solar Home Systems
T/L	Transmission Line
TA	Technical Assistance
WPP	West Phnom Penh

KINGDOM OF CAMBODIA
RURAL ELECTRIFICATION AND TRANSMISSION PROJECT

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CAMBODIA
Rural Electrification and Transmission Project

GEF Project Document

East Asia and Pacific Regional Office
Energy and Mining Development Unit

Date: October 16, 2003	**Team Leader:** Rebecca C. Sekse
Director: Ian Porter	**Sector Manager:** Junhui Wu
Project ID: P064844	**Sector(s):** PP – Electric Power & Other Energy Adjustment
Lending Instrument:	**Theme(s):** Rural Development
Specific Investment Loan (SIL)	**Poverty Targeted Intervention:** [X] Yes [ ] No
Global Supplemental ID: P071591	Team Leader: Rebecca C. Sekse
Sector Manager: Junhui Wu:	Sector: Renewable energy (100%)
Lending Instrument:	Theme(s): Climate change (P) , Rural services and
Specific Investment Loan (SIL)	infrastructure (S)
Focal Area: C - Climate change	
Supplement Fully Blended? No	

Project Financing
[ ] Loan [X] Credit [X] Grant [ ] Guarantee [ ] Other:
For Loans/Credits/Others:
Amount (US$): 40.0
Proposed Terms:
Grace period (years): 10 **Years to maturity:** 40
Commitment fee: 0.50% **Service charge:** 0.75%

Financing Plan: Source	**Local**	**Foreign**	**Total**
RCG Counterpart Funds (IDA)*	6.55	-	6.55
Government Counterpart funds (ADB)	18.25	-	18.25
IDA	9.00	31.00	40.00
ADB and Other	9.72	46.13	55.85
GEF grant	1.36	4.39	5.75
Total:	52.59	93.91	146.50

Borrower: Kingdom of Cambodia
Responsible agency: Electricite du Cambodge (EDC), Ministry of Industry, Mines and Energy (MIME), Electricity Authority of Cambodia (EAC)
Address: Street 19, Wat Phnom, Daun Penh District, Phnom Penh (EDC); No. 45 Norodom Blvd., Phnom Penh (MIME); No. 2, Sangkat Boeng Keng Kang I, Phnom Penh (EAC)
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Estimated disbursements (Bank FY/US$M):

FY	2004	2005	2006	2007	2008	2009		
Annual	3.00	7.00	15.00	10.00	3.00	2.00		
Cumulative	3.00	10.00	25.00	35.00	38.00	40.00		

Project implementation period: FY04 – FY09
Expected effectiveness date: March 2004 **Expected closing date:** June 30, 2009

A. Project Development Objective

1. Project development objectives (see Annex 1)

The main development objectives of the Project are to: (a) improve power sector efficiency and reliability and reduce electricity supply costs; (b) improve standards of living and foster economic growth in rural areas by expanding rural electricity supplies; and (c) strengthen electricity institutions, the regulatory framework and the "enabling environment" for sector commercialization and privatization.

To achieve these objectives, the Project's **transmission line (T/L) component** would establish the first stage of a 220 kV link between Cambodia and Vietnam, furnishing low cost reliable power to industrial users currently employing costly diesel-based self-generation. The **rural electrification (RE) component** would bring affordable and reliable grid-based electricity within the reach of rural consumers, while continuing to promote a "uniquely Cambodian" private-sector-led, Government-enabled rural and renewable electricity market. The **technical assistance (TA) component** would strengthen capacity of the sector institutions and provide operational support and training to implementing agencies in land compensation, resettlement and environmental management.

2. Global objective (see Annex 1)

The Project's global environmental objective is to overcome barriers to renewable energy development in Cambodia, including those related to lack of a policy framework, financing, information and institutional capacity.

3. Key performance indicators (see Annex 1)

The performance indicators established for this Project would focus on: (a) increased efficiency, reliability and quality of overall power system services; (b) reduction of average electricity production costs by means of power trade with Vietnam; (c) maintenance of financial soundness of EdC; (d) the number of additional rural households with electricity (conventional and renewable), as well as indicators of social benefits and income-generating impacts; (e) increased share of licensed private power in project areas outside of Phnom Penh; and (f) effective operation on a sustainable basis of the Electricity Authority of Cambodia (EAC) and the Rural Electrification Fund (REF).

B. Strategic Context

1(a). Sector-related Country Assistance Strategy (CAS) goal supported by the project
(see Annex 1)
CAS document number: 20077-KH Date of latest CAS discussion: Feb/00

The main objective of the CAS are to assist Cambodia in building the foundations for sustainable development and poverty reduction, through: (a) rebuilding human capital to enhance institutional capacity and good governance, ultimately leading to better public services and increased economic activity; (b) building physical infrastructure, particularly roads, water supply, and electricity in rural and provincial areas to increase access to services and productive activities; (c) facilitating private sector development through policy work, constructive dialogue with the Government and the private sector, and direct support to business ventures; and (d) focusing all interventions as much as possible on rural areas where the majority of the poor, and indeed the majority of the population live.

The Project amply conforms with the CAS objectives through its support for electricity infrastructure development for both urban and rural economic growth, and its emphasis on improving the operational and managerial efficiency of the power sector and promoting its commercialization and privatization.

1(b). GEF Operational Strategy/Program objectives addressed by the project:

The renewable energy activities supported by the Project are fully consistent with the Global Environment Facility's (GEF) Operational Strategy and with its *"Operational Program #6: Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Costs"*. The major barriers it will address are lack of Government, private and financial capacity to plan, provide and finance renewable energy systems; high initial costs of renewable energy equipment in the currently small Cambodian market; and the lack of awareness of and confidence in renewable energy systems among potential suppliers and consumers.

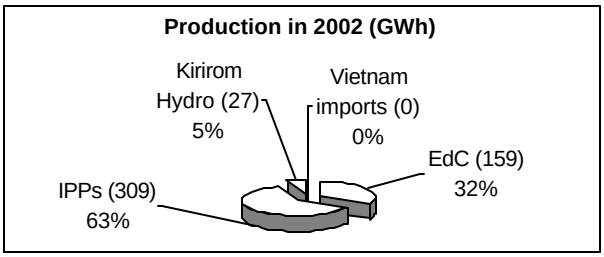
While implementing various initiatives aimed at economic recovery, the Government is fully committed to environmental sustainability, as indicated by their ratification of UNFCCC in 1995. As part of this, the Government initiated an exercise for building a national inventory of greenhouse gas (GHG) emissions, and several other projects related to environmental capacity building, resource management, etc., financed by UN and bilateral organizations.

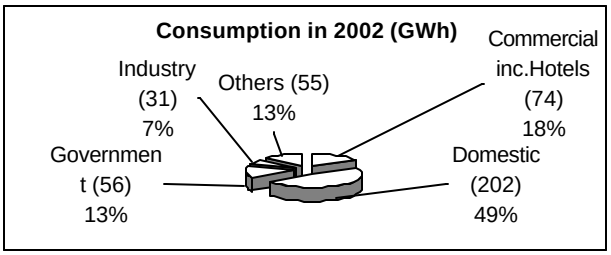
The Government has prepared a 10 year, 3-phase Renewable Energy Action Plan (REAP) in May 2003. This action plan has been prepared based on wide and extensive stakeholders consultations spanning three national workshops over a 2-year period. **Phase 1, market preparation**, lasts approximately three years and broadly includes institutional and regulatory development and private and public sector capacity building. **Phase 2, early growth**, builds on the base established during Phase 1 and will last another three years. It will be typified by early market growth, and assessment of initial investments made in hydro and solar photo voltaics. **Phase 3, rapid growth**, continues from year six forward. It will be characterized by robust market growth, more private sector firms and participants, and improved donor support to leverage successful activities. The result of these three phases will be a nationwide understanding and appreciation of when and where privately owned renewable energy technologies are able to be most cost effective in the production and distribution of electricity to rural homes and businesses.

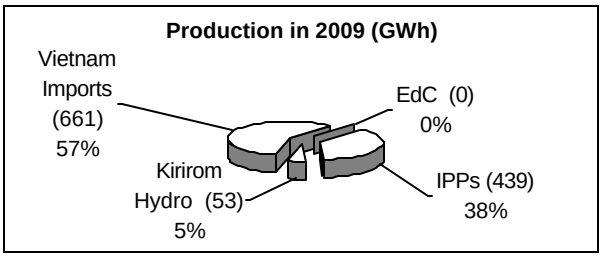
The Project coincides with phases 1 and 2 of the REAP. As part of the Project, investments will be made in technologies that were identified during the Project's PDF B phase as having short term potential, that is, small hydro, village (mini) hydro systems and solar home systems. Total avoided emissions are estimated to be about 233,026 tons of CO_2, over the 12-18 year life (varying with technology used) of the investments done during the Project's implementation period. This GHG mitigation potential is the rationale for the GEF grant component.

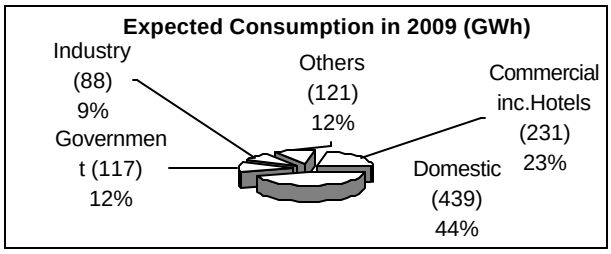
2. Main sector issues and Government strategy

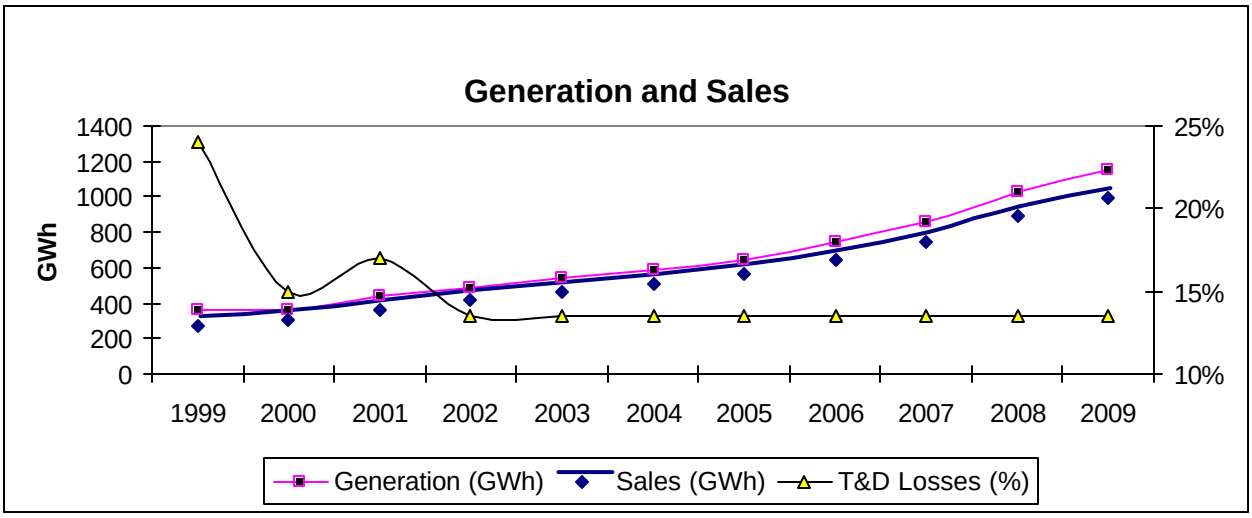
Power Sector Background: Cambodia has one of the lowest electrification rates in Asia with only about 12% of its population of 13 million connected to a power supply. Electricity costs are among the highest in the world. These two aspects are partly connected and both are partly the consequence of Cambodia's recent turbulent history – the country has only recently emerged from a lengthy period of conflict, civil war and invasion. Civil peace was restored only in 1998. Private independent power producers (IPPs) engaged in early1994 to revive supplies, contributed 63% of the supply in 2002; generation by the government-owned Electricite du Cambodge (EdC) accounted for 32% and the Kirirom Hydro Plant the remaining 5% (see figure 1 below). The dependable total system capacity in 2003 was 109 MW. There is no national grid and towns are supplied through isolated systems.











The table below provides a forecast of demand-supply in Phnom Penh for 2003-2009.

Item	2003	2004	2005	2006	2007	2008	2009
Generation required (GWh)	**539**	**589**	**649**	**748**	**863**	**1,030**	**1,153**
EdC Internal Consumption (GWh)	**1.3**	**1.4**	**1.5**	**1.5**	**1.6**	**1.7**	**1.8**
Losses (%)	**13.5%**	**13.5%**	**13.5%**	**13.5%**	**13.5%**	**13.5%**	**13.5%**
Sales (GWh)	**465**	**508**	**560**	**645**	**745**	**889**	**996**
Available Generation (GWh)	**539**	**589**	**649**	**748**	**863**	**1,030**	**1,153**
EdC own generation	153	211	42	256	0	0	0
IPPs*	332	325	554	439	439	439	439
Kirirom Hydro	53	53	53	53	53	53	53
Imports from Vietnam					371	538	661
Peak Demand (MW)	**108**	**118**	**130**	**150**	**173**	**206**	**231**
Dependable capacity (MW)	**109**	**109**	**141**	**119**	**199**	**199**	**295**
EDC	52	52	52	52	52	52	28
IPP	50	50	82	60	60	60	60
Kirirom Hydro	7	7	7	7	7	7	7
Imports from Vietnam					80	80	200

* Includes 30 MW KEP IPP.

The principal entities in the electricity sector are: (a) the Ministry of Industry, Mines and Energy (MIME), responsible for sector policy, strategy for RE, negotiations for electricity trade agreements and major investment projects and, with the Ministry of Economy and Finance (MEF), is the sponsoring ministry for EdC; (b) the Electricity Authority of Cambodia (EAC), the newly created power sector regulator responsible for licensing, approving tariffs, setting and enforcing performance standards and settling disputes; and (c) the electricity providers: (i) EdC, which supplies Phnom Penh, Sihanoukville, Siem Reap, Kampong Cham, Takeo and Battambang, accounting for nearly 90% of the total consumption; (ii) IPPs, providing nearly half of EdC's power requirements; (iii) small diesel-based generators (not companies) under the responsibility of MIME, accounting for 5% of total consumption; and (iv) Rural Electricity Enterprises (REEs), small private entrepreneurs in the countryside, supplying about 5% of total consumption.

Power Sector Issues. The main sector issues and Government strategy are:

Shortage of Reliable Electricity Supply. Despite the creation of substantial IPP generating capacity and EdC's commendable efforts to reduce system losses to 13.5%, the quality and reliability of supply to Phnom Penh continue to be poor, and generation reserve margins remain well below norms. Consequently, many large consumers operate high cost captive diesel-powered generators and the national electricity network remains disintegrated, precluding capture of economies of scale. With demand from EdC's grid expected to grow at a rate of about 13% p.a. during 2003-2008, EdC must look for major new sources of power supply.

Government's long term strategy to meet demand growth includes the development of a National Transmission System, the construction of a 120 MW hydropower plant at Kamchay, and interconnections with neighboring countries, especially Vietnam and Thailand, in coordination with the development of the Greater Mekong Sub-Region (GMS) grid. In the near to medium term, EdC and the Government plan to engage new IPPs and import power from Vietnam through a 220 link, whose establishment would later facilitate retirement of EdC's largely inefficient and costly generation.

High Electricity Costs. Electricity costs to Cambodian consumers are very high by international standards, ranging from about USc14/kWh in EdC's grid to about USc30-92/kWh in the rural areas served by REEs. Costs of urban supplies are high because the disaggregated generation facilities of both EdC and IPPs are small capacity, low efficiency, high fuel cost diesel plants. In addition, earlier IPP contracts provided for high risk premiums. Rural supplies are expensive as they reflect costs posed by: (a) very small diesel generators, using diesel oil transported over long distances; (b) small loads with demands peaking at certain hours (due again to high prices); (c) low technical levels and high losses of the networks; (d) high risks borne by operators due to lack of regulation and clear franchising arrangements; and (e) limited access to capital for investments to improve efficiency or capture economies of scale.

Government's strategy to reduce the high costs of EdC's supply comprises: (a) the import of electric power from Vietnam, and possibly other neighbors; (b) conversion of selected IPP and EdC generating plant from diesel oil to less-expensive heavy distillate oil; (c) renegotiation of certain IPP power purchase agreements, and securing new IPP generation on better terms; (d) reducing EdC's operating costs through - competition in fuel procurement, introduction of modern load dispatching, improving maintenance efficiency, reducing staff costs, and reducing bad debts; (e) retirement of EdC's inefficient plant, when reserve margins allow; and (f) possible development of medium-sized hydropower generation.

Government's strategy to reduce prices of rural electricity includes: (a) extension of bulk power supply from EdC's grid to peri-urban areas, where economically viable; (b) support for the stabilization and strengthening of REEs, by improving their access to financing, increasing licensing of rural franchises by

EAC, and providing technical support; and (c) support for the development of lower cost generation sources, including mini hydro and other renewable energy sources.

Low Access to Electric Power in Rural Areas. Rural electrification (RE) is relevant to the vast majority of Cambodia's population and land areas. In the provincial towns, EdC and/or local entrepreneurs supply power to the town center. Outside of these areas, power supply is rare and meager. As shown in Table 2, only about 6% of Cambodia's rural households have access to electricity supply, and another 3% have some type of individual power generating unit. The remaining 91% of the rural population either use automobile batteries (costing US$2-3.5/kWh) for occasional and limited use, or do without electricity completely. The RE rate of 12% is exceptionally low.

Table 2: Electricity in Rural Cambodia
(as of June 2001)

	Villages		Households	
	Number	%	Number	%
EdC-grid	370	3%	42,000	2%
REE-grid	864	7%	84,000	4%
Household batteries*	10,488	85%	1,155,000	55%
Household gen-set	-	-	63,000	3%
None of these**	617	5%	756,000	36%
Total	12,339	100%	2,100,000	100%

* In 85% of the villages, car batteries are the most common sources of electricity. Almost 55% of households use a battery and about 32% of the households have a B/W TV set.
** Use dry cell batteries or no electricity.

On the outskirts of suburban areas and in a few localities near transmission lines, electric power is supplied from small isolated systems and generators, covering about 100,000 households. Mini networks developed informally by local entrepreneurs are very small (about 200 kVA), and technically low grade.

The Government's plan to increase rural electricity coverage from about 10% today to 70% by 2030, faces serious obstacles. EdC does not have the capacity or financial resources to extend its small grids into the countryside; besides it is uneconomical to stretch its network to vast remote areas which can be more economically served by decentralized grids. The existing roughly 600 REEs provide a possible private-sector- led framework for developing local systems. To make significant contributions to Cambodia's RE goals, however, the REEs must significantly expand their scale of operations and reduce costs and prices, all of which are interrelated. Many REEs are having difficulty doing so. To make a better contribution, REEs need: (a) legitimacy, through licensing, to be able to solidify and formalize their businesses, coupled with a clear framework of technical standards and pricing guidelines within which all players have a common understanding of expectations; (b) improved access to financing, beyond the current limited resources of the entrepreneurs' private equity; and (c) greater access to technical and managerial know how.

Power Sector Reform. Major steps undertaken by the Government to reform the power sector include: (a) the conversion in 1996, by a Royal Decree, of EdC into a limited liability company, owned jointly by MIME and MEF; (b) developing with IDA assistance and passing in February 2001 of Cambodia's new Electricity Law; and (c) establishment in 2002 of EAC, an independent regulatory body to license operating entities and establish electricity prices. The passage of the Electricity Law and the subsequent implementation steps have set the power sector on a path of reform that would lead to a largely unbundled sector with substantial private participation in generation and distribution of electricity. The main reform

issue is to strengthen the new sector structure established under the Electricity Law, and further commercialize EdC's operations.

Although EdC is a legally separate entity, it has been difficult for the Government to separate its own role as sector policy maker (as EdC's owner), from its interests as one of EdC's largest customers, and to refrain from interference in EdC's operations. Lines between EdC's finances and the government budget remain blurred. EdC has been plagued since inception by financial problems, arising from its inability to pass on to consumers increases in the cost of power, and from high arrears in bill payment by government entities. EdC also needs to transform to a true company, and focus its attention on core businesses in transmission, system dispatch, and urban distribution, with a declining role in generation.

EAC has already begun to make an impact on sector operations. As of July 2003, it has issued over 40 licenses to power generators and REE distributors. With the support of ESMAP and the Public/Private Investment Advisory Facility (PPIAF), EAC is currently developing standard power purchase agreements (PPAs) and licensing guidelines and policies, specifically for small REEs. It plans to develop pricing methodologies, possibly with ADB assistance in the latter part of 2003. Continued support to EAC is necessary to increase its capacity and effectiveness in licensing and implementation of pricing regulation.

Involvement of IDA in the Power Sector. IDA, with major donors, has been supporting the Cambodian power sector since 1993 through lending for emergency rehabilitation, TA and an active policy dialogue. Assistance has included the following:

Power Transmission Master Plan and RE Strategy. Financed by AusAID and executed by IDA in 1998, this study analyzed the development of a transmission network in Cambodia and provided a long-term approach to defining the evolution of the transmission system;

A *Power Trade Strategy* was formulated for the GMS in March 1999, which proposed the T/L from Phnom Penh to Vietnam to be the first interconnection investment under the GMS power trade initiative;

The *Cambodia Power Sector Strategy* was completed in June 1999 as a collaborative effort between IDA and the power policy team within MIME. The strategy has provided an underpinning for the subsequent structural and legal reforms in the sector;

The *IDA Phnom Penh Power Rehabilitation Project, CR 2782-KH*, approved in December 1995, provided for the rehabilitation of the distribution system in Phnom Penh, strengthening of commercial operations of EdC, and implementing a new sector structure through the establishment of EAC.

IDA has organized a series of efforts for *Institutional Capacity Building at EAC and MIME.* PHRD, GEF, ESMAP, ASTAE, and PPIAF have provided financing for the following: (a) Cambodia RE Strategy and Implementation Plan (PHRD) to assist the Government in the preparation of an RE strategy; (b) Cambodia Preparation of GEF Renewable Energy Promotion Project to prepare for a GEF grant and support for building its capacity to implement the renewable energy component of this Project; (c) Cambodia Renewable Energy Action Plan (ESMAP) to support a strategy and plan of action for private sector-led renewable energy development; (d) Cambodia Private Power Policy Development (PPIAF) to support the Government with: (i) the development of a clear and comprehensive policy that will attract private sector to the power sector; and (ii) detailing critical elements of the BOT Law and the new Electricity Law; and (e) Capacity Building for EAC (ESMAP) to expand and implement the regulatory framework and good governance in the power sector of Cambodia.

Sector issues to be addressed by the Project and strategic choices

The Project addresses the main sector issues as described below.

Alleviating Shortages of Reliable Power and Reducing Electricity Costs for EdC's Grid. Establishment of the proposed 220 kV link with Vietnam, and reinforcement of the Phnom Penh 115 kV transmission network, will allow Cambodia to import and utilize about 156 Gwh of power in 2007 and about 484 Gwh in 2009 (almost 50% of EdC's requirement). This new source of power would allow EdC to better meet the natural demand growth in its Phnom Penh-centered system.

The weighted average price of Vietnamese imports at the medium-voltage level in Phnom Penh are expected to be about USc 7/kWh, compared to Usc 11.8/kWh from IPPs in 2002. Combining the cost reduction benefits of the interconnection together with other cost reduction measures being undertaken by EdC, it is estimated that, even with no changes in oil prices, the average cost of electricity supply into EdC's system would decrease from about USc 10/kWh in 2002 to about USc 8/kWh in 2009. Based on the PPA already signed with Vietnam, and the marginal costs for generating plants supplying the Phnom Penh area, production simulation studies show that electricity cost savings due to power purchases from Vietnam would be about US$18 million in 2007, rising to US$24 million in 2009.

Apart from reducing electricity costs, the 220 kV interconnection to Vietnam and the strengthening of the 115 kV ring around Phnom Penh would enhance system quality and reliability and induce commercial consumers to discontinue high-cost self-generation and switch over to EdC's grid.

As the first investment in the overall GMS Power Trade Initiative (supported by IDA), the proposed Project is a key landmark in the realization of the broader power trade strategy. These medium and long-term strategies can provide major benefits among the GMS countries in terms of reduced or postponed costs through shared reserve capacity and lower cost hydro generation; improve supply conditions, through increased reliability and quality of service and reduced emissions. These benefits can be very important for relatively small systems such as Cambodia's in which size becomes an obstacle to installing efficient, low cost units.

Improving Rural Access to Electricity. The Project would develop a new long-term framework for RE that would significantly increase access to electricity supply in rural areas and reduce rural electricity costs. Specifically, it would: (a) support extension of EdC's grid, where feasible, to outlying suburban areas, with distribution largely undertaken by REEs, acting as lessees or agents who may eventually buy out the assets; and (b) through the creation of the pilot Rural Electrification Fund (REF), provide financial and technical support for the expansion of REE distribution systems and generating capacity in rural areas, outside the ambit of economic grid extension, and finance connection of about 100,000 households, (almost doubling the current level). The key ingredients of this framework are:

- Licensing. Proper licensing of REEs is required to establish their franchise rights, provide business stability, and allow better access to financing. Licensing would also establish safety, quality and service standards, and pricing boundaries.

- Financing. Mechanisms are required to facilitate flows of commercial financing, especially loan financing, to REEs who have little or no access to local financing. While legitimization through licensing would help, it would be necessary to foster borrowing relationships with the banking sector, which is currently underdeveloped.

- Technical Support. Substantial TA is required to enhance technical and managerial capacity of REEs to enable them meet minimum standards, and delve into decentralized generation.

- Cross-Subsidization. As urban and rural distribution are physically separated, a special urban-rural cross-subsidy mechanism is needed, to provide a measure of relief to the inherently poor rural consumers from the high costs of RE, or else desired RE levels would be unattainable. Subsidy levels could be tapered off as rural demand grows, networks expand and economies of scale are realized.

Consolidating and Deepening Power Sector Reform. Specific reform areas addressed by the Project are:

- Strengthening EAC's capacity - through TA and IDA's operational involvement in the issuance of licenses for rural generation and distribution entities.

- Enhancing Commercialization of EdC – through: (a) implementation of the financial action plan agreed with IDA and ADB, which would steer EdC towards greater financial and commercial discipline; and (b) IDA's engagement with EdC and MIME in a steady dialogue to involve strategic partners, or possibly other equity investors, in EdC.

- Unbundling Transmission and Distribution - through strong support for the development of distribution companies independent of EdC, compelling the latter to focus on transmission.

C. Project Description Summary

(See Annex 2 for detailed description and Annex 3 for detailed cost breakdown)

1. Project Components

The Project has the following three components:

Part A. The **Transmission Line** (T/L) component to be implemented by EdC comprises: (1) construction of a 109 km long double circuit 220kV line from the border with Vietnam to Phnom Penh and two associated substations; (2) reinforcement of the 115kV grid around Phnom Penh involving about 20 km of 115kV lines and modifications to three 115kV substations and 22kV extension; (3) a National Control Center to optimize load dispatch operations in the EdC system and increase system security; and (4) building EDC's capacity in project management, land acquisition, resettlement and environmental monitoring and mitigation. Part A (1) of the Project within Cambodia would be financed by the ADB. Complementary investments in the 220kV system relating to Part A (1), above, on the Vietnam side would be financed by surplus funds in an ongoing IDA Credit **3034-VN**

Part B. The **Rural Electrification** (RE) component, to be implemented by EdC, comprises the EdC grid extension program covering 516 km of medium voltage (MV) and 536km of low voltage (LV) lines and electrification of about 50,000 households. The Project will support the symbiotic relationship of EdC and the REEs, and whenever feasible, will make use of private sector providers (REEs) in the operation of rural distribution systems. EdC would identify existing REEs and options for public/private partnership including distribution licensing, billing and collection arrangements, management contracts, and leasing arrangements.

Part C. The **pilot REF** component to implement an innovative mini and off-grid electrification program. The creation of the REF as a transparent institutional mechanism for promoting RE, has been widely accepted in the country through three national stakeholder consultation workshops. As a result, the REF is being established by the Government as a public institution with administrative, managerial, technical and financial autonomy to channel sub-grants and TA to the private sector and

rural communities to implement RE sub-projects. The REF will provide assistance to private sector developers for: (a) provision by REEs of about 45,000 new connections; (b) provision of electricity to about 12,000 households using solar home systems; and (c) addition of at least 6 MW of mini-hydro and 850kW of micro hydro capacity.

Box 1: Summary of the Rural Electrification Fund (REF)

To implement sub-projects, the REF would use the concept of "capital enabling", rather than project financing. The REF will rely on three principal factors to leverage commercial financing for sub-projects: (a) to ensure safety and technical standards, only sub-projects with valid operational licenses from the EAC will qualify for REF consideration; (b) co-financing sub-grants will be provided by the REF to facilitate financial closure; and (c) TA will be provided to prepare good quality sub-projects and build local technical and business capacity. Together, these will strengthen the REEs case for securing loans with suitable terms from commercial banks and micro-finance institutions. The justification for the co-financing grants is two-fold: (i) to make supported RE projects and promising renewable energy technologies commercially viable by closing the gap between the rural population's affordability to pay and the cost of electricity supply; and (ii) to facilitate financial closure or secure financing for a sub-project, since the capital market is under-developed and has limited access to financing, reflecting the high transaction risks inherent in the country and rural operations. As the REF is a new concept, implementation will include a pilot phase to gain experience that will then be applied to the main phase. (Refer to Annex 13 for details).

Part D. The **Institutional Development and Sector Reform TA** component comprises consulting and advisory services to: (1) MIME in renewable energy policy development, power market analysis, and development of a power sector master plan; (2) REF for implementation support, promotion of rural income generation options, renewable energy business development, REE improvement and association building, and capacity building of financial institutions; (3) EAC for institutional strengthening; and (4) EdC for services of a project implementation consultant and in-house advisor, creation of an independent monitoring agency and a project grievance committee, improvement of commercial practices, management training, capacity building for land acquisition, resettlement and environment, and power investment planning.

Component	Indicative Costs (US$M)	% of total financing	Bank-financing (US$M)	% of total financing	GEF financing (US$M)	% of total financing	Private Sector financing (US$M)	% of total financing
A. Transmission Component	**87.22**	**59.54%**	**15.69**	**10.71%**				
A1. 220 kV Interconnection to Vietnam*	67.85	46.31%	0.00	0.00%				
A2. 115 kV Reinforcement and MV extension**	14.05	9.59%	11.29	7.71%				
A3. National Control Center **	5.32	3.63%	4.40	3.00%				
B. Rural Electrification Component	**13.94**	**9.51%**	**12.06**	**8.23%**				
C. REF Component	**26.74**	**18.26%**	**5.10**	**3.48%**	**1.54**	**1.05%**	**20.10**	**13.72%**
D. Institutional Capacity and Sector Reform Component	**11.36**	**7.75%**	**7.15**	**4.88%**	**4.21**	**2.87%**		
D1. MIME	1.30	0.89%	0.80	0.55%	0.50			
D2. EAC	0.55	0.38%	0.43	0.29%	0.12			
D3. EDC	2.34	1.60%	2.34	1.60%				
D4. REF***	7.17	4.89%	3.58	2.44%	3.59			
Total Project Costs	**139.26**	**95.06%**	**40.00**	**27.30%**	**5.75**	**3.92%**	**20.10**	**13.72%**
Service Charge (IDA only)	0.54	0.37%						
Commitment fee (IDA only)	0.44	0.30%						
IDC (ADB)	6.26	4.27%						
Total Financing Required	**146.50**	**100.00%**	**40.00**	**27.30%**	**5.75**	**3.92%**	**20.10**	**13.72%**

All Indicative Costs include price and physical contingencies plus Taxes and Duties

* Includes capacity building and land acquisition and resettlement costs associated with 220 kV components and National Control Center.

** Includes Operational Support to EDC during Project Implementation (US$0.60 million) and land acquisition and resettlement cost (US$0.30 million)

*** TA will be initially carried by the PMU at MIME.

2. Key policy and institutional reforms supported by the Project

The basic framework for reform of the power sector has already been instituted by the Government. A new Electricity Law has been passed and subsequent implementation steps defined that would lead to a largely unbundled sector with substantial private participation in generation and distribution of electricity. The roles of entities in the sector and the legal and regulatory basis for sector management and regulation have been defined. EdC has been converted into a limited liability company. The licensing regime for all enterprises carrying out generation, transmission, dispatch, distribution, bulk sale, retail, and subcontracting has been established. An independent regulatory body, EAC, has been set up to license operating entities, to establish electricity prices, and to lay down and enforce standards.

The Project would consolidate and deepen the reform process in regard to the following aspects:

- Enhance the commercialization of EdC, secure greater autonomy from Government interventions.
- Investigate options for strategic partnerships by coordinating donor action in the power sector.
- Strengthen the regulatory framework and the regulatory enforcement capacity of EAC.
- Limit Government's role to market-enabling, regulating, and providing technical and management support to REEs.
- Establish sector policies that reflect actual cost of service, permitted to vary by service area.
- Establish an urban-rural cross subsidy mechanism making electricity affordable to the rural poor.
- Introduce sound pricing procedures and create incentives to extend services in rural areas through diversified distribution.
- Concretize Government policy for promotion of renewable energy resources.
- Foster environmentally sound and socially acceptable methods of service.
- Retain flexibility especially in the early stages of institutional development (particularly, through the envisaged pilot phase of co-financed grant awards).

3. Benefits and target population

Obvious beneficiaries of the Project would be consumers in urban, rural and remote areas of Cambodia. Urban consumers would benefit from better quality, more reliable and lower-priced electricity and commercial consumers would be able to retire their expensive captive generating sets. Consumers in rural areas would benefit from availability of electricity per se and from lower than hitherto electricity prices. Efforts to reach isolated pockets of population will allow such consumers to avail of basic amenities (lighting, communications) which would significantly improve their welfare. Electricity would foster growth in non-farm rural enterprises such as grain mills and food and agricultural processing, carpentry shops, welding shops, vehicle repair, refrigeration etc. Electricity will also enhance social services - street lighting, education in schools and night study at home, and health clinics. The overall project target is to provide electricity to about 100,000 new consumers.

Other beneficiaries of the Project would be the electricity agencies EdC, EAC, MIME, the REF and REEs and the electricity sector itself which through capacity building progress towards commercialization. Finally, the GMS would get a shot in the arm through the first Cambodia-Vietnam high voltage link.

4. Institutional and implementation arrangements

4.1 Implementation period

The Project will be implemented over a period of six years from 2004-2009.

4.2 Executing agencies

The executing agency responsibilities are summarized in the table below:

Component Description		Implementing Agency
1.	**220 kV Interconnection (ADB financed)**	EdC
2.	**115 kV Transmission System Reinforcement**	EdC
3.	**National Control Center**	EdC
4.	**EdC Rural Grid Extension**	EdC
5.	**REF Component**	REF
6.	**Technical Assistance Component**	MIME/EAC/EdC/IRC/REF

Project oversight: MIME would ensure that all project activities are in accordance with national power sector policies and oversee project implementation. MEF would oversee financing and disbursements, monitor compliance with financial covenants, and supervise and advise EdC and REF on financial matters. The Office of the Prime Minister would provide policy guidance to all entities. EAC would ensure that all operators in the power sector adhere to standards and regulations and facilitate private sector involvement in RE by means of regulatory instruments. The Board of Directors of EdC and the REF would be in charge of reviewing progress of their respective project sub-components.

Project Preparation Facility (PPF) for US$290,840 was approved on August 28, 2001 to allow MIME and EdC to support the initial operation of the then recently established EAC and to engage project management consultants to assist in the initial stages of EdC's procurement. The activities supported by the PPF consolidated the ongoing reform of the power sector and expedited the start-up of urgent physical components of the proposed Project. The effective operation of these institutions is essential for successful implementation of the Project. On September 10, 2002, the Government, requested an extension of the refinancing date for 18 months from September 30, 2002 to March 31, 2004. Extension of the PPF became necessary due to delays in project processing and uncertainties over project financing. The extension request was approved in January 2003.

Retroactive financing in an aggregate amount not to exceed US$0.2 million, accounting for 0.5% of the expected IDA credit amount, would be provided for anticipated expenditures (for any advanced contracts related to TA for project preparation and implementation, such as the in-house advisor to EdC) incurred after January 1, 2003.

4.3 Accounting, financial reporting and auditing arrangement

An assessment of the adequacy of the project financial management systems has been carried out and an action plan to improve EdC's capabilities has been agreed (see Annex 6B). The Project would meet minimum Bank Group financial management requirements. While traditional disbursement procedures would be used as opposed to Financial Management Reports (FMR)-based disbursement system, FMRs will still be produced for monitoring purposes.

Status of the borrower and the project implementing entities' compliance with audit covenants in existing Bank Group-financed projects. There were no overdue audit reports of the financial

statements, special accounts, statement of expenditures and project financial statements for Credit 2782-KH (Phnom Penh Power Rehabilitation Project) and Grant No. TF026154 (Cambodia Rural Electrification and Transmission Project). The audit reports were acceptable to IDA.

Agreement with the borrower on standard format for audited financial statements and the timetable for their submission: EdC's accounts are audited by independent financial auditors and audits are conducted in accordance with International Auditing and International Accounting Standards (IAS). Independent audits of the REF's accounts would be prepared by external auditors acceptable to IDA. The audit reports of EdC and the REF would be furnished to IDA no later than June 30 of each fiscal year. Project and Special accounts of MIME and EAC would also be audited annually.

Monitoring and evaluation arrangement: Satisfactory procedures for monitoring the progress of the Project in terms of physical execution, environment and social aspects and financial reports have been agreed with the implementing agencies, which would furnish quarterly progress reports. EdC, the REF, MIME and EAC, together with IDA, have established performance indicators by which the Project can be monitored and evaluated. These performance indicators (as indicated in Annex 1) will be confirmed at negotiations. An Implementation Completion Report (ICR) would be drafted by IDA, with the assistance of EdC, REF, MIME and EAC, not later than six months after closure of the IDA Credit. EdC and the REF would also prepare and make available to IDA their own evaluation reports, which would form part of the ICR.

4.4 Project supervision

Four missions annually (two main and two project updating missions) for a period of six years are foreseen, with an estimated 48 staff weeks of input p.a. Bank's field-based staff would be used for the updating missions. Supervision expertise would comprise RE and renewable energy development, power engineering, economics, financial analysis, fiduciary (procurement and financial management), and safeguard (environment, resettlement and social issues), restructuring, and private sector development. For the REF, the level of co-financing grants and disbursement principles for the initial phase have been agreed based on preparatory studies and surveys undertaken during project preparation. Supervision would initially concentrate on making the REF operational, in the grant approvals for the 6-10 sub-projects and their release mechanisms. Following this initial phase, the grant setting process and the grant levels would be reviewed and, if necessary, modified in the operational manual for the main phase of the Project. A mid-term review would be carried out in December 2006.

D. Project Rationale

1. Project alternatives considered and reasons for rejection

T/L component. Development of a high voltage transmission network in Cambodia is premised on the assumption that to effectively meet demand in the fast growing urban areas, electricity supply must capture economies of scale to reduce costs while simultaneously improving service quality and reliability. The transmission study contracted for project preparation considered several alternatives for meeting the forecast demand growth and concluded that a 220kV transmission link to Vietnam would be the appropriate first step in the least-cost power development plan for Cambodia. This would be followed by 115kV interconnections between major cities of Sihanoukville, Kampot and Siem Reap.

RE Component. During project preparation, consideration was given to alternative project designs and models regarding different institutional arrangements for providing and expanding rural and renewable energy services:

- ***Expanding EdC's mandate*** to exclusively undertake all electrification, to ensure service standards and quality. This approach has been discussed by IDA with the Government over the past few years, and discarded because: (a) this model has failed in many countries due to politicization and lack of incentives; (b) Government resources are inadequate even with generous donor assistance; (c) the approach would undermine locally-based innovators and drivers behind the REEs. Enactment of the Electricity Law has eliminated this approach.

- ***Project implementation through village cooperatives***. The cooperative structure in Cambodia is neither universal nor strong and too much time and resources would be consumed combating political rivalry and local favoritism to the detriment of the project objectives. The Project provides for a limited number of community village hydro pilots, recognizing that the ultimate aim of village electrification is community development.

- ***Market approach without oversight and regulation***. While the Project accepts the market approach, it provides for regulation of the market players. Experience in other countries has shown that a minimum amount of regulation is necessary to protect the consumer.

In summary, the Project propounds an institutional model that brings together the respective strengths of the different stakeholders - Government, financial institutions, project developers, local communities, equipment suppliers, etc. - to bear on Cambodia's electrification program.

Staged development of REF. A full fledged implementation of the REF from start was considered and rejected in view of the large preparatory institution building efforts required. The REF-based program would be piloted in the first year of the Project by capping the number of transactions to 6-10 projects in 3-4 provinces. Based on the experience gained, the REF criteria and manuals would be revised before proceeding with the main phase.

2. Major related projects financed by IDA/IBRD and/or other development agencies

(completed, ongoing and planned)

Sector issue	**Project**	Latest PSR Ratings (Bank-financed projects)	
		IP	DO
Bank-financed			
In Cambodia: (a) Rehabilitation of Phnom Penh's distribution system; (b) Strengthen sector institutions; and promote private sector involvement	Phnom Penh Power Rehabilitation Project (CR 2782), closed in 2000	S	S
(a) Restore macroeconomic stability; (b) Ensure adequate functioning of the newly-established Government administration (c) Maintain essential services	Emergency Rehabilitation Project – Infrastructure Component (CR 2550), closed in 1996.	S	S
Outside of Cambodia: (a) Rural electrification – grid intensification and expansion (b) Renewable energy – dealer model	Indonesia Solar Home Systems Project	S S	S S
Renewable energy – national policy and high level government institutional set-up	India Renewable Resources Development; and India Renewable Energy II Project	S S	S S

Renewable energy - off-grid models	Lao Southern Provinces Rural Electrification Project	S	S
Renewable energy – programmatic approach	Vietnam Rural Energy I	S	S
Rural electrification - rural energy fund	Uganda Energy for Rural Transformation Project	S	S
Renewable energy – performance based subsidies	Sri Lanka Energy Services Delivery Project	HS	HS
Renewable energy – community based hydro	Nepal Power Sector Development	S	S
Renewable energy – off-grid concessions	Argentina Renewable	S	S
Other development agencies			
Asian Development Bank (ADB)	Power Distribution and GMS Transmission Project (TA 4078); Provincial Power Supply Project (SF 1794); Power Rehabilitation II Project (TA 2629); SSTA to Update Power Rehabilitation II Project Preparatory Study (TA 3256); Power Rehabilitation I Project (SF 1345); and Special Rehabilitation Assistance Loan (SF 1199)		
UNDP	Nepal Rural Energy Project		

3. Lessons learned and reflected in the project design

Key lessons learned and reflected in the Project design are:

- OED's *Cambodia Country Assistance Evaluation* (CAE) indicated that project design was in some cases too complex and implementation capacity stretched and as the policy dialogue has become complex, donor coordination has become increasingly important. The project design has been kept simple and adequate institutional strengthening incorporated. Coordination with other organizations has been maintained and will continue to be maintained throughout project execution.

- The IDA-funded *Phnom Penh Power Rehabilitation Project* revealed the need to provide consulting services for project management at least until all civil works have been fully completed in order to ensure that IDA assistance is available at every project stage. It also stressed the need for a firm compensation policy for land acquisition that allows the implementing agencies to apply uniform standards for compensation. These aspects have been taken care of in the Project.

- The Project is built upon the *Energy Sector Strategy for Cambodia* and the ensuing RE strategy prepared and discussed with the Government in 2001. Setting up of the regulatory and institutional framework for encouraging private sector participation in RE are the key ingredients of the Project.

- The Government's RE strategy sets targets for a phased expansion of RE and builds upon the five main principles given in the Bank's *Rural Energy and Development Best Practice Paper*:[1] (a) providing for consumer choice; (b) ensuring cost-reflective pricing; (c) overcoming the high first cost barrier; (d) encouraging local participation; and (e) implementing good sector policies.

[1] The World Bank, *Rural Energy and Development: Improving Energy Supplies for Two Billion People*, 1996.

- The design of the REF has benefited from lessons learned in a number of other countries and incorporates the concepts of transparency and output based subsidies. In particular, experiences in the implementation of the *Sri Lanka: Energy Services Delivery Project, the Indonesia: Solar Home Systems Project, Bangladesh: Rural Electrification and Renewable Energy Development Project, and the Uganda: Energy for Rural Transformation Project* have been incorporated in designing this Project. Experience in other countries showed that targeting of subsidies can be an effective way of leveraging private investment. The financial support for REEs has been limited but a general Law on Investment gives fiscal incentives to large investors. The REF will be oriented towards coordinating the allocation of funds to the sector using the concept of "capital enabling" rather than total project funding or credit guarantee.

- A major challenge being addressed in the Project is to determine how to extend the institutional framework in a practical way to support and develop the private sector's role through the initiative of REEs. The lessons reflected in a cross study[2] of RE in South East Asian countries have been incorporated in the design of the REF. To ensure sustainable development of rural private power, it is necessary to: (a) have absolute clarity in Government procedures for approval/licensing regime and awarding of grants; (b) assist the REEs to improve their technical performance by learning from each other and encouraging them to adopt best practice standards; (c) implement effective micro-finance funding mechanisms; and (d) find appropriate regulatory balance to promote development and protect existing customers. Moreover, through the Project, the Government will announce its policies, making clear what is to be offered, what incentives it will provide – the guidelines for award of the co-financed grants, and what rules are to be followed to avail of the grants. Licensed REEs would be subjected to the same rules so that all are treated equally. The steps and procedures to be followed by all interested parties would be made public, making Government's action fully transparent and predictable.

- The autonomy of EAC is a key requirement to attract private capital and ensure an efficient development and operation of the power sector. The Electricity Law ensures achievement of this objective when it appointed a well respected and capable power sector professional to act as regulator whose decisions could not be revoked by the executive branch, who will operate with budgetary autonomy, and whose office could attract qualified technical staff. Experience in other countries have shown that, even under the protection of the law, regulatory bodies have suffered arbitrary political pressures which undermined their autonomy because of lack of commitment to respect regulatory authority and a strong office to support its daily operation. The Project would contribute to the success of regulatory reform by providing TA that would ensure EAC becomes a technically competent and independent organization able to attract and retain qualified staff.

4. Indications of borrower commitment and ownership

The commitment of Government and EdC to the Project is assessed to be strong as amply demonstrated by the actions it has already taken:

- Promulgation of the Electricity Law followed by the creation of EAC;
- Promotion of the private sector: (a) formally, by establishing the institutional framework under the Electricity Law, appointment of a professional regulator, and establishment of the REF by Royal Decree; and (b) informally, by the acceptance by EdC of private producers and to co-exist with REEs;

[2] Economic Consulting Associates, *"Emerging Lessons in Private Provision of Rural Infrastructure Services, Rural Electrification in South East Asia: Cambodia, Laos, Vietnam"*, October 2002.

- The Government's adoption of a Rural Renewable Electricity Policy to set the underpinning principles of localized development of renewable energy resources, under the RE Master Plan;
- Government's action to address the financial problems of EdC and support the commercialization process of EdC;
- Adoption of manuals for financial management and availing of Credits in support of TA to modernize and professionalise power sector staff;
- Development of a Regional Master Plan which outlines transmission links between the region's present and expected future generating facilities;
- Signing of a PPA between EdC and EVN and a power trade Memorandum of Understanding (MOU) between the Governments of Cambodia and Vietnam for import of up to 200 MW of power;
- The Government's request from ADB to provide a loan to co-finance the proposed Project.
- Assumption of primary responsibility for project implementation and committing to establish PMUs;
- Issue of a policy statement by MIME committing to promote renewable energy resources for rural development and creation of a Directorate of Renewable Energy within MIME.
- Passage of the Decree establishing the REF to promote equitable RE coverage in Cambodia by facilitating the population's access to electricity for economic, social and household uses.

5. Value added of IDA support in this Project

IDA's value-added to the Project would be in the following key areas:

- IDA's continuing involvement in the Cambodian power sector would help maintain the momentum of reform and address Government concerns about alleviation of rural poverty.
- IDA has a lead role to play in mobilizing resources for RE and renewable energy development from donors such as ADB, JICA and GEF and in coordinating donor action in the power sector.
- IDA is well positioned, through its presence in the power sectors of Cambodia and Vietnam, to support trade between the two countries and promote a regional strategy for power trade among the GMS countries;
- Through its experience in RE in countries round the world, IDA is well placed to help Cambodia in analyzing fresh approaches to RE;
- Based on its experience and global knowledge, IDA can assist in coordinating TA activities including a large array of specialized technical advisors;
- During Project preparation itself, IDA has contributed, through the ESMAP, GEF and PDF B in preparing a Renewable Energy Action Plan and designing the renewable energy component, preparing Small Producers Purchase Agreement templates and establishing the feasibility for solar home systems and small hydro power projects. Its continued presence is vital for satisfactory implementation;
- The presence of IDA would promote greater transparency and accountability in EdC's and REF's operations, through requirements to produce reliable financial information, and public disclosure.

E. Summary Project Analysis

(detailed assessments are in the project file, see Annex 8)

1. Economic (see Annex 4)

[X] Cost benefit
[ ] Cost effectiveness
[ ] Other (specify)

Table 4: Summary Economic Analysis of the Transmission and RE Components

	Base case		Sensitivity (+10% costs, -10% consumers)	
	ERR (%)	**NPV (million)**	**ERR (%)**	**NPV (million)**
(i) 220 kV transmission system*	23%	US$ 114	**NA**	**NA**
(ii) 115kV distribution system*	23%	US$ 114	**NA**	**NA**
(iii) National Control Center*	23%	US$ 114		
(iv) Grid extension	17.67	US$ 8.95	14.07	US$ 4.96
(v) Isolated systems	22.3	US$ 9.6	21.2	US$ 9.2
(vi) Mini hydro	8.1-19.4	US$ 9.3 (total)	5.6-15.5	US$ 3.2 (total)

*From draft project document of the ADB. Analysis includes Cambodia portion of the 220 kV transmission line, 115 kV refurbishments and the National control center

2. Financial (see Annex 4 and 5)

Financial Analysis of the Transmission and RE Components

	Base case		Sensitivity (+10% costs, -10% consumers)	
	Return on equity (%)	**NPV (million)**	**Return on equity (%)**	**NPV (million)**
(i) 220 kV transmission system*	16%	US$ 142	NA	NA
(ii) 115kV distribution system*	16%	US$ 142	NA	NA
(iii) National Control Center*	16%	142	NA	NA
(v) Grid extension	-1.49%	US$ 2.89	-1.94%	US$ 3.33
(v) Isolated systems	22.3	US$ 4.3	20.5	US$ 3.9
(vi) Mini hydro	25.9	US$ 13.0 (total)	20.5	US$ 7.3 (total)

*. From draft project document of the ADB. Analysis includes Cambodia portion of the 220 kV transmission line, 115 kV refurbishments and the National control center

2.1 Fiscal impact (see Annex 4A)

The REF is designed to be self-sustaining over the long-term. While the initial funding is largely expected to come from IDA and GEF under the Project and other donors later, long-term sustainability of the REF would be achieved though a "compensation fee" paid for RE by urban, commercial and industrial customers. In addition, the Government could also make budgetary allocations to the REF based on an assessment of the social and economic benefits. The REF represents a clear and transparent mechanism for providing cross-subsidy support for RE. The IDA and GEF financing of the REF component is US$6.64 million, which will be disbursed over the 6 year life of the Project at the rate of approximately US$1.0 million p.a. The national budget expenditures for Cambodia are in the range of US$680 million p.a. and growing approximately 12-15% p.a. The REF would also provide co-financing grants for renewable energy development for overcoming market barriers and will be phased out over time (7-10 years). However, as these grants would be largely provided for by GEF, it would not pose additional burden on the Government. The amount of public resources allocated through the REF in support of RE are justified by their socio-economic and resulting revenue impacts.

2.2 Financial Performance (see Annex 5A**)**

EdC's Financial Situation. A summary of the financial performance is presented in Annex 5. EdC recorded positive operating incomes in FY01 and 02 due to: (a) high sales growth of 19% and 17%; (b) reduction in losses from 24.1% in Fy99 to 17.1% in FY01 and 13.5% in FY02; (c) improved customer billing and collection; (d) reduction in operating costs, through reduction of staff, and retirement and refinancing of expensive debts to IPPs; (e) the Riel remaining fairly stable against the US dollar; and (f) reduction in international crude oil prices from a yearly average of $27 to $23 and $25/bbl.

Despite these developments, EdC's liquidity and financial condition remain unsatisfactory. At IDA's and ADB's behest, a Financial Action Plan on measures to improve EdC's finances was approved by MEF, MIME, EAC and EdC in June 2003. The Plan called for actions on: (a) the reduction of overdue Government and Municipalities' arrears; (b) arrangements for settlement of future arrears; (c) the reimbursement of VAT by the Government to EdC; and (d) measures to reduce EdC's operating costs. As of September 2003, the Government and EdC had made substantial progress in implementing the specific elements of the Plan by: (a) settling overdue electricity bills via offsets against amounts owing to the Government by EdC for custom duties and taxes and cash transfer; (b) setting up adequate line item budgets by MEF for each ministry sufficient to meet their expected electricity consumption and implementing a Plan to improve mechanisms for collecting government arrears; (c) offsetting the VAT amounts due against EdC's excise taxes and penalties; and (d) implementing various time bound measures to reduce EdC's operating expenses. These strong but short-term measures to address current operational and financial weaknesses would not be sufficient and EdC's financial outlook will remain fragile particularly if EdC's tariffs are not indexed to the movements of operating costs, foreign exchange and inflation. But with tariffs being high as they already are and EdC having no control over international fuel prices or for macroeconomic factors, EdC's only option is to develop less expensive approaches to supplying electricity. The proposed Project provides this option. The interconnection with Vietnam is a significant first step as the Vietnamese have agreed to provide Cambodia with supplies at prices below EdC's cost of generation. In the long-term, further steps would be the development of a regional power market with the possibilities of purchasing more power from neighboring countries. EdC's prospects are projected to be favorable with the implementation of the proposed Project which when fully operational should increase its electricity revenues by 20%.

3. Technical

Design of the physical components of the Project is backed by detailed feasibility studies. Implementation to international standards would be ensured through high grade technical specifications. Strategies have been planned to ensure supply continuity to the Takeo and WPP areas during construction of the 220 kV and 115 kV transmission systems. Studies have been conducted to ensure stable operation of the interconnected Vietnam-Cambodia grids. The technologies for mini-hydro, community hydro and PV have already been proven in other countries in the region. Identification of low-cost designs and procedures for electrification of off-grid loads and the pilot projects would be addressed during implementation.

4. Institutional

4.1 Executing Agencies

Primary responsible agencies for project preparation and implementation are EdC and the REF.

EdC. Although previous IDA and ADB financed projects has given EdC practical experience in technical design, international procurement and project management, it still does not have the full capacity to prepare and implement the Project independently. Hence, in addition to establishment of a fully staffed EdC PMU, TA will be provided for an in-house advisor, and an international consultant to provide a full range of services in project implementation, including procurement, engineering design, construction supervision and coordination, contract management, quality/cost/schedule control, testing and commissioning, resettlement and environmental management, and training of EdC staff. EdC prepared a Project Implementation Plan (PIP), covering all key aspects related to project implementation, which will be finalized before credit negotiations, and adopted and updated as necessary during project implementation.

REF. As the REF organizational structure is not expected to be fully operational after credit effectiveness, a PMU within MIME has been established during the transitional phase prior to REF establishment. The PMU is responsible for implementing actions necessary to establish the REF Board and Secretariat. The Project includes TA for implementation support; initially, assistance will be provided to the MIME PMU and subsequently the TA will be transferred to the REF, once it becomes operational. Support will be needed for sub-project appraisal, monitoring and evaluation capacity, incremental operating costs, and development and implementation of a financial management system. An in-house technical advisor will assist the REF in its day-to-day operations. An Operational Manual for REF has been finalized, and covers eligibility criteria, technical specifications, grant trigger mechanisms, sub-project cycle, conflict of interest and disclosure of information, financial management, procurement, disbursement, and social and environmental safeguard measures.

MIME will have policy oversight of the REF and the MEF will be responsible for the mobilization of national and international sources of funding for the REF. The REF will be governed by a Board composed of representatives from the Government, donors, private sector and civil society. An Annual Meeting of Stakeholders will act as the consultative organ for the REF Board. The Executive Director of the REF Secretariat will be responsible for the day-to-day management of the REF. This will include appraising and approving applications for REF grants, within the overall criteria and budgets approved by the Board. An REF Payment Agent will administer payments to sub-project grant recipients.

4.2 Procurement Issues A procurement capacity assessment by IDA has determined the overall risk related to procurement as average. A procurement plan has been prepared as part of the PIP including procurement packaging, procurement method, contract type, schedule, etc. More than 95% of the goods procurement will be carried out through ICB procedures and subject to IDA prior review. Three major packages (115kV T/L, substation modification, and National Control Center) will be based on supply and installation contracts. Most of the consultants for TA activities will be selected through QCBS or other competitive procedures and subject to IDA prior-review. International consultants will be engaged to help prepare bidding documents and handle the bidding process. In addition, extensive procurement training will be provided to the PMU staff.

4.3 Financial Management Issues

EdC. The financial management function at EdC is organized under a Finance and Accounting Director who reports to the Managing Director. There is separation of accounting and cash management functions. The Finance Office is responsible for accounting for the foreign funded projects of IDA, ADB, and other donors.

The accounting system at EdC is computerized and a Customer Billing and a Financial Accounting Systems are in use. An assessment of these systems was carried out in June 2000 which identified principal weaknesses and a comprehensive Financial and Accounting Procedures Manual to address these was developed. The Manual was found to be a sound basis for establishing policies and procedures and training of staff. An assessment of the financial management system related to the Project and actions to improve the systems was done by IDA and is detailed in Annex 6B.

The **REF** is being established as an autonomous public institution with independent legal status and full juridical standing as well as administrative, managerial, technical and financial autonomy under the laws of Cambodia. Several aspects of the operation of the REF would ensure good governance, namely: (a) REF operation would be closely linked to a strong sector institution in the EAC; (b) grants would be disbursed only against physical audit reports jointly prepared by the REF with the commercial bank/financing institution; (c) payment of grants would actually be made by a "payment agent" and not

the REF Secretariat or its finance unit; (d) dual signatures would be utilized for processing grants; and (e) transparency in the REF's management and operations through stakeholder involvement and public disclosure of information. The finance unit (once established), and payment agent (National Bank of Cambodia), would be assessed by IDA to ensure that effective internal controls are in place (Annex 6B).

5. Environmental

In accordance with World Bank safeguard policies on environment (OP/BP/GP 4.01) the Project has been assigned "Category B" . The rating is based upon conclusions drawn from two environmental analysis studies for the transmission and RE components respectively, that any impacts are moderate, of limited spatial influence and/or of short duration.

The *transmission component* consisting of the 220kV and 115kV T/Ls and two substations will be built and operated in compliance with all appropriate policies, procedures and regulations of the Government of Cambodia, the World Bank and/or international best practice. Furthermore, the Vietnam transmission line currently under construction to which this sub-project will connect is also financed by the World Bank , and is in full compliance with both the government of Vietnam and World Bank environmental regulations, policies and procedures.

During construction, chief areas of concern are temporary disruption to agriculture from access roads and movement of men, machines and material, as well as dust, noise and management of any hazardous materials (fuels, lubricants etc.) associated with these activities. Reinforcement of 115kV Phnom Penh ring may cause temporary disruption to traffic and noise to local residents. Any land clearance will use manual methods, no pesticides will be involved. T/Ls and substations will be routed to minimize proximity to population centers and any areas of ecological or cultural significance and avoid migratory bird flight paths. They will be designed to international standards to minimize exposure to electric and magnetic fields, and use of polychlorinated biphenyls (PCBs) will be prohibited. The route followed is predominantly agricultural land (rice paddy).

During operation the chief issues involve exposure of the local population to electric and magnetic fields and permanent loss of agricultural production from the land occupied by the transmission tower footings and the substations.

An Environmental Management Plan (EMP) to address these key issues includes: (a) mitigation program, (b) monitoring program, and (c) institutional strengthening has been prepared by the Borrower and found acceptable to IDA. The Borrower and EdC have agreed to implement this EMP (see Annex 12) in a manner satisfactory to IDA.

The RE component consists of a number of sub-projects which fall broadly into two classes: (a) grid extension to provincial towns, and (b) off grid electrification with renewable energy sources. These sub-projects will be identified during project implementation. Consequently environmental issues, which are directly linked to the exact location and nature of the specific power source[5] are not known a priori. Therefore, for both classes of electrification, eligibility criteria for financing will be established that will include, inter alia, environmental factors. For grid extension sub-projects, a checklist (see Annex 12) establishes key environmental aspects which must be evaluated to determine if an environmental assessment is needed and the issues to be addressed if any specific environmental assessment is required. Off grid electrification subprojects will be financed through the REF. The REF policies and procedures will be in accordance with an IDA-approved Operations Manual. A special chapter of this Operations Manual will be dedicated to environmental criteria, and will include checklists and generic EMP. In addition, the environmental chapter of the Operations Manual will provide institutional procedures for

sub-project environmental review and approval. Sample generic EMPs for the types of subprojects to be financed are also included in Annex 12.

Early in implementation, the Project will focus on strengthening institutional capacities by supporting the formation of a Rural Electrification Environmental Advisory Group (REEAG) under the Ministry of Environment (MoE). The REEAG will consist of both government and non-governmental members and have overall responsibility for implementing the EMPs of both project components.. The project will provide TA to REEAG for the transmission component, and to support creation and operation of an environmental unit in the REF to establish their environmental review and evaluation function for the RE component.

Details regarding the environmental analysis for the transmission and RE components are presented in Annex 12.

6. Social

6.1 Key Social Issues

T/L Component. Certain amount of land acquisition and resettlement will be required, which is mainly caused by acquiring land for substations, tower bases, and clearing right of way (ROW) under the T/L. Following the Bank policy on involuntary resettlement, a Resettlement Action Plan (RAP) was prepared in 2001, and updated in 2003. A common RAP has been prepared for the ADB-financed 220kV and IDA-financed 115kV elements of the components.

Resettlement Action Plan. The RAP was based on 100% census survey of all affected people and social economic survey among 25% of potentially affected families. According to the updated survey, the whole component will acquire about 9 ha of land areas for both substations and tower bases. Most of them are paddy land. Along with land acquisition, a total of 149 households will be relocated from the ROW, most of whom will be moved within a short distance. Among total impacts, significant portion of resettlement is under the 220kV component funded by ADB. For the whole component, a total of four Provinces (including Phnom Penh Municipality), 15 Districts, 37 Communes, and 120 Villages will be affected by the Project. Most of such impact is relatively minor; caused by the clearance of ROW (30m) and land acquisition of tower bases. The more significant impact is those affected by land acquisition in two substations (23 households) and those to be physically relocated along the transmission alignment (149 households), with a total of 172 households.

Removal of 7,300 economic trees, primarily sugar palm, might also have significant impacts for some affected households. Most of those are likely to be the owners of residences requiring relocation, as the trees tend to be clustered around built up residential areas. In addition, during project construction, some temporary impacts might take place either in or outside the ROW and substation boundaries.

In order to ensure that the affected people will be able to restore their living condition and livelihood after resettlement, a set of compensation standards has been developed, based on detailed survey of replacement values. For acquired farmland, compensation rate will be set at US$0.1 to US$5.6/m^2 based on replacement value and market prices at different locations. For removed houses, compensation will be set at US$7 to US$283/m^2, averaging US$2000/house. For removed attachments, detailed compensation rates will be developed based on replacement cost. In addition, the Project will provide various moving and transition allowance for the project affected people, such as US$40/household for moving allowance, US$40/household for transition assistance, and US$20/household for those vulnerable households. These compensation rates will be reviewed and approved by IRC - an ad hoc inter-ministrial committee.

According to the RAP, for those who will lose farmland, replacement farmland or cash at replacement value will be provided; while those losing structures and other attachments, compensation will be provided at replacement value. Extensive consultation had been carried out during the resettlement planning stage, and a resettlement information booklet had been translated into local language and distributed to affected villages.

To ensure that affected people's complaints on compensation and rehabilitation are addressed in a timely and satisfactory manner, a well defined grievance redress mechanism will be established under the Project through the PMU at EdC. A special resettlement and environment unit has been established at EdC to handle resettlement implementation for all projects under EdC. To strengthen institutional capacity for resettlement, TA such as workshops, training, and study tour, will be provided under the Credit for staff from both EdC and IRC. An Independent Monitoring Organization (IMO) will be appointed to monitor the resettlement and compensation process and verify that these have been implemented in accordance with the RAP.

Linkage with the 220kV T/L in Vietnam. On the Vietnamese side the Cambodia-Vietnam T/L component will connect the 220kV T/L between Thot Not and the border point (via Chau Doc) in Vietnam, a length of about 98 km. Because the 220kV T/L in Vietnam is "directly and significantly related to the IDA assisted project", the IDA resettlement policy should also apply in accordance with the IDA's new OP 4.12. This 220kV T/L with two switchyards is proposed to be funded from cost saving from the existing IDA loan, Vietnam Transmission, Distribution and Disaster Reconstruction Project (Cr. 3034-VN) and the RAP, following the IDA OP, has been developed and approved by the Bank.

Resettlement Policy Framework For the RE Component. The RE component includes both grid extension and off-grid RE sub-projects. While construction of MV and LV requires little land acquisition and resettlement, small land acquisition might be required for the construction of mini hydro and some MV facilities. Since detailed project selection and design has not yet been prepared, a resettlement policy framework has been developed in 2001 and updated in 2003 to ensure that any land acquisition and resettlement under the RE component will follow the same resettlement policy as under the transmission component. The developed resettlement policy framework includes these key elements: (a) resettlement principles; (b) project description; (c) potential impacts and resettlement screening procedures; (d) legal framework; (e) organizational structure; (f) consultation and grievance procedures; and (g) monitoring arrangements. According to the Policy Framework, an abbreviated RAP will be prepared by the implementing agency if less than 200 people are affected by a sub-project. If more than 200 people are affected, then a RAP will be prepared. The screening of resettlement impacts will be the responsibility of two implementing agencies: EdC for the grid extension sub-projects, and the REF for the off-grid sub-projects.

Ethnic Minority Development Strategy for REF Component. Although there are no ethnic minorities in the project areas for both transmission and grid extension components, because the REF is a national program and its activities may benefit ethnic minority populations, an ethnic minority development strategy has been developed for the REF component. The proposed ethnic minority development strategy will include a screening process, followed by social assessment and development of an indigenous people development plan, which will be incorporated into the application and approval process for REF sub-projects, identifying sub-projects that involve ethnic minorities and setting a consultative process in place where this is the case.

6.2 Participatory Approach

	Identification/ Preparation	Implementation	Operation
Beneficiaries/community groups	IS	COL	COL
National government	CON	COL	COL
NGOs	CON	COL	COL
Other donors: GEF	CON	CON	CON
ADB	CON	COL	COL
Japan	CON	IS	IS

(Note: IS: information sharing; CON: consultation; COL: collaboration)

Extensive stakeholder consultations have been held, especially in the design of the REF component. With assistance from ESMAP, three national stakeholder consultation workshops were organized for the preparation of a renewable energy action plan and the creation of the REF as an independent financing mechanism for off-grid electrification. Another workshop will be organized to address resettlement issues for each of the two project components. Active participation of local communities would be sought throughout project implementation in a demand-driven provision of RE services.

7. Safeguard and Business Policies

7.1. Safeguard Policies

Policy	Applicability
(OP 4.01, BP 4.01, GP 4.01) Environmental Assessment	Y
(OP 4.04, BP 4.04, GP 4.04) Natural Habitats	N
(OP 4.36, GP 4.36) Forestry	N
(OP 4.09) Pest Management	N
(OPN 11.03) Cultural Property	N
(OD 4.20) Indigenous People	N
(OD 4.30) Involuntary Resettlement	Y
(OP 4.37, BP 4.37) Safety of Dams	N
(OP 7.50, BP 7.50, GP 7.50) Project in International Waterway	N
(OP 7.60, BP 7.60, GP 7.60) Project in Disputed Area	N

Where safeguards were deemed applicable (OP/BP 4.01 Environmental Assessment and OD 4.30 Involuntary Resettlement), measures were taken from the earliest stages in the project preparation. Local communities have participated in all stages of project development and will continue to do so. Each subproject of the RE component will be subject to individual assessments of environmental risks. Institutional strengthening in the Ministry of Environment and MIME's Energy Development Department will work towards this end. Assessments and management plans which are currently available, provide for the development of detailed implementation plans as soon as project details are specified.

A number of the targeted REEs are community-based organizations with features similar to NGOs, i.e. field-based and specialized knowledge, social proximity and long term commitment to sustainability. In order to capitalize on these skills, local community groups and NGOs have participated in project design and identification of priorities as prescribed in OD 14.70, Involving NGOs in Bank-sponsored activities.

F. Sustainability and Risks

1(a). Sustainability

The following conditions would ensure the sustainability of project components**.**

- The Government's willingness to deepen ***power sector reforms***, including enhanced liberalization of investments and full support of the commercialization of EdC, is vital for project sustainability, as also actions to address government arrears and electricity tariffs.

- A clear political and public commitment to encourage and sustain ***private investment*** in the sector is the only guarantee that the private sector can flourish.

- **Growth of electricity demand** in urban as well as rural areas is necessary to make power trade strategies such as the interconnection with Vietnam and Cambodia viable.

- **High standards and quality of T/Ls, substations and distribution system construction and proper maintenance** of facilities constructed under the Project are critical to project sustainability. The choice of appropriate technology/maintenance management practices and procedures for renewable electricity projects is essential for their sustainable operation.

- The success of the REF is intertwined with the **future performance of REEs** and local financial institutions in expanding rural electricity supply. Government would need to develop specific policies to encourage the private sector in RE. Government should also adhere to the RE master plan to ensure coordination between grid and off-grid components.

- The decree establishing the REF allows for different **sources of funding to sustain the REF**. The sources may include various donors, power transmission and supply businesses, urban consumers, and/or the Government. Sources of funds and funding mechanisms must be identified and confirmed no later than the proposed project mid-term review.

1(b). Replicability

The Project offers a significant opportunity for replication: (a) the current level of RE is low and the potential expansion through grid and off-grid options is quite large; (b) the Project pilots an innovative institutional approach to improve electricity access and depending on the success of the REF mechanism in the pilot stage, could be significantly scaled-up to cover larger market segments. The flexible and transparent design of the REF allows for different delivery models to be implemented, ensuring that the program build on rich experience and selection of suitable replicable models; (c) there is substantial private sector presence in the rural areas among the estimated 8,000 battery chargers over 600 REEs that will be supportive in program replication; and (d) the pilot REF experience will also have a significant impact on the commercial institutions through project financing experience and TA. With greater maturity in the financial institutions, these will become channels for providing longer term credit to consumers, and therefore expanding rural markets for off-grid technologies. The REF implementation support TA sub-component includes specific activities to disseminate results among REEs and financial institutions, share experience among stakeholders, and community demonstrations.

2. Critical Risks

The critical risks that the Project may encounter during implementation are detailed in the table below. Some of the key implementation risks are:

(a) The Financial Action Plan is not implemented by EdC. A number of actions have been agreed with the Government to improve EdC's financial condition. Close monitoring of the implementation of the Plan by the Government, IDA and ADB will be required.

(b) REF operation: While the REF model to RE has been selected as the optimal approach by all the stakeholders, its successful operation hinges on a number of factors coming together such as good progress of REE licensing by EAC, coordination between grid and off-grid development, ability of the REF seed funding to act as a "capital enabler" for commercial banks to provide longer term credit, transparent selection of subprojects based on clear criteria, consumer receptiveness and private sector appetite for such a program. Moreover, sustainability of the REF is linked to the use of some cross-subsidization within the sector. While the REF is a transparent mechanism for providing support to RE, the team also recognizes its complexity. The Government will need to take a pro-active approach and high level of commitment in its early implementation, and later, in ensuring timely transfers of "compensation fees"/budget support. Close supervision by IDA and the Government will be required during the implementation of the pilot phase of the REF and the team has plans for three supervision missions during the first year of REF operations.

(reflecting assumptions in the fourth column of Annex 1)

Risk	Risk Rating	Risk Minimization Measure
From Outputs to Objective		
PPAs are not solicited on a competitive basis.	S	Electricity Law has been enacted. Procedures for the selection and contracting of IPPs will be approved.
Government and EdC does not honor their financial commitments.	M	EdC commercialization together with sound pricing policies are implemented. Financial actions/decisions required prior to Board presentation and Credit effectiveness.
Transparent implementation of regulatory rulings and EAC decisions are not carried out.	M	MIME/MEF commitment to support EAC's independence prevails. TOR has been prepared for additional TA for further development of the regulatory structure, including licensing procedures for operators and standard PPAs.
Vietnam does not honor PPA.	M	Clear contractual agreements have been signed.
From Components to Outputs		
MIME, the REF and financial institutions do not function effectively in their respective roles of planning, policy development, supervision, implementation of the REF sub-component.	S	Close monitoring during the initial phase of the REF will help in fine tuning of the operations.

Mismanagement of the REF.	M	To ensure governance, fund operation would be linked to EAC, grants would be disbursed against physical audit reports, payment of grants would be made by an outside payment agent, financial management systems would be set up aimed at establishing effective internal controls, and independent audits of REF accounts will be required.
Counterpart funds are not available.	M	Credit covenants enable the Government to sustain its commitments.
Low utilization of the REF.	M	Phased approach would assess and fine-tune disbursement/implementation bottlenecks. Based on these lessons, experience would be reviewed, and the REF manuals and grant criteria would be revised before proceeding with main phase.
Time and cost overruns.	M	Utilize EdC who is familiar with IDA procedures. Familiarize other stakeholders on IDA procurement and disbursement procedures. Improve monitoring and supervision capacity in MIME, EdC, EAC and financial institutions through TA provided in the Project.
Overall Risk Rating	M	

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

3. Possible controversial aspects

No controversial aspects have been identified.

G. Main Credit Conditions

1. Effectiveness Condition

- *Execution of subsidiary loan agreement between the Borrower and EdC;*
- *Execution of the loan agreement between the Borrower and ADB;*
- *Execution of the GEF grant agreement;*
- *Establish and thereafter maintain a PMU for implementation of the transmission and grid extension components.*
- *Establish an Internal Audit Department in EdC and provide training to the internal auditor.*

2. Other

[classify according to covenant types in the legal Agreements]

Agreements Reached with the Borrower:

Flow and Utilization of Project Funds:

- *Onlend the Credit amount to EdC under a subsidiary loan agreement between the Government and EdC under terms and conditions satisfactory to IDA which shall include: (a) interest at a fixed rate of 4.2% per annum, repayment over 20 years including a grace period of 5 years for the T/L component; (b) interest at a rate of 1% per annum, repayment over 25 years including a grace period of 7 years for the rural grid extension component; (c) commitment charge of 0.5%; and (d) foreign exchange risk to be borne by EdC; and*

- *Assure availability of adequate counterpart funds in addition to the IDA credit for implementing the project components.*

Management and Financial Aspects of the Project:

- *Take all actions, including but not limited to adjustment of tariffs to enable EdC to realize satisfactory operating, cash generation and debt limitation ratios;*
- *Take all necessary measures to assist EdC collect its outstanding account receivables, and cause EdC to reduce these receivables to not more than three months of sales revenue;*

Agreements Reached with EdC, EAC, the REF and MIME:

Management Aspects of the Project:

- *MIME to establish and thereafter fully operationalize the REF in a manner satisfactory to IDA, no later than April 30, 2004;*

- *REF to review and update the REF Operational Manual as appropriate upon completion of the REF initial phase, in a manner satisfactory to IDA; and*

- *REF Board to contract the National Bank of Cambodia to act as the independent payment agent for the REF no later than May 31, 2004.*

Environmental and Resettlement Aspects:

- *EdC to carry out the EMP and RAP as agreed with IDA and in a manner satisfactory to IDA..*

Financial Aspects:

- *EdC to review with IDA, by April 30 of each year, the adequacy of its tariffs to produce the required break-even, debt service coverage, and debt equity ratio covenants, satisfactory to IDA;*
- *EdC to generate sufficient revenues to cover no less than the sum of: (a) operating expenses; and (b) the amount by which debt service requirements exceed the provision for depreciation;*
- *EdC to maintain net revenues at the level of 1.2 times its total estimated debt service requirements until FY06 and 1.3 times by FY07 and thereafter;*

- *EdC to not incur further debt if such additional debt would raise its long-term indebtedness to more than 1.5 times its total capitalization;*
- *MEF to implement an Accounts Receivable Management Plan, satisfactory to IDA;*
- *EdC and MIME shall review with IDA, by April 30 of each year, EdC's and the REF's proposed annual budgets and financial plan for each succeeding three-year period.*

Accounts/Audits:

- *EdC, MIME, the REF and EAC to appoint independent auditors, acceptable to IDA, and make the audit reports available to IDA within six months after the close of each fiscal year.*

Monitoring, Review and Reporting:

- *EdC, the REF and MIME to: (a) carry out satisfactory procedures for monitoring the progress of the Project in terms of physical execution and financial reports, and agreed performance monitoring indicators; (b) furnish to IDA: quarterly Progress Reports and Financial Management Reports (FMRs), 15 days after the end of each calendar quarter with the first of such reports due on April 15, 2004 covering period up to March 31, 2004; and (c) carry out a mid-term assessment of project implementation for the period ending December 31, 2006.*

3. Negotiation conditions

- *Approval of the RAP for T/L and RE Framework and Procedure Guidelines;*
- *Adoption of the REF Manual.*

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.
[x] 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)

The feasibility studies for all project components have been completed and approved by the Government. EdC has hired consultants to review/update the feasibility study (that was carried out by IDA in FY00) for both the 220 kV and 115 kV components of the Project, as well as for updating the RAPs and EIAs. The PPA between the Governments of Cambodia and Vietnam on the 220kV interconnection was signed by EdC and EVN on July 24, 2000 and a written commitment from the Vietnamese authorities confirming their intention to implement their sections of the project, as agreed with the Cambodian authorities, was obtained on July 1, 2003.

A Project Implementation Consultant (PIC) will be hired under the Project to assist EdC in the engineering design and preparation of bidding documents. To this end, EdC has advertised requests for expression of interest in the UNDB and local newspapers. Upon IDA's approval, the RFP has been released to the short listed consultants. Proposals will be submitted by October 2003. After evaluation and approval, the PIC

should be on board in March 2003. To facilitate a possible more advanced project preparation and implementation, the project team has recommended the option of retroactive financing. But while the Borrower, opted to avail of this financing for an in-house technical adviser, it was unwilling to take any risk in using the same financing arrangement for the PIC in view of its budget constraint.

I. Compliance with Bank Policies

[x] 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 policies.

_____	_____	_____
Rebecca Sekse	Junhui Wu	Ian Porter
Team Leader	Sector Manager	Country Manager

Annex 1: Project Design Summary

Hierarchy of objectives	**Key performance indicators**	**Data collection strategy**	**Critical assumptions and risks**
Sector-related CAS Goal: Cambodia's physical infrastructure built and human capital re-built, with a focus on rural areas and private sector development	Sector indicators: • Power supply increased to match expected average rate of growth in demand of 13% between 2003-2008. • Rural electricity coverage increased from 9% in 2003 to 70% by 2030.	• Project mid-term review • Project Implementation Completion Report • Quarterly Progress Reports	CAS Objectives will support Bank mission if: • Political stability persists and Government is committed to sector and institutional reforms and to principles of good governance Government policy is open to private sector investment and supportive of rural income generation.
GEF Operational Program Goal: Greenhouse Gas Emissions reduced	• 233,026 tons of CO_2 avoided over the Project's duration. • 1.5 million tons of CO_2 abated indirectly as a result of sustained investment in renewable energy technologies.	• Project status reports	• 12-18 year life (varying with technology used) of the investments made during the Project's six year duration. • Indirect abatement of CO_2, assuming an annual 12% growth per year in investment in renewable energy technologies during 2000-2020 .
Project Development Objectives: 1. Efficiency and service delivery improved in the Cambodian power sector. 2. Access to electricity increased in rural areas. Global environmental objective: 3. Barriers to renewable energy development	Outcome/impact indicators: 1.1 Costs of EdC's electricity supply reduced from US$0.14/kWh in 2002 to	• Mid-term review report • EdC's power planning reports • EAC annual reports	Project development objective will support CAS goal if: • Government supports EAC operations and REF. • EAC and REF support economic pricing of electricity services. • Utilization of electricity for rural income

in Cambodia overcome, including: policy framework, financing, information and institutional capacity.	US$0.11/kWh in 2009 (at midterm: US$0.12/kWh). 1.2 EdC T&D losses maintained at 13.5%. 1.3 Issuance of licenses to all IPPs and 90% of REEs by 2009 (at midterm: all IPPs and 50% of REEs). 1.4 75% of industrial consumers switch from self-generation to grid supply by 2009. 2.1 Average off-grid tariffs reduced by 15% by 2009 (at midterm: 5%). 2.2 Number of people (including through rural business and social services) benefiting from modern electricity services (EAC standards) increased by about 567,000 people by 2009. 2.3 Average number of hours per day in which electricity is supplied to rural households by REEs increased from 4hours/day to	• Quarterly progress reports • REF annual reports	generation can be promoted.

	8hours/day by 2009 (at mid-term: 6hours/day). 3.1 Percentage of national generation capacity by renewable energy systems increased from 0% in 2002 to about 5% in 2009 (at midterm: 2%). 3.2 Increase in number of renewable energy businesses (serving 500 to 1500 customers) from 0 in 2002 to about 5 in 2009 (at midterm: 2) 3.3 Increase in local commercial lending and other financing for rural electrification and renewable energy from about US$0.5 million in 2002 to about US$15 million in 2009 (at midterm: US$5 million).		
Project Outputs: • Interconnection of Phnom Penh grid with Vietnam constructed and Phnom Penh transmission network reinforced. • EdC grid extension and REF mini/off-grid electrification program implemented.	Outputs indicators: 1.1 220kV double circuit 109 km transmission line and sub-stations constructed and	Quarterly progress reports Project financial management	Project outputs will achieve development objectives if: PPAs are solicited on a competitive basis. Government and EdC honor their financial commitments.

electrification program implemented. • Power sector regulatory framework strengthened.	operational according to agreed standards by 2007 1.2 20km (two 10km circuits) of 115kV line to connect WPP S/S to 115kV ring around Phnom Penh, 23 km of 2nd circuit of existing T/L and three sub-stations reinforced, transformer MVA capacity connected to 115kV grid, and reactive compensation to 22kV network, according to agreed standards by 2006. 1.3 130km of MV line extensions from WPP and Takeo S/S along major routes. 2.1 About 50,000 additional rural households connected to the grid (at midterm: 25,000). 2.2 REF established and sub-grants appraised, approved and disbursed for about 45,000 new rural connections (diesel) by REEs (at	reports Project status reports Mid-term review report Implementation Completion Report	Transparent implementation of regulatory rulings and EAC decisions are carried out. Vietnam honors PPA.

	midterm: 21,500); installation of SHS for about 12,000 new rural households (at midterm: 4,000); construction of about 6 MW of mini hydro capacity (at midterm: 2.4 MW); and, construction of about 850kW of micro hydro capacity (at midterm: 350kW). 2.3 Financing and subsidy mechanisms for REF identified by mid-term. 3.1 EAC regulations and codes issued to improve quality of supply and services by end of Project. 3.2 EdC staff trained in, and applying, commercial practices and power investment planning by end of Project. 3.3 Small Power Purchase Agreement for renewable energy developers and sector master plan developed by MIME.		

	3.4 About 200 rural and renewable energy business employees, commercial bank staff, and regulators trained on renewable energy technologies, and participating in the development, financing and regulation of RE sub-projects (at midterm: 80) 3.5 6-10 feasibility studies for renewable energy sub-projects prepared and sub-grants approved for the resulting sub-projects, in first year of REF.		
Components: **1.1** 220 kV interconnector to Vietnam **1.2** 220/115/22 kV substation at West Phnom Penh (WPP) (120/200 MVA) **1.3** 220/22 kV substation at Takeo (16 MVA) **1.4** Spare Parts and Equipment **1.5** HV Line O&M **1.6** 22kV Bulk Supply Distribution **1.7** Land Acquisition / Resettlement **1.8** Project Implementation Consultant **1.9** Capacity Building **1.10** Reinforcement of the 115kV transmission	Inputs (budget for each component) 1.1 US$25.02 million 1.2 US$21.45 million 1.3 US$8.26 million 1.4 US$0.82 million 1.5 US$1.92 million 1.6 US$3.81 million 1.7 US$2.00 million 1.8 US$3.55 million 1.9 US$1.02 million 1.10 US$5.65 million		Project components will translate to outputs if: • MIME, the REF and financial institutions function effectively in their respective roles of planning, policy development, supervision, implementation of the REF sub-component. • No mismanagement of the REF. • Counterpart funds are available. • Full utilization of the REF. • No time and cost overruns. • Technical guidelines are followed.

system **1.11** Upgrading of to 115kV grid substations GS1, GS2, and GS3 **1.12** MV network expansion at WPP and Takeo **1.13** Operational Support to EdC/PMU **1.14** National Control Center **2.1** Extension of MV and LV networks to new customers in Sihanoukville, Battambang, Kampot, and Kampong Speu. **2.2** REF sub-grants for REE grid extension, SHS installations, and mini/micro hydro construction. **3.1** TA to MIME **3.2** TA to REF **3.3** TA to EAC **3.4** TA to EdC	1.11 US$6.00 million 1.12 US$1.80 million 1.13 US$0.60 million 1.14 US$5.32 million 2.1 US$13.94 million 2.2 US$26.74 million 3.1 US$1.30 million 3.2 US$7.17 million 3.3 US$0.55 million 3.4 US$2.34 million		

Annex 2: Detailed Project Description

CAMBODIA: Rural Electrification and Transmission Project

Background

The design of the Project maintains its integrated nature as it was originally conceived, namely: (i) 220kV interconnection to Vietnam, (ii) National Control Center; (iii) reinforcement of the 115kV transmission grid around Phnom Penh; (iv) EdC RE grid extension; (v) REF Pilot, based on the establishment of a Rural Electrification Fund (REF); and (vi) technical assistance to MIME, EAC, REF and EdC. Because of restricted IDA-financing, the 220kV transmission component will be financed by ADB, together with financing from the Nordic Development Fund, under a parallel financing scheme. ADB's project, Greater Mekong Sub-region Transmission Project, includes the 220kV transmission line to Vietnam; two new substations, at West Phnom Penh (WPP) and Takeo; and capacity building.

The Project's transmission components are part of EdC's Transmission Master Plan for 2003-2008. In reference to the 220kV interconnection to Vietnam, a recent regional indicative master plan on power interconnection in the Greater Mekong Subregion (GMS), outlining transmission links between the region's present and expected future generating facilities, requires the interconnection to Vietnam to be commissioned at the earliest possible time. The new National Control Center will assist greatly in system protection including the analysis of faults and initiation of actions to safely secure the system in minimum time following a system disturbance, as well as in coordination of planned maintenance of lines and substations, and in system operation studies.

The T/L component in Cambodia cannot function without construction of complementary works in Vietnam including 98 km of 220kV T/L between the existing substation at Thot Not via Chau Doc to the border plus development of two 220 kV switchyards at Thot Not and Chau Doc. Funding for this investment will be provided from Credit Savings from an ongoing IDA Credit to Vietnam (Transmission, Distribution and Disaster Reconstruction Project, CR 3034-VN). The existing PPA (Bilateral Cooperation Agreement), signed on July 24, 2000 between EdC and Electricity of Vietnam (EVN), follows a Power Sector Cooperation Agreement signed on July 10, 1999 between the Governments of Cambodia and Vietnam.

Under the terms and conditions of the PPA, EVN would make available at the interconnection point, subject to force-majeure and planned outage, firm capacity of 80 MW initially between 2003 and 2005, and 200 MW after 2005. As these dates are now no longer valid, EdC has drafted an Amendment to the PPA to renegotiate the terms and conditions of the agreement, in line with the Articles of Agreement. The tariff structure of the original PPA allows for "dry" and "rainy" season tariffs varying with the time of day with an average tariff of US¢ 6.2/kWh in the dry season and US¢ 5.6/kWh in the rainy reason (assuming 4 hours at the peak tariff rate, 14 hours at the normal tariff rate and 6 hours at the off-peak tariff rate)

A two-pronged approach is being followed as part of the Government's rural electrification program. First, continue with EdC's RE program through grid extensions based on an economic

rationale and revenue generation criteria. Secondly, utilize the unique strengths of the REEs to rapidly expand access and broaden scope of service. Cambodia is in the unique situation that it has substantial private participation in providing RE services.

The RE components are in line with the Government's RE strategy to ensure equity in access to supplies by means of a (i) balanced development in the provinces at different levels of economic growth, (iii) choice of scheme having the highest cost/benefit ratio and economic rate of return; and (iii) providing electricity to as many households as possible within the limit of affordability.

By Component:

A. Transmission Component. (US$87.22 million; of which US$19.37 million IDA and US$67.85 million ADB)

A1. 220kV interconnection to Vietnam (ADB financed: US$67.85 m - not including IDC)

Background. This component of the Project, to be co-financed by ADB, would develop a first stage of a 220kV transmission grid linking Cambodia and Vietnam that would enable regional loads to be supplied from the grid at lower costs and actively promote industrial users to switch from self-generation to the grid, as the quality and reliability of electricity supply would improve. The Project is also part of a larger strategic objective of increasing access to electricity to the rural areas in Cambodia, in particular around West Phnom Penh and Takeo where substations will be placed for this purpose.

This physical element of the project will initially generate benefits stemming from interconnection with Vietnam. When commissioned in 2007 the interconnector is expected to start transferring about 80 MW and be increased to 200MW after 2008. Sufficient reactive power compensation is provided not only in ADB's –financed component but also in this component of the Project to maintain bus voltages within allowed voltage variation limits. The operation of a National Control Center is expected to reduce system operation costs, and improve system security. The reinforced 115kV ring around Phnom Penh will be able to evacuate the power being transferred over the Cambodia-Vietnam 220kV interconnector.

A feasibility study carried out as part of the preparation of the Project (in the year 2000) showed that the construction of the 220kV interconnection from Phnom Penh to Vietnam would be very beneficial to the Cambodian economy and part of the least cost transmission development for Cambodia. The final route of the transmission line was selected to minimize environmental and social disruption, ease of construction and maintenance access and cost. The net benefit of this Project generated during the projected period, 2002 to 2012, were estimated at over US$100 million at the time when the feasibility study was carried out.

ADB, as part of project preparation for their transmission Project, has reviewed and update previous feasibility study carried out by IDA. To ensure compliance with ADB's safeguard policies for the environment and involuntary resettlement, ADB also updated the resettlement plan and prepare a full inventory of all land and projects affected households. In addition, a new economic analysis reviewed and updated results of the feasibility study carried out by IDA which was used to update the cost estimates and the Resettlement Action Plans in the Project Appraisal Document.

Subcomponent Description. The transmission line component of the Project consists of (all costs include contingencies plus Taxes and Duties and IDC):

Subcomponent A1.1 – 22 kV interconnector to Vietnam (US$25.02 million). This subcomponent comprises the construction of a 220 kV double circuit 109 km T/L, with steel lattice towers at approximately 300 meters spacing;

Subcomponent A1.2 – 220/115/22kV substation at West Phnom Penh (WPP) (120/200 MVA) (US$21.45 million)

Subcomponent A1.3 – 220/22kV substation at Takeo (16 MVA) (US$8.26 million);

Subcomponent A1.4 – Spare Parts and Equipment (US$0.82 million);

Subcomponent A1.5 – HV Line O&M (US$1.92 million) –This includes training to update skills of SCADA system maintenance, system protection including fault analysis and fault finding, initiation of actions to secure the safety of the system in minimum time after a fault, metering and communications systems. This TA will also ensure that competent personnel staff the National Control Center;

Subcomponent A1.6 – 22kV Bulk Supply Distribution (US$3.81 million) – This includes connection to the 22kV system to supply areas around Takeo and WPP;

Subcomponent A1.7 – Land Acquisition/Resettlement (US$2.00 million). This includes the acquisition of land for two substations and transmission towers, removal and relocation of houses and other building from within 30m ROW, removal of trees within the ROW, and other resettlement-environmental costs, etc. It also includes costs associated with land acquisition and resettlement for the construction of the National Control Center on the same site as the WPP substation

Subcomponent A1.8 – Project Implementation Consultant (US$3.55 million). This includes implementation consultants for the: (i) 220kV transmission lines and substations (US$2.99 million); (ii) Resettlement (US$0.41 million); and (iii) 22kV Bulk Supply Distribution (US$0.15 million);

Subcomponent A1.9 – Capacity Building (US$1.02 million). This includes TA for: (i) Resident Financial Management Advisor (US$0.20 million); (ii) EdC Energy Savings Program (US$0.18 million); (iii) EdC Consumer Services Training (US$0.24 million); (iv) Private Participation (US$0.10 million); (v) Resettlement training (US$0.10 million), and (vi) Implementation of EAC tariff applications and setting of licensees, including REEs (US$0.20 million);

A2. <u>115kV T/L reinforcement and MV Extension (US$14.05 million, of which US$11.29 million IDA).</u>

Background. During the previous IDA Project (i.e. Phnom Penh Power Rehabilitation Project), which connected about 50,000 additional consumers, three new primary 115kV substations (i.e. GS1, GS2 and GS3) were built together with about 23 km of 115kV single circuit line connecting these substations around the perimeter of Phnom Penh. In addition about 144 cct-km of MV lines and about 400 km of LV lines resulted in the improvement of reliability of supply of existing

customers as well as improvement of transmission and distribution effic iency with a reduction of system losses from 33% in 1995 to 16% in 2002.

The lack of available capacity to supply the demand at Phnom Penh is becoming of increasing concern. System peak is exceeding 100 MW with a dependable supply that is currently limited to about 110 MW. Average demand growth rates have been high in the last years, with an average of 12.2% in the period 2000 – 2003. An important factor in the increasing demand rate of growth is the efforts made by EDC in increasing the quality of power in recent years. However, as supply is limited, this demand growth rate is expected to be reduced in the next 2-3 years.

This component of the Project is designed to reinforce the 115kV ring around Phnom Penh as operation with a second circuit which would improve reliability and quality of supply to customers and increase the possible transfer capacity of the 115kV ring to supply the increasing demand in Phnom Penh and outlying areas. Additional transformer capacity and reactive compensation, as well as improvements in the protection system, would further reduce losses and improve voltage quality in the area. The Project also includes a 115kV connection from the new ADB-financed WPP substation to the existing 115kV ring through two double circuit 10 km pole lines. Each line will take separate route to increase security. As stringing of the second circuit of the existing 115kV line may require outages, attention to focused project management and close cooperation between EDC and the contractor is expected to minimize the inconvenience to consumers.

Extension of the MV network around the new substations WPP and Takeo is also provided by the Project. This will extend the MV side of the transformer at the substations by about 130 km over a SWER three phase wire system along the main routes (WPP to Ang Snoul Road No. 4; WPP to Tram Khnar road No. 3; Takeo to Kampong Chrey Road No. 2; Takeo –Kg Chrey and Takeo to Samraong).

Component Description. To support EdC's initiatives in the Phnom Penh and adjacent areas to (i) improve quality of supply and achieve greater utilization of existing generation capacity; (ii) improve the security of supply, and (iii) reduce losses, the Project will provide financing toward the following subcomponents (all costs include contingencies plus taxes & duties and service charges and commitment fee). Land acquisition and resettlement costs amounting to US$0.36 million have been included for the 115kV and MV extension components.

Subcomponent A2.1 – Reinforcement of the 115kV transmission system (US$5.65 million, of which US$4.54 million IDA). This subcomponent comprises (i) 20 km of 115kV T/Ls, including poles, conductors, insulators and fittings, and other accessories, to connect the new WPP substation and grid substation 3 (GS3), and (ii) stringing of about 23 km of 115kV conductors to complete the second circuit between the three existing grid substations, i.e. GS1, GS2, and GS3;

Subcomponent A2.2 – Upgrading of to 115kV grid substations GS1, GS2, and GS3 (US$6.00 million, of which US$4.80 million IDA). This subcomponent comprises: (i) GS1: switchyard modifications and connection of 10 MVAr of reactive compensation at the 22kV side; (ii) GS3: switchyard modifications, 1x115/22kV 30/50 MVA transformer, 115kV bus coupler and transformer bay, and 15 MVAr of reactive compensation at the 22kV side; (iii) GS3: switchyard modifications, 1x115/22kV 30/50 MVA transformer, 115kV bus coupler and transformer bay, and 15 MVAr of reactive compensation at the 22kV side;

Subcomponent A2.3 – MV network expansion at WPP and Takeo (***US$1.80 million, of which US$1.45 million IDA***). This component will extend the distribution networks at the new

substations at WPP and Takeo to supply the MV along the roads No 3 and 4 at WPP and from Takeo to Samraong, and to Kampong Chrey;

Subcomponent A2.4 – Operational Support to EdC/PMU (***US$0.60 m, of which US$0.50 million IDA***). This operational support to EDC and the IDA-PMU is important for the smooth functioning of the PMU during implementation of the 115kV and RE grid extension components. It consists of (i) Inspection Vehicles (US$ 0.1 million); (ii) Field work Vehicles (US$0.10 million); (iii) computer and peripherals (US$0.095 million); (v) Office Equipment (US$0.095 million); (vi) O&M Equipment and Tools (US$0.095 million); (vii) Communication Equipment (US$0.095 million); and (vii) Power Planning Software (US$0.07 million).

A3. National Control Center (US$5.32 million; of which US$4.40 million IDA).

Background. A National Control Center is considered essential for the operation of the grid, which will eventually connect several countries. The expanding interconnected system must have a separate functional National Control Center manned by senior staff with the following functions. (i) generation planning/scheduling, load forecasting; (ii) planned and forced maintenance co-ordination; (iii) control and status monitoring of generators, circuit breakers, capacitor banks, transformers; (iv) frequency control; (v) under frequency load shedding; (vi) scheduling of spinning reserve as required by interconnected grid; (vii) real-time data acquisition of GWh generated, GWh consumed; system losses, MVAR flows, voltages; (viii) management of losses, frequency, voltage, load flows, reactive flows; (ix) sequence of events recording for fault analysis for major substation CB operations, major substation reclose operations, line protection trips and alarms, generator trips and alarms; and (x) statistics and metering data, load forecasts, billing data/reconciliations, and data required for PPA with Vietnam. This component is being prepared by ADB but financed by the IDA Credit (all costs include contingencies plus taxes and duties and service charges and commitment fee).

Subcomponent A3.1. Construction of Modern National Control Center and installation of a modern SCADA system (US$5.32 million). The SCADA system is expected to operate over an optical fiber communication cable which would enable all of the above to be implemented.

B. Rural Electrification Component (US$13.94 million, of which US$12.06 million IDA)

Background. Electricity demand in Cambodia is concentrated in Phnom Penh and neighboring areas, which account for over 70% of the country's electricity consumption. At present only 12% of the country's total population of 13 million have access to electricity. Consistent with the Government's objective of 70% electrification by the year 2030, this component of the Project will contribute to achieving this objective by extending the MV and LV networks to about 50,000 new costumers in the four provincial areas of Sihanoukville, Battambang, Kampot, and Kampong Speu. EdC now provides electricity to six isolated provincial areas of which Phnom Penh is the largest. This grid extension component will support EdC in the planning, installation of low-cost feeders and backbone LV distribution systems, to the rural area, that is, non-urban areas excluding cities and towns, on a commercially sound basis. It will improve the quality of service to customers and provide the most cost-effective solution for doing so.

The main criteria drawn-up for the selection of the grid extension to rural areas was based on the following considerations:

- Expansion of EdC's grid to rural areas which are already provided with electricity by EdC, or under contractual arrangement with MIME, or areas which are not currently electrified;
- Villages within 40 km surrounding EdC's distribution grid;
- Villages with reasonable access to roads, where there are already population living along-side the road, for ease of installation, as well as operation and maintenance;
- Villages in which the population is ready to make a partial contribution to electrification and are able to pay their electricity bills;
- Villages that have development potential for agriculture, forestry, handicrafts, or other income generation opportunities
- Villages where investments in infrastructure and electrification will assist the Government programs for stopping internal migration, reducing nomadic farming and deforestation, or helping in the development of communes or villages;
- Villages within cost-effective reach of the grid, or cross-border points of supply.

The areas selected for grid extensions were those exhibiting amongst the highest levels of per capita income, population and load density, and where clearly the extension of EdC's grid is the least cost option. The methodology for the final selection is based on the valuation of the cost per connection for each customer, based on the MV and LV length of the conductors selected, as well as the number of distribution transformers, isolating transformers (i.e. for SWER-based system - the use of isolating transformers allows, among other factors, for the selection of an operating voltage for SWER lines independent of the voltage of the parent supply system), poles and meters). The dominant criterion used in the selection of SWER in any particular area, is the projected load. A SWER system is selected in those areas where the estimated loading, for the next 10 years, is less than 100-500kVA.

Subcomponent Description. The estimated average cost per household connection is about US$214 for about 50,000 additional households to be connected by this Project, which would require about 516 cct-km of MV line (SWER), 536 cct-km of LV lines, 200 sets of single-phase transformers with capacities ranging from 50-100 kVA and one 150kVA three phase transformer for Sihanoukville, as well as 16 sets of isolating transformers. Insulated MV 70 sqmm and ABC LV conductors are selected. The cost estimates also include any associated land acquisition and resettlement costs for this MV component of the project, which are estimated not to exceed 1 % of the total costs for this component. The cost estimates for the component were based solely on the use of the SWER system for cost effective rural electrification at reasonable reliability and quality of service. The costs estimates also assume a span of 50-100 m between poles, 70 sq mm MV and LV conductors, and pole-mounted substations. All connected customers will be provided with a watt-hour meter and protected by distribution circuit breakers.

C. REF Component (US$26.74 million, of which US$5.10 million IDA, US$1.54 million GEF, and US$20.10 million from the Private Sector)

Background. A recent survey carried out by Enterprise Development of Cambodia (now SME Cambodia) in January 2001 established that over 600 independent entrepreneurs are currently supplying power to about 60,000 rural electric customers throughout Cambodia. The survey identified several factors that limit the ability of the REEs including: (i) a low level of business management and technical skills; (ii) extremely limited access to reasonable priced financing alternatives; (iii) lack of focus as to what constitutes "best practice"; and (iv) lack of valuable synergies that occur through interaction with similar and other businesses in industry sector groups or organizations.

REE's face problems of low quality, low connections and high tariffs. Though at present REEs are operating commercially, their very high tariffs (average of USc 51/kWh) severely constrain access to rural consumers, particularly the poor. Lack of adequate technical capacity and use of sub-standard equipment also results in poor service standards. There are no incentives for growth of REE businesses and economies of scale in service delivery are not being achieved-- they remain small and scattered. Provision of public support for this rural program through TA and co-financing grants will help REEs overcome these problems and establish businesses that have a built in incentive for growth and improved service delivery.

There is consensus among stakeholders that a joint private/public effort is essential to achieve the set RE goals. To embark on this partnership, the Government has adopted a new Electricity Law that established the newly appointed regulator as well as initiated steps to develop the regulations and to make the EAC fully operational. Also, the Government is working on a Rural and Renewable Electricity Strategy and Action Plan. These important activities should define "the rules of the game" for future expansion of rural electricity services in Cambodia.

EAC and the REF, will closely coordinate private sector promotion. REF will invite RFPs to serve particular areas, based on least cost principles. Proposals received by the REF will be evaluated based on specific indicators such as number of consumers served, level of tariff proposed by the bidder, a viable business plan and, quality and level of service. Pre-selected proposals would apply to EAC for an operating license to serve in an area and also be eligible to receive the small co-financing grant from the REF as an incentive for RE. Together, the license and the availability of grant will act as a "capital enabler" to help strengthen the case for the developer in securing loans with suitable terms from commercial banks. Final approvals of sub-grants will be made by the REF only against evidence of EAC license and financial closure on bank loans. Final portion of grant disbursements will take place after physical audits and customer certification.

As the strategy to facilitate private sector involvement through the REF is a new one, it was agreed with the Government that a phased implementation approach be followed, in order to refine the operations based on lessons from an initial phase. It was agreed with the Government and private sector stakeholders that 6-10 sub-projects will be tested out in the initial phase of the REF in 3-4 provinces. The guidelines for the initial phase will consist of:

- Effective license issued by EAC with a duration of not less than 5 years;
- Economic least-cost option in the area;
- Variety in fuel source (including at least 1 solar system, 1 hydro scheme);
- Variety in size (1 provincial town, 1 district, and 1 commune);
- Number of consumers should not be less than 300; and
- Installation of 300 Solar Home Systems (SHS).

The REF will prepare simple RFPs in collaboration with EAC; the RFP will be flexible and allow bidders to utilize one or more technologies to serve an area. To ensure transparency and current EAC process, all licenses issued will be displayed on EAC's internet site.

Agreement has been reached in principle with the various stakeholders and Government on the level of the co-financing grant as well as on disbursement principles for the initial phase. For the main phase and after incorporating lessons learned from the initial phase, the process and levels of sub-grant amounts will be reviewed and, if necessary, modified in the operational manual. The co-financing estimates for various systems for the initial phase are:

Type	Grant Proposed	Estimated Total Cost/Unit
New household connected (diesel)	US$45	US$150
Mini hydro (0.75-5 MW)	US$400/kW installed	US$1744/kW installed
Micro hydro (average 50 kW)	US$400/kW installed	US$2700/kW installed
Solar Home System	US$100/set of 40 Wp	US$400/set of 40 Wp

Sub-grants will be approved in parallel with the approval of licenses by EAC and loans by commercial banks for REEs. The REF will publicly disclose inter alia the names of the approved sub-projects, a brief description of the approved subprojects, the names of the sub-grant beneficiaries, and the amount of each sub-grant approved.

Grants will be released in 2-3 installments based on implementation progress and will be paid directly to the supplier of equipment/developers by the payment agent upon certification by the REF. In the case of SHS, co-financing grants will be released to the supplier after installation and verification. The grant allowance is expected to be calculated in a way that splits the capital costs in approximately 25% co-financing grant, hence, assuming a 25% equity share and 50% loan financing.

Subcomponent Description. This component will promote private sector participation in RE and renewable energy development and will include investments as well as implementation assistance. The Project would assist in financing the following:

Subcomponent C2.1 – REE Grid Extension (US$7.21 million; of which US$2.34 million IDA, US$ 4.87 million private sector). This subcomponent comprises the provision by REEs of about 45,000 new connections;

Subcomponent C2.2 – Solar Home System (US$5.20 million, of which US$1.20 million GEF; US$4.00 million private sector). This subcomponent comprises the provision of electricity to about 12,000 households using SHS. This subcomponent will be implemented by existing solar dealers, companies and REEs;

Subcomponent C2.3 – Mini Hydro (US$12.15 million; of which US$2.76 million IDA, US$9.39 million private sector). This subcomponent comprises the construction of at least 6 MW of renewable energy capacity;

Subcomponent C2.4. – Village Hydro (US$2.18 million, of which US$0.34 million GEF; US$1.84 million private sector). This subcomponent comprises the construction of about 850 kW of micro hydro plants and will be implemented by rural communities, and private entrepreneurs, including REEs.

Since the off-take from the REF will be based on market demand, the allocations for the various technologies are notional and funding is fungible within sub-components C2.1 – C2.4. It is useful to note that the REF itself is a technology neutral mechanism for RE where proposals will be selected based on economic least cost principles.

D. Institutional Development and Sector Reform Component (US$11.36 million, of which US$7.15 million IDA, and US$4.21 million GEF)

Background. As in the previous IDA project, institutional strengthening is required by MIME, EAC and EdC to be able to execute this Project. TA is therefore provided for institutional strengthening/capacity building/operational support to MIME, REF, EAC, EdC, and for training in land compensation, resettlement and environment.

D1. TA to MIME (US$1.30 million, of which US$0.80 million IDA, and US$0.50 million GEF). The Project will provide financing towards the following subcomponents:

Subcomponent D1.1 – Renewable Energy Policy Development (US$0.50 million, all GEF). This subcomponent comprises the development of policy that would create a level playing field for renewable energy private sector investors based on renewable energy assessments and least cost planning; and other TA as required within the budget and scope of the Project. Assistance will include development and implementation of a Small Power Purchase Agreement (SPPA) for renewable energy developers, and development of details of the financing of the subsidy mechanism for ensuring sustainability of renewable energy development in the country.

Subcomponent D1.2 – Power Market Analysis of Special Zone (US$0.35 million, all IDA). The triangle area by Rattnakiri and Stung Treng located close to the borders of Vietnam and Lao PDR has been designated by Government as Special Zone for agro-industrial development. This TA will undertake a market analysis to assess the cross-border power trade opportunities in this area including selection of appropriate commercial tariffs.

Subcomponent D1.3 – Development of a Master Plan (US$0.45 million, all IDA). To improve MIME capabilities in planning to develop a master plan for the sector, this TA would complement the assistance provided by JICA and Australia in the fields of RE master planning and energy consumption forecasting. This TA would also provide consultancy service to: (a) survey energy consumption in provincial and rural areas which would serve as a baseline survey of areas to be included in the grid extension component; and (b) preparation of a power system expansion master plan including generation additions, transmission as well as distribution expansion, and zoning of grid versus off-grid areas.

D2. TA to REF (US$7.17 million, of which, US$3.58 million IDA, US$3.59 million GEF).

Subcomponent D2.1 – Implementation Support for the REF (US$2.87 million; of which, US$1.92 million IDA, US$0.95 million GEF). The REF component will also include implementation assistance to ensure smooth administration of this component. The REF has yet to be established and a PMU will be operated under MIME. When the REF Decree and sub-Decree are enacted, and the REF becomes operational, this TA will be transferred from MIME to the REF. Support will be needed for implementation capacity of the REF (including appraisal capacity), incremental operating costs, implementation of a financial management system (a qualified firm will be selected to put in place an efficient and transparent system) and a technical in-house advisor to assist in the day-to-day operation of the REF. It will also include support for setting up the REF consisting of office equipment and supplies, furniture, computers, printers, and fax machines, fax machine, and fieldwork vehicles.

Subcomponent D2.2 – Rural Income Generation Promotion (US$0.35 million, of which US$0.20 million IDA, US$0.15 million GEF). TA will be provided to develop end-use activities in order to increase income generation opportunities in rural areas and enhance productive uses. Suitably tailored training programs and demonstration activities on new electricity-based rural income generating options as well as adapting existing uses to run on electricity will be offered (for example, use of power tools by existing village carpenters). Promotion of such village economic activity will gradually build up demand among new consumers and also increase affordability. It is envisaged that these activities will be carried out by local consultants and NGOs so as to ensure outreach to rural consumers. Specific areas of support include: (i) rural village and commune planning related to electricity; (ii) assessment of businesses and products; (iii) economic development promotional activities, i.e. training programs and demonstrations; and (iv) establishing links between rural businesses and markets.

Subcomponent D2.3 – Renewable Energy Business Development for Solar and Mini/Micro Hydro (US$2.44 million, of which, US$0.20 million IDA, US$2.24 million GEF). Cost-shared TA will be provided for preparation of feasibility reports, business plans, technical training, awareness programs and promotion of the use of renewable energy sources. Separate activities will address solar and hydro power, with possible extension to bio-mass as well. This subcomponent funds activities in three principal areas: (i) pipeline development, to be implemented as one or two consolidated consulting assignments over the life of the Project, whereby developers and communities interested in preparing REF proposals will receive cost-shared assistance. The TOR of the consultant would include a provision that a pipeline of six sub-projects should have completed feasibility studies, business plans and REF sub-grant applications prepared for appraisal by the REF within three months of Credit effectiveness. Guidelines for cost-sharing were decided based on consultations with stakeholders and will be specified in the TOR for this block consulting assignment; (ii) promotional activities which will include media campaign, awareness programs, community demonstration, as well as other suitable interventions to overcome information barriers; and (iii) training and workshops including technician training, training of NGO and private sector entrepreneurs on renewable energy technologies, regional and international study tours and participation international conferences.

Subcomponent D2.4 – REE Improvement and Association Building (US$1.26 million, all IDA). TA will be provided to build technical and business planning capacity within REEs. This activity will work towards converging technical standards and improved services. Specific areas of support will include: (i) strengthening REE management, technical and operating capacity; (ii) demonstration of international and regional best practices; (iii) strengthen and expand the capacity of REE cooperation in the areas of training, communications, outreach and business support activities; and (iv) facilitate coordination with local stakeholders, i.e. industry, villages and communities to better serve their electricity service needs.

Subcomponent D2.5 – Capacity Building of Financial Institution (US$0.25 million, all GEF). Meetings with commercial banks indicated that main barriers with regard to financing RE subprojects would be unfamiliarity with renewable energy technologies and projects, resulting in limited appraisal and supervision ability. To address this, assistance for appraisal and supervision would be provided as TA.

D3. TA to EAC (US$0.55 million; of which US$0.43 million IDA; US$0.12 million GEF). The Project will provide financing towards the following subcomponent.

Subcomponent D3.1 – Institutional strengthening of the EAC (US$0.55 million; of which US$0.43 million IDA; US$0.12 million GEF). The proposed TA will strengthen EAC's capacity to discharge its responsibilities mandated in the Electricity Law, and have Regulations and Codes in place to improve the quality of the supply and services and ensure transparency in EAC's operation. The specific tasks comprise: (i) Operational Support (US$0.42 million) – for consultancy services to assist EAC in: (a) issuing licenses to more number of the existing service providers and all the service providers that assistance from the REF; (b) dealing with tariff applications, fixing of tariff and writing of tariff orders; (c) monitoring of Licensees in identifying information to be recorded and the format to report the information to the EAC; (d) Regulation and Codes including preparation of Grid Code and Distribution Code and to issue regulation/procedures to amend existing regulations/procedures to enable EAC to carry out it duties properly; and (e) development of technical standards to ensure consumer safety and a minimum quality of services by REEs and to build capacity and awareness on renewable energy in EAC; (ii) Training (US$0.06 million) – in three areas: (a) foundation skill training in computer skill, administration and management and English language; (b) job specific training including Power Sector Regulation, Pricing Control and methodology for tariff setting; and Public Hearing, Complaint and Dispute Resolution; (c) practical training for managers and senior staff on best practice management and operation of a regulatory body; and (ii) Facility Support (US$0.07 million) consisting of a portable meter testing equipment and accessories.

D4. TA to EdC (US$2.34 million, all IDA). The Project will provide financing towards the following subcomponents.

Subcomponent D4.1 – EdC PMU Project Implementation Consultant (US$1.00 million, all IDA). The Project Implementation Consultants (PIC) will assist EdC in engineering supervision, inspection, coordination, training, and implementation of the IDA financed 115 kV and RE EdC grid extensions components of the Project, as well as in the establishment of a National Control Center. As one of the components of the Project is being carried out by ADB through a co-financing arrangement, the Consultant also needs to coordinate activities with the ADB PMU which is executing the 220 kV component of the Project. The proposed TA of a Resident Engineer, adviser to EdC's IDA-PMU Manager, is expected to extend over a period of about 36 months. In addition, senior specialists in the areas of 115 kV and MV/LV T/L design and construction, substation design and construction, system planning and protection, and experts providing advice to the resettlement and compensation programs will be required to work in Cambodia for shorter periods. Finally for the National Control Center which would be fully equipped to carry out the extensive monitoring of the entire net-work operations, load dispatching, load and frequency control, load shedding and optimum loading of various plants, remote back-up protection etc, as well as modern SCADA system operating over optical fiberglass communications cable, specialized consultancy services are required. The Consulting Firm will also be expected to provide additional non-resident short-term consultants in various specialized fields as and when required.

Subcomponent D4.2 – EdC In-house advisor (US$0.54 million, all IDA). An in-house procurement advisor has assisted EdC during in all activities related to project preparation, including procurement, and in performing the tasks in implementation of the Project including NCB procurement, as well as other related tasks as determined by EdC. The in-house

Advisor has been financed through retroactive financing from the proposed Credit. The mission agreed in principle to continue providing in-house advisory support to EdC through Project Launch and Project Implementation.

Subcomponent D4.3 – Independent Monitoring Agency and Project Grievance Committee (US$0.04 million, all IDA). The Independent Monitoring Agency (IMO) monitors the resettlement and land compensation process to verify and ensure to IDA, EdC and the IRC that the objectives are met. The agency would also be involved in complaints/grievance procedures to ensure that any relevant concerns of the PAFs are being addressed. The Mission advised that the IMO must have a good working relationship with the Government; but at the same time needs to maintain a strong independent position and provide constructive feedback to the Project to ensure the objectives are met. EdC/PMU needs to contact NGOs to initiate the selection of a qualified IMO. The in-house Advisor will prepare TOR for the IMO. It was agreed that the in-house Advisor would prepare separate TOR for the Project Grievance Committee, which will respond to complaints and grievances.

Subcomponent D4.4 – Improvement of EdC Commercial Practices and management training (US$0.45 million of which US$0.08 million for training, all IDA). This subcomponent comprises: (i) TA to fully implement ACCPAC software, including installation and training; (ii) training to introduce new module of project costs and financial management system for use in the Project; and (iii) management training.

Subcomponent D4.5 – Capacity Building for Land Acquisition, Resettlement and Environment (US$0.06 million, all IDA). This subcomponent comprises activities to improve resettlement implementation in Cambodia, for both EdC and the IRC, namely: (i) Workshop; (ii) Training on IDA resettlement, land compensation and environmental monitoring and mitigation; and (iii) a study tour to improve resettlement implementation in Cambodia.

Subcomponent D4.6 – Power Investment Planning (US$0.25 million, all IDA). Consultancy services will be provided to EdC to develop the planning capacity to preparing a power investment plan which includes various alternatives for generation, transmission and distribution investment, talking into account demand, fuel and other uncertainties, and to prepare 10 years plans on a rolling yearly basis.

Annex 3: Project Costs

Cambodia: Rural Electrification and Transmission Project.

Summary of Project Costs by Component

Integrated Project (IDA, GEF and ADB)

Project Cost by Component	Foreign	Local	Total
	US$ million		
A. Transmission Component	**48.29**	**11.83**	**60.12**
A1. 220kV TL and SS and other ADB-financed components	39.64	10.14	49.79
A2. 115kV TL and Substations and MV extensions at WPP and Takeo	8.19	1.64	9.83
A3. Operational Support to EdC/PMU	0.45	0.05	0.50
B. National Control Center	**3.60**	**0.40**	**4.00**
B. Rural Electrification Component	**7.49**	**3.71**	**11.20**
B1. EdC RE Grid Extension (for about 50,000 new connections)	7.49	3.21	10.70
B2. Warehouse to store RE Equipment and Materials		0.50	0.50
C. REF Component	**14.92**	**5.96**	**20.88**
C1. REE off-grid extension (for 45,000 new connections)	4.11	1.82	**5.94**
C2. Mini Hydro (6 MW)	6.37	2.81	**9.19**
C3. Solar Home System (12000 units)	3.19	0.79	**3.97**
C4. Village Hydro (850kW)	1.25	0.53	**1.78**
D. Institutional Capacity and Sector Reform Component	**8.39**	**2.97**	**11.36**
D1. TA to MIME	0.85	0.46	1.30
D2. TA to EAC	0.37	0.12	0.49
D3. TA to EdC	1.66	0.54	2.20
D4 TA to REF	5.38	1.79	7.17
D5. Training for resettlement	0.04	0.02	0.06
D6. Training for EAC	0.05	0.01	0.06
D7. Training for EdC	0.06	0.02	0.08
Total Baseline Costs	**82.69**	**24.87**	**107.56**
Contingencies	**5.77**	**4.59**	**10.36**
Subtotal	**88.46**	**29.46**	**117.92**
Taxes and Duties		**21.34**	**21.34**
Total Project Costs	**88.46**	**50.80**	**139.26**
Interest and Service Charges (IDA only)	0.54		0.54
Commitment fee (IDA only)	0.44		0.44
IDC (ADB)	**4.47**	**1.79**	**6.26**
Total Financing Required	**93.91**	**52.59**	**146.50**

IDA and GEF-Financed Components

Project Cost by Component	Foreign	Local	Total
	US$ million		
Physical Components			
115kV Transmission and MV extension Component	8.64	1.69	10.33
National Control Center	3.60	0.40	4.00
EdC RE Extension	7.49	3.71	11.20
Rural Electrification Fund	14.92	5.96	20.88
Subtotal	**34.65**	**11.76**	**46.41**
Technical Assistance			
Technical Assistance to MIME	0.85	0.46	1.30
Technical Assistance to EAC	0.37	0.12	0.49
Technical Assistance to EdC	1.65	0.575	2.20
Technical Assistance to REF	5.38	1.79	7.17
Subtotal	**8.24**	**2.92**	**11.16**
Training			
EdC/MIME/REF/IRC in resettlement and environment	0.04	0.02	0.06
EAC Training Program	0.05	0.01	0.06
EdC Training Program	0.06	0.02	0.08
Subtotal	**0.15**	**0.05**	**0.20**
Land Acquisition, resettlement and environment costs for 115kV and MV extension		**0.30**	**0.30**
Total Baseline Cost	**43.04**	**15.03**	**58.07**
Contingencies	**3.76**	**3.21**	**6.97**
Physical Contingency	1.73	0.59	2.32
Price Contingency	2.02	2.62	4.64
Subtotal	**46.80**	**18.24**	**65.04**
Taxes and Duties		6.38	6.38
Total Project Cost	**46.80**	**24.62**	**71.42**
Service charges	0.54		0.54
Commitment Fee	0.44		0.44
Total Financing Required	**47.78**	**24.62**	**72.40**
Financing from GEF	**4.39**	**1.36**	**5.75**
Financing from RGC*		**6.55**	**6.55**
Financing from Private Sector **	**12.39**	**7.72**	**20.10**
Financing from IDA	**31.00**	**9.00**	**40.00**

* Government Cash Contribution US$2.82 million, Taxes and Duties: US$3.73 million.

** Including Private Sector Taxes and Duties in the amount of US$2.65 million.

Annex 4: Economic and Financial Analysis Summary

General Approach

This annex summarizes the economic and financial analysis of the project components. The project has three components (a) A transmission line component (b) a rural electrification component and (c) institutional development and sector reform component. The transmission line and the grid extension part of the rural electrification component will be implemented by the EdC. The mini-grid and off-grid technologies will be supported through the REF sub-component under rural electrification. The REF provides sub-grant assistance to private sector entities and NGOs to develop, finance and implement mini and off-grid sub-projects, including renewable energy technologies, on a market driven basis, following least cost principles. The criteria and procedures for selection of projects is available in the REF operational manual.

T/L component: The economic analysis of the T/L component indicates that the project is economically robust and entails economic benefits to the consumers as well as the country. The financial analysis of the T/L component also specify that those are viable alternatives and if implemented would generate positive returns for the EdC

Without the transmission line, energy demands in Phnom Penh would be met by diesel based generation. Under these conditions, the tariff would need to rise to US$0.144 compared to the existing weighted average tariff of US$0.14 – an increase of about 3%. A higher tariff would be expected to reduce demand for electricity in Cambodia. The models developed in the forecast of electricity demands is used to forecast demand if the tariff were increased from the current average of US$0.14 per kWh to US$0.144 kWh. This price increase was estimated to reduce aggregate demand in Phnom Penh by just under 25 GWh in 2016. This change in demand is the incremental effect associated with the introduction of the transmission line. That is, without the line the tariff would need to rise and this would reduce demand by approximately 100 GWh by 2038.

As well as providing benefits through additional sales, the transmission line will provide benefits through reduced costs associated with meeting non-incremental demand. The transmission line would also reduce the number and duration of forced outages and enable a more reliable supply to be provided. This would stimulate demand. The evaluation of benefits of the transmission line were undertaken with respect to:

(i) the additional demand created through lower tariffs than would be the case without the transmission line;

(ii) lower costs of production associated with existing supplies; and

(iii) a reduction in lost load.

Incremental demand is valued at the average of the demand price with and without the project. Non-incremental demand is calculated by deducting the incremental demands from total demand supplied through the transmission line. The valuation of the reduction in lost load made possible by a more secure electricity supply was made in two steps. First, the reduction in load was estimated by comparing the reliability of the transmission line to the expected reliability of the alternate means of supply, i.e. the combined cycle power station. Experience of a combined

cycle power plant indicates that it has a very low forced outage factor initially. However, the forced outage factor would be expected to grow through time. Thus, it is assumed that the forced outage rate of the Combined Cycle power plant will rise from 0.3% of expected generation in 2004 to three percent of expected generation in 2016. In contrast, the forced outage rate of the transmission line is designed to be very low at 1 hour per 100 kilometers per year per circuit. The forced outage rate in 2004 has been conservatively set at 0.04% of expected sales and it is assumed this rate will remain constant throughout the project lifetime.

An unexpected interruption to supply can impose very large costs on consumers, and on society at large. The value of the lost load is also likely to vary across consumer categories. The domestic consumers would be expected to value the lost load less than commercial and industrial consumers. On a conservative basis, lost load for domestic consumers was evaluated at the tariff while the value of the lost load to commercial an industrial customers can be obtained by calculating what it costs these customers to supply the lost load from a standby generator operated by an individual. These calculations indicated that private generation would cost over US$1.00 depending on the utilization of the generator. The value of the lost load was set at US$0.60 for commercial, hotels and industrial customers.

The results of the economic analysis indicate an economic internal rate of return of about 23% for Cambodia.

A financial analysis of the transmission component was undertaken by valuing the energy demand supplied by the transmission line at the prevailing average tariff of Rs 582/kWh in Phnom Penh. As per the assumptions in the EdC's financial model, the average real tariff was assumed to remain constant throughout the forecast period. The cost of meeting this demand was taken to be : (i) the capital cost of the transmission line including physical contingencies, taxes and duties but excluding price contingencies and interest during construction (approximately US$75.4 million); (ii) the quantity of energy imported from Vietnam, valued at the average purchase price of US$0.07/kWh; (iii) O&M on the transmission line valued at 2% of the capital cost of the transmission line; (iv) O&M distribution cost at US$0.0045/kWh; and (v) return on and of distribution capital estimated at US$0.04/kWh. All project benefits and costs were discounted at a rate of 5.8%, the calculated WACC for EdC.

After accounting for the full costs of meeting the additional demand via the T/L, the Project generates a significant net return suggesting the project is viable from a financial perspective. The net present value (NPV) of the Project is estimated to be about US$142 million, which is equivalent to a financial internal rate of return (FIRR) of return of approximately 16%.

(Further analysis and assumptions can be found in the ADB project document)

B. Rural Electrification component: The economic and financial analysis of the RE component of the proposed project covers: (i) Analysis of grid extension led by EdC and (ii) Analysis of sample projects under the REF. Considering that a different technologies can be supported under the REF depending on the market demand, analysis is presented here for the most significant ones. For that reason, the REEs and Mini-hydro were selected. Additional analysis on renewable energy technologies are available in project files on GEF project. Presented below is the methodology and summary analysis of the RE component.

Methodology
The calculations are based on the following assumptions:

	Grid-connected supply	Off-grid supply
Discount rate	10%	10%
Study period	2003-2013	2003-2013
Evaluation period	2003-2035	2003-2035
Fuel costs (Diesel Oil)	379 US$/ton	Re Isolated: 396 US$/ton Mini hydro: 238 US$/ton
Tariff (excl 10% VAT)	0.19US$/kWh	0.35 US$/kWh Mini hydro bulk price: 0.07-0.11 US$/kWh
Economic benefit of electricity consumption	average cost of off-grid supply (0.38 US$/kWh)	selling price plus VAT of 10% (=0.38 US$/kWh)

Results of the economic analysis

All main sub-components show acceptable to good ERRs in the base case scenario. Two of six potential hydro sites produce an ERR of only around 8%, the other have a return of at least 15%. The ERRs are conservative as only readily quantifiable benefits, such as avoided costs of self-generation, are included as consumer benefits. Other consumer benefits such as increased productivity, improved social services etc. are, thus, not included. This approach was necessary because of the limited level of productive uses of electricity in rural Cambodia at present, combined with a lack of data on the project area, giving insufficient material for their quantification.

	Base case		**Sensitivity (+10% costs, -10% consumers)**	
	ERR	**NPV**	**ERR**	**NPV**
(i) Grid extension	17.67%	US$8.95m.	14.07%	US$ 4.96m.
(ii) Isolated systems	22.3%	US$ 9.6m.	21.2%	US$ 9.2m.
(iii) Mini hydro	8.1-19.4%	US$ 9.26m. (total)	5.6-15.5%	US$ 3.2m. (total)

(i) Grid extension sub-component. The base case economic internal rate of return (ERR) for the grid extension sub-component is calculated to be 17.67%. This estimate is based on a total connection up-take of 50,000 households, that is 56% of households within reach of the feeders by the end of year 2008. With 10% lower up-take and 10% cost overruns, the ERR would be 14.07% and NPV at US$ 4.96m. Supply of electricity to the project is priced at the estimated LRMC of bulk supply at MV-level, whereas the consumer benefit of electricity supply is set at the average cost of electricity supply ion off-grid projects of US$0.38/kWh.

(ii) RE isolated systems. The base case ERR of the *RE isolated systems* sub-component is calculated to be 22.3% and NPV US$ 9.6m. Due to the use of the US$0.38/kWh W-T-P estimate, there is no reference to the avoided cost of battery charging, kerosene etc. because consumption pattern once electricity is introduced will be different, showing an increase in standard of living.

(iii) Mini hydro projects. The base case EIRR of the *mini hydro projects* are based on displacement of the fuel and variable operating costs of existing diesel generation in the town systems into which the mini hydro schemes will feed. Four of the six projects show good

economic return, with EIRRs ranging from 15.6% to 19.4% whilst he two projects at Siem Reap exhibit marginal economic return of about 8%. The analysis ignores other benefits, such as CO_2 abated from avoided diesel generation, the diversification of Cambodia's power generation facilities, and the reduction of foreign exchange expenditure on imported fossil fuels and spare parts.

Results of financial analysis

The financial rates of return range from a low negative 1.49 return on equity for grid connected RE to strong return on equity for isolated systems and mini hydro projects. In the case of cost overruns of 10% and a 10% lower up-take, the return on equity on EdC grid connections plunge to a negative 1.94% whilst off-grid and mini hydro remain attractive.

The higher financial returns of isolated systems and mini hydro are a result of up-front subsidies and the higher tariffs which shield the developers from accessing debt in an underdeveloped capital market.

	Base case		**Sensitivity (+10% costs, -10% consumers)**	
	Return on equity	**NPV**	**Return on equity**	**NPV**
(i) Grid extension	-1.49%	US$ 2.89m.	-1.94%	US$ 3.33m.
(ii) Isolated systems	22.3%	US$ 4.3m.	20.5%	US$ 3.9m.
(iii) Mini hydro	25.9 %	US$ 13.04m. (total)	20.1%	US$ 7.32m. (total)

Grid extension. The base case financial analysis for the grid extension sub-component was calculated on the following financial terms:

Equity contribution:	20%
Loan conditions:	Interest rate 1% - Loan period - 25 years - Grace period - 7 years
Corporate tax:	20% profit tax and 4% turn-over tax
Average revenue:	0.19 US$/kWh (excl. VAT)

The debt service cover achieved by the EdC grid extension component starts from 0.24 in Year 1 of loan repayment, gradually increasing to 0.73 in Year 15, the last year of debt servicing. This negative result reflects the fact that the on-lending policy of the Ministry of Finance to EdC for electrification investments makes no distinction in the rates charged on loans between "commercial projects" such as investments in national transmission grid and "non-commercial projects", such as rural distribution projects. The adequacy of debt service cover generated by project revenues should be determined for EdC as a whole and not on the basis of individual rural investments.

The fiscal impact, in terms of incremental tax revenue from the grid extension component, is estimated to result in an NPV US$ 2.9m. (incl. VAT and corporate taxes) in the base case. In the low case scenario the fiscal impact would be US$ 2.6m.

Average tariff is calculated on the basis of current tariff regimes in the targeted provinces, with the exception of Kampong Speu which will be connected to the Phnom Penh system, as a consequence, reduction to Phnom Penh level is assumed. No capital subsidy has been assumed

for grid extension projects, but support is granted in terms of on-lending rate from MOF at 6%, representing long-term LIBOR plus 1.5% mark-up (as expressed by MOF).

REE isolated systems were calculated on the same assumptions as the grid component except that:

Loan terms: Interest rate 12% - Loan period - 7 years - Grace period - 4 years
Average revenue: 0.35 US$/kWh (excl. VAT)
Cost subsidy: 45 US$/New household connected

The base case return on equity on isolated systems is 22.3%. This result is significantly higher than the grid-based rural extensions because of the higher tariff and an up-front capital subsidy of 45 US$/HH connected. The different tariff/subsidy structure is required in order to shield the private REEs from high initial debt obligations. The loan structure operates with a four year grace period after which the debt service cover (DSC) will reach 0.64 and 0.83 in Year 5. Full DSC, at 0.35 US$/kWh would be achieved with a loan maturity at 12 years. However, this approach is not feasible presently because of the weakly developed financial sector in Cambodia.

The Project will assist the rural finance institutions and commercial banks to prepare themselves for the proposed credit lines and will assist in developing acceptance of REE projects for funding on reasonable terms. Every encouragement should be given to helping create an environment conducive to loan terms of around 10-15 years, rather than shorter terms.

The NPV of fiscal impact is estimated at US$ 8.8m in the base case and US$ US$ 8.5m. in the low case.

Mini hydro projects have been assessed for six sites on similar terms as REE isolated systems, except that:

Average revenue: Competitive bulk price at 0.11-0.148 US$
Capital subsidy: 400 USD/kW installed

The sites exhibit good financial returns on capital employed averaging about 25.9% with assumed power purchase prices of 0.11 and 0.148 US$/kWh depending on the alternative solution available for the provincial grid. These returns indicate that the projects are viable and would be attractive to private investors. DSC is reached no later than Year 5 of operation for any of the investments and could be further improved if clean development mechanisms were introduced.

The sites are estimated to have a significant fiscal impact in the order of US$ 5.85m. to US$ 6.83m. over the full life span of 33 years.

Annex 5: Financial Summary

A. Past Financial Performance and Present Financial Position

1. The past performance, present financial condition, key financial issues and expected future performance of EdC are discussed below. A summary of the actual and projected financial performance of EdC's consolidated accounts is presented in Table 1. Detailed historical and projected financial performance is available in the project files.

2. The principal business of EdC is to develop, generate, transmit and distribute electric power throughout Cambodia through its Head Office in Phnom Penh and its provincial branch operations in Sihanoukville, Siem Reap, Kompong Cham, Battambang, and Takeo. Consolidated accounts of EdC comprising Phnom Penh and branch operations were prepared for FY01. As Phnom Penh revenues accounted for about 90% of EdC's consolidated operations, the analysis of past financial results were restricted to Phnom Penh's.

3. EdC reported positive developments in its financial operations which allowed it to record operating income in the last two years, FY01-02: (a) sales growth of 19% and 15%, surpassing earlier projections; (b) reduction in the level of transmission and distribution losses from 17.1% in 2001 to 13.5% in 2002 (24.1% in FY99 and 21.6% in FY00); (c) improved customer billing and collection of past due receivables resulting in a satisfactory collection performance for non-Government receivables; (d) actions to minimize operating costs, including reduction of staff, and retirement of expensive debts to IPPs; (e) the Riel remained fairly stable against the US$; and (f) international crude oil prices dropped from a yearly average of $27 to $23 and $25/bbl.

4. Despite these developments, EdC's liquidity and financial operations has not improved. EdC's prospects would continue to be negatively impacted by: (a) electricity supplies that are based almost entirely on high cost imported fuel or purchased power payable to IPPs in US dollars; (b) poor collection performance of outstanding Government arrears; and (c) the inability of EdC through the tariffs to recover costs or pass them on to consumers. As a consequence, EdC is not expected to generate sufficient revenues to enable it to sustain operations nor self-finance any significant investment for rehabilitation of existing systems or expansion.

5. From FY98-01, EdC's liabilities far exceeded its equity. The erosion of equity has been caused by continued losses as EdC had not posted any net profit, much less operating profits, since its creation in FY95. However, despite cumulative losses which stood at Rs 87 billion in FY02 (from Rs 63 billion in FY99), EdC's financial condition had been maintained at satisfactory levels since FY99. This was due to earlier actions by the Government to strengthen EdC's equity base, via the conversion to equity of an ADB loan of US$25 million in FY98, a further Government contribution of US$15 million (for its share of the Japanese funded-Phnom Penh Distribution Project) in FY99, and subsequent yearly contributions aggregating to US$20 million in FY01-03. The debt equity ratio since FY99 of 58:42 has improved to 42:58, 40:60, and 47:53 in FY00-02.

B. Key Financial Issues

6. Insufficient Electricity Tariffs. The projected poor financial performance of EdC is caused partly by tariffs, which are insufficient to recover operational costs or allow the sharing of costs with consumers. EdC is caught in a terrible bind of having to provide electricity at fixed rates (which were last adjusted in February 2000), without being able to pass on increasing costs to consumers.

7. The Government implemented a Financial Recovery Action Plan[1] (FRAP) in October 2000. The Plan included a restructuring of tariffs, with effect from August 1, 2000, and adjustments by about 17% applied mainly to domestic consumers using more than 50 kWh/month. Although the timing of these adjustments was implemented without much delay, EdC's proposal to index tariff levels to fuel prices and foreign exchange rate fluctuation was not approved.

8. Agreement was reached among the Government, ADB and IDA to consider the possible measures on a new time bound action plan for improving EdC's current finances (para. 32). The Financial Action Plan of 2003 would address government arrears, VAT, tariffs and EdC's operating costs. The Plan was discussed with the Government at a meeting on June 24, 2003 (chaired by the Minister of MEF and attended by heads of EdC, Customs, Tax Department, ADB and IDA) to agree on the settlement of government arrears, and input VAT to electricity generators and imported electricity. The Plan and implementation matrix, which contained more detailed actions on: (a) the reduction of overdue Government and Municipalities' arrears; (b) arrangements for settlement of future receivables; (c) reimbursement of VAT to EdC; and (d) measures to reduce EdC's operating cost, was approved by the Government in August 2004. Agreement would be reached at negotiations that EdC would achieve an annual: (a) minimum cash break-even covenant (revenues to cover no less than the sum of operating expenses and debt service requirements); (b) debt service coverage ratio of 1.2x initially until FY06 and 1.3x by FY07 and thereafter; and (c) debt equity ratio of 1.5x.

9. Electricity Costs. While poor financial performance could partly be explained by insufficient tariffs, another factor is EdC's operational costs that are extremely sensitive to exchange rate fluctuations. Electricity in Cambodia is inherently expensive to supply and electricity costs are among the highest in the world. Electricity supply is highly fragmented, with 22 separate power systems centered on the various provincial cities, and Phnom Penh. Cambodia has no proven deposits of coal, oil or gas, although there is ongoing offshore exploration for oil and gas by foreign concessionaires. There is potential for development of hydropower resources but development is hampered by the lack of hydrological data and the high cost of its development. Electricity supplies, therefore, are based almost entirely on high cost imported fuel or purchased power payable to IPPs in US dollars. Over 75% of EdC's operating costs are incurred in US dollars and the Riel had depreciated steadily over the years. From Rs 2,600 to the dollar in September 1995, when the Bank appraised its first operation, it went up to as much as Rs 4,800 in FY02, showing a 16% annual average decline over the 5 year period. Currently, it has stabilized to about Rs 3,800/US$1.

10. The extent of EdC's dependence on purchased power is another critical operating input. In FY96, purchased power was almost zero, but as an emergency response to a serious energy crisis in FY97, it accounted for 43%, 54%, 48%, 56%, and 61% of cost of sales, in FY97-02 respectively. While IPP operations are more economic than EdC's due to their efficiency

[1] The new rates called for domestic tariffs to be graduated into 3 blocks as follows: (a) 50 kWh/month (Rs 350/kWh); (b) 51-100 kWh/month (Rs 550/kWh); and (c) over 101 kWh/month (Rs 650/kWh). Hotel tariffs were reduced and aligned with commercial tariffs, and industrial tariffs were also slightly reduced to attract more industrial consumers. In addition, hotels, commercial, and industrial categories were also separated into "Small", "Medium" and "Big" with tariff levels at Rs 650, 600 and 500/kWh, for hotels and commercials, and Rs 600, 550 and 500/kWh for industrials, respectively. A new category for medium voltage, with tariffs at Rs 480/kWh, was also introduced. Moreover, a lifeline rate of Rs 350/kWh was introduced for residential users to eliminate the undesirable cross subsidies to the domestic sector by industrial and commercial customers.

advantages in terms of fuel, technical and managerial aspects, past experience with private power had resulted in high prices, particularly for fixed capacity fees, due in part to an absence of transparent and competitive selection process. In any event, EdC undertakes through the IPPs an additional hard currency commitment increasing its exposure to exchange rate fluctuations.

11. MIME first sought expressions of interest from IPPs in 1994 to help re-establish adequate power supplies in Phnom Penh and major provincial towns, in reaction to the extreme shortage of generating capacity and the limited funds at the disposal of the Government. However, a transparent and competitive selection process was not followed, which together with the lack of a competent and/or independent advisors, and political interference, led invariably to mistakes that resulted in unfavorable PPAs to EdC. It also led to concerns that the transactions were not transparent, nor competitive. Initially, groups of interested investors signed memoranda of understanding with the Government and negotiated directly the contractual arrangements, including the PPAs with EdC. EdC had little experience in negotiating these contracts and allowed itself to be advised by the developers and lawyers acting on behalf of, or paid by, the developers.

12. IPPs provide 45% of the capacity of EdC's system and are likely to continue playing a significant role in providing generation in the towns. There are two large private IPPs providing power: CUPL which signed a 25 year agreement followed later by Jupiter, which was only offered a 3-year agreement, but benefited from fiscal incentives including tax and duty concessions under the existing Law on Investments, which is soon to be amended, i.e. reduced income tax rate from 20% to 9% and exemption from import duty on generating equipment. The amended Law on Investments will remove the tax concessions and are being vigorously objected by foreign-invested IPPs arguing that it would make Cambodia less competitive with other regional investment laws, could harm private power investment availability, and raise the cost of private generation. This could be particularly sensitive at a time of highly volatile fuel prices.

13. Outstanding Government Arrears. The collection performance of government arrears is poor. While non-government arrears account for less than one month of sales, owing to EdC's strict disconnection policy, about Rs 51 billion of government arrears were more than 90 days overdue as of the end of May 2003 . Similar to the earlier situation and prior to reaching agreement on the terms of the 2000 Financial Recovery Plan to clear away these receivables, the arrears situation had again taken alarming proportions resulting in an EdC cash shortage. EdC's cash flow is under heavy strain from the above-mentioned costs and tying up cash in unpaid receivables had forced EdC to borrow to finance daily operations.

14. Under the 2000 Financial Action Plan, the Government undertook measures for the timely settlement of electricity bills via an offset of EdC's taxes. The Government also issued Declaration No. 4, signed by the Prime Minister on October 9, 2000 to government ministries and departments, stipulating that: (a) each ministry shall create a provision in their annual budgets for electricity payments; (b) if consumption exceeds the electricity budget, the ministry shall seek MEF approval and charge the extra consumption against its other budget expense; (c) MEF shall make direct payments to EdC of each ministries' bill upon presentation and verification of monthly bills; (d) ministries shall enter into a Purchase and Sale Agreement of Electricity with EdC for the amount provided in the ministries' budget allocation; (e) ministries shall assign their officers at MEF to monitor implementation of this Agreement; and more importantly; (f) EdC shall have the right to temporarily disconnect the electricity supply of errant ministries not complying with this Agreement. Since then, however, accounts receivables have accumulated again and Government instructions have not been complied with. On the one hand, EdC explained that while the earmarking of each ministries' budget for payment of their respective

bills are being followed, the budgets are unreasonably low, and hence, insufficient to cover actual consumption. On the other, MEF argued that the outstanding arrears represented the over-budgeted electricity bills that are the responsibility of each ministry.

15. On January 5, 2003, the Prime Minister approved Declaration No. 13 proposed by MEF regarding the annual budget for the payment of electricity bills of the Government ministries. Specifically, it: (a) calls for all ministries to strictly implement the measures stipulated in Declaration No. 4; (b) sets out the budget for 2003 as estimated by EdC; and (c) instructs MEF to allocate from the budget, funds for electricity consumption of the ministries as estimated by EdC. Agreement would be reached at negotiations that MEF would implement a Government Arrears Management Plan, satisfactory to IDA, which would focus on maintenance of satisfactory levels of government arrears (not to exceed 3 months of EdC's average sales), implement the improved mechanism for collecting government arrears, and monitor compliance of ministries' and EdC with the Management Plan.

16. System Losses and Operating Efficiency. Electricity in Cambodia is generated through small, isolated thermal systems that are mostly diesel-fired. Approximately 60% of Phnom Penh's distribution network is underground, and although sections of the network were repaired, newer parts are in poor shape and just minimally maintained. The cost of spare parts for generators is extremely high; and this factor together with EdC's poor liquidity position has led to deferral of scheduled maintenance of generators. The network continues to be rehabilitated and refurbished, and although it is expected to continue to suffer from interruptions, failures and high losses, EdC's investments in rehabilitation since FY96 is beginning to pay off. Losses were 25% in FY99 on account of EdC's absorption of wholesalers in October 1998. However, with ongoing rehabilitation of the system, the losses have been dramatically brought down in FY02 (para. 3).

17. The number of EdC's domestic customers in Phnom Penh has increased from 21,000 in FY97 to 123,100 at the end of FY02. EdC extension of the grid to rural areas is likely to increase its customer base but at the same time increase the level of distribution losses. In Phnom Penh and Sihanoukville, franchise areas formerly held by wholesalers have now been absorbed by EdC into their system, so that retail consumers now pay for their electricity consumption at EdC's scheduled rates. EdC had replaced the old substations and distribution networks of the wholesalers with new systems as part of IDA's Phnom Penh Rehabilitation Project. Through the 2000 Financial Action Plan, EdC formulated a plan to further reduce system losses from 24% in FY99 to 22% in FY00, 17.1% in FY01, and 13.5% in FY02 and thereafter. EdC had achieved, even surpassed, this benchmark by: (a) identifying and improving loss reduction in the weakest areas of the system; (b) requiring industrial and big commercial customers to install capacitors to maintain the minimum power factor; (c) setting up vigilance squads to conduct surprise checks at consumers' premises to detect energy theft; (d) introducing energy audit systems to reduce losses; and (e) implementing incentive schemes to reduce distribution losses.

18. Rural and Provincial Electrification Investments. MIME is responsible for policy and planning of the electricity sector and also for the management of supplies in provincial capital towns where EdC does not operate. The total investment requirements over the period FY03-10 would require about US$195 million, half of which are for the electrification of provincial towns and the other half for expansion in the remaining 8 provincial capital towns and system upgrading for adjacent villages. EdC is progressively taking responsibility for power supply in the provincial centers. It assumed responsibility for the power systems in Sihanoukville, Siem Reap and Kompong Cham in FY99 and has assumed control of existing systems in Takeo and Battambang in FY00. Elsewhere, a mix of public and private providers operates the other 16 isolated systems in provincial centers. In the smaller towns and villages, a mix of private generators, informal

networks and automotive batteries is supplying electricity. Because the Government had only marginally invested in the development of provincial and rural electrification, there is a vibrant and highly profitable private power market in rural towns and provinces.

19. So far, no RE program has been undertaken either by MIME or EdC. The Government, however, is committed to supplying power to the rural areas as an integral part of its poverty alleviation strategy and in December 2000 formulated an RE Strategy with the objective of supplying power to 70% of the rural households and all communities by FY30. To achieve the Government target, an investment of more than US$1 billion would be required, translating to an electrification rate of about 14,000 new services per year, and over the next 10 years, additional manpower and training. The recent Government action of allowing the commercialization of EdC and establishing a regulatory framework for the power sector, through the implementation of the Electricity Law, would encourage private sector involvement and respond to the RE challenge. It is recognized that further expansion of EdC's role by way of rural supply of electricity should not be pursued, as it would offer no clear financial advantage to EdC. Due to its own financial difficulties, EdC is also reluctant and unable to commit to the social cost of RE without firm commitments of significant and reasonable financing. The pace of EdC's rural involvement depends substantially on the availability of external sources of funding. EdC's financial prospects in view of the current levels of tariff and its volatile operating expenses is not very promising, hence, the issue of how EdC's contribution to rural grid extension would be financed, capital investments paid for and debt repayments serviced, needs to be addressed.

20. EdC would be the executing agency for the US$15 million grid extension component of the proposed Project and would provide near term investment boost for about 45,000 new rural consumers. A critical issue is the likelihood that affordable electricity could be provided by the EdC grid or diesel generation at a cost of less than USc 16/kwh. Widespread RE would only be feasible if cheaper sources of electricity could be found through alternative sources, i.e. imports from neighboring countries, solar, micro hydro systems, etc. Another concern would be the separation of finances of the provincial and rural systems from EdC's finances in Phnom Penh to avoid cross subsidization. However, creation of a separate entity may be difficult since EdC has already assumed the operation of 5 provincial towns. Moreover, an extreme shortage of experienced managers and the fact that the necessary technical skills, spare parts, workshops, equipment facilities are already existing in EdC, would also pose a problem if there is a separate entity. Resolution of these pricing and institutional issues would have to be carefully assessed.

21. Eventually, EdC will gradually take over the responsibility for more towns and extend their service outwards to the highest density urban centers. This pattern of small town development will provide urban and peri-urban areas with lower cost electricity than is possible in the rural areas. The nature of the institutional arrangements via lease-purchase, joint venture, or other arrangements with the private sector and exactly what role, if any, EdC would or should play need to be clarified. The RE Master plan, among other things, should guide decentralized investments in RE, delineate areas for grid and off-grid/mini-grid electricity service provision, and develop targeted projects to be implemented by the private sector or public/private sector partnerships.

22. The Electricity Law created uncertainty for REEs faced with potential competition from EdC. When EAC issues licenses, there is a danger that without exclusive geographic rights, local bosses could effectively over-ride EAC by only facilitating the operation of the REE in an area despite the issuance of multiple licenses. A more important point is the potential for crowding out private initiatives of the REEs by EdC. If EdC extends the grid they should not be allowed to push out the REEs unless they have previously announced firmly their plans, and these were

known to the REEs and taken into account by EAC in the license. Ultimately, the two types of service provided by EdC and the REEs should be viewed as complementary. REEs can initiate service provision in areas that may remain outside the reach of the EdC grid for a considerable time with some on the fringes of the grid served areas. Over time, the grids will extend and encompass supply to areas now served by the REEs whilst REEs should then move on to the new fringe areas. EAC stated that clear boundaries should exist between EdC's and REEs' service areas, and to achieve this, EdC was awarded a consolidated license for generation, transmission and distribution in Phnom Penh and provincial centers. Therefore, the extent of EdC's rural grid expansion would initially be to connect rural households but with a view that REEs could and would enter into lease-buy back arrangements for these operations with EdC or to purchase bulk power from EdC. EAC has clarified that only REEs have and will be given retail license in the rural areas.

23. Commercialization and Institutional Strengthening of EdC. EdC is a wholly state-owned limited liability company with the character of a Society National, being vested with a juridical personality in accordance with the law. Operationally, EdC uses private contractors to plan, construct, operate and maintain power systems outside Phnom Penh, and provides technical support to the provincial electricity operations as required. Staffing levels at EdC are high (1,278 staff in Phnom Penh and about 200 in the branches), and government salaries are extremely low, averaging about US$60 a month. EdC has a shortage of experienced management and technical staff especially in system planning, construction supervision, and accounting and finance. The dearth of qualified people is understandable as Cambodia is just emerging from civil war and political turmoil with most of its infrastructure and educated elite decimated. Hence, institutional strengthening is of paramount concern.

24. The issue was identified in the earlier credit operation such that credit disbursements were conditioned on several actions that addressed EdC's commercialization and corporatization: (a) EdC be established as an autonomous entity possessing a separate juridical personality with attributes, powers and responsibilities; (b) the Electricity Law be enacted; and (c) an autonomous regulatory body for the power sector be established. Substantial progress has been achieved. EdC now has a corporate status and legally, it operates as an autonomous body; the Electricity Law was enacted and the EAC was created in March 2001; external auditors have been in place since 1997; and corporate plans and objectives, monitored through performance contracts developed since 1997. However, much remains to be done to improve EdC's productivity by improving its financial and budgeting systems, the efficiency of staff, gradually restructuring staff levels to match work requirements and upgrading its financial systems and accounting practices.

25. EdC formally operates as a separate entity from MIME and has been granted autonomy in its operations since 1996, but the Government's inability to separate its role as policy maker, owner and customer of EdC, manifests itself in political interference in EdC's operations and blurs the lines between EdC's finances and the Government budget. A case in point is government arrears (paras. 13-15), where EdC faces difficulties not only from political pressure to forestall service cutoff, but also from the convoluted current collection practice of offsetting arrears against government remittances and taxes. Another test would be tariff decision making, and whether EAC, free from political pressure, could implement difficult and politically charged tariff increases and automatic tariff adjustment clauses. Complete autonomy, in fact and in practice, is only possible if EdC's Board of Directors is truly independent. More importantly, further commercialization of EdC is possible with the implementation of the Electricity Law to explicitly separate government ownership and policy-making roles and the effectiveness of EAC to, among others: (a) rationalize tariffs that make EdC viable, in the short-term, and profitable in the medium-term; (b) mandate performance targets in exchange for greater autonomy; (c) impose

regulatory standards for the supervision of the different operational functions (i.e. generation, transmission, distribution and bulk supply); and (d) require EdC to conform to the requirements of the new regulatory standards.

26. Power Development Plan and Financing. Neither EdC nor the Government has access to local funding and neither is in a position to provide substantial amounts of counterpart funds for significant power sector expansion. Understandably, the Government's first preference would be to seek grants from bilateral sources. However, grant funding would not be adequate to meet the sector's financing targets. For instance, the ADB funded training center, at a cost of US$3.5 million, faced major start-up problems due to the lack of counterpart funding by EdC.

27. Cambodia has experienced mobilizing private funds. CUPL, Malaysia, a 35MW IPP has been operating a power plant since 1996. Private funds have also been raised through a BOT for the rehabilitation of the Kirirom hydro plant and associated transmission. In addition, there have been unsuccessful efforts in funding IPPs in Phnom Penh and other provincial centers, the most recent being the 60MW Beacon Hill project, initially supported by IFC, but was eventually canceled. Another more recent project was the agreement signed by the Government with Jupiter Power Cambodia Ltd for a temporary 22.5MW power plant facility in Phnom Penh and its successor, the 30MW Khmer Electrical Power Development Ltd (renegotiated from the failed Eclipse Energy which could not come to financial closure). The cost of the CUPL and Jupiter transactions, unfortunately, has been unacceptably high due mainly to the lack of any competitive selection process and the high-risk premium associated with private funding for power development. Recently, concerns have been raised on the Government's continued use of directly negotiated contracts despite the stated commitment in the Electricity Law to provide electricity services in a transparent and competitive manner. These non-competitive deals would have a serious negative impact on the Cambodian economy, and would undermine the benefits of the proposed Project. IDA had stated that pursuing these deals outside of EdC's power development plan and without prior consultation with IDA could jeopardize the final processing of the proposed Project. It is now up to EAC to improve the investment climate and with the help of the TA provided under the PPIAF, give guidance on the proper policies for approval and selection of private power development.

28. The main source of financing power development in Cambodia for the moment is foreign funds, principally multi-lateral sources. These also provide the most attractive source of financing as they are offered on highly concessional terms to the Government, although onlent at commercial or near-commercial terms to EdC. The unimpeded flow of multi-lateral financing is critical not only for the obvious reasons that it is "the only game in town" but also because of its impact on improving EdC's finances and sustainability. The support of these lending is vital to pressing the Government to permit adequate tariff increases, pay its electricity bill on time, improve operational efficiency, and ensure low-cost power particularly for those living in poverty.

C. Future Financial Performance.

29. Financial projections for FY03-16 were prepared for EdC's projected financial accounts and a summary of the consolidated accounts are presented in Table 2.

30. Main Assumptions. EdC's power sales are expected to increase on average by 14% from 477 Gwh in FY02 to 1,400 Gwh in FY10 (Table 3). The demand forecasts are based on EdC's forecasts of growth related to the expected economic growth, EdC's marketing efforts to attract customers not presently connected to its grid, changes in population density and patterns of electricity consumption among electricity users. The projected sales are reasonable considering

that for the last four years, sales increased at an average rate of 12% and electricity consumption and penetration is still considered very low. The ADB project to finance power supplies for 8 provincial towns is expected to be completed in FY05 with the first full year of operation to commence on FY06. The proposed Project which would electrify about 45,000 EdC grid connected rural households in FY04-08, respectively, is expected to consume about 20 kWh/month. Sales from the 8 provincial towns and the rural households would account for no less than 4% of EdC's total sales. EdC has succeeded in bringing technical losses down from the average level of 24% in FY99 to 13.5% in FY02 (para. 17) and it is expected that this level would be maintained throughout the projected period.

31. Depending on its generators, EdC uses light diesel oil and heavy fuel oil, the costs of which were assumed to increase to US$422/ton (from US$382/ton in FY02) and to US$253/ton (from US$219/ton), respectively. These costs are based on the average international crude oil price increasing from US$25/bbl in FY02 to US$30/bbl in FY03 and exclude the 10% VAT. In accordance with government instructions, VAT is not added to the customer's electricity bills (para 34). The fuel costs for subsequent years are projected to move in line with international crude oil price, which were assumed to return to normal levels of US$25/bbl on average from FY04 onwards. EdC is expected to continue purchasing power from IPPs (35 MW-CUPL until FY14; 15 MW-Jupiter until FY06; and 30 MW-KEP from FY07 onwards), and from the existing 12 MW Kirirom hydro plant and the possible Kamchai hydro plant (currently under study and expected by FY14). Imports from Vietnam, through the proposed Project, of up to a maximum of 200 MW is expected from FY07 and thereafter. Detailed assumptions for fuel and other operating expenses, purchasing power, foreign exchange losses, revaluation of assets, depreciation rates, taxes, debt servicing and borrowings, grant and equity contributions, and other input parameters are available in the project files.

32. EdC's Future Financial Performance. Given the extent of EdC's financial problems, serious efforts had to be undertaken to address Government arrears, the VAT, and electricity tariffs to give EdC some relief in burdening the cost of supplying electricity. The FY03 Financial Action Plan (para. 3) on measures to improve EdC's finances was prepared in May 2003, and approved by the MEF, MIME, EAC and EdC in June 2003. It was submitted to IDA and ADB in September 2003. The status of the Plan is as follows:

33. *Overdue Government Arrears:*

For overdue electricity bills of Government departments, Municipalities and Public Lighting amounting to CR 48.6 million as of December 31, 2002 were settled as follows (a) Rs 33.4 billion was offset against amounts owing to the Government by EdC for custom duties and taxes on September 19, 2003; and (b) Rs 13.7 billion will be paid by the Municipalities via cash transfer on September 19, 2003 and Rs 1.5 billion by December 31, 2003.

Current arrears (FY03) would be settled under similar arrangements as follows: (a) government departments bills to be offset against EdC's outstanding duties and taxes; and (b) for Municipalities' bills, first priority for allocation of the special tax collected by the Municipalities will be for electricity bills.

Future arrears (FY04), MEF will set up an adequate line item budgets for each ministry sufficient to meet their expected electricity consumption and implement a Plan to improve mechanisms for collecting government arrears.

34. *Input VAT for Electricity[2]:*

VAT on power purchases, fuel and spare parts would be a subsidy to the consumers. EdC, however, will be reimbursed by the Government for these VAT which EdC could not pass on to electricity consumers;

Offset the amount of CR 40.3 billion for VAT amounts due as of December 31, 2003 against EdC excise taxes and penalties due to the customs department on July 31, 2003;

Continue to provide the VAT subsidy to EdC for payment of future VAT until a new policy on subsidy is introduced.

35. *Tariff Structure and Levels:*

EAC has agreed in principle to review the following tariff proposals of EdC:

Adjust EdC's retail tariff that would allow EdC to comply with the proposed ADB and IDA financial covenants: (a) Break Even beginning FY04; and (b) Minimum Debt Service Coverage Ratio of 1.1 times in 2004 and 1.3 times in 2005 and thereafter;

Introduction of an automatic fuel cost and foreign exchange rate adjustment mechanisms to the retail tariffs;

Increase in the minimum consumption charge for all customers except those with 5 amperes or lower service.

Government will consider EdC's proposal to rationalize Lifeline Tariffs[3] by applying the tariff only to customers with monthly consumption in excess of 50 kwh as part of a broad restructuring of tariffs when lower cost power from the new IPP (see below) is available.

36. *Reduction in EdC's Operating Expense:*

Implement the following measures to reduce operating expenses as follows:

Procure fuel on the basis of competitive bids based on new Government guidelines beginning first quarter of FY04;

Convert EdC's C5 power plant to run on cheaper heavy fuel oil by FY04;

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[2] EdC could not collect this VAT from customer bills nor could the tax laws be changed so that EdC could become VAT-exempt or be under the 0% VAT rate, as earlier proposed to the Government.

[3] EdC's proposal would allow for the first block of domestic tariff only to consumers who receive the first 50kwh at Rs 350/kwh; consumption at 51-99kwh would require consumers to immediately pay the next block at Rs 550/kwh and those with consumption at 100kwh and above would pay the next block at Rs 50/kwh. This proposal should take effect in FY06 in order for EdC to achieve the proposed financial covenants.

Negotiate with a new IPP (218 GWh per year) with purchase price considerably below the cost of EdC's existing IPPs within the next 18 months to: (a) allow EdC to shut down higher cost plant; and (b) seek new commercial customers currently operating their own plants;

Renegotiate with existing IPPs to reduce its off-take of power once new IPP is operating;

Implement a 5-year Staffing Plan by assessing EdC's staff needs at Head Office and provincial branches over the period that would allow EdC to realize some cost savings in Salaries and Wages beginning in FY04;

Review O&M costs starting from FY04 and achieve cost savings by shutting down older generating units in FY05 when the new IPP is operational;

Further reduce system losses and improve metering by setting targets for each branch and taking action to maintain power load factors at each substations from FY04;

Update EdC policy for bad debts provisioning and write-offs and present the new policy to EdC Board and MEF for approval in FY04.

37. Notwithstanding the strong measures to address current operational and financial weaknesses, EdC's financial outlook will remain fragile if EdC is not able to pass on fuel price increases and huge foreign exchange risks to consumers. EdC assumed that no tariff adjustment would be necessary if the outstanding measures under the Financial Action Plan related to EdC's operating costs (para. 36) are implemented. Critical to these results include the assumption that: (a) sales would grow by at least 12% in FY03-04 and gradually increase until it reaches 20% when the interconnection project is fully operational in FY08; (b) international fuel prices would be reduced to US$25/bbl (para. 31); and (c) consolidated transmission and distribution losses would be held down from the current level of 13.9% to 13.5% in FY06 and 13.4% in FY09. Under these projected scenario, EdC is expected to comply with the proposed financial covenants.

38. A stress test on the various probabilities of tariffs and fuel prices was analyzed under several scenarios: (a) Case A: EdC's base case, international price of crude oil is unchanged; (b) Case B: these prices drop to only US$28/bbl (instead of the projected US$25/bbl in the base case); and (c) Case C: these prices remain at US$30/bbl. The results of the sensitivity analysis are given in Table 4.

Table 1: EdC Phnom Penh Financial Operating Results and Projection, FY97-02

(billion Riels)

Fiscal Year ending December 31	1997	1998	1999	2000	2001	2002
			Audited			Unaudited
Energy Sales (GWh)	218	266	274	305	364	418
Sales Growth	28%	22%	3%	11%	19%	15%
Average Tariffs (Rs/kWh)	354	371	493	570	588	589
Average Tariffs (US cent/kWh)	9.3	9.8	13.0	15.0	15.1	15.0
Average Tariff Increase in Riel term	0%	5%	33%	16%	3%	0%
Income Statement Items:						
Revenues	79	104	146	177	223	253
Operating Expenses	90	150	146	192	216	252
Other Income/Expense	0	0	3	17	2	1
Net Income/Loss	-14	-49	-4	-16	-5	-11
Cash Flow Items:						
Cash Flow from Operating Activities	-5	1	4	0	-9	-2
Cash Flow from Financing Activities	4	189	26	19	14	100
Cash Flow from Investing Activities	1	-186	-28	-15	-2	-95
Increase/decrease in Cash	-1	4	2	4	3	3
Balance Sheet Items:						
Fixed Asssets	197	365	378	358	341	408
Current Asseets	32	43	76	107	143	183
Gross Accounts Receivables	34	46	69	54	76	101
Provisions for Bad Debts	11	18	19	7	7	11
Total Assets	229	408	454	465	485	591
Equity	137	190	186	231	234	328
Long-Term Liabilities	62	147	172	120	130	131
Current Liabilities	31	72	96	114	120	132
Financial Ratios:						
Opearating Ratio	114%	145%	100%	108%	97%	100%
Return on Net Fixed Assets in Operation	0.0%	-21.5%	0.0%	-4.7%	2.1%	0.3%
LT Debt to Equity Ratio (times)	0.0	0.5	0.8	0.9	0.5	0.6
Debt Service Coverage Ratio (times)				1.0	2.3	0.9
Current Ratio (times)	1.1	0.6	0.8	0.9	1.2	1.4
Receivables Collection Period (months)	0.0	5.4	5.8	3.7	4.1	4.8

Table 2: EdC Consolidated Financial Operating Results and Projection, FY01-10

Fiscal Year ending December 31	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Audited	Unaudited				Projected				
Income Statement Items:										
Revenues	266	304	315	380	435	513	603	723	828	935
Operating Expenses	258	299	344	377	428	490	570	675	770	868
Other Income/Expense	2	1	1	1	1	1	1	0	0	0
Net Income/Loss	-5	-6	-45	-13	-12	-5	-4	3	10	19
Cash Flow Items:										
Cash Flow from Operating Activities	7	17	55	18	40	65	67	93	103	115
Cash Flow from Financing Activities	1	68	15	102	80	199	89	13	-51	-56
Cash Flow from Investing Activities	-3	-98	-54	-129	-107	-245	-132	-123	-70	-74
Increase/decrease in Cash	4	5	-13	16	-8	12	18	24	-18	-18
Balance Sheet Items:										
Fixed Asssets	418	478	493	583	647	838	908	964	963	962
Current Asseets	159	192	128	137	164	205	254	267	276	289
Cash & Other Current Assets	19	6	22	14	26	44	68	50	31	17
Net Accounts Receivables	75	98	64	76	84	96	111	132	149	166
Total Assets	577	669	621	720	811	1,043	1,162	1,231	1,239	1,251
Equity	320	400	350	413	405	396	379	367	361	364
Long-Term Liabilities	130	131	158	188	275	497	620	671	660	644
Current Liabilities	127	138	113	119	130	150	163	193	217	243
Financial Ratios:										
Debt Service Coverage Ratio (times)	2.7	1.1	0.3	1.5	2.2	2.3	2.3	2.6	1.8	1.9
Break Even Tariffs (Rs/kWh)	618	614	629	614	617	605	600	595	597	601
Average Tariffs (Rs/kWh)	626	623	579	624	633	641	645	648	653	658
Return on Net Fixed Assets in Operation	1.9%	1.3%	-6.2%	0.3%	0.9%	2.8%	3.7%	4.9%	5.8%	6.7%
Opearating Ratio	97%	98%	109%	99%	99%	96%	94%	93%	93%	93%
LT Debt to Equity Ratio (times)	0.4	0.3	0.5	0.5	0.7	1.3	1.6	1.8	1.8	1.8
Current Ratio (times)	1.3	1.4	1.1	1.1	1.3	1.4	1.6	1.4	1.3	1.2
Receivables Collection Period (months)	4.0	4.6	3.0	2.9	2.9	2.8	2.7	2.7	2.7	2.6

Table 3: Main Assumptions to Financial Projections

	2003	2004	2005	2006	2007	2008	2009	2010
Operational Data:								
Generation Required (GWh)	617	692	778	908	1,061	1,269	1,441	1,617
Energy Purchases (GWh)	386	378	607	492	863	1,030	1,153	1,280
Share of Vietnam Import to Total Generation	0%	0%	0%	0%	35%	42%	46%	49%
Sales of Power (GWh)	532	596	672	785	919	1,099	1,247	1,400
Sales Growth	11.6%	12.1%	12.7%	16.8%	17.1%	19.6%	13.5%	12.3%
Transmission & Distribution Losses	13.9%	13.8%	13.6%	13.5%	13.4%	13.5%	13.4%	13.4%
Average Tariffs (R/kWh)	579	624	633	641	645	648	653	658
Average Tariffs (US cent/kWh)	14.5	15.4	15.4	15.3	15.2	15.0	14.9	14.8
Economic Data:								
Foreign Exchange Rate (Riel/US$)	4,000	4,063	4,126	4,190	4,256	4,322	4,390	4,459
Foreign Inflation	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Local Inflation	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
International Crude Oil Price ($/bbl)	30	25	25	25	25	25	25	25
Annual Capital Expenditures (US$ million)								
Generation Projects	13	27	1	0	0	0	0	0
Transmission Projects	0	2	18	38	14	7	0	0
Distribution Projects	0	1	5	18	14	18	12	13
Total Capital Expenditures	13	30	24	56	28	25	12	13
Financing Plan (US$ million)								
ADB	10	10	19	48	23	7	0	0
IDA	0	1	4	8	3	2	0	0
Government	0	21	2	0	0	0	0	0
EDC Funds	3	-1	-1	0	2	17	12	13

Table 4: Sensitivity Analysis

	2003	2004	2005	2006	2007	2008	2009	2010
A. Base Case								
International Crude Oil Price ($/bbl)	30	25	25	25	25	25	25	25
Average Tariffs (R/kWh)	579	624	633	641	645	648	653	658
Average Tariffs (US cent/kWh)	14.5	15.4	15.4	15.3	15.2	15.0	14.9	14.8
Increase in Average Tariff in Riel term	-7%	8%	1%	1%	1%	0%	1%	1%
Break Even Tariff (Riel/kWh)	629	614	617	605	600	595	597	601
Debt Service Coverage Ratio (times)	0.3	1.5	2.2	2.3	2.3	2.6	1.8	1.9
B. Fuel at $28/bbl after 2004								
Break Even Tariff (Riel/kWh)	629	627	629	612	606	600	602	605
Debt Service Coverage Ratio (times)	0.3	1.2	1.8	2.1	2.2	2.4	1.7	1.8
C. Fuel at $30/bbl after 2004								
Break Even Tariff (Riel/kWh)	629	635	638	617	611	604	605	608
Debt Service Coverage Ratio (times)	0.3	1.0	1.6	2.0	2.1	2.3	1.7	1.7

Annex 6(A): Procurement Arrangements

Summary of Procurement Capacity Assessment

An assessment of the project implementing agency's procurement capacity was carried out in line with IDA guidelines during the project preparation. The full Procurement Capacity Assessment Report (PCAR) is available in the project file; and brief summary is provided below.

The current version of the Country Procurement Assessment Report (CPAR) is a "Draft for Review by Royal Government of Cambodia" dated June 30, 2003. This report was jointly prepared by World Bank and ADB. Among other aspects, the acceptability of Government NCB procedures is summarized in the CPAR (Annex D), and the suggested legal provisions for inclusion in the IDA Development Credit Agreement in respect of NCB procurement are also provided in the CPAR (Annex E). Nevertheless, for NCB procurement, EdC follows as much as possible IDA's ICB procedures. An internal regulation entitled "EdC's Guidelines for Procurement of Goods and Works for National Competitive Bidding and Local Shopping" has been prepared by EdC and found acceptable.

Cambodia is well known to IDA. From 1993 to March 2003, IDA approved more than 20 credits and grants to Cambodia with a total amount of US$505 million equivalent, including one credit in the amount of US$40 million equivalent for a project in the power sector (i.e. the Phnom Penh Power Rehabilitation Project which was approved in 1995). The project was successfully completed and the credit was closed in June 2000. The performance of the implementing agency (EdC, who will be the main implementing agency of the proposed Project) was rated highly satisfactory. In addition, EdC has also undertaken ADB-financed projects (three loans with an aggregate amount of US$68 million). Through these projects, EdC has gained practical experience with ICB procurement and become familiar with the IDA procurement and consultant selection guidelines.

The overall procurement risk is therefore rated as average. Nevertheless, to mitigate any possible risk associated with procurement and to enhance long-term institutional development and capacity building, a plan of action, as summarized in the section below, has been developed and agreed to be implemented:

a) Procurement Training: In addition to the several procurement training sessions organized by World Bank and ADB in 2002 and 2003 for Cambodia that EdC has sent several staff to attend, a special procurement training program for the Project will be conducted in March 2004, as part of the project launch workshop. All aspects of the IDA procurement and consultant selection guidelines and procedures including latest SBDs and SRFP will be covered. In addition, adequate attention will also be given to procurement filing requirements. The project launch workshop will be organized jointly by IDA and EdC, with participation of all the related agencies.

b) Procurement Related TA: Two TA will be provided by external consultants: (i) the current in-house advisor will be retained under the proposed Project to provide assistance in technical and administrative areas including procurement particularly related to consultant selection and implementation of various TA activities; and (ii) a project implementation consultant will be hired to provide assistance in procurement

(including preparation of bidding documents, bid evaluation and contract negotiation), engineering design, construction supervision and coordination, contract management, quality/cost/schedule control, testing and commissioning. The consultant will also provide on-the-job training to EdC staff in various aspects of project management including contract management.

c) Internal regulations for NCB procurement, Procurement Check List: An internal document entitled "EdC Guidelines for Procurement of Goods and Works for National Competitive Bidding and Local Shopping" has been prepared by EdC and found acceptable (The guidelines are attached to the PCAR). A draft "EdC Procurement Checklist – Information and Practical Instructions on Procurement" has also been prepared and will be revised taking into IDA's comments. Both documents are expected to facilitate the procurement process.

d) Project Management Units (PMU): Two PMUs have already been established, one by EdC to implement all the physical components as well as TA activities for EdC, and the other by MIME to facilitate establishing the REF and manage some preparatory work during the initial transition period. Both PMUs have procurement staff who are familiar with the IDA procurement and consultant selection guidelines. In addition, the procurement group under the EdC PMU is expected to sustain as an independent procurement unit even if the PMU will be dissolved upon the project completion.

In addition, risk of procurement delays was minimized under the previous IDA financed project through IDA close monitoring and supervision and prompt actions in procurement related reviews and clearance. A similar approach will be adopted in the proposed Project.

Expenditure Items for IDA and GEF Financing

The IDA Credit and GEF Grant will be used to finance: (a) goods for power transmission and distribution, including: SCADA system, cables and conductors, transformers, concrete poles, meters and meter boxes, insulators and fittings; inspection and filed work vehicles, O&M equipment, computers and software, office equipment, portable meter testing equipment; (b) works associated with the installation of the above equipment and materials; (c) subgrants under the REF for new rural connections, mini hydro, micro hydro and solar home systems; (d) consultant services and training, such as institutional capacity building and strengthening, operational and project implementation support, policy studies, market analysis, strategy development, etc. Table A shows amounts to be financed by IDA and GEF, respectively.

Procurement Guidelines

All goods, works and consultant services to be financed under the IDA Credit and GEF Grant shall be procured in accordance with the IDA Guidelines ("Guidelines – Procurement under IBRD Loans and IDA Credits", January 1995, revised in January and August 1996, September 1997 and January 1999; and "Guidelines for Selection and Employment of Consultants by World Bank Borrowers", January 1997, revised in September 1997, January 1999, and May 2002).

Standard Documents for Procurement

Various types of standard bidding documents (SBD) shall be used in preparation of bidding documents. For procurement of goods based on supply and installation arrangements, the

SBD for Supply and Installation of Plant and Equipment (November 1997, Revised January 1999, March 2002 and March 2003) shall be used. For other procurement of goods, the SBD for Procurement of Goods (January 1995, Revised March 2000, January 2001, March 2002 and March 2003) shall be used. For procurement of installation works, the SBD for Procurement of Works (smaller contract, January 1995, revised June 2002 and March 2003) shall be used. The Standard Bid Evaluation Forms for Procurement of Goods and Works (April 1996) shall be used in bid evaluation and preparation of the bid evaluation report.

For employment of consultants, the Standard Request for Proposals (dated July 1997, Revised April 1998, July 1999, and March 2002) shall be used. In evaluation of the proposals following QCBS and QBS, the Bank Sample Form of Evaluation Report for Selection of Consultants (October 1999) shall be used.

In the event that the above SBDs and SRFP are revised or updated during the project implementation, the latest versions will be applicable.

Domestic Preference

In evaluation of bids following ICB procedures, qualified domestic manufacturers of goods would be eligible for a margin of preference of 15% of the Cost, Insurance and Freight (CIF) price or the actual customs duty, whichever is lower.

Advertising

For procurement of goods, the invitations to bid shall be advertised as specific procurement notices in accordance with the procedures under paragraph 2.8 of the IDA Procurement Guidelines. For selection of consultants, advertisements shall be conducted according to the procedures under paragraph 2.5 of the IDA Guidelines for Selection of Consultants. In addition, a General Procurement Notice (GPN) has been published in UNDB Issue No. 604 on April 16, 2003; it shall be updated on an annual basis.

Project Costs By Procurement Arrangements

The estimated project costs by procurement arrangements are summarized in **Table A**.

Procurement Packaging and Methods

Goods to be financed under 115kV Transmission, National Control Center, and EdC RE Grid Extension components (total estimated cost is US$28.47 million including contingencies and estimated taxes and duties, of which the IDA credit will cover US$23.79 million): The procurement shall be carried out through the ICB procedures, based on the arrangements of supply and installation or supply only. However, for smaller packages with estimated cost not exceeding US$100,000 or US$50,000 equivalent per package (up to an aggregate amount of US$1.0 million), procurement may be carried out following the International Shopping (IS) or National Shopping (NS) procedures under paragraphs 3.5 and 3.6 of the IDA Procurement Guidelines. Operational support to REF, EdC and EAC, consisting of goods, are also included. The related procurement packaging arrangements are presented in Table A1.

Installation Works (total estimated cost is US$4.56 million including contingencies, of which the IDA credit covers US$3.69 million): The installation works associated with the EdC rural grid extension component shall be carried out through the NCB procedures for those

procurement packages with estimated cost of US$1.5 million equivalent or less per package. ICB procedures shall be followed for any larger works packages. The related procurement packaging arrangements are presented in Table A2.

Subgrants under Rural Electrification Fund (REF) (total estimated cost is US$26.74 million; of which the IDA credit covers US$5.10 million, GEF grant finances US$1.54 million, and private sector developers fund the balance of US$20.10 million). The REF will provide subgrants to eligible subprojects (rural electrification enterprises, mini hydro, micro hydro, solar home systems, etc.). The associated goods and construction works shall be procured by the subproject developers (private companies) in line with established local private sector commercial practices, except those large procurement packages with estimated cost exceeding US$2 million equivalent per package for which ICB may be the more efficient and economic procurement method. Based on the current survey and estimation, it is unlikely there will be procurement packages of this size.

Consultant Services and Training (total estimated cost is US$11.29 million, of which the IDA credit covers US$6.74 million while GEF grant finances US$4.21 million): All consultant services will be subject to QCBS procedures except those cost less than US$100,000 for which CQ procedures would be more practicable (up to an aggregate amount not to exceed US$2.0 million). For the assignments that would be performed more effectively by individual consultants such as operational support to PMUs, the REF and EAC as well as the in-house advisor to EdC, individual consultants shall be selected through comparison of qualifications of at least three candidates, with the following exception.

An in-house advisor (an expatriate individual consultant) has been financed previously under the PPF to assist EdC in various technical and administrative aspects. The advisor has established a very close and effective working relationship with EdC and has earned high trust of the EdC management and staff. In view of the substantial delays in project preparation and the necessity of his service, EdC has decided to retain the advisor under its own budget upon depleting of the funds allocated under the PPF, with an understanding that related expenditures will be reimbursed from the IDA credit upon its approval and effectiveness. IDA has issued no-objection to the extension of advisor's contract and endorsed the above arrangement on a retroactive financing basis. The advisor will continue his service during the period of project implementation.

The consultant services arrangement is summarized in Table A3.

Prior Review Thresholds (Table B)

For procurement of works, IDA prior review in line with the IDA Procurement Guidelines shall be carried out for all procurement packages with estimated cost of US$500,000 equivalent or more per package. According to the current procurement packaging arrangements, such prior review would cover about 65% of the value of all works.

For procurement of goods, IDA prior review in line with the IDA Procurement Guidelines shall be carried out for all procurement packages with estimated cost of US$200,000 equivalent or more per package. According to the current procurement packaging arrangements, such prior review would cover about 95% of the value of all goods.

No prior-review shall be conducted for commercial-practice-based procurements under subprojects to be financed by the REF subgrants.

For consultant services, Bank prior review in line with the IDA Guidelines for Selection of Consultants shall be required for all contracts with estimated cost exceeding US$100,000 for firms and US$50,000 for individuals. Such prior review would cover at least 90% of all consultant contracts to be financed by the IDA and GEF.

Shortlists of Entirely National Consultants

National consultants and local NGOs would be capable and more economically perform certain services under the Project, such as rural income generation promotion activities, independent monitoring of land acquisition and resettlement; project grievance services. In such cases, the shortlist may comprise entirely national consultants (firms registered or incorporated in Cambodia), if the assignment is below a ceiling of US$100,000.

Procurement Supervision and Post Reviews

Field based supervision of procurement work will be conducted as part of the regular project supervision missions, which are expected to be fielded twice a year. For those contracts that are not subject to IDA prior review, post-reviews will be carried out based on a ratio of one out of three.

Procurement Progress Reporting

Procurement progress will be reported as part of the Quarterly Project Progress Reports. Information would include but not limited to the following: (a) progress of the bidding process and updated procurement schedule with explanations for nay delays; (b) contract awards; (c) contract amendments, with explanations and justifications; and (d) compliance with prior-review threshold levels and aggregate limits on specified methods of procurement.

NCB Provisions

For NCB procurement, EdC has adopted an internal regulation entitled "EdC's Guidelines for Procurement of Goods and Works for National Competitive Bidding and Local Shopping", which is generally in line with the IDA ICB procurement guidelines. Nevertheless, the legal provisions in Annex E to the CPAR of June 30, 2003 shall be included as an attachment to the procurement schedule in the DCA and shall apply to the NCB procurements under the Project.

Retroactive Financing

Retroactive financing up to an aggregate amount of US$200,000, or 0.5% of the Credit amount, would be provided for anticipated expenditures (for any advanced contracts related to TA for project preparation and implementation, such as in-house advisor to EdC) incurred after January 1, 2003 (one year prior to the expected signing of the DCA).

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

Expenditure Category	Procurement Method [1]				Total Cost
	ICB	NCB	Other [2]	N.B.F. [3]	
1. Works		4.10		0.46	4.56
IDA		(3.69)			(3.69)
GEF					
2. Goods	26.76		0.69	1.02	28.47
IDA	(23.79)		(0.69)		(24.48)
GEF					
3. REF Subgrants			6.64	20.10	26.74
IDA			(5.10)		(5.10)
GEF			(1.54)		(1.54)
4. Consultant Services			11.09		11.09
IDA			(6.54)		(6.54)
GEF			(4.21)		(4.21)
5. Training			0.20		0.20
IDA			(0.20)		(0.20)
GEF					
6. Miscellaneous				0.36	0.36
IDA					
GEF					
7. Service Charge & Commitment Fee				0.98	0.98
IDA					
GEF					
Total	26.76	4.10	18.62	22.92	72.40
IDA	(23.79)	(3.69)	(12.52)		(40.00)
GEF			(5.75)		(5.75)

1/ Figures in the parenthesis are the amounts to be financed by the IDA credit and GEF grant respectively. All costs include contingencies.
2/ Including: goods to be procured through IS and NS procedures; and consultant services.
3/ N.B.F. – Not Bank Financed.
4/ ADB will cofinance (US$55.85 million – including contingencies, but excluding taxes and duties and IDC) the Project on a parallel basis. The associated procurement will be carried out separately following ADB's guidelines. ADB's procurement arrangements are not included in the above table.

Table A1: Procurement Packaging for Goods

Package No.	Description	Estimated Cost ($'000)	Procurement Method	Remark
EdC				
IFB-1	115kV Transmission Line	4,000	ICB	S&I
IFB-2	115kV Substation Modifications	4,330	ICB	S&I
IFB-3	National Control Center – SCADA System	4,000	ICB	S&I
IFB-4	Cables and Conductors (M &LV)	2,980	ICB	
IFB-5	Concrete Poles (MV&LV)	3,320	ICB	
IFB-6	Distribution & Isolating Transformers (MV&LV)	740	ICB	
IFB-7	Insulators & Fittings, Cross Arms, Accessories	2,400	ICB	
IFB-8	Meters and Meter Boxes	2,760	ICB	
	Inspection Vehicles	95	IS	
	Field Work Vehicle	95	IS	
	Computers and Peripherals	95	IS	
	Office Equipment	80	IS	
	Operation & Maintenance Equipment and Tools	80	IS	
	Planning Software	45	IS	
EAC	Portable Meter Testing Equipment for EAC	70	IS	
REF	Vehicles	60	IS	
	Computers and Peripherals	25	IS	
	Office Equipment	20	IS	
	Office Furniture	20	IS/NS	

Notes: The above costs exclude contingencies and taxes (thus may not reconcile with Table A).

ICB: International Competitive Bidding
S&I: Supply and Installation.
IS: International Shopping
NS: National Shopping

Table A2: Procurement Packaging for Civil Works

Package No.	Description	Estimated Cost ($'000)	Procurement Method	Remark
1	Works for Sihanoukville Area	500	NCB	Smaller Works
2	Works for Battambang Area	800	NCB	Smaller Works
3	Works for Kampot Area	400	NCB	Smaller Works
4	Works for Kampong Speu Area	800	NCB	Smaller Works
5	MV Networks (West Phnom Penh & Takeo)	350	NCB	Smaller Works
6	Warehouse	500	NCB	Smaller Works

Notes: The above costs exclude contingencies and taxes (thus may not reconcile with Table A).

NCB: National Competitive Bidding.

Smaller Works mean IDA's Standard Bidding Documents for Procurement of Works (Smaller Contracts).

Table A3: Consultant Services and Training Arrangements

No.	Description	Estimated Cost ($'000)	Selection Method	Remark
MIME Component				
1	Renewable Energy Policy Development	500	QCBS	Firm
2	Power Market Analysis of Special Industrial Zone	350	QCBS	Firm
3	Development of a Power Sector Master Plan	450	QCBS	Firm
REF Component				
4	Implementation Support to REF (including accounting system, expatriate technical advisor, local long-term consultants)	2,870	QCBS, CQ, IC	Multi-contracts, firm & individual
5	REE Rural Income Generation Promotion	350	CQ	Multi-contracts, local consultants & NGOs
6	Renewable Energy Business Development for Solar and Mini/Micro Hydro	2,440	QCBS, CQ, IC	Multi-contracts, firm & individual
7	REE Improvement and Association Building	1,260	QCBS, CQ, IC	Multi-contracts, firm & individual
8	Capacity Building for Financial Institutions	250	QCBS, CQ, IC	Multi-contracts, firm & individual
EAC Component				
9	Operational Support	420	IC	Individual
10	Training	60	CQ, IC	Multi-contracts, firm & individual
EdC Component				
11	Project Implementation Consultant (PIC)	1,000	QCBS	Firm
12	In-house Advisor	540	SSS	Individual
13	Independent Monitoring of Land Acquisition and Resettlement	20	CQ	Local NGO
14	Project Grievance Committee	20	CQ	Local NGO
15	Commercial Practice Improvement and Management Training	450	QCBS, CQ, IC	Multi-contracts, Firm & Individual
16	Capacity Building for Land Acquisition, Resettlement, and Environmental Management	60	CQ	Firm
17	Power Investment Planning	250	QCBS	Firm

Notes: REF Component – the REF has not yet been established. The assignment details shall be worked out in due course with the progress of project implementation.

QCBS: Quality- and Cost-Based Selection

CQ: Selection Based on Consultants' Qualifications
SSS: Single-Source Selection
IC: Individual Consultant

Table B: Thresholds for Procurement Methods and Prior Review

Expenditure Category	Contract Value Threshold (US$'000)	Procurement Method	Contracts Subject to Prior Review (US$'000)
1. Works	>=1,500	ICB	>=500
	<1,500	NCB	
2. Goods	>=100	ICB	>=200
	<100	IS	
	<50	NS	
3. Consultant services	>=200	QCBS	>=100 for firms
	<=100	CQ	
	NA	IC	>=50 for individuals

Annex 6 (B): Financial Management and Disbursement Arrangements

Financial Management

1. Summary of the Financial Management Assessment

The Country Financial Accountability Assessment (CFAA) was carried out by the World Bank and the report was delivered to the Government in May 2003. It was noted that the legislative and regulatory framework governing public finances in Cambodia is generally acceptable, with the exception of the control function, which requires a complete overhaul. However, the implementation of public expenditure is very weak, resulting in a lack of transparency and high level of risk concerning the reliability of public expenditure management. In addition, the financial management systems and procedures cannot be relied upon to provide any assurance that the public funds are used for authorized purposes. The system is all cash based and most receipts and almost all payments do not pass through bank accounts. Such a system provides many opportunities for corruption and misuse of public funds.

The overall country fiduciary risk in Cambodia is considered to be high. In spite of the multiplicity of controls and the centralized nature of the Public Expenditure Management system, weak financial management practices pose serious fiduciary risks. The fundamental problems result from a weak control environment, severe weaknesses in National Treasury operations, especially in the area of cash management, inadequacies in the public accounting system, and weak internal and external auditing capacity. These problems are so serious that the Government's budget and reporting systems cannot be relied upon to expend resources in an accountable manner. These systematic weaknesses thus raise serious concerns about fiduciary risks and possible corruption. However, such fiduciary risks are expected to be mitigated through the proposed system. These risks are considered as manageable due to the risk-mitigation measures to be taken as outlined in the financial management action plan.

To assess the existing capacity at the implementing agencies, an assessment of the adequacy of the project financial management system of the following implementing agencies was carried out in October 2003: (a) EdC, the electricity utility, a separate legal entity, is revenue generating and maintains its own books and accounts; (b) MIME-PMU, initially and until the REF is created, the MIME-PMU will handle the MIME-TA and REF-TA activities. Once the REF is established, the MIME-PMU's responsibilities will be absorbed by the REF. The REF is to be a legal entity, non-revenue generating and will maintain its own books and accounts; and (c) EAC, the power sector regulator, is a separate legal entity, non-revenue generating but maintains its own books and accounts.

The overall assessment is that EdC, which has experience with the previous Bank-financed projects, has the capacity to manage the project financed activities while the capacity at the MIME and EAC needs to be developed. EdC will help MIME during the transition in disbursement arrangement and book keeping. Once the REF is established, the Project Accountant to be engaged under the REF will also handle the above tasks. EdC will provide the same assistances to EAC.

2. Audit Arrangements

EdC has engaged as its external auditor, PriceWaterhouseCoopers (PWC), since 1999. The annual audits are conducted in accordance with international standards on auditing and includes both the consolidated financial statements of EdC; and the separate audits of the EdC units: Phnom Penh Head Office, Siem Reap, Battambang, Kampong Cham, Sihanoukville, and Takeo branches. There are no overdue audit reports for Credit 2782-KH (Phnom Penh Power Rehabilitation Project) and Grant No. TF026154 (Cambodia Rural Electrification and Transmission Project). The audit reports were acceptable to IDA since FY99 for purposes of EdC's full compliance with the audit report requirements of the Credit and Project Agreements. The corporate financial statements of previous years were qualified by the auditor due to the VAT issue - pending decision from the Government whether the offsetting of input VAT (being recorded as an asset in the balance sheet) with the Government arrears and tax to be paid to the Custom Department would be allowed. The mission noted from the appraisal mission during September 15-25, 2003 that the VAT issue has been settled and EdC has made substantial progress in improving EdC's finances.

The REF will be responsible for ensuring that the project accounts of the REF operations, MIME-TA and EAC-TA components, under a consolidated project financial statements, are audited in accordance with International Standards on Auditing by an independent external auditor appointed under terms of reference satisfactory to IDA.
Auditors will be required to audit: (a) EdC's annual consolidated corporate financial statements; and (b) the consolidated project financial statements of the REF, and the MIME-TA and EAC-TA components. In addition, the respective audits will be required to determine: (i) whether the activities of the Special Accounts associated with the respective project funds have been correctly accounted for and used in accordance with the IDA Credit and GEF Grant Agreements; and (ii) the adequacy of supporting documents and controls surrounding the use of the Statement of Expenditures (SOEs) as a basis for disbursement. A separate Management Letter will also be submitted which will: (a) identify any material weakness in accounting and internal control; (b) report on the degree of compliance of financial covenants of the Credit and Project Agreements; and (c) communicate matters that have come to the attention of the auditors which might have a significant impact on the implementation of the Project. The audited financial statements will be submitted to IDA within six months after the end of each fiscal year.

The table below summarizes the audit reporting requirements for the Project.

Implementing Agency	Required Audit Report
EdC	EdC Consolidated Corporate Financial Statements
REF	Consolidated Project Financial Statements of REF, MIME-TA and EAC-TA
MIME	Audited under REF
EAC	Audited under REF

PWC has been engaged as EdC's external auditor since 1999 and PWC is eligible to audit the Bank-financed projects, so it is likely that PWC will continue to audit EdC Corporate Financial Statements which include the transactions of project activities to be implemented by EdC. The auditor of the Consolidated Project Financial Statement will be appointed in the future according to the procurement method indicated in the Development Credit Agreement. The possibility that two different auditors would be appointed is likely and, hence, separate auditors may not be able to access the information of the whole Project.

3. Disbursement Arrangements

Disbursement of the proceeds of the Credit/Grant will be made based on the traditional system: from the Special Accounts with reimbursements made based on full documentation or against SOEs; and direct payment from the Credit/Grant accounts. Two Special Accounts will be established for EdC and the MIME PMU/ REF. EAC will disburse via direct payment for its TA activities.

Disbursement arrangements for each of the respective implementing agencies will be as follows:

Implementing Agency	Disbursement Arrangements
EdC	Special Account
REF	Special Account
MIME	Disbursement through the REF Special Account
EAC	Direct Payment

Allocation of Credit/Grant Proceeds (Table C)

Disbursement of the proceeds of the Credit/Grant would be made against expenditure categories as shown in Table C.

Table C: Allocation of Credit/Grant Proceeds

Expenditure Category	IDA Credit Amount in US$	GEF Grant Amount in US$	Financing Percentage
1. Works	**3,240,000**		90%
2. Goods	**22,940,000**		100% of foreign expenditures, 100% of local expenditures (ex-factory cost), and 85% of local expenditures for other items procured locally.
Under EdC's Respective Part	22,710,000		
Under EAC's Respective Parts	70,000		
Under REF's Respective Parts	160,000		
3. Consultants' Services	**6,880,000**	**4,210,000**	95%
Under MIME	800,000	4,090,000	
Under EAC's Respective Parts	300,000	120,000	
Under EdC's Respective Parts	2,200,000		
Under REF's Respective Parts	3,580,000		
4. Training	**200,000**		100%
Under EdC's Respective Parts	140,000		
Under EAC Respective Parts	60,000		
5. REF Subgrant	**4,940,000**	**1,540,000**	
6. PPF Refinancing (applied to REF)	**290,840**		
7. Unallocated	**1,509,160**		
Total	**40,000,000**	**5,750,000**	

Use of Statement of Expenditures (SOEs):

Some of the proceeds of the Credit/Grant are expected to be disbursed on the basis of SOEs as follows:

- works estimated to cost the equivalent of US$500,000 or less;
- goods estimated to cost the equivalent of US$200,000 or less;
- REF sub-grants estimated to cost the equivalent of US$10,000 or less;
- consulting firms estimated to cost the equivalent of US$100,000 or less; and
- individual consultant's contract estimated to cost the equivalent of US$50,000 or less.

Disbursement for any expenditure exceeding the above limits will be made in accordance with respective procurement guidelines and provision in the Credit/Grant Agreements against submission of full documentation and signed contracts.

The documentation supporting SOE disbursements will be retained by the Project during the life of the Project and until one year after the receipt of the audit report for the last year in which the last disbursement would be made. These documents will be made available for review by the auditors and IDA supervision missions.

Should the auditors or IDA supervision missions find that disbursements have been made that are not justified by supporting documentations, or are ineligible, IDA will have the right to withhold further deposits to the Special Accounts. IDA may exercise this right until the Borrower has refunded the amount involved or (if IDA agrees) has submitted evidence of other eligible expenditures that offset the ineligible amounts.

Special Accounts:

To facilitate credit/grant disbursement, EdC and MIME shall each maintain a separate US dollar Special Account (SA) at the National Bank of Cambodia, the central bank, on terms and conditions satisfactory to IDA including appropriate protection against set off, seizure and attachments. The SAs will cover the IDA share of eligible expenditures in all disbursement categories.

The EdC Special Account, to be managed by EdC for all components, except for the REF component, will have an authorized allocation of US$2.5 million with an initial deposit of US$1 million equivalent to be withdrawn from the Credit account and deposited in the SA. When the amount withdrawn from the Credit account totals SDR 3 million equivalent, the initial allocation will be increased to the authorized allocation.

The MIME IDA and GEF SAs, to be managed initially by MIME-PMU for the MIME TA and REF-TA activities until the REF is established, will have an authorized allocation of US$1.5 million with an initial deposit of US$0.5 million equivalent to be withdrawn from the Credit/Grant accounts and deposited in the SA. When the amount withdrawn from the Credit/Grant accounts totals SDR 2 million equivalent, the initial allocation will be increased to the authorized allocation. After the REF is established, the SA will be managed by the REF and the National Bank of Cambodia will act as a payment agency of the REF.

The SAs should be replenished regularly, preferably monthly (but not less than quarterly) or when the amounts withdrawn equal 20% of the initial deposit, whichever comes first. All replenishment applications will be accompanied by reconciled bank statements from the depository bank showing all transactions in the SAs. The SAs will be audited annually by independent auditors acceptable to IDA.

Financial Management and Reporting Arrangements:

Implementing Entity: EdC was the executing agency for the previous IDA financed Phnom Penh Power Rehabilitation Project (Credit No. 2782-KH) and Cambodia Rural Electrification and Transmission Project (Grant No. TF026154). The organizational chart of EdC is attached in Appendix 1.

The proposed Project will be implemented by two PMUs:

(a) One PMU will be hosted by EdC, to be responsible for management and implementation of: (a) EdC rural grid extension; (b) construction of the 115kV transmission line and substation; (c) National Control Center; and (d) TA for institutional strengthening. The PMU will be under the Director for Corporate Planning and Project Department and comprise professional staff in various disciplines (including but not limited to technical, procurement, contract management, quality/cost/schedule control, environmental, land acquisition and resettlement). One MIME staff will be selected to join this PMU and is expected to facilitate necessary coordination with Government agencies related to project implementation.

(b) One PMU will be hosted by MIME, to be responsible for: (a) TA activities related to MIME and REF while the REF is not yet established; and (b) the setting-up of the REF (organizational chart in Appendix 2). Once the REF is established (the REF Board has organized the REF Secretariat to run day-to-day operations of the REF), the PMU would cease to exist. The REF Secretariat will also be responsible for payment of TA activities related to MIME afterwards.

Funds Flow: IDA and GEF funds will be channeled through the respective SAs as described above to EdC, MIME and REF; and through direct payment for EAC. IDA and GEF will deposit an advance within the authorized allocation to the SAs based on the Implementing Agencies' applications. The Implementing Agency will use the SA to finance IDA's and GEF's share of eligible expenditures under the Project in both foreign and local currencies, and then claim for replenishment of the SA. For some expenditures with the amount over the minimum application size set up in the Disbursement Letter, the Implementing Agencies may submit withdrawal applications to request IDA and GEF to make payments directly to the suppliers.

Disbursement from the SAs. The disbursement from the SAs will require the signatures of: (a) in case of EdC - the Project Director or his designate and the Director of Finance and Accounting Department or his designate; (b) in case of MIME - the Minister of Economy and Finance or his designate and the Minister of Industry, Mines and Energy or his designate; and (c) in case of the REF – Minister of Economy and Finance or his designate and the representative from the REF Board.

Withdrawal of IDA funds. Disbursement of IDA funds will be based on SOEs, Withdrawal Applications (WA) or Direct Payment Applications. EdC and MIME shall each prepare WAs to be submitted to IDA for their respective Special Accounts and through MEF deal with IDA

replenishments. Signatures on the IDA WAs shall be the Minister of Economy and Finance or his designate and: (a) in case of EdC - the Project Director of EdC or his designate; (b) in case of MIME - the Minister of Industry, Mine and Energy or his designate.

Direct Payment for EAC. The Direct Payment Application prepared by EAC will require the signature of: (a) the Ministry of Economy and Finance or his designate; and (b) the Chairman-Secretary of State of EAC or his designate.

Government counterpart funds will be channeled through the Counterpart Fund Account to be maintained by each implementing agency. The Counterpart Fund Account at EdC shall receive an initial deposit of US$40,000 from MEF and will be recorded as EdC's capital, and the Counterpart Fund Account at MIME and EAC shall each receive an initial deposit of US$10,000 from MEF. The Counterpart Funds Accounts will be periodically replenished from the Government (monthly or when the amounts withdrawn equal 20% of the initial deposit, whichever comes first).

Accounting Organization and Staffing: The financial management arrangements for the proposed Project will be handled as follows:

(a) EdC - under the External Financial Management Division of Finance and Accounting Department of EdC. The division is responsible for all externally funded projects, accounting and reporting, preparation of SOEs and Withdrawal Application for submission to IDA, supplier records and processing and filing of disbursement vouchers and supporting documents. The Manager of External Financial Management Division will be designated as the Project Accountant. The accounting transactions of the proposed project will be consolidated with the corporate accounting transactions to produce the consolidated corporate financial statements at the end of the year.

(b) MIME – as the experiences in procurement, disbursement and accounting are low within MIME, EdC will help during the transition in: (i) preparation of SOEs and Withdrawal Application for submission to IDA; (ii) maintaining of the accounting books; and (iii) preparation of consolidated FMRs for MIME-TA and EAC-TA activities. Once the REF is established, the Project Accountant to be engaged under the REF will help maintain the above tasks.

(c) REF – under the Project Accountant to be engaged under REF, he/she will also: (i) handle the disbursement arrangement and accounting books for MIME activities once the MIME-PMU is ceased; and (ii) preparation of consolidated FMRs for MIME-TA, REF and EAC-TA activities.

(d) EAC – under the accounting department of EAC. As the experiences in procurement, disbursement and accounting are low within EAC, the accounting department of EAC will be closely supervised by EdC in: (i) preparation of SOEs and Withdrawal Application for direct payment; (ii) maintaining of the accounting books; and (iii) preparation of FMRs.

EdC, MIME PMU/REF and EAC would be responsible for ensuring that IDA guidelines and procedures are followed on disbursements, auditing and overall financial management. This will include maintaining the Project's books of accounts, monitoring overall project disbursements, requesting replenishment of the Special Accounts and the Counterpart Funds Accounts, coordinating with the MEF on annual counterpart fund requirements, preparing withdrawal

applications for the MEF to submit to IDA, producing quarterly Financial Management Reports (FMRs), preparing annual financial statements, and having them audited by an external auditor acceptable to the IDA.

Accounting Policies and Procedures:

1. EdC - Currently, the bookkeeping of all externally funded projects and EdC as a whole are carried out on Excel spread sheets that is not automated. Meanwhile, the ACCPAC accounting software has been implemented in 1997, but only the General Ledger module is being utilized to keep track of accounting records of EdC. There are several issues with using dual accounting systems and running them in parallel: (a) the report produced from ACCPAC is unnecessarily used to confirm the accuracy of the report produced in the Excel spread sheet; (b) adequate software technical support is not available in Cambodia (EdC is not sure whether all problems can be resolved as some problems could not be solved in the past); (c) ACCPAC cannot provide the financial statements in the format required by MEF; (d) according to EdC, information is not available in Khmer language; and (e) only one person is designated to maintain the information. As a result, EdC prefers to maintain both systems to cross check figures but results in duplication of work.

   Since the Government is planning to introduce International Accounting Standards (IAS) this year, there is no reason for maintaining a dual accounting system and for not utilizing ACCPAC to its fullest capacity as ACCPAC is capable of providing the accounting books compliance with IAS. Therefore,
   (i) a new version of the ACCPAC accounting software for both General Ledger and Inventory modules will be financed under the Project; and
   (ii) a consultant will be hired, under the Project, to implement:
      (a) the two modules for EdC; and
      (b) the computerized accounting system for the Project Accounting using ACCPAC;
      (c) design the chart of accounts, and train the staff in running the software to full operation.

   The technical assistance will include the hiring the consultant on-board during on-the-job training for 4 months in order that EdC staff acquire enough experience in operating the computerized system.

2. REF - As the REF will be a new organization, it was agreed that a consultant would design, implement, and initially operate a financial management system with proper procedures and controls, according to the REF Operational Manual, during the first few years of the REF's operation. The consultant, who would also provide the necessary training of REF staff, would slowly phase-out as capacity is built within the organization.

Accounting policies will be in accordance with IAS applicable for project accounting. The accounting system will contain: (a) a chart of accounts and a coding system capable of capturing transactions classified by project components and IDA disbursement categories; (b) use of the cash method of accounting; (c) a double entry accounting system; and (d) the production of annual financial statements and quarterly FMRs acceptable to IDA.

Internal Audit. EdC used to have an internal audit department (IAD), but the department has ceased operating since 2000 due to the inability of the department to effectively carry out the assigned tasks. EdC has planned to reestablish this function: (i) at the last Board meeting, the Board had already acknowledged and agreed in principle on reactivating the internal audit department; and (ii) the proposal for re-establishing the IAD has been prepared and will be

submitted for Board endorsement at the next Board meeting. The establishment of the IAD will be a conditions of Credit effectiveness for the IDA and ADB loan. Initially, three personnel will be appointed and will obtain internal audit training provided by MEF. Currently, MEF was granted a technical assistance by ADB to provide training to State-Owned Enterprises and line ministry audit personnel on internal audit, law and sub-decree, etc. . ADB will also support the additional audit training to be provided by the resident financial advisor.

Planning and Budgeting: The External Financial Management Division of EdC, the REF Secretariat, and the accounting department of EAC will be responsible for annual plans and budgets of the Project, with the inputs from responsible units. This should help ensure that financial resources are available for project implementation and coordinated with the procurement plans.

Reporting and Monitoring: The project Implementing Agencies shall provide IDA with FMRs in accordance with the Guideline to Borrowers issued on November 30, 2002. The FMRs shall include: (a) Discussion of Project Progress; (b) a Balance Sheet; (c) Sources and Uses of Funds by Disbursement Categories; (d) Uses of Funds by Project Activities; (e) Output Monitoring Report; and (f) Procurement Status Report. The reports shall emphasize linkages between expenditures and physical progress. The FMR formats for EdC and the REF (including MIME and EAC) have been designed and agreed with EdC and MIME PMU
EdC and the REF will be responsible for submitting the FMRs to IDA on a quarterly basis within 45 days of the quarter end starting the first quarter following Project's first disbursement. Additional output monitoring report and key performance indicators will be identified and developed to suit project needs during implementation as appropriate. Responsibility for submitting the FMRs will be as follows:

Implementing Agency	**FMRs**	**Due Date**
EdC	Consolidated FMRs for all components implemented by EdC.	Quarterly, starting the quarter of June 30, 2004
REF	Consolidated FMRs for: (a) REF sub-grants and TA; and (b) TA for MIME and EAC.	Quarterly, starting the quarter of September 30, 2004
MIME	To be consolidated under REF	N.A.
EAC	To be consolidated under REF	N.A.

However, in order to have a clear view of all activities, a Consolidated FMRs for the whole project may be requested during implementation as appropriate.

Financial Management Action Plan: It has been agreed that the Implementing Agencies shall carry out a time-bound action plan as stated below for strengthening their financial management system.

Actions	Responsibility	Completion Date
Financial Management System and Reporting		
1. Put in place a project accounting system at the REF (manual accounting system using Excel spread sheet) capable of producing FMRs, annual financial statements and required statutory reports.	REF/Consultant	By May 31, 2004
2. Put in place a computerized accounting system for EdC (both General/Ledger (G/L) and Inventory modules) and a project accounting system for the External Financial Management Division (G/L module) using ACCPAC accounting software.	EdC/Consultant	By Dec 31, 2004
Financial and Administration Manual (FAM)		
3. RE to finalize and adopt the FAM, satisfactory to IDA.	REF/Consultant	By June 30, 2004
Training		
4. Provide training to REF staff in maintaining manual accounting records.	REF/Consultant	By June 30, 2004
Internal Audit		
5. Establish the IAD in EdC and provide training to the internal auditor.	EdC/Consultant	Effectiveness
Audit Arrangement		
6. Appoint an independent auditor acceptable to IDA to carry out the audit of the Project in accordance with TORs satisfactory to IDA.	EdC/REF	By June 30, 2004

Annex 7: Project Processing Schedule

Project Schedule	Planned	Actual
Time taken to prepare the project (months)		
First Bank mission (identification)	03/15/00	07/12/99
Appraisal mission commencement	09/15/03	09/15/03
Negotiations	10/21/03	11/04/03
Planned date of Effectiveness	02/28/04	03/31/04
Board Date	12/16/03	

Prepared by:
Staff of the MIME and EdC, under the direction of a Steering Committee for the project and in co-ordination with the MEF and the Ministry of Environment. The Government team worked with the assistance from a team of international and local consultants.

Preparation assistance:
Japanese PHRD, Finnida grant, GEF preparation grant, IDA PPF, ESMAP

Bank staff who worked on the Project included:

Name	Specialty
Rebecca Sekse	Task Team Leader/Financial Analysis
Chandrasekar Govindarajalu/Jon Exel/Rohit Khanna	Rural and Renewable Energy Specialist
Enrique Crousillat	Task Team Leader/Economist
Yuling Zhou	Procurement/project implementation
Kurt Schenk	Engineering and cost estimates
Glenn Morgan/Bernie Baratz	Environmental Assessment
Youxuan Zhu	Social Scientist
Lanfranco Blanchetti-Revelli/Teck Ghee Lim	Social Scientist
Fernando Lecaros/Morten Larsen	Power Economist
Kannathee Danaisawat/Wijaya Wickrema	Financial Management
Mei Wang/Karin Nordlander	Legal Counsel
Robert P. Taylor	Energy Specialist
Rosa Muleta/Omowunmi Ladipo	Disbursement Officer
Soudalath Silaphet	Project Assistant
Chrisantha Ratnayake	Peer Reviewer
Mac Cosgrove-Davies	Peer Reviewer
Peter Cordukes	Peer Reviewer

Annex 8: Documents in the Project File

REF and REF Interim PMU; MIME, September 2003.
The Royal Decree for establishment of the Rural and Renewable Electrification Fund;
Project Implementation Plan for the Grid-Extension sub-component;
Second draft of the detailed Implementation Plan for the Renewable Energy sub-component;
Final draft Mini Hydro Pre-Investments study;
Final report of Solar Market survey "Investing in Solar Photovoltaics in Cambodia;
Financing Photovoltaic Household electrification in Cambodia: Suitability of Emerging Delivery Models Photovoltaic market Development in Cambodia: Potential involvement of ESCO and batteries/appliance traders
Final draft of detailed incremental cost calculations.
Pre-investment Study of Community Scale Hydro Projects
Renewable Energy Action Plan: An investment Guide for Renewable Electricity Development
RREF reports
REF Vol. 1 - Organization and Management of REF, November 2001
REF Vol. 2 – Procedures for the REF, November 2001
REF Vol. 3 – Subsidy Principles, November 2001
National Rural and Renewable Electricity Policy, MIME, March 2003
REE study report
REE interim association building report
Evaluation of Implementing Options and Alternative Funding Mechanisms Designed to Encourage Greater Private Sector Participation in Cambodia's Provincial Electricity Sector; Draft Report; K.W. Wentzel, Enertech, Intl. ; March 2003.
Renewable Energy – Based Rural Electrification Five Year Action Plan; MIME; September 2003
Proceedings from the Renewable Electricity Action Plan National Participatory Workshop 2, November 2002.
Renewable Energy Action Plan, An Investment Guide for Renewable Electricity Development, May 2003
Procurement Capacity Assessment Report

Project Implementation Plan
Environmental and Social Impact Assessments
T/L Feasibility Study
Rural Electrification Strategy and Implementation Programme
Resettlement and Rehabilitation Action Plan and Policy Framework
Bank Mission Aide Memoires
Phnom Penh Power Rehabilitation Project, Staff Appraisal Report, December 1995
Phnom Penh Power Rehabilitation Project, Implementation Completion Report, March 2001
Cambodia Country Assistance Strategy - Report No. 20077-KH
Cambodia Power Sector Strategy - Report No. 19382-KH
Power Trade Strategy for the Greater Mekong Sub-region - Report No. 19067-EAP
Private Solutions for Infrastructure in Cambodia
Cambodia Rural Electrification Fund Strategy Reports
Energy Lessons in Private Provision of Rural Infrastructure Services, Rural Electrification in South East Asia: Cambodia, Laos, Vietnam; Final Report, October 2002
Cambodia Power Sector Strategy 2003-2020; Royal Government of California; MIME; February 2003
Electricity Act

Samples of Model Documents and Licenses
Business Plan for Electricité du Cambodge
Assessment of EdC's Capacity to Implement Project Procurement
Acleda Bank Limited; Annual Report, 2001
Overseas Cambodia Investment Corporation; Investment Guideline; Cambodia Toda and Canadian Bank Limited, 2002
Overseas Cambodian Investment Corporation Ltd; Annual Report 2001.

Power Trade Agreement between the Ministry of Industry Mines and Energy of the Royal Government of Cambodia, and the Ministry of Industry of the Government of the Socialist Republic of Vietnam, July 3, 2000
Agreement between the Royal Government of Cambodia and the Government of the Socialist Republic of Vietnam on the Power Sector Cooperation.
Power Purchase Agreement for the Supply of Power at High Voltage Level from Thot-Not to Phnom Penh Via Chau Doc and Takeo between Electricite du Cabodge and Electricity of Vietnam, July 24, 2000.
Proposed Draft, Amendment No. 1, the Power Purchase Agreement for the Supply of Power at High Voltage Level from Thot-Not to Phnom Penh Via Chau Doc and Takeo between Electricite du Cambodge and Electricity of Vietnam, October 2003.
Power Purchase Agreement between EdC and Khmer Power Company Limited; September 2003.
Asian Development Bank Memorandum of Understanding; Tripartete Meeting for TA 4076; Power Distribution and GMS Transmission Project and Partial Review of Loan No. 1794-CAM (SF); Provincial Power Supply; February 2003.

Annex 9: Statement of Loans and Credits

CAMBODIA: Rural Electrification and Transmission Project

24-Sep-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
P071207	2004	KH-Prov. & Rural Infrastructure Project	0.00	20.00	0.00	0.00	19.72	0.00	0.00
P070542	2003	KH-Health Sector Support Project	0.00	17.20	0.00	0.00	25.67	-2.92	0.00
P073311	2003	KH-PROV & PERI-URB WATER	0.00	16.90	0.00	0.00	20.46	0.00	0.00
P071146	2003	KH- RURAL INVESTMENT & LOCAL GOVERNAN	0.00	22.00	0.00	0.00	22.41	0.97	0.00
P070875	2002	KH-Land Management and Administration	0.00	24.30	0.00	0.00	24.63	1.68	0.00
P071247	2002	KH - Eco. & PS Capacity Building Project	0.00	5.50	0.00	0.00	6.02	1.23	0.00
P071445	2002	KH - Demobilization and Reintegration	0.00	18.40	0.00	0.00	16.40	-3.95	0.00
P073394	2001	KH-Flood Emergency Rehabilitation Proj	0.00	35.00	0.00	0.00	16.68	1.45	0.00
P065798	2000	KH-BIO & PROTEC AREAS M	0.00	1.91	0.00	0.00	1.31	0.83	0.93
P052006	2000	KH BIO & PROT AREA M	0.00	0.00	2.75	0.00	1.96	3.70	1.38
P058544	2000	KH - Cambodia SAC	0.00	30.00	0.00	0.00	15.42	26.89	0.00
P060003	2000	KH-Forest Concession Mgt & Control Pilot	0.00	4.82	0.00	0.00	3.14	3.04	0.00
P059971	2000	KH-EDUCATION QUALITY IMPROVEMENT	0.00	5.00	0.00	0.00	0.34	0.43	0.00
P004030	1999	KH-Road Rehab.	0.00	45.31	0.00	0.00	23.48	24.47	0.00
P050601	1999	KH-SOCIAL FUND II	0.00	25.00	0.00	0.00	2.45	-6.52	0.00
P058841	1999	KH-NORTHEAST VILLAGE	0.00	5.00	0.00	0.00	0.62	0.77	0.79
P045629	1998	KH-URBAN WATER SUPPLY	0.00	30.96	0.00	0.00	3.31	4.30	1.89
P004033	1997	KH-AGRICULTURAL PRODUCTIVITY IMPROVE	0.00	27.00	0.00	0.00	12.96	14.36	13.18
		Total:	0.00	334.30	2.75	0.00	216.98	70.72	18.16

CAMBODIA
STATEMENT OF IFC's
Held and Disbursed Portfolio
June 30 - 2003
In Millions US Dollars

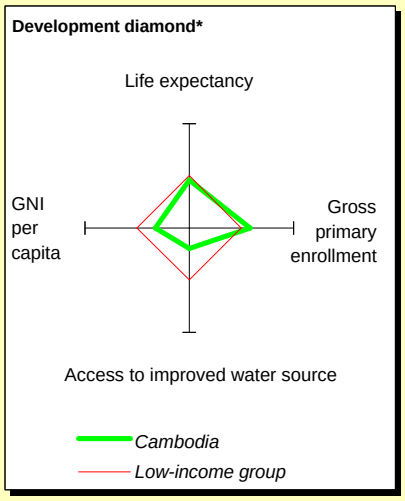
		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
2003	Amanresort	1.20	0.00	0.00	0.00	1.20	0.00	0.00	0.00
2000	SEF ACLEDA Bank	0.00	0.49	0.00	0.00	0.00	0.49	0.00	0.00
2003	SEF Hagar Soya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Portfolio:	1.20	0.49	0.00	0.00	1.20	0.49	0.00	0.00

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic
2004	Acleda Bank RI	0.00	0.00	0.00	0.00
2000	SEF ACLEDA Bank	0.00	0.00	0.00	0.00
	Total Pending Commitment:	0.00	0.00	0.00	0.00

Annex 10: Country at a Glance

CAMBODIA: Rural Electrification and Transmission Project

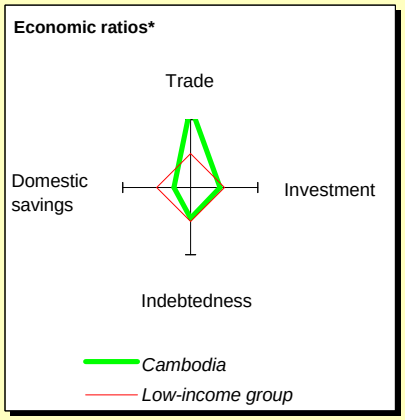
POVERTY and SOCIAL	Cambodia	East Asia & Pacific	Low-income
2002			
Population, mid-year *(millions)*	12.5	1,838	2,495
GNI per capita *(Atlas method, US$)*	280	950	430
GNI *(Atlas method, US$ billions)*	3.5	1,740	1,072
Average annual growth, 1996-02			
Population *(%)*	2.2	1.0	1.9
Labor force *(%)*	2.6	1.2	2.3
Most recent estimate (latest year available, 1996-02)			
Poverty *(% of population below national poverty line)*	36	..	..
Urban population *(% of total population)*	18	38	30
Life expectancy at birth *(years)*	54	69	59
Infant mortality *(per 1,000 live births)*	90	33	81
Child malnutrition *(% of children under 5)*	45	15	..
Access to an improved water source *(% of population)*	30	76	76
Illiteracy *(% of population age 15+)*	31	13	37
Gross primary enrollment *(% of school-age population)*	110	106	95
Male	117	105	103
Female	103	106	87



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

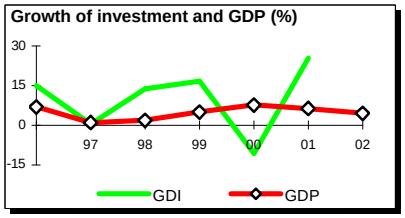
	1982	1992	2001	2002
GDP *(US$ billions)*	..	2.0	3.4	3.7
Gross domestic investment/GDP	..	9.8	17.9	..
Exports of goods and services/GDP	..	15.7	53.2	..
Gross domestic savings/GDP	..	6.9	9.8	..
Gross national savings/GDP	..	7.6	..	..
Current account balance/GDP	..	-4.7	-3.1	..
Interest payments/GDP	..	0.0	0.1	0.2
Total debt/GDP	..	92.4	79.3	79.1
Total debt service/exports	..	..	1.2	..
Present value of debt/GDP	..	..	67.5	..
Present value of debt/exports	..	..	133.8	..

	1982-92	1992-02	2001	2002	2002-06
(average annual growth)					
GDP	5.5	4.8	6.3	4.5	..
GDP per capita	2.2	2.2	4.2	2.6	..
Exports of goods and services	..	19.0	14.6	..	..

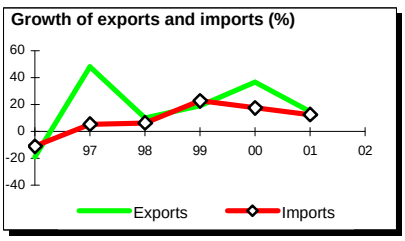


STRUCTURE of the ECONOMY

	1982	1992	2001	2002
(% of GDP)				
Agriculture	..	47.8	36.9	..
Industry	..	13.2	21.9	..
Manufacturing	..	5.1	..	..
Services	..	39.1	41.2	..
Private consumption	..	83.6	84.2	..
General government consumption	..	9.5	6.0	..
Imports of goods and services	..	18.6	61.3	..



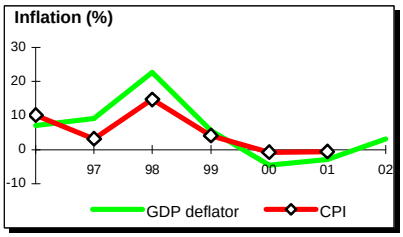
	1982-92	1992-02	2001	2002
(average annual growth)				
Agriculture	5.1	1.7	3.9	..
Industry	6.0	9.8	15.5	..
Manufacturing	6.1	9.2	..	..
Services	5.8	5.4	2.5	..
Private consumption	..	1.7	2.2	..
General government consumption	..	3.1	13.1	..
Gross domestic investment	..	10.5	25.5	..
Imports of goods and services	..	12.2	12.6	..



* 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.

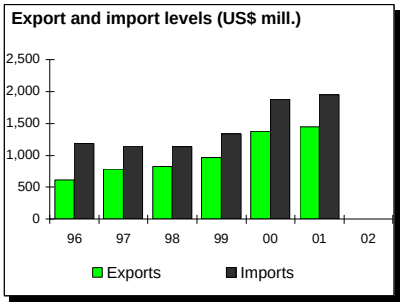
PRICES and GOVERNMENT FINANCE

	1982	1992	2001	2002
Domestic prices				
(% change)				
Consumer prices	..	..	-0.6	..
Implicit GDP deflator	..	75.4	-2.8	3.1
Government finance				
(% of GDP, includes current grants)				
Current revenue	..	6.5	12.2	..
Current budget balance	..	-3.0	1.5	..
Overall surplus/deficit	..	-3.3	-6.0	..



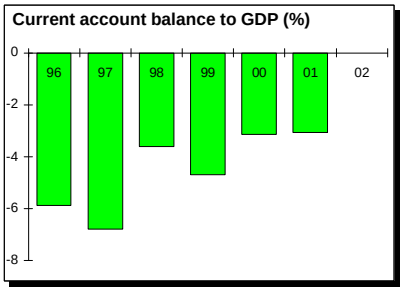
TRADE

	1982	1992	2001	2002
(US$ millions)				
Total exports (fob)	..	265	1,451	..
Rubber	..	12	..	..
Logs and sawn timber	..	25	..	..
Manufactures	..	..	..	..
Total imports (cif)	..	351	1,950	..
Food	..	..	..	..
Fuel and energy	..	..	..	..
Capital goods	..	..	..	..
Export price index *(1995=100)*	..	..	..	..
Import price index *(1995=100)*	..	..	..	..
Terms of trade *(1995=100)*	..	..	..	..



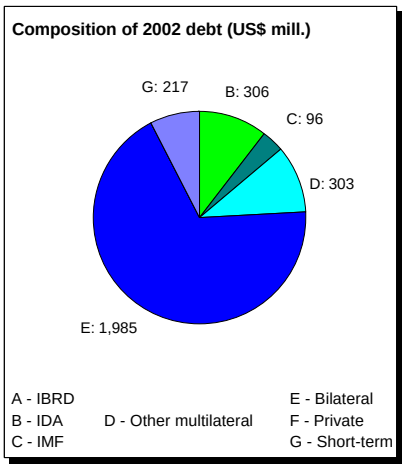
BALANCE of PAYMENTS

	1982	1992	2001	2002
(US$ millions)				
Exports of goods and services	..	314	1,681	..
Imports of goods and services	..	373	2,006	..
Resource balance	..	-59	-325	..
Net income	..	0	-118	..
Net current transfers	..	14	..	..
Current account balance	..	-93	-105	..
Financing items (net)	..	..	171	..
Changes in net reserves	..	..	-66	..
Memo:				
Reserves including gold *(US$ millions)*	..	..	..	..
Conversion rate *(DEC, local/US$)*	..	1,266.6	3,916.3	3,912.1



EXTERNAL DEBT and RESOURCE FLOWS

	1982	1992	2001	2002
(US$ millions)				
Total debt outstanding and disbursed	9	1,831	2,703	2,907
IBRD	0	0	0	0
IDA	0	0	238	306
Total debt service	0	13	21	21
IBRD	0	0	0	0
IDA	0	0	1	2
Composition of net resource flows				
Official grants	21	99	186	..
Official creditors	0	0	91	146
Private creditors	0	0	0	0
Foreign direct investment	0	33	113	..
Portfolio equity	0	0	0	..
World Bank program				
Commitments	0	0	63	30
Disbursements	0	0	40	47
Principal repayments	0	0	0	0
Net flows	0	0	40	47
Interest payments	0	0	1	2
Net transfers	0	0	38	45



Note: This table was produced from the Development Economics central database. 8/20/03

Annex 11: Resettlement and Social Safeguards

Land Acquisition and Resettlement

The proposed Cambodia Rural Electrification and Transmission Project will consist of three components: (1) Rural Electrification (RE) Component; (2) Transmission Component; and (3) TA Component. The RE Component will include both grid extension and off-grid RE. For the transmission component, certain amount of land acquisition and resettlement will be required, which is mainly caused by acquiring land for substations, building tower bases, and clearing right of way (ROW) under the T/Ls. For the RE component, while construction of MV and LV requires little land acquisition and resettlement, small land acquisition might be required for the construction of mini hydro and some MV facilities. Following the Bank policy on involuntary resettlement, a resettlement policy framework for the RE component and a resettlement action plan for the transmission component were prepared in 2001, and updated in 2003. In addition, although there are no ethnic minorities in the project areas for both transmission and grid extension components, because the REF is a national program and its activities may benefit ethnic minority populations, an ethnic minority development strategy has been developed for the REF component. This summary is based on these three documents.

Resettlement Action Plan for the Transmission Component

The Transmission Component will consist of: (i) a 220kV double circuit T/L from West Phnom Penh (WPP) to the Vietnamese border; (ii) two new substations in WPP and Takeo (TSS); and (iii) 115kV connection and reinforcement of the 115kV grid in Phnom Penh. The component will be financed by IDA and ADB, with ADB financing all 220kV elements and IDA financing all 115kV elements. Based on agreement between ADB and IDA missions, one common RAP has been prepared based on an early draft.

Scope of Resettlement

The RAP for transmission component was based on 100% census survey of all affected people and social economic survey among 25% of potentially affected families. According to updated survey, the whole component will acquire a total of 8.94 ha of land areas for both substations and tower bases. About 96% of acquired land areas are paddy land. Along with land acquisition, a total of 149 households and 745 persons will be relocated from the right of way. Among total impacts, significant portion of resettlement is under 220 kV component funded by ADB. For the whole component, a total of four Provinces (including Phnom Penh Municipality), 15 Districts, 37 Communes, and 120 Villages will be affected by the Project. Most of such impact is relatively minor, caused by the clearance of ROW (30 m) and land acquisition of tower bases. The more significant impact is those affected by land acquisition in two substations (23 households) and those to be physically relocated along the transmission alignment (149 households), with a total of 172 households.

Removal of 7,300 economic trees, primarily sugar palm, might also have significant impacts for some affected households. Most of those are likely to be the owners of residences requiring relocation, as the trees tend to be clustered around built up residential areas. In addition, during project construction, some temporary impacts might take place either in or outside the ROW and substation boundaries for access road, storage areas, borrow pits and work areas. Compensation will be based at replacement value for such impacts, which will be determined during project implementation.

Table 1. Scope of Resettlement Impact for Transmission Component

	Components	Land Acquired ha.	Household affected by land loss[4]	Number of Relocated Households[5]	Number of trees to be removed
ADB	220kV T/L	3.70	370	140	7,112
	220kV Substations	5.20	23		
IDA	115kV T/L	0.04	93	9	184
	Total	8.94	486	149	7,296

Social economic conditions

The project areas consist mainly of rice fields in very flat terrain with scattered villages, houses and trees. The villages are located mostly along roads, with some small businesses also developed along the sides of major roads. The major economic activity is rainfed lowland rice farming. Other farming activities include vegetables and tree crops, small-scale livestock production and collecting fish, frogs and crabs in rice fields and channels. By far the most common primary occupation was farming (87% of respondents), with rice being the main source of income. Reported annual household incomes ranged from to US$2,737 to only US$13, with a median of US$183 and an average of US$249. About 87% of surveyed Affected Persons (Aps) would be classified as at or below the national poverty line at US$14 per capita/month.

The literacy rates for the general population in the 176 communes along the ROW is nearly 69% with 83% for males and 57% for females. In the general population along the T/L ROWs, some 35% have not completed their Primary Education, 22% have completed Primary Education, 9% Lower Secondary, and 2% have a Secondary Education or above.[6] All affected people interviewed identified themselves as ethnic Khmer. No indigenous or other ethnic minorities have been identified in the surveys.

About 23% of surveyed population could be considered as being vulnerable groups, such as female headed households, elderly without support, disabled, and in extreme poverty, and certain form of assistance will be provided during resettlement implementation.

Objective and Principles

Efforts have been made to minimize the number of houses affected and to completely avoid sensitive sites such as temples and schools. For those where impact could not be avoided, adequate compensation and rehabilitation measures will be provided in order to ensure that APs will be able to restore or even improve their livelihood after resettlement.

[4] The number of affected households by substations is based on actual survey. The number of affected by T/L is based on assumption that each tower base will affect one household.

[5] Among relocated households, one commercial scale chicken farm will be affected at Krang Chake village, requiring the relocation of a chicken shed within the same site.

[6] The corresponding percentages for the 127 APs household heads along the 220kV Line who are required to shift their residences are 29% having some schooling, 39% completed Primary School, 19% Lower Secondary, and 13% having a Secondary Education or above.

The Project's resettlement and compensation are to be in accordance with World Bank requirements and Cambodian law. The objectives and principles for resettlement and compensation to be adopted to implement the Bank' policies for the Project are as follows:

1. The livelihood for APs following the Project shall be better or at least equal to livelihood levels before the Project.
2. The Project shall be designed so that resettlement and associated impacts are minimized
3. Compensation and resettlement shall be carried out before land acquisition and construction; this needs to be taken into account in the development of the project schedule.
4. Compensation shall be based on replacement value with no deduction for depreciation, demolition or the value of salvaged materials.
5. The preferred form of compensation for lost land is land of equivalent value, including productivity, area and location. However if the area of land taken is small (less than 20% of total landholding), then cash compensation shall be acceptable.
6. All APs shall be eligible for compensation, regardless of whether they hold legal title to the land they occupy

Legal framework and compensation policies

Cambodian law requires that land can only be compulsorily acquired where it is in the national interest and that in such case, fair compensation must be paid in advance. This is consistent with the Bank's policies, which go beyond this and have further specific requirements. Although Cambodian law does not recognize private ownership in certain cases, such as in existing ROWs, this does in any case not prevent compensation being provided to meet with the Banks' policies, through other means than direct compensation under the law. While the individual's rights to ownership and compensation are protected in the new Land Law, there is no clearly defined mechanism for land acquisition and amounts of compensation. For different Bank projects, ad hoc inter-ministries committee was often set up to review and adopt compensation rates. For this Project, in order to ensure that adopted compensations are reflecting replacement values, a set of compensation standards has been developed, based on detailed survey of replacement values among various assets, such as land, structures, and various attachments. For acquired farmland, compensation rate will be set at US$0.1 to US$5.6 per square meter based on replacement value and market prices, including the location factor. For removed houses, compensation will be set at US$7 to US$283 per square meter, averaging US$2000 per house. For removed attachments, detailed compensation rates will be developed based on replacement cost. In addition, the Project will provide various moving and transition allowance for the APs, such as US$40 per household for moving allowance, US$40 per household for transition assistance, and US$20 per household for those vulnerable households.

Rehabilitation Approaches and Options

For those affected by house demolition, they will be provided compensation at replacement value to rebuild their new houses either within the same housing plots, or at new housing plots within the same villages. The cost associated with purchasing new housing plots, installing relevant facilities and moving expenses will all be paid under the Project. The affected households will be consulted for the location of new housing plots, which will be comparable with their current locations.

For those affected by land acquisition, adequate compensation and rehabilitation will be provided. For those affected by land acquisition of tower bases under T/Ls, due to little land areas involved, ranging from only 4 square meters for the 115 kV T/L to about 100 square meters under the 220 kV T/L , cash compensation will be made to affected individuals. For those affected under two substations, the land acquisition could take quite large proportion of their land holdings, averaging 22% for TSS and 37% for WPP. Extensive consultations have been carried among affected families. Most of affected families seem to prefer cash compensation, since the compensation provided under the Project would allow them to either purchase existing paddy from the market or engage in other income generation activities. Further consultation will be carried out prior to resettlement implementation.

Consultation and disclosure

Extensive consultation and disclosure had been carried out during the resettlement planning stage, and the draft RAP had been translated into local language and distributed to affected provinces and districts. For the updated RAP, a resettlement information booklet has been prepared in both English and Khmer, which had been distributed among the APs and other stakeholders at the end of September. In addition, the summary of the final RAP (including detailed compensation rates after approval by IRC) will also be placed in public places accessible to the APs, such as in EdC offices in Phnom Penh and Takeo, and selected villages along the alignment.

In order to ensure that AP's complaints on compensation and rehabilitation are addressed in a timely and satisfactory manner, a well defined grievance redress mechanism will be established under the Project. The PMO in EdC will establish a Committee for the consideration of complaints and grievances, with members from EdC, IRC at both national and local levels, Commune Committee Members; Independent Monitoring Organization (IMO) (Observer role); and local village officials.

The community consultation program will provide contact details for submission of complaints and grievances. This will include a phone contact and address for written submissions. However, as this is not a practical means of communication for many people in remote areas, it will also be necessary to establish an appropriate alternative avenue for those who are illiterate or for whom these are not appropriate avenues. There will be no fees or charges required of those wishing to have a compla int heard. Follow up checks of this will be included in the scope of the IMO.

Institutional Arrangement

The main responsibility for resettlement implementation is EdC, under the general supervision of MIME and MEF. MEF will fund the implementation of the RAP, and EdC will, in coordination with relevant agencies, manage and supervise the overall Project, including resettlement activities. A special resettlement and environment unit will be established at EdC to handle resettlement implementation for all projects under EdC. To strengthen institutional capacity for resettlement, TA such as workshops, training, and study tour, is provided under the Credit for staff of EdC and IRC.

Local Authority Sub-Committees will be established during project implementation. The Sub-Committee will be headed by the Provincial Governor and members will be the District Governors, Chief of Communes, and head of Villages, along the ROW. During resettlement implementation, Commune Councils of the affected communities will play a key role in

facilitating and coordinating with the resettlement team. They will help to organize public meetings and consultations, guide the RAP team during the Detailed Measurement Survey's (DMS's) revalidating inventory, facilitate in conflict resolution and witness with signature the agreed inventory list of affected assets of each household.

Resettlement Cost Estimate

The total resettlement cost for the transmission component is estimated at US$2.0 million, which includes a 20% contingency. This is based on a Replacement Cost Survey carried out in April 2003 and the inclusion of an Income Restoration Strategy for loss of income-producing trees, which raised the overall budget from a previous US$1.9 million. Among total costs (US$2.0 million), 5% for permanent land acquisition, 40% for house demolition and relocation, 25% for temporary impact and 20% for income restoration for sugar palms.

Monitoring and Evaluation

An IMO will be appointed to monitor the resettlement and compensation process and verify that compensation, resettlement and rehabilitation have been implemented in accordance with the agreed RAP. To ensure the resettlement objective, the IMO should also carry out income surveys among a group of sample households to monitor changes of income and livelihood and identify issues associated with the process of resettlement and restoration.

Resettlement Policy Framework for RE Component

For both on-grid distribution sub-projects and off-grid REF sub-projects under the RE component, although little land acquisition are expected for MV and LV connections, small land acquisition might be required for the construction of mini hydro and some MV facilities. Since detailed project selection and design has not yet been prepared, a resettlement policy framework and procedure guidelines has been developed to ensure that any land acquisition and resettlement will follow the same resettlement policy as under the transmission component.

The proposed resettlement policy framework developed includes key elements, such as resettlement principles, project description, potential impacts and resettlement screening procedure, legal framework, organizational structure, consultation and grievance procedure, and monitoring arrangement. According to the policy framework, an abbreviated resettlement plan will be prepared by the implementation agency if less than 200 people are affected by a sub-project. If more than 200 people are affected, then a RAP will be prepared. The screening of resettlement impacts will be the responsibility of two implementation agencies, EdC for the on-grid component, and PMU MIME (or the REF once it is set up) for REF sub-projects.

Ethnic Minority Development Strategy for the REF Component

Although there are no ethnic minorities in the project areas for both transmission and grid extension components, because the REF is a national program and its activities may benefit ethnic minority populations, an ethnic minority development strategy has been developed for the REF component. The proposed ethnic minority development strategy will include a screening process, followed by social assessment and development of an indigenous people development plan, which will be incorporated into the application and approval process for REF sub-projects, identifying sub-projects that involve ethnic minorities and setting a consultative process in place where this is the case.

Linkage of 220kV T/L in Vietnam

The proposed Transmission Component will connect the 220kV T/L between Thot Not and the border point (via Chau Doc) in Vietnam with a total of 98 km, which will enable EdC to purchase low cost electricity from Vietnam. Because the 220kV T/L in Vietnam is "directly and significantly related with the Bank assisted project", the Bank resettlement policy should also apply in accordance with new Bank OP 4.12. Since this 220kV T/L in Vietnam including two switchyards will also be funded with cost saving from the existing IDA Credit, a RAP following the Bank OP has been developed and approved by the Bank.

Annex 12: Environmental Management Plan

A. 220kV Interconnection to Vietnam (ADB Financed)

A.1 <u>109 km Transmission Line</u>

A.1.1 Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Construction		
Loss of Tree Resources	Trees that can survive pruning to <3 m will be pruned Vegetation to be cleared will be marked prior to clearance Trees to remain are to be clearly marked Vegetation to be removed manually, no pesticides to be used	Contractor*
Crop and Land Disturbance	Construction techniques and machinery selected to minimize disturbance Construction timed to avoid disturbance of crops within one month of harvest wherever possible Existing roads/tracks to be used wherever possible. When new access roads are to be constructed alignment should cause minimum loss/damage and impact to local land use pattern. Placement of fill in drains/canals not permitted Excavated soil (e.g. for tower footings) placed along roadsides or wherever requested by landowners (no fees) Concrete batching plants to be located on existing disturbed/low productivity sites. Only officially licensed plants permitted	Contractor*
Wildlife Impact: Habitat Loss	Trees up to 3 m retained in ROW Trees that can survive pruning to <3 m will be pruned Workers restricted from harvesting or collecting wood/tree products *At the freshwater swamp area* special	Contractor*

	precautions are to be taken to avoid fish spawning and waterfowl habitat areas.	
Air quality	Concrete batching plants to be located downwind and away from inhabited areas	Contractor*
Soil Erosion	No significant activity during monsoon Groundcover to be left undisturbed as much as possible Trees cut only to ground level; tree stumps/roots retained Soil removed from tower foundation excavation disposed in accordance with local community (along roads or houses) and disposal site revegetated	Contractor*
Water Quality and Soil Contamination	Fuel or hazardous materials securely stored at least 20m from any surface water and above flood level Proper wastewater treatment, water supply and waste disposal facilities for workforce	Contractor*
Noise	Activities to be conducted during daytime hours and local residents informed of construction schedule	Contractor*
Cultural Resources	Alignment should be designed to avoid areas of cultural significance Chance find procedures should be established and incorporated into construction contract bidding documents.	Contractor*
Operation		
Wildlife Impact: Flight Death and Electrocution	Silhouettes of birds of prey attached to conductors Markers (e.g. colored balls) attached to wires to improve bird visibility Perch guards and/or conductor insulation Screens to prevent monkeys/arboreal animals from climbing towers	Contractor*
Telecommunication Interference	Design to comply with international standards for electromagnetic interference from AC power lines Bundle conductors to mitigate corona effect Design and manufacture components to avoid high electrical stress	Contractor*
Public Health	Design to meet international standards (IEC: International Electro-Technical Commission) for ground level exposure to electric and magnetic fields	Contractor*
Worker/Public Safety	All sites certified clear of UXO by Cambodian	Contractor*

	Mine Clearance Authority, CMAC) prior to construction Signs and fences to prevent trespassing	
Loss of Agricultural Productivity	Tower footing design should minimize permanent land use requirement, and should allow access for farming in and around footing area.	Contractor*

* To be specified in the bid document

A.1.2 Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Construction				
Loss of Tree Resources	Observation	Along Right-of-Way	Once/month	EDC Environment Office in PMU
Crop and Land Disturbance	Observation	Along Right-of-Way	Once/month	EDC Environment Office in PMU
Wildlife Impact: Habitat Loss	Observation	Along Right-of-Way	Once prior and during construction	EDC Environment Office in PMU
Air quality	Observation	Concrete batching plant location	Once, when plant is built	EDC Environment Office in PMU
Soil Erosion	Observation	Along Right-of-Way	Once/week and after rainstorm	EDC Environment Office in PMU
Water Quality and Soil Contamination	Observation	Along Right-of-Way	Daily	EDC Environment Office in PMU
Noise	Observation	Along Right-of-Way	Daily	EDC Site Engineer in PMU
Cultural Resources	Observation	Along Right-of-Way	During construction	EDC Site Engineer in PMU
Operation				
Wildlife Impact: Flight Death and Electrocution	Observation	On transmission lines and/or towers	Once, after construction	EDC Site Engineer in PMU
Telecommunication Interference	Observation	Along Right-of-Way	Once, after construction	EDC Site Engineer in PMU
Public Health	Electric and magnetic field measurement	Along Right-of-Way	Once, after line is energized	Contractor *

Worker/Public Safety	Contractor will be required to receive CMAC certification that the work area is mine free prior to the start of any construction			
Loss of Agricultural Productivity	Observation	At tower footings	During construction and after completion	EDC Site Engineer in PMU

A.1.3 Institutional Strengthening

- Training

The Contractor is to provide training to EDC PMU Environmental Office staff for one month, in Cambodia, in:

environmental planning
environmental impact assessment
environmental monitoring
environmental impacts and effects
environmental data analysis

In addition, the Contractor, is to provide a one week study tour to EDC PMU Environmental Office staff in his home country.

Design and construction contractor to prepare an occupational health and safety plan and provide training to all staff prior to their starting any work assignment

A.2 West Phnom Penh Substation

A.2.1 Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Construction		
Erosion	Embankments covered with topsoil and planted with cover and fenced to prevent grazing Borrow pits to be rehabilitated and revegetated	Design and Construction Contractor*
Water Quality and Soil Contamination	Site prepared above 1 in 10 year flood Transformers sited in impervious and bunded areas for 110% of oil capacity and reserve tanks Drainage traps with oil/water separators installed Proper wastewater treatment, water supply and waste disposal facilities for workforce	Design and Construction Contractor*
Hazardous Materials	PCBs are prohibited from use	Design and Construction Contractor*/EDC
Worker/Public Safety	Site certified clear of UXO prior to construction	Contractor required to received CMAC clearance*
Operation		
Public Safety	Proper design to limit lightning strike	Design Consultant/PMU
Noise	Setback of housing in accordance with Cambodian and World Bank noise standards/guidelines	Design Consultant/PMU
Electric and magnetic field	Setback of housing in accordance with IRPA/INIRC standards to minimize electric and magnetic field exposure (6-7 meters, minimum)	Design Consultant/PMU

* To be specified in the bid document

A.2.2 Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Construction				
Erosion	Observation	At substation site	Once/week and after rain	EDC Environment Office in PMU
Water Quality and Soil Contamination	Observation	At substation site	Once/week	EDC Environment Office in PMU
Hazardous Materials	Supplier certification that PCB content of transformer oil is zero	At substation site	Once, when transformer is delivered	EDC Environment Office in PMU
Worker/Public Safety • Mines • Housing setback	CMAC certification for mines Observation	Project construction area Vicinity of project construction area	CMAC establishes frequency Once, before construction	Contractor* EDC Environment Office in PMU
Operation				
Public Safety	Observation (Lightning strike design)	Substation	Once, after construction	PMU Site Engineer
Noise	Observation	Substation and in vicinity of local residents	Once, during commissioning	PMU Site Engineer
Electric and Magnetic Field	Electric and magnetic field measurement	Along Right-of-Way	Once, after substation is energized	Contractor*

A.2.3 Institutional Strengthening

Presented in Section A.1.3, above

A.3 Takeo Substation

A.3.1 Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Construction		
Erosion	Embankments covered with topsoil and planted with cover and fenced to prevent grazing Borrow pits to be rehabilitated and revegetated	Design and Construction Contractor*
Water Quality and Soil Contamination	Site prepared above 1 in 10 year flood Transformers sited in impervious and bunded areas for 110% of oil capacity and reserve tanks Drainage traps with oil/water separators installed Proper wastewater treatment, water supply and waste disposal facilities for workforce	Design and Construction Contractor*
Hazardous Materials	PCBs are prohibited from use	Design and Construction Contractor*/EDC
Worker/Public Safety	Site certified clear of UXO prior to construction	Contractor required to receive CMAC clearance*
Operation		
Public Safety	Proper design to limit lightning strike	Design Consultant/PMU
Noise	Setback of housing in accordance with Cambodian and World Bank noise standards/guidelines	Design Consultant/PMU
Electric and magnetic field	Setback of housing in accordance with IRPA/INIRC standards to minimize electric and magnetic field exposure (6-7 meters, minimum)	Design Consultant/PMU

* To be specified in the bid document

A.3.2 Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Construction				
Erosion	Observation	At substation site	Once/week and after rain	EDC Environment Office in PMU
Water Quality and Soil Contamination	Observation	At substation site	Once/week	EDC Environment Office in PMU
Hazardous Materials	Supplier certification that PCB content of transformer oil is zero	At substation site	Once, when transformer is delivered	EDC Environment Office in PMU
Worker/Public Safety • Mines	CMAC certification for mines	Project construction area	CMAC establishes frequency	Consultant*
• Housing Setback	Observation	Vicinity of project construction area	Once, before construction	EDC Environment Office in PMU
Operation				
Public Safety	Observation (Lightning strike design)	Substation	Once, after construction	PMU Site Engineer
Noise	Observation	Substation and in vicinity of local residents	Once, during commissioning	PMU Site Engineer
Electric and Magnetic Field	Electric and magnetic field measurement	Along Right-of-Way	Once, after substation is energized	Contractor*

A.3.3 Institutional Strengthening

Presented in Section A.1.3, above

Institutional Arrangements for Environmental Management

Institutional arrangements for environmental management of the three project components consisting of: 109 km T/L (A.1), West Phnom Penh Substation (A.2), and Takeo Substation (A.3), will be conducted as follows:

The Environment Office in the EDC PMU will collect all monitoring data. The data will be submitted to the Project Implementation Consultant environmental expert who will be responsible for analyzing the data. Consequently, the Project Implementation Consultant will prepare a quarterly monitoring report to the PMU. The PMU then, submits this report to EDC management with any recommendations. EDC Management will then instruct the PMU regarding any further actions.

If a serious environmental issues is identified which requires immediate action, the Project Implementation Consultant directly informs the PMU Environment Office who contacts EDC management immediately.

B. 115kV Transmission System Reinforcement

B.1 Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Construction		
Dust	Wet surfaces during hot, dry and/or windy conditions	Contractor*
Noise	Limit construction activities to daytime hours. If nighttime construction is necessary, local population will be notified in advance	Contractor*
Disruption of traffic patterns	Place warning signs at appropriate locations Consult with local population well in advance of construction activity	Contractor*
Land use at new pole placements	Design to minimize pole footprint	Design consultant
Hazardous Materials	No PCBs to be used for substation transformers or any other electrical equipment (specify in bid documents)	Contractor*
Operation		
Electric and Magnetic Fields	Design to meet standards	Design consultant

*To be specified in the bid document

B.2 Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Construction				
Dust	Observation	Construction site	Dry, windy weather	Environment Office of EDC PMU
Noise	Observation	Construction site	Daily	Environment Office of EDC PMU
Disruption of traffic patterns	Observation	Construction site	Once	EDC PMU Site Engineer
Land use at new pole placements	Observation	Construction site	During construction and after completion	EDC PMU Site Engineer
Hazardous Materials	Receipt of certification that any equipment is free from PCBs	EDC office of PMU	Once, during tender procedure	Design Consultant/Environment Office of PMU
Operation				
Electric and Magnetic Fields	Electric and magnetic field measurement	Along Right-of-Way	Once, after line is energized	Contractor*

B.3 Institutional Strengthening
Presented in Section A.1.3, above

Institutional Arrangements for Environmental Management

Institutional arrangements for environmental management of the 115kV Transmission System Reinforcement will be the same as described above for the three project components consisting of: 109 km T/L (A.1), West Phnom Penh Substation (A.2), and Takeo Substation (A.3).

EdC Rural Electrification (RE)

C.1 Grid Extension

Extension Criteria -General

Non-urban areas not provided with electricity by EDC or MIME

Villages within 40 km surrounding EDC's distribution grid

Villages with reasonable access to roads, population already living alongside the road (for ease of installation/operation/maintenance)

Villages where population is make a partial contribution to electrification and can pay their electric bills

Villages that have development potential/income generating opportunities (agriculture, forestry, handicrafts, etc.) and need electricity to develop this potential

Villages where electrification investments will support Government programs to halt internal migration, reduce nomadic farming and deforestation, or assist commune/village development

Villages which are included in the list of other development assistance programs or projects for developing infrastructure such as: transportation, water supply, health clinics, schools, etc.

Likely elements:

Grid extension could involved construction activities which include: (a) transformers, (b) poles, and other supporting mechanisms, (c) conductors and (d) electricity meters

Environmental Checklist Criteria

If any of the following factors are considered significant, an Environmental Management Plan (EMP, see format below) should be prepared.

- Change in land use or land surface contours (altering runoff patterns)
- Possible use of herbicides to keep area free of vegetation (usually for fire control)
- Possible use of PCBs (transformers or capacitors)
- Soil erosion (land clearing)
- Tree removal or pruning
- Public exposure to electric and magnetic fields
- Interference with local aesthetic characteristics
- Permanent loss of productive land from support structure placement
- Environmentally sensitive area involved (protected area, sensitive ecosystems)
- Culturally sensitive area involved (temples, historically/archaeologically significant etc.)
- Access road construction
- Potential impacts to air/water quality
- Potential risk to public health/safety
- Possible significant increase in noise levels during construction

Environmental Management Plan (EMP) Generic Form

Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Construction		
Operation		

Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Construction				
Operation				

Implementation Schedule: A brief schedule indicating the start and end of all mitigating and monitoring activities. The schedule should be integrated with the overall implementation schedule of the specific grid extension activity.

Institutional Arrangements: The EMP will be prepared by the project sponsor and submitted to the EdC PMU who will incorporate this information into their appraisal of the subproject and their overall decision to support the project proposal.

C.2 Rural Electrification Fund

Environmental Screening Criteria

Will the project take place on a new or existing site?
Will the impact on land/water affect the income or lifestyle of any local people?
Will the impact on air/land/water affect the local environment?
Are there any impacts that affect a large region and/or are long duration (months or years)?
Will there be a potential impact to the health of local people?

GENERIC ENVIRONMENTAL MANAGEMENT PLANS

New Household Connected (Diesel)

Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Construct		
Noise	Limit construction activities to daytime hours. If necessary, nighttime construction, but local population must be informed	Contractor*
Dust	Water sprinkle site during hot, dry and or windy weather Set up physical barriers around the construction site	Contractor*
Operation		
Noise	Design plant to meet Cambodian or international standards, specify standard in equipment bid document	Design Contractor*
Air Emissions	Design plant to meet Cambodian standards or World Bank guidelines (whichever is stricter), specify standards in equipment bid document Locate plant downwind and as far away from residential areas as possible Use low sulfur diesel fuels	Design Contractor* Contractor* Power producer

* To be specified in bid document

Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Construct				
Noise	Observation	Construction Site Residential Areas	Peak construction activity or residential complaints	MIME-PMU Working Group
Dust	Visual	Construction Site	Hot, dry windy weather or residential complaints	MIME-PMU Working Group
Operation				
Noise	Acoustimeter	Construction Site Residential Areas	Twice/year or upon complaints of local residents	MIME-PMU Working Group (Office of Standards and Efficiency)
Air Emissions	Exhaust gas analyzer	Diesel Exhaust	Once/year	MIME-PMU Working Group (Office of Standards and Efficiency)

Mini Hydro (0.75-5 MW)

Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Construction		
Water quality	Design site to minimize erosion/sediment runoff (management of drainage and runoff)	Contractor*
Dust	Spray dry surfaces during dry windy weather	Contractor*
Site alteration (Borrow pits)	Isolate borrow pits and rehabilitate after construction	Contractor*
Hazardous materials	Proper storage of chemical and fuels. Limit access (keep locked)	Contractor*
Loss of rare and endangered species	Identify critical habitats Prepare habitat protection plan Change project site	Contractor*, in consultation with Ministry of Environment to approve
Operation		
Changes in water quality (upstream and downstream)	Air injection Remove vegetation prior to filling	Power producer
Sediment transport/erosion	Sediment bypass systems Flushing Dredging	Power producer
Downstream/upstream hydrology change (or flow regulation) impact on aquatic ecosystems/biodiversity and water use characteristics	If significant, change site Downstream regulating ponds Implement habitat protection plan	Power producer
Introduction of exotic pest species	Reduce water residence time	Power producer

* To be specified in bid document

Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Construction				
Water quality (suspended solids)	Turbidity meter	Construction site/river or stream	Once/month	MIME-PMU Working group (MIME Laboratory)
Dust	Observation	Construction site	Once/mo nth	MIME-PMU Working group (MIME Laboratory)
Site alteration	Observation	At Borrow Pit	Once/month	MIME-PMU Working group (MIME Laboratory)
Hazardous materials	Observation	Construction site	Once/month	MIME-PMU Working group (MIME Laboratory)
Loss of rare and endangered species	Observation	Construction site	Once/month	MIME-PMU Working group (MIME Laboratory)
Operation				
Changes in water quality (upstream and downstream)	PH, COD, TSS, photometer	Upstream and downstream of dam	Once/month	MIME-PMU Working group (MIME Laboratory)
Sediment transport/erosion	Turbidity meter	Upstream	Once/month	MIME-PMU Working group (MIME Laboratory)
Downstream/upstream hydrology change (or flow regulation) impact on aquatic ecosystems/biodiversity and water use characteris tics	Observation	Upstream and downstream of dam	Quarterly	MIME-PMU Working group (MIME Laboratory)
Introduction of exotic pest species	Observation	Upstream and downstream of dam	Quarterly	MIME-PMU Working group (MIME Laboratory)

Micro Hydro (average 50kW)

Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Construction		
Water quality	Design site to minimize erosion/sediment runoff (management of drainage and runoff)	Contractor*
Hazardous materials	Proper storage of chemical and fuels. Limit access (keep locked)	Contractor*
Loss of rare and endangered species	Identify critical habitats Prepare habitat protection plan Change project site	Ministry of Environment approval required from Contractor*
Operation		
Changes in water quality (upstream and downstream)	Air injection Remove vegetation prior to filling Remove upstream pollution sources	Operator
Sediment transport/erosion	Sediment bypass systems Flushing Dredging	Operator
Downstream/upstream hydrology change (or flow regulation) impact on aquatic ecosystems/biodiversity and water use characteristics	If significant, change site Downstream regulating ponds Implement habitat protection plan	Operator
Passage of aquatic species	Fish ladders Elevators Guidance systems	Operator
Introduction of exotic pest species	Reduce water residence time	Operator

* To be specified in bid document

Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Construction				
Water quality (suspended solids)	Turbidity meter	Construction site/river or stream	Once/month	MIME-PMU Working group (MIME Laboratory)
Hazardous materials	Observation	Construction site	Once/month	MIME-PMU Working group (MIME Laboratory)
Loss of rare and endangered species	Observation	Construction site	Once/month	MIME-PMU Working group (MIME Laboratory)
Operation				
Changes in water quality (upstream and downstream)	PH, COD, TSS, photometer	Upstream and downstream of dam	Once/month	MIME-PMU Working group (MIME Laboratory)
Sediment transport/erosion	Turbidity meter	Upstream	Once/month	MIME-PMU Working group (MIME Laboratory)
Downstream/upstream hydrology change (or flow regulation) impact on aquatic ecosystems/biodiversity and water use characteristics	Observation	Upstream and downstream of dam	Quarterly	MIME-PMU Working group (MIME Laboratory)
Introduction of exotic pest species	Observation	Upstream and downstream of dam	Quarterly	MIME-PMU Working group (MIME Laboratory)

Solar Home System

Mitigation Plan

Environmental Issue	Mitigating Measure	Implementation Responsibility
Operation		
Disposal of spent batteries, lead and acid wastes	Sell to scrap collector for recycling	Solar power consumer

Monitoring Plan

Monitoring Parameter	Measurement Technique	Monitoring Location	Monitoring Frequency	Monitoring Responsibility
Operation				
Disposal	Observation	At consumer site	Twice/year	MIME Working Group

Institutional Arrangements: The EMP will be prepared by the power producer after receiving instruction from the MIME PMU regarding the nature and scope of the issues to be addressed. The power producer will then submit the EMP to the MIME PMU who will incorporate this information into their appraisal of the subproject and their overall decision to support the project proposal.

Institutional Strengthening: MIME will purchase four (4) acoustimeters and one (1) exhaust combustion gas analyzer (including training) to support their monitoring program.

Annex 13A: Rural Electrification Fund

Objectives

The Government will establish a Rural Electrification Fund (REF) as a public institution with administrative, managerial, technical and financial autonomy under the laws of the Kingdom of Cambodia. The objectives for which the REF is established are to promote equitable rural electrification coverage in the Kingdom of Cambodia by facilitating the population's access to electricity for economic, social and household uses. In its support of investment projects, the REF will in particular promote the exploitation of the economic potential for the application of well proven, technically and commercially, of new and renewable energy technologies in rural areas. According to the royal decree establishing the REF, its mandate will last until it achieves the government's policy goals on rural electrification.

The sources of funding for the REF will include various donors, power transmission businesses, power supply businesses, urban consumers, and/or government. The REF will use its resources to co-finance on a grant basis the implementation of projects consistent with its objectives such as:

(a) providing general support activities for the preparation and implementation of rural electrification projects in Cambodia such as promotion campaigns, gathering of information on rural investment opportunities and costs, and promotion of productive uses of electricity;
(b) providing private sector and local community output-based investments in rural electrification projects; and,
(c) promoting the commercialization of well proven, technically and commercially, of new and renewable energy technologies.

Governance and organizational structure

The Ministry of Industry, Mines and Energy (MIME) will have policy oversight of the REF. In particular, MIME will submit to the Prime Minister for appointment nominated candidates for members of the Board of the REF Board and monitor the compliance of REF funding policies and strategies with the national objectives for rural electrification. The Ministry of Economy and Finance will be responsible for the mobilization of national and international sources of funding for the REF.

The Annual Meeting of Stakeholders will act as the key consultative organ for the Ministries and for the Board of the REF. Before the end of each fiscal year, the Minister of Industry, Mines and Energy will convene a meeting of REF Stakeholders to be attended by the following:

- A representative for each donor providing funds to the REF;
- Senior representatives from the concerned ministries (involved in rural electrification);
- Representatives from financial institutions, rural electrification enterprises, suppliers of rural electrification goods and services, and NGOs involved in rural electrification and renewable energy projects; and,
- Members of the REF Board and the Executive Director of the REF Secretariat.

The purposes of the meeting will be to provide for the presentation by REF Board and discussions with stakeholders of:

- The draft Annual REF Report containing a status of the national rural electrification program.
- A preliminary report on the end-of-year financial situation of the REF.

- A draft Board resolution for the optimal allocation and use of REF funds for the next fiscal year, including: (a) allocation of the annual REF funds to investment subsidies, to general rural electrification and renewable energy support programs, and to the REF operational expenses such as payments to the Board, the Secretariat and the Payments Agent; (b) eligibility criteria for grant support to rural electrification and renewable energy projects; and (c) REF subsidy rates for the next financial year.

The Board of the REF (REFB) will consist of:

- The Minister of Industry, Mines and Energy or his/her representative as Chairman of the Board;
- The Secretary of State of the Ministry of Economy and Finance or his/her representative;
- The Chairman of Electricity Authority of Cambodia (EAC) or his/her representative;
- The Under Secretary of State or his/her representative, from the Ministry of Rural Development;
- A representative of donors, recommended to the Minister of Industry, Mines and Energy by the donors;
- A representative of the financial sector recommended to the Minister of Economy and Finance by the Cambodia Bankers Association;
- A representative of firms involved in rural electrification development projects, recommended to the Minister of Industry, Mines and Energy;
- A representative of non-governmental organizations or international organizations involved in rural electrification development projects, recommended to the Minister of Industry, Mines and Energy;
- A Commune Mayor, representing rural consumers.

The members of the Board will hold office for a duration of two years which upon expiration may be renewed only once for another two (2) years term. All members of the REF Board will have the right to vote on all matters requiring the decisions of the REF. These decisions of the REF Board will be based on the majority vote. All members of the REF Board will be given notice of the date and time, place and objective of the session in which the decision will be voted on. The REF will keep a record of the Board proceedings, findings and decisions. The REF Board decisions, with their explanations, will be published as soon as the decisions are made unless the REF Board has reasonable causes to withhold or delay the publication.

The functions of the Board will be as follows:

- To act as the advisory board on policy issues related to rural electrification and the commercialisation of well proven, technically and commercially, of new and renewable energy technologies to the Ministry of Industry, Mines and Energy;
- To adopt its own procedures for conducting meetings and other administrative matters related to the execution of its functions.
- To approve the appointment of a duly qualified independent and internationally recognized firm to carry out the external audits of the REF and the Payments Agent.
- At the end of each financial year, adopt the annual policies and procedures for the use of REF funds for the next financial year, in particular concerning: (a) the allocation of the annual REF budget to funds for investment subsidies, rural electrification support programs and projects, REF operational expenses including the cost of the Payments Agent, and new and renewable energy programs and projects; (b) eligibility criteria for REF grant support; and, (c) REF subsidy rates for the financial year.
- Hire or dismiss the Executive Director of the REF Secretariat.
- Define procedures for tendering of out-sourced programs and consulting tasks and payments to project sponsors.

- Approve the organizational structure, personnel policies and internal work procedures of the REF; the annual work program of the REF; the annual operational budget of the REF; and, the annual accounts of the REF;
- Monitor the management and operational performance of the REF Secretariat, including the payment procedures for sub-contracts.
- Contract the REF Payments Agent and supervise its performance and the flow of funds to subsidy recipients.

The REF Secretariat will be managed by an Executive Director, who will be appointed by the Board on the basis of public competitive selection. The Executive Director will be responsible for the daily management of the REF. The specific functions of the Executive Director will be defined in the employment contract signed with the Board. The Board will also ensure that the remuneration of REF Secretariat staff is competitive with prevailing salaries offered by the private sector and shall not be bound by the terms established under the State regulations for civil service salaries and terms of employment.

The REF Secretariat will have the following functions:

- To generate and provide information to communities, investors, consultants, and financial institutions costs and benefits of rural electrification and new and renewable energy projects; potential investment opportunities, and the terms and procedures of technical and financial support programs.
- To evaluate and approve applications for the REF grant funds to rural electrification and new and renewable energy projects and disclose, inter alia, the names of the approved projects, a brief descriptions of the approved projects, the names of the grant beneficiaries, and the amount of each grant approved.
- To undertake planning and project preparation activities needed to keep up the momentum of the Government's rural electrification program support.
- To monitor and evaluate the performance of supported programs and projects and maintain a national rural electrification database on rural electrification projects in Cambodia.
- To carry out any other functions as the Board will direct it to carry out.

The administration of payments to beneficiaries of REF grants will be undertaken by the REF Payments Agent contracted by the Board through public tender for the procurement of the service: banks, accounting firms or similarly qualified institutions acceptable to the Board may participate in the tender.

To avoid conflicts of interest, all employees of the REF, including their spouses and children will not be permitted to hold any official, advisory or consulting role with, own stocks or bonds of, or have any economic interest in the beneficiaries of the REF grants. Furthermore, all employees of the REF will be prohibited to accept, any gift or gratuity, different from that generally applicable to the public, from any above-mentioned beneficiaries of the REF grants.

The REF will establish and maintain a financial management system, including records and accounts, and prepare financial statements in accordance with international accounting standards to adequately reflect the operations, resources and expenditures related to the REF. The auditor will within four (4) months after the end of each financial year, submit his audit report to the REF Board, to the Minister of Industry, Mines and Energy, the Minister of Economy and Finance, and to each donor of the REF. A donor may require to appoint the auditor of its choice and at its cost to audit the books of the REF and the Payments Agent and may have a provision to this effect in its agreement with the REF. The REF will ensure that the funds from the REF are used for intended purposes and procurement of goods, works and services under the rural electrification projects to be financed by the REF funds are performed, pursuant to the laws and

regulations on procurement of the Kingdom of Cambodia, in accordance with economy and efficiency principles, and in a competitive and transparent manner.

Program mechanisms

The REF, in coordination with EAC, will float Requests for Proposals to serve particular areas, based on the least cost principle. The REF Secretariat will align applications forms with the forms used by the EAC in the license applications - requested technical, institutional, financial and other information - to minimize the transaction costs for developers and for the REF-EAC appraisal process.

Criteria for pre-screening of REF investment grants

- Application form fully filled out.
- Copy of the feasibility report attached.
- Copy of the application to EAC for the generation/distribution license attached; and or copy of the license itself.
- Copy of the application for project loan attached.
- Copies for all relevant approval documents attached; or if, not yet processed, of the applications for approval.
- Project eligible for REF-grant support, falling into one of the following categories:
  a) Isolated grid project with diesel generator (grid extension by Rural Electricity Enterprises);
  b) Isolated grid project served by micro-hydro;
  c) Micro-hydro plant connected to national grid;
  d) Mini-hydro plant connected to national grid;
  e) Off-grid solar home systems.

Criteria for approval of REF investment grants

All categories of REF-supported projects

- Compliance with regulatory conditions
  a) All needed local planning approvals have been obtained;
  b) An EIA, if required, has been performed and approved by the pertinent authorities;
  c) EAC has issued a license for the project;
  d) No other party applied to EAC for a license for the same project in response to the publication by EAC of the license application, within the time limit established by the Electricity Act and EAC regulations.

- Compliance with technical conditions:
  a) The technical norms and standards for rural electrification and for renewable energy are fulfilled; the least cost design is used.
  b) The cost of individual major investment items is in line with the level of local costs according to the data bank on rural electrification costs established by REF or EAC.

- Financial viability of the project:
  a) there is strong evidence of financial closure;
  b) the commercial bank for providing the debt finance for the project has agreed to finance the project and finalized its due diligence assessment (copies of the draft loan agreement and the bank's project appraisal document are attached)
  c) the REF evaluation confirms the bank's assessment of financial viability and ability of the project's cash flow in early years to service the debt payments.

- Institutional viability of the project:
  a) project applicant is a legal person; or actively engaged in becoming registered as a legal person (such as a co-operative or a company).
  b) projects are not to be managed or majority-owned by the public sector and must demonstrate local community support.

- Compliance with World Bank standards for social and environmental safeguards.

Criteria specific for distribution projects

- The tariff calculation formula used to establish the tariff schedule, submitted to EAC for approval, takes the REF-investment subsidy into account.
- Potential consumers have expressed their interest in the project by paying a deposit.

Criterion specific for grid-connected hydropower plants

- EdC has signed a PPA with the developer or a letter of intent.

Criterion specific for SHS

- The solar company is eligible for access to REF-grants, being on the approved dealer list for solar home systems (SHS). Inclusion in the list is subject to confirmation by the REF that the solar home systems marketed by the solar company in Cambodia comply with REF quality standards for SHS.

<u>REF grant rate schedule (for first year of operations)</u>

- New household connection (diesel): $45/new connection
- Mini-hydro (0.75-5 MW): $400/kW installed
- Micro-hydro (average 50 kW): $400/kW installed
- Solar Home Systems: $100/set of 40 Wp

<u>Triggers for disbursement of REF grants</u>

Isolated grid project with diesel generator,isolated grid project served by micro-hydro, and hydro connected to national grid

- First payment: 40% after start of construction, based on declaration by project developer of signing of contracts amounting at least to 50% of total investment sum, written confirmation by contractors having signed the listed contracts, and declaration of project developer providing planned time schedule for completion of construction.
- Second payment: 40 % at finalization of construction, based on certification by chartered engineer that system is complete and complies with specification and is operational.
- Final payment: 20% after three months of operation, based on certification by chartered engineer and/or confirmation by EAC or EdC.

Solar Home Systems

- Single payment: 100% upon receipt of detailed schedules in hard copy and in read-only soft copy format of REF-compliant SHS installed along with grant disbursement request. The solar company will also forward a declaration confirming that the schedules exactly match the

information given in Customer Acceptance Receipts (CARs) and that the original CARs will be kept available for inspection by authorized personnel. Copies of custom forms for imports of SHS or SHS-components will be provided. The solar company has signed a declaration confirming that the original custom forms will be kept available for inspection

The REF Operational Manual will establish procedures for control checks on information received from project developers, evaluations in the event of irregularities, and sanctions for breach of subsidy award contracts.

Cost-shared technical assistance for project developers

The REF will provide technical assistance to the private sector, NGOs and rural communities in order to build technical and business capacity and prepare feasibility studies for good quality proposals for REF funding.

Targeted business sectors

The targeted business sectors involved in the supply side of rural electrification will include:

- Project developers (professional private investors as well as CBOs);
- Renewable energy technology (RET) and rural electrification (RE) consultants, construction companies and other businesses involved in the production, installation, supply of equipment, O&M and other rural electrification related services;
- Financial intermediaries providing loans to rural electrification and renewable energy investments.

Scope of support

Support to the supply side in rural electrification covers TA at all stages -- pre-investment; start up and early business and market development, business improvement and growth:

- Business Development Assistance to agents involved in the implementation of *grid based RE-projects* - project developers and small utility operators, NGOs assisting local communities in developing local electricity supply, consultants preparing feasibility studies, and constructors.
- Business Development Assistance to companies involved in the commercialization of *renewable energy technologies*, comprising dealers, retailers, and leasers of solar home systems.
- Capacity building in the *financial sector* to banks and micro-finance institutions in the appraisal of RE and RET investment projects.
- TA in management, finance, customer relations, billing and invoicing and O&M to *community owned and small scale private RE-utilities*.
- *Promotion of productive uses of electricity* in on-farm and off-farm production. TA to small and medium scale rural enterprises on the financial feasibility of investments in electricity consuming equipment, and the preparation of business plans for investments making productive use of electricity.
- *Promotion of technical norms and standards and quality control*, including the verification of the accuracy of electric meters.

As a general rule:

- *Recipients of TA to businesses in the supply side of RE* are charged a fee equal to 50 percent of the specific cost of the service.
- *TA to businesses* for enhancing their productive uses of electricity is provided free of charge.

Monitoring and Evaluation

M&E reports will be prepared to provide the REB, the RGC and co-financing donors and multilateral banks with information on:

1. The status of national RE and the role of the REF herein, making use of *output indicators* for the REF.
2. The socio-economic impact of RE projects (*impact indicators* for the REF).
3. The effectiveness of REF procedures and the relevancy and cost-effectiveness of REF-financed support programs (*program quality indicators* for the REF).

Monitoring and evaluation will be undertaken through self-evaluation and through contracted external consultants, funded from the REF operating budget. As inputs to the preparation of the Annual REF Report, the REF Secretariat will prepare assessments and evaluations of the effectiveness of REF procedures and REF support projects. The M&E of the impact of RE on rural transformation will be entrusted to external consultants, reporting directly to the REF Board. Approximately $200,000 will be budgeted in the pilot REF, financed by IDA and GEF, for external consultant contracts for M&E, in addition to the portion of the REF Secretariat budget for M&E.

The *Rural Electrification Planning and Monitoring & Evaluation Unit (REPMEU)* of the REF Secretariat will be the responsible implementing entity for M&E-activities within the REF. Normally, REPMEU will write the TOR for an M&E activity and contract the consultants. In the case of M&E activities initiated by foreign donors and multilateral development banks, REPMEU will be responsible for facilitating required local assistance to the M&E-team contracted by these.
The *RE-Data base* developed and maintained by REPMEU will be of key importance for the monitoring work. It will store quantitative information from REF-grant application forms (feasibility study: number of households in community, economic activities, number of household/business owned generators) and from REF-grant disbursement forms (project completion form: number of connected households, type of productive uses and estimated productive loads, km of MV- and LV-lines, number of poles and transformers and cost data). It will also store quantitative and synthesize qualitative data from M&E reports.

REPMEU will, in close consultation with the contracted consultants for the capacity building components, develop efficient *M&E procedures for REF supported capacity building activities*. One standard procedure is that participants at training courses are requested to fill out a questionnaire at the end of the seminar on the quality and relevancy of received training.

Type of Report	Comments
<u>REFS</u>	
- Quarterly progress	Short standard format report with quantitative data on outputs + short observations on items calling for attention
- Annual REF Status Report	Quantitative data on RE + REF-outputs + self-evaluation by REFS on effectiveness of procedures, programs and subsidy levels + synthesis of conclusions of evaluation reports prepared by outside consultant
- Mid-term review	Evaluation by outside consultant contracted by donors
- End-of-term report	Quantitative data + self-evaluation + evaluation report prepared by donor-contracted consultant
<u>Outsourced TA-activities</u>:	
- Quarterly progress	Short standard format report with quantitative data on outputs +

- Annual status report - Mid-term review - End-of-term project report	short observations on items calling for attention Quantitative data + conclusions from self-evaluation Evaluation by outside consultant contracted by REFS Quantitative data + self-evaluation + evaluation report prepared by REFS-contracted consultant
Socio-Economic Impact of REF	Responsibility for M&E out-sourced to outside institution
Ad-hoc M&E Reports	Evaluation reports requested by donors and executed by donor-contracted consultants or by consultants contracted by REFS on behalf of donor

The Annual REF Report will cover the following performance indicators that will be monitored by the REF:

1. Rural Grid Electrification Status

- The number of communities and agglomerations in Cambodia that have been electrified during the year; new households getting electricity service; percentage and number of communities by category of size that remain without electricity service
- Progress in rural electrification coverage (percentage of rural population living in electrified areas) and rural connection rate (percentage of rural households having electricity service).
- The number of rural enterprises (including those in the broadly defined agriculture sector) that have been connected during the year and their estimated load.
- The number of health clinics and schools that have been electrified during the year and the percentage and number of national clinics that remain without electricity service

2. Sales of solar home systems

- Annual sales of solar pv systems for isolated households and institutions.

3.Promotion of grid-connected generators using renewable energy

- Number of micro-hydro plants, total installed capacity and annual generation of electricity.
- Number of mini-hydro plants, total installed capacity and annual generation of electricity.
- Number of biomass-fueled power plants, total installed capacity and annual generation of electricity.

4. Socio-economic impacts

- *Productive use impact.* The impact of electricity (i) on the improvement and quality of *social services* – health, education, public administration – (ii) on *commercial business activities* - the creation of new agro-industrial businesses and services, development of productivity and quality enhancement in existing agro-industrial businesses and services- and (iii) links to *other infrastructure investments* such as water, road and telecommunications.

- *Impact on household welfare.* Benefits from improved lighting and better access to radio and, above all, TV.

- *Poverty impact of supported RE-projects*. Connection rates of poor households; poverty impacts from indirect access to electricity.

- *The equity impact* of REF subsidies

- REE and renewable energy business development impacts. Number of new businesses and scaling up of existing businesses.

Indicators for the above are collected using a methodology containing participatory and survey elements.

5. Impacts on costs of rural electrification and on rural tariffs and quality of service

- Evolution in *the costs of rural electrification over time, adjusted for differences in customer density and other cost-affecting factors*
- Evolution in *rural tariffs over time, adjusted for differences in customer density and other cost-affecting factors.*
- Average number of hours per day in which electricity is supplied to households by the REEs.

In determining the overall policies, procedures, work program and budget of the REF, the Board will monitor the following aspects of the effectiveness of REF investment subsidies:

- The annual balance between the supply of grant funds (forecast payments for the year) and the demand for funds (accumulated grant finance requested by applicants)
- The impact of REF investment subsidies on reducing the cost of investment for project developers (subsidy in percent of the cost of investment).
- The importance of RE-investment subsidies for facilitating financial closure of projects
- Whether other instruments for investment support, such as guarantee schemes for loans, for example, would be a cost effective mean to enhance the impact of RE investment subsidies on the acceleration of RE.
- The extent of free-rider effects (giving subsidies to projects, which would have been carried out also in the absence of a subsidy; or offering lower tariffs to consumers who would have been willing to pay a higher tariff).
- The evolution over time in the cost of subsidy per connected customer.
- Extent of "perverse" (investment distorting) incentives of procedures used for the processing of applications and for the form for payment of awarded subsidies

M&E of the effectiveness of RE-support TA programs

Key <u>output indicators</u> are:
- Number of feasibility studies/business plans prepared with REF-financed TA.
- Number of technicians in RE-construction and/or operation trained in REF-financed courses number of trained rural and renewable electricity employees in different institutions.
- Number of solar energy technicians trained in REF-financed courses.
- Number of bank staff trained in appraisal of RE- and renewable energy projects.

Key <u>impact indicators</u> are:
- Evolution in the quality of feasibility studies, which are attached to the applications for REF investment subsidies.
- Evolution in the penetration of least cost technologies and quality of construction work.
- Evolution in the unit price of components and of services.
- Evolution in the quality of business plans presented by project developers to banks for loan finance for RE and RET projects.
- Evolution in the percentage of timely repayment of loans by REEs to financial institutions.
- Evolution in the quality of project appraisal by financial intermediaries, inter alia witnessed in repayments of loans

Annex 13B : Status of REF Sub-Project Pipeline

A number of preparatory studies were undertaken by the team in association with the stakeholders as part of preparation activities. This annex summarizes the findings of the studies and lists some projects that are ready for further development.

Mini-Hydro projects: A pre-investment study was conducted to identify potential mini-hydro projects. Over 68 previously identified sites were screened based on criteria such as distance from demand center, distance from transmission line, existence of medium voltage lines in demand centers, location on suitably sized rivers, and social and environment impacts. From the initial screening, a total of 28 sites were identified for a desk study. Based on further screening , a set of 17 sites were identified for site visits to get first hand knowledge of project sites and carry out preliminary technical and social/environmental assessments. Based on this approach, a pipeline of projects identified for further development and support under the REF. The project pipeline proposed for development is:

- **O Turou Trao** project in Kampot province.
- **Phnum Batau downstream** and **O Sla** projects in Koh Kong province.
- **Stung Sva Slab** project in Kampong Spoe province.
- **Tunsang upstream, Tunsang downstream** projects in Koh Kong province.
- **Stung Siem Reap** and **Upper Stung Siem Reap** projects in Siem Reap province.

The first three pipeline projects are considered the most likely to be developed by the private sector due to the following reasons:

Production cost is between US$0.03 and 0.06/kwh without capital subsidy.
Development cost is less than US$1,700/kW without capital subsidy.
Favourable project location.
Favorable topographic and hydrological conditions.

Table 1: Pipeline of Potential Mini Hydropower Projects in Cambodia

Hydro Project Name	Province	Load Centre	Load Centre Demand	Distance to Grid	Catchment Area	Mean Annual Flow	Power Flow	Net Head	Installed Capacity [1]	Plant Factor	Annual Generation	Development Cost (US$/kW)[2]			Production Cost [4]
			MW	km	km2	m3/sec	m3/sec	m	kW	%	kWhr/yr	Hydro	Trans	Total	US$/kWhr
O Turou Trao	Kampot	Kampot town	1	2.7	20	1.5	1.0	135.0	1,100	55.8	5,487,000	1,629	13	1,642	0.041
Phnum Batau – downstream	Khao Kong	Phnom Penh / Kampong Spoe	80.0	44	105	5.0	5.0	101.0	4.200	57.9	21,302,000	1,188	100	1,288	0.031
Stung Sva Slab	Kampong Spoe	Phnom Penh / Kampong Spoe	80.0	23	205	7.8	8.0	56.5	3,800	60.9	20,296,000	1,634	54	1,688	0.055
O Sla Upstream	Khao Kong	Phnom Penh / Kampong Spoe	80.0	3 [5]	54	3.1	3.0	78.0	2,000	59.7	10,208,000	1,662	14	1,676	0.058
								Total	**11,100**	**kW**			**Total**	**17,000,000 USD**	

Hydro Project Name	Province	Load Centre	Load Centre Demand	Distance to Grid	Catchment Area	Mean Annual Flow	Power Flow	Net Head	Installed Capacity [1]	Plant Factor	Annual Generation	Development Cost (US$/kW) [2]			Production Cost [4]
			MW	Km	km2	m3/sec	m3/sec	m	kW	%	kWhr/yr	Hydro	Trans	Total	US $/kWhr
Stung Siem Reap [3]	Siem Reap	Siem Reap town	3.3	44	115	2.2	3.0	69.0	1,700	43.8	6,640,000	2,120	212	2,332	0.074
Upper Stung Siem Reap [3]	Siem Reap	Siem Reap town	3.3	6.9	86	1.6	3.0	26.0	650	35.5	2,036,000	1,709	88	1,797	0.055
Phnum Tunsang Upstream [3]	Khao Kong	Phnom Penh / Kampong Spoe	80.0	3[5]	32	1.5	2.0	189.0	3,100	57.6	15,853,000	1,406	6	1,412	0.054
Phnum Tunsang Downstream [3]	Khao Kong	Phnom Penh / Kampong Spoe	80.0	3[5]	53	2.5	4.0	90.0	3,000	54.4	14,316,000	1,704	21	1,725	0.071
								Total	**8,450**	**kW**			**Total**	**14,700,000 USD**	

Note:
1. Determined by Peak Demand at Load Centre
2. Cost does not include financing costs or O&M.
3. Projects are in a cascade and development is interdependent
4. Calculated at the 10% discount rate assuming a scheme operating lifetime of 30 years
5. Transmission line length is dependent on development of Phnum Batau HEPP.

Rural Electric Enterprises: In order to assess the market demand, an initial survey (*A survey of 45 Rural Electricity Entrepreneurs*) of rural electricity entrepreneurs was conducted to determine to what extent these businesses were supplying electricity to rural consumers. The survey demonstrated that private sector participation in rural electrification was substantial and estimated that there were more than 600 privately owned and operated firms were supplying power to between 60,000 and 120,000 households. These businesses had substantial investments exceeding US$12 million and were willing to invest more in expanding their services if there was long term potential and given assurances that grid extension policies would be properly coordinated by the EAC. In order to determine REE's interest in working together as a group to improve their business climate and technical capabilities, formation of two private business associations representing 67 REEs in Battambang and Banteay Meanchaey was supported.

Further, the project also assisted in detailed analysis of three REEs on a technical level and to determine if there was interest, potential and value in linking independent isolated grids. The results indicated that if the REEs were provided a small subsidy per household hook-up to fund upgrades in the generating and distribution equipment, then REEs could produce and sell quality power at a price equal to or slightly higher than national utility could provide through grid extension at a much higher price per hook-up. Details of the three sample projects are provided below, but considering the earlier market assessment as well as discussions with financial institutions such as ACELEDA that already have REE clients (for working capital support), the demand for REE project proposals is not seen as a problem by the team.

Project name/establishment date	**Location**	**Customers**	**System configuration**	**Energy sold/year**
Kouk Ampil REE, Established 1995	Phnom Smapov commune, Battambang	295 HH	Total 70 kW (30kW+40kW) Length of distribution line 5,700 meters Conductor size 2x16 mm2	30,060 kWh
Krapeu Choeung REE, established in 1998	Phonom Sampov commune, Battambang	75 HH	Total 15 kW capacity; Total of 2150 meters of distribution line. Conductor size is 2x2.50 mm2	2,256 kWh
Paoy Svay REE, established 1999	Takream commune, Battambang	30 HH	10 KW capacity; 1,330 meters of distribution line. Conductor size is 2x2.5 mm2	1,236 kWh

Solar PV market: Several consultant studies were undertaken during preparation to assess the market for solar home systems in Cambodia. These include (1)Investing in solar Photovoltaics in Cambodia: Market study and business models; (2) Market Development and promotion plan for SHS; (3) Financing PV Household Electrification in Cambodia and (4) Photovoltaic market development in Cambodia (UNDP/FINESSE). Based on the information and analysis available to date, there is already a commercial market for PV based telecommunication relay stations. However, PV as means to serve basic electricity

needs in rural Cambodia is yet to be tested and established. Today battery charging is the main source of electricity in rural Cambodia with over 50% of rural families or over 1.15 million households exercising this option. This represents a large global market potential for Solar Home Systems (SHS) in Cambodia. The solar market assessment study estimates that that the exploitable market potential for households systems could be between 250,000 and 450,000 units, if capital cost buy down subsidies of about $ 3.5 /Wp were offered. Approximately 85% of the market appears to be in the 30-40 Wp systems, that offer the capacity to supply one (or two) lamps and a B&W TV. Currently, three companies import and sell almost all solar products in Cambodia, including systems for telecommunications and solar home systems; Khmer solar company, Metrofield engineering Co. Ltd and R.M Asia Ltd. An estimated 250 kWp of solar panels have been installed thus far. In addition, several international PV manufacturers such as Photowatt, Shell (Siemens), Solarex, unisolar and BP Solar have either a national or local presence.

Village/Micro Hydro Projects: In order to identify a pipeline of village/micro hydro projects, a pre-investment study was conducted in partnership with the Asian Development Assistance Facility (ADAF) of the New Zealand Ministry of Foreign Affairs and Trade. Based on preliminary screening, 45 potential micro hydro projects were identified in 9 provinces ranging in capacity between 10 kW and 500 kW. Six (6) priority communes were identified for conducting detailed studies and social and energy assessments were conducted using a range of qualitative and quantitative research methods. The social assessments utilized a variety of PRA techniques to gather information from different social, ethnic, age, income and gender groups in the commune in order to gain a more detailed understanding of the issues from the perspectives of the various groups within the community. The first pipeline represents the projects considered most likely to be developed because:

- Reliable safe electricity supply was ranked first, second or third in development priority within the community.
- Favorable socio economic conditions exist in the community.
- Capacity of the community supports sustainable development.
- Community mobilization will not be time consuming.
- Economic internal rate of return is between 8 and 13% and the average incremental economic cost is between US$0.2 and US$0.24/kwh without capital subsidy.
- Projects are located near the communities.
- Favorable topographic and hydrological conditions.

Detailed below are the details of the initial pipeline of sub-projects that could be developed.

Table 1.1, First Pipeline of Potential Community Hydropower Projects in Cambodia

Hydro Project Name	Province/district	Load Centre	Households Served HH	Peak Load Demand KW	Catchment Area km2	Mean Annual Flow m3/sec	Power Flow m3/sec	Installed Capacity kW	Load Factor %	Annual Generation kWhr/yr	Development Cost US/kW	Capital Subsidy Required[1] US$/kW
Srae Cheng	Kampot/Chumkiri	Srae Cheng, Prey Khley, Khpob Run, Pong Teuk, Kamnab.	902	91	36	1.80	0.45	130	41	329,966	3,400	1,310
Busra	Mondulkiri/Pechr Chenda	Pum 1,2,3,4,5, 6,7,8	270	43	198	8.79	0.15	54	31	113,128	2,520	1,080
O Samrel	Battambang/Samlot	Ou Khroch	107	23	12	0.46	0.18	32	37	74,991	3,130	1,580
Ta Taok	Battambang/Samlot	Peam Ta, Ta Touk, Peam, Ou Nonoung, Veal Roleum, O Tre Ang, Ou Ta Tea	203	26	14	0.53	0.10	40	40	91,823	3,620	1,910
		Total	**1482**	**HH**			**Total**	**256**	**kW**	**Total**	**824,000 USD**	

Table 1.2, Second Pipeline of Potential Community Hydropower Projects in Cambodia

Hydro Project Name	Province/district	Load Centre	Households Served HH	Peak Load Demand kW	Catchment Area km2	Mean Annual Flow m3/sec	Power Flow m3/sec	Installed Capacity kW	Load Factor %	Annual Generation kWhr/yr	Development Cost US/kW	Capital Subsidy Required[1] US$/kW
Kampong Lpov	Battambang/Samlot	Ou Dam Chek, Kampong Lpov, Svay Chrum, Chamlang Romonea	194	23	15	0.57	0.10	32	34	69,542	3,950	2,720
O Chum III	Ratanakiri	Banlung town	> 500	577	22.7	3.75	1.30	74	50	325,311	3,199	1,300
Beisroc	Ratanakiri	Beisroc town, Kaleng	464	56	115	4.4	0.53	80	33	161,783	3,000	1,120
Prek Dak Deur	Mondulkiri/Sen Monorom	Sen Monorom town	893	144	139	6.2	1.22	200	46	502,174	5,310	2750
		Total	**2051**	**HH**			**Total**	**386**	**kW**	**Total**	**1,665,126 USD**	

Annex 14
Incremental Cost Analysis

1. Introduction

After decades of civil war, which devastated the economy and society during much of 1970s and 80s, Cambodia is making a valiant attempt to rebuild the nation and economy. Since 1994, elected governments have been ruling the country. Annual GDP growth was uneven in the 1990s, reaching a high 7.6% in 1995 before slipping to 1% in 1996-97 and recovering to around 4% in 1999 and since maintaining that level of growth. There is widespread poverty and the country suffers from a poor industrial base and lack of technical manpower. Over 85% of the labor force is engaged in agriculture in the rural areas. A strong legal framework is yet to be put in place to aid economic development. Cambodia depends heavily on donor assistance.

While implementing various initiatives aimed at economic recovery, the Royal Government of Cambodia (RCG) is fully committed to environmental sustainability, as indicated by their ratification of UNFCCC in 1995. As part of this, RGC initiated an exercise for building a national inventory of greenhouse gas (GHG) emissions, and several other projects related to environmental capacity building, resource management, etc., financed by UN and bilateral organizations. A GEF co-financed biodiversity conservation project is presently in advanced stages of implementation. In climate change area, significant projects are yet to be implemented.

Cambodia has no known fossil fuel sources, and imports all its petroleum requirements. . A small deposit of 7 million tonnes of coal was discovered, but is yet to be exploited. No known gas reserves exist. The number of rural households with electricity access is very low. Expanding the domestic markets for electricity in a sustainable manner and exploiting the considerable hydro resources are two major challenges before the RGC in the rural energy sector. The strategy is to:

- **Increase the access of rural households, enterprises and community institutions to electricity services.** Per capita electricity consumption is among the lowest in Asia. Only about 9% of the rural population has access to lighting services through diesel generators and imported batteries. Kerosene is extensively used for lighting in rural areas. Though there is some interest at the policy level, and also a fledgling solar energy market, major market barriers exist to large large-scale promotion of electricity service. The current extremely low access to electricity services notwithstanding, a comprehensive rural electrification strategy is only beginning to emerge.

- **Exploit renewable energy resources with near-term emphasis on hydro and solar**. Though Cambodia is known to have huge potential to generate power from hydro resources, no systematic measurement of potential or program planning has been done to exploit it so far. A few desk studies, based on data provided by the Ministry of Meteorology and Water Resources, indicate an overall potential of about

10,000 MW. As part of the project preparation, over 60 sites were screened and 6 pre-feasibility studies completed during the PDF B phase. In addition, potential is indicated for a number of micro- (up to 500 kW) and mini- (up to 5 MW) hydro projects in different parts of the country, which are capable of catering to rural electrification needs in a significant way through mini grids and isolated systems. With bilateral assistance from the New Zealand, 45 potential micro hydro projects were identified in 9 provinces ranging in capacity between 10 kW and 500 kW. Solar resources are rich in Cambodia with an average radiation of about 5kWh/m2. The high prices of competitive products like small diesel grid electricity, battery electricity and/or kerosene show the relatively high willingness to pay for electricity, indicating a considerable potential commercial solar home system market. An initial wind assessment for the Indo-China region shows some pockets of good (7 to 8 m/s) and very good (8 to 8.5 m/s) wind regimes near the coast.

With assistance from ESMAP, the government has prepared a 10 year, 3 phase Renewable Energy Action Plan (REAP) in May 2003. This action plan has been prepared based on wide and extensive stakeholders consultations spanning 3 National workshops over a 2 year period. **Phase 1, market preparation**, lasts approximately three years and broadly includes institutional and regulatory development as well as private and public sector capacity building. **Phase 2, early growth**, builds on the base established during phase 1 and will last another 3 years. It will be typified by early market growth, and assessment of initial investments made in hydro and solar PV. **Phase 3, rapid growth**, continues from year six forward. It will be characterized by robust market growth, more private sector firms and participants, and improved donor support to leverage successful activities. The result of these three phases will be a nationwide understanding and appreciation of when and where privately owned renewable energy technologies are able to be most cost effective in producing electricity and distributing it to rural homes and businesses.

2. Project Development Goals

This GEF Renewable Energy Promotion project is an integral part of the Cambodia Rural Electrification and Transmission (RE&T) project under preparation with World Bank/GEF assistance. The overall objective of the project is to support the Royal Government of Cambodia (RGC) goal of building the foundations for sustainable development in the long term and reducing poverty. It will do so by:

- Promoting rural development by providing the economic benefits of electricity;
- Improving power sector efficiency through: (a) consolidating current initiatives which seek to foster an environment favorable to private participation and an overall commercialization of the power sector; and (b) reducing electricity costs and removing infrastructure bottlenecks.

To achieve these objectives the project will include three principal components: (a) rural electrification; (b) transmission interconnection with Vietnam; and (c) technical assistance.

The global environment objective is to reduce the risk of climate change by mitigating Cambodia's greenhouse gas (GHG) emissions through the promotion renewable energy technologies as alternatives to and substitutes for GHG-emitting diesel and kerosene. The project coincides with phases 1 and 2 of the REAP. As part of the project, investments will be made in technologies that were identified during the project's PDF B phase as having short term potential, that is, small hydro, village (mini) hydro systems and solar home systems. **Total avoided emissions are estimated to be about 233,026 tons of CO_2 over the 12 to 18 year life (varying with technology used) of the investments done during the project's period of duration (6 years).** This GHG mitigation potential is the rationale for the GEF grant component.

The project supports the GEF Operational Program 6, "Promoting the adoption of renewable energy by removing barriers and reducing implementation costs". The major barriers addressed are lack of government, private and financial sector capacity to plan, provide and finance renewable energy systems; the absence of a supportive policy and regulatory framework; the high initial cost of renewable energy systems; and lack and awareness and confidence in renewable energy systems among potential suppliers and consumers. The project can be sustained in the longer run, once these barriers are lowered, allowing private entrepreneurs to invest and manage decentralized electricity service schemes on a commercial basis.

3. Baseline

Only about 9% of the rural households have access to electricity through the EdC grid (2%), Rural Electric Enterprises (REEs) (4%) and personal gensets (3%). A large proportion of the rural population, estimated at 55% or over 1 million households uses car batteries. Nearly 600 REEs operate in Cambodia, running diesel power stations, which range from 25 kW to 5 MW in capacity. Some of them, who also supply in provincial and district centers, operate under license from the government. The others are in an informal market. In absence of any law or regulatory framework, these IPPs charge variable tariffs ranging from $0.30 to $0.90 per kWh, the highest tariff rates in South and South-east Asia.

According to a survey commissioned by the Bank during project preparation, rural households spend an average (weighted) US$ 3.2 per month, on kerosene for lighting, batteries and on power from local generators. Apart from diesel power, rechargeable batteries are the other main source of lighting for rural people, with an estimated 1,155,000 families using them. Average expenditures on battery charging are about US$ 1/month (without including cost of the battery of about US$ 30 which translates to little over US$1 over its lifetime of 2.5 years) According to a study commissioned by UNDP-FINNESSE on photovoltaic market development in Cambodia, there are over 8000 battery charging stations in country. Batteries are all imported from China, Singapore and Malaysia. Cambodia has no modern energy resources with the exception of

hydropower, which is completely unexploited. Domestic markets for electricity are extremely small and mainly concentrated in Phnom Penh and a few other provincial towns. Most other households use kerosene for lighting purposes, paying on an average, 30 cents per liter. Kerosene, like all other petroleum products, is imported. Without the implementation of the proposed project, the situation is likely to remain as it is in the foreseeable future, leading to the following consequences:

- The access to electricity services will continue to be low, and the demand suppressed;
- Process of economic development in the rural areas will continue to be hampered due to lack of electricity;
- Increased use of fossil fuels will lead to increasing environmental unsustainability; and
- Continued dependence on fossil fuels is likely to put pressure on foreign exchange reserves.

However, several features of this situation create opportunities to promote sustainable renewable energy alternatives in rural Cambodia. Among them are:

- Electricity tariffs being paid by rural consumers at present are very high on average. This indicates that consumers would be willing to pay relatively high prices if reliable services were provided by solar or hydro sources.
- Around 1,155,000 rural households are estimated to be using batteries, thus paying about US$1.05/ kWh on average (It is worth noting that poorest people can only afford smallest 6V/10Ah batteries for an amount of US$ 5 and recharge fee of US$ 0.10, which leads to very high tariff of 4.2/kWh)
- Over 600 independent rural electric enterprises are operating diesel power stations and over 8000 are involved in battery charging, which indicates a good small entrepreneurial base in rural areas for small power businesses.
- Government is committed to promoting private enterprise to increase access to electricity services in rural areas.
- Local micro-financing institutions have already supported some of these REEs, and are interested in promoting renewable energy.

A limited solar energy program is being implemented by the Ministry of Industry, Mines and Energy (MIME), with the support of donors like SIDA for institutional purposes, targeting health centers and educational institutions. However, no information is available on their functionality and performance in the absence of any monitoring system (However, it is worth noting that there is already a commercial market for PV based telecommunication relay stations and about 250 kWp of solar PV systems are estimated to be in place in the country).

In sum, the baseline scenario is that these households/communities will continue to rely on fossil fuel for their basic energy needs in the form of kerosene lamps for lighting and/or diesel-powered small grids or batteries chargers for their basic electricity needs. The mini/micro hydropower and solar power would remain limited to application in

donor-funded or NGO-driven projects, but would not successfully penetrate into the targeted rural markets, due to the existence of barriers mentioned below.

4. Barriers

Major barriers exist in Cambodia impeding the development of renewable energy for rural electrification. These barriers[1] can be summed up as follows

- **4.1 Lack of strong policy and legal framework**

The legal environment in Cambodia is generally weak, with an elected government being in power only in the last 5 years. Many of the laws are still being drafted and the regulation of the electricity sector is at an early stage of development at present, and tariff setting by private REEs is arbitrary, placing the consumers at a disadvantage.

A draft rural renewable energy policy in Cambodia has been prepared as part of the REAP though a lot depends on how this policy is implemented. The government has expressed its commitment to promote renewables for remote applications and examine several policy and regulatory aspects related to renewable energy. For instance, there is high import duty on imported solar equipment, which, in absence of any policy, acts as a serious barrier for solar energy. Also, there is a need for a supportive legal and policy framework to be put in place, including a regulatory mechanism, to encourage small renewable power producing entities.

- **4.2 Access to financing of renewable energy devices with high front-end costs**

The Cambodian banking system is relatively fragile, and operates mostly on short-term capital with high interest rates. Several micro-finance institutions operate in the rural areas providing credit for short duration with interest rates ranging from 40-60% per annum. Few energy businesses access financing from these MFIs at present for longer term financing. The high cost of renewable energy equipment, especially the front-end cost, acts as a deterrent for MFIs to finance them. Other factors acting as barriers to financing are:

- Lack of adequate and appropriate operating licences for REEs
- Low and moderate incomes in rural areas and consequently low creditworthiness
- General shortage of capital, mostly accessed for promoting direct income generating activities, and renewable energy is not a top priority
- Lack of long term funds for REEs, which prevents them from investing in downstream activities (distribution, alternative technologies, etc.)
- High administrative costs for servicing micro finance in rural areas, and
- No legal framework to deal with collateral, bankruptcy, etc.

[1]The barriers are partly derived from a one-day consultative renewable energy workshop organized by MIME and the World Bank in which 18 main stakeholders were represented. One of the three sessions of the workshop discussed the question "what are the main barriers and solutions for faster renewable energy development?" In addition, these barriers were confirmed during three national stakeholder workshops with assistance from ESMAP, leading to the preparation of a Renewable Energy Action Plan (REAP).

4.3 Lack of information on market characteristics, resource potential

Some documented information is available on the characteristics of rural energy markets, including their scope, potential, segments and consumer characteristics based on PDF B activities. However, no systematic feasibility studies have been done to assess the potential for exploiting renewable energy resources in the country. For instance, potential of small hydro power was estimated based on desk-based analysis. A first set of initial field-based pre-feasibility studies were completed as part of the project preparation.

There is also a need to conduct further resource and market assessment studies for solar, wind, sustainable biomass and hydro. Several preliminary studies have been carried out as part of PDF B, but further detailed market assessment is needed to evaluate the prospects of solar energy as an alternative to diesel stations or batteries in the different provinces. Though wind potential is reported on the coast and the island systems, and biomass resources (e.g. rice husk) are available in the north-east and northern Cambodia, systematic resource and policy studies will be required to determine their feasibility as energy sources.

4.4 Institutional capacity for planning, implementation and maintenance

Cambodia, relatively inexperienced in democratic governance, is still in the process of building its institutions and the infrastructure is still very poor. Management systems are weak in rural areas. Technical know-how and maintenance skills are in short supply. Lack of experience in operation and maintenance; limited training possibilities; low volume of renewable energy installations so far; no network for service outlets and supply of spare parts are some of the factors leading to institutional barriers.

While an effort has been made through the REAP to bring together stakeholders, lack of coordination among concerned stakeholders (government, donors, NGOs, private sector, financial sector) also acts as an institutional barrier to renewable energy development.

4.5 General lack of awareness and political support

Lack of information on different renewable energy options and their costs and benefits is a big barrier in creating awareness, which is presently very low among the consumers and grass-root level organizations. Efforts at information dissemination are feeble, and marketing of renewable energy products non-existent. Low literacy levels in rural areas, and non-availability of local language (Khmer) literature on renewable energy also contribute to the general lack of awareness.

Presently, active support for renewables is not forthcoming from all the political powers, and there are few 'champions' promoting the cause of renewable energy. Mobilizing this kind of political support in the beginning of the program is critical for sector development.

It is clear that, without addressing these barriers, it is difficult to promote sustainable energy alternatives to increase rural access. At the same time, government and other institutions in Cambodia have little capacity – financial or institutional – to address these barriers. Hence, the request for GEF assistance to progressively lower and finally remove them.

5. GEF Alternative

Overall Project Objectives

The overall objectives of the GEF alternative project are to:

- Eliminate the policy, institutional, financing and information barriers that impede the market development for renewable energy in Cambodia so that rural people can have increased access to electricity services; and

- Realize the contribution that electricity access expansion can make towards rural transformation by offering: (i) technical assistance and capacity building for various stakeholders; and (ii) investments in renewable energy systems for isolated mini-grids using hydro sources and in off-grid systems for households, small businesses and community organizations in rural areas.

Further, the proposed renewable energy project will complement the rural electrification and transmission project of the Bank in capacity building and technical assistance.

6. Project components

The Renewable energy promotion project will be integrated with the Cambodia Rural Electrification and Transmission project mainly through two project component:

Establishment of a IDA/GEF-financed Rural Electrification Fund to support barrier removal (US$ 5.1 million IDA; US$ 1.54 million GEF)

A transparent and clear guided RE-Fund is being be set up with IDA and GEF grant resources to provide sub-grants for new connections in rural areas. The fund will support REE grid extension, off-grid/mini-grid energy services including renewable energy and grid-connected renewable energy investments on the basis of progress towards implementation. Under the REF, sub-grants will be provided as "capital enablers" to the extent of about 25% of project costs to facilitate the implementation of projects by the private sector through commercial financing.

The royal decrees establishing the REF allow for different sources of funding to sustain the REF, including various donors, power transmission businesses, power supply businesses, urban consumers, and/or government. For further details on the REF component, please refer to the main section of the project appraisal document and Annexes 2, 13 and 14.

The key renewable energy performance indicators of the project are:

- 5% of generation capacity by renewable energy systems (6MW);
- 3 strong renewable energy businesses;
- 3 mini hydro projects supplying to grids on a commercial basis;
- About 12,000 solar home systems installed;
- About 200 educated renewable energy employees.

Technical assistance component (US$ 8.22 million of which GEF US$ 4.21 million)

In addition to the support provided to the REF investments, the project will also provide technical assistance in the following areas:

MIME Policy making (US$0.50 million from GEF). This subcomponent comprises the development of policy that would create a level playing field for renewable energy private sector investors based on renewable energy assessments and least cost planning; and other TA as required within the budget and scope of the project. Assistance will include development and implementation of a Small Power Purchase Agreement (SPPA) for renewable energy developers, development of technical standards to ensure safety to the consumers and a minimal quality of services, policy on battery recycling and development of details of the financing and subsidy mechanism for ensuring sustainability of renewable energy development in the country.

Rural income generation promotion. (US$ .20 mill IDA, US$0.15 million GEF). TA will be provided to develop end-use activities in order to increase income generation opportunities in rural areas and enhance productive uses. Suitably tailored training programs and demonstration activities on new electricity based rural income generation options as well as adapting existing uses to run on electricity will be offered (e.g., use of power tools by and existing village carpenters). Promotion of such village level economic activities will gradually build up demand among new consumers and also increase affordability. It is envisaged that these activities will be carried out by local consultants and NGOs so as to ensure outreach to rural consumers. Specific areas of support include; (i) rural village and commune planning related to electricity,(ii) assessment of businesses and products, (iii) economic development promotional activities such as training programs and demonstrations and (iv) establishing links between rural businesses and markets.

Renewable Energy Business Development. (US$ 0.2 mill IDA, US$2.24 million GEF). Cost-shared TA will be provided for preparation of feasibility reports, business plans, technical training, awareness programs and promotion of the use of renewable energy sources. Separate activities will address solar and hydropower with possible extension to biomass as well. This sub-component funds activities in three principle areas; (i) Pipeline development, to be implemented as a 1-2 consolidated consulting assignments over the life of the project whereby developers and communities interested in preparing REF proposals will receive cost-shared assistance. Guidelines for cost-sharing were decided based on consultations with stakeholders and will be specified in the TORs for this block

consulting assignment; (ii) Promotional activities which will include media campaigns, awareness programs, community demonstrations as well as other suitable interventions to overcome information barriers; (iii) Training and workshops including technician training, training of NGOs and private sector entrepreneurs on renewable energy technologies, regional and international study tours and participation in international conferences.

Capacity Building of Financial Institutions. (US$0.25 million GEF) Meetings with commercial banks indicated that main barriers with regard to financing RE projects would be unfamiliarity with renewable energy technologies and projects, resulting in limited appraisal and supervision ability. To address this, assistance for appraisal and supervision would be provided as TA.

Implementation Support for the REF (US$ 1.92 million IDA, US$0.95 million GEF). The GEF support will include implementation assistance to ensure smooth administration of this component. The REF has yet to be established and a PMU will be operated under MIME. When the REF Decree and sub-Decree are enacted, and the REF becomes operational, this TA will be transferred from MIME to the REF. Support will be needed for implementation capacity of the REF (including appraisal capacity), incremental operating costs, implementation of a financial management system (a qualified firm will be selected to put in place an efficient and transparent system) and a technical in-house advisor to assist in the day-to-day operation of the REF.

Regulatory Capacity Building at the Electricity Authority of Cambodia (US$ 0.43 million IDA US$ 0.12 million GEF) .The GEF support will be focused on providing exposure and building a better knowledge base within the EAC on grid-connected and off-grid renewable energy projects.

REE Improvement and Association Building ($1.26 million IDA): TA will be provided to strengthen REE management, technical and operational capacity; demonstration of regional and international best practices; strengthen and expand REE cooperation in training, communications/outreach, and business support activities; and facilitate coordination with local stakeholders to better serve their electricity needs.

7. Incremental cost analysis

The GEF project aims at providing lighting and small power needs of rural households by sustainable energy technologies. It thereby leads to fossil fuel substitution and ultimately GHG emission reductions. In the proposed alternatives, the barriers for increased use of renewable energy sources will be removed by demonstrating the viability of providing these services by local enterprises. The project proposes to meet rural energy needs through the following renewable energy technologies as GEF alternatives: i) 6 MW of grid-connected small hydropower schemes (1-2 MW); ii) 850 kW of village/community

level mini hydropower systems (50-200 kW); and iii) 12,000 solar home systems (40 Wp systems on average)[2].

Costs

The total costs of the project intervention come to US$ 34.53 million. The baseline costs are estimated at US$ 28.78 million and the incremental costs (that is the costs of removing the barriers necessary to make the long run implementation of renewable energy technologies sustainable) are US$ 5.75 million, including incremental cost of investment (US$ 1.54 million) and technical assistance including operational support (US$ 4.21 million). Including the GEF PDF B resources (USD 0.33 million), the requested GEF contribution amounts to USD 6.08 million. Cost break-up by funding source is provided below:

Estimated project cost and financing plan.

	Target	**Projected Cost**	**IDA**	**GEF**	**Private/ Government/Donor/NGO**
	Systems	**Million $**	**Million $**	**Million $**	**Million $**
Mini-grid connected	6 (6MW)	12.15	2.76	-	9.39
Village hydro	10 (850kW)	2.18	-	0.340	1.84
Solar Home Systems	12,000	5.2	-	1.2	4.0
REE Grid Extension	45,000	7.21	2.34	-	4.87
Technical assistance		8.22	4.01	4.21	-
Total		**34.96**	**9.11**	**5.75**	**20.1**

Table 1 gives an overview of the incremental cost of each technology and the avoided CO_2 emissions, as well as of the incremental cost of general technical assistance activities.

[2] The installed capacity of power generation by mini and small hydro (GEF alternatives) is identical to that in the baseline (diesel gensets). In the case of solar home systems this is also the case for batteries (PV-powered or diesel-charged), but it is difficult to make exact comparisons between the lighting provided by a kerosene lamp and that of TL as may be used in a solar home system.

Table 1 Overview of alternative, baseline and increment costs and avoided GHG emissions

	Baseline (USD millions)	**Alternative (USD millions**	**Incremental Cost (USD millions)**	**Avoided CO2 emissions (tons CO2)**	**GEF cost of emission reduction (USD/ton CO2)**
Investments					
REE Grid extensions	Diesel genset 7.21	Diesel genset 7.21	0		
Grid connected investments	Diesel genset 12.15	Mini hydro 12.15	0	202,449	
Village level investments	Diesel genset 1.84	Village hydro 2.18	0.34	19, 832	17.1
Household level investments	Kerosene lighting & battery charging 4.00	Solar home systems (PV) 5.2	1.2	10,745	112.7
Total	25.2	26.74	1.54	233,026	6.7
Technical Assistance					
RE Policy Dev	0	0.5	0.5		
REF Imp Support	1.92	2.87	0.95		
Rural Income Generation	0.2	0.35	0.15		
RE Business Dev.	0.2	2.44	2.24		
REE Improvement	1.26	1.26	0		
FI Capacity Building	0	0.25	0.25		
EAC TA	0.43	0.55	0.12		
Total	4.01	8.22	4.21		
Grand Total	29.21	34.96	5.75		24.7

Incremental cost of investment

Incremental cost between the baseline scenario technologies and alternative options are calculated by comparing the NPV of the investment cost and the operating and maintenance cost of the systems. A discount rate of 12% is used. In Cambodia, there is a sales tax (VAT) of 10%, while import duties vary (15% for generators and 35% for solar panels). In the analysis it has been assumed that in the WB/GEF project, renewable energy equipment will be exempted from import duties[3]. The Government intends to maintain this exemption as part of its energy policy to support rural electrification and to protect the environment.

To ensure private sector participation, investments are built on common commercial practices based on credit from commercial financial institutions. This means that in case of loans (3 to 4 years), financing institutions will require a 20-25% down-payment (to serve as guarantee for the fully commercial loan for which a lending rate of 18% is assumed). The subsidy from the Rural Electrification Fund (covering the incremental

[3] It has to be noted though that much of the baseline technologies are currently acquired on the informal market, including (second-hand) generators, and thus are imported without paying duty.

cost) is meant only to leverage private sector contribution by addressing the high front-end cost barrier.

The investment component has three parts:

Investment in grid connected small hydropower systems
About six small hydropower schemes are to be set up in areas with relatively high concentration of demand by a private developer. One purpose is to show models for public-private sector agreements under which power is sold, for example, to the utility EdC. The incremental costs analysis shows that a 1 MW mini hydropower system, as compared with the baseline option of diesel generators, is actually the least-cost option, and will therefore not need GEF incremental subsidy. However, the project will provide "capital enabling" grant support utilizing IDA resources to the industry in view of the underdeveloped capital market. The possible pipeline of sub-projects is presented as a separate Annex.

Investment in village/community level hydro systems
Micro hydropower (50-200 kW) will be set up in remote areas; it is assumed that in the baseline scenario a village-level decentralized grid, fed by a diesel generator, would otherwise have been put in place by a rural electricity enterprise (REE), which is already practice in many areas in Cambodia, or by a community level institution. A total of 10 systems are targeted to be installed under the project to achieve total installed capacity of 850 kW.

The incremental cost analysis of reveals a 12-year life cost of USD 264,000 for a 85 kW micro hydro system, compared with the present value of USD 229,000 for the baseline option of a diesel-powered village grid. The difference in cost would be covered by an incremental subsidy from GEF grant

Investment in solar home systems
Baseline costs associated with the delivery of photovoltaic energy services to rural households are based upon continued use of kerosene lanterns and recharged batteries. Based on the energy survey by Kosan Engineering (2001), the average household would opt for a 40 Wp solar home system, providing power for a B/W TV and a light, replacing the purchase of a kerosene lantern (USD 30), the total consumption of 18 liters of kerosene annually as well as replacing the weekly diesel-powered recharging of the battery (at USD 1/month). Some 12,000 solar home systems (SHS) would be disseminated to the households by service providers. Existing solar companies/dealers, REEs and battery chargers are envisaged to play a role as service providers that would buy solar home systems, using funds from the commercial credit channels in Cambodia and operate on a fee-for-services basis to the individual households. The initial market take-off will be from the top 25% of the rural households (estimated to be 300,000 households) that are incurring an expenditure of US$ 4/month on battery charging.

The incremental cost analysis, as presented in table 1, reveals a 12-year life cost of USD 434 for a SHS, compared with the present value of USD 333 for the baseline option of

kerosene lighting and battery charging, giving an incremental cost of about USD 100 per unit, or USD 2.50 per Wp.

Additional benefits

Additional global environmental benefits

Apart from the **direct** carbon emission reduction of 233000 tons for the renewable energy investments over the project's duration 2002-2007 in small hydro, mini hydro and solar home systems, an estimated *1,5 million tons of CO_2* are abated **indirectly** as a result of sustained investment in these technologies *after the project has ended*, assuming an annual 12% growth per year in investment in renewable energy technologies during 2000-2020. Such emission reduction can be indirectly attributed to the project, as the non-project investments would not be possible without the buildup of private sector capacity during the project.

Domestic benefits

Additional domestic benefits attributable to project activities can be expected to take several forms. First, employment will be created and skills enhanced amongst installers and maintainers of renewable energy systems. Second, the small power needs of rural consumers are satisfied. Those consumers investing in PV systems for lighting will receive substantially higher quality lighting albeit at somewhat higher cost as in the baseline.

Incremental cost matrix

	Baseline	**Alternative**	**Increment**
Global environmental benefits	Business-as-usual power supply development and rural energy services, relying on kerosene lighting and diesel generators for grid and village power supply and car battery charging.	Significant offset of greenhouse gas emissions through a range of renewable energy options (grid-connected: mini hydro, village-level: mini hydro, household level: solar home systems).	0.23 million tons of CO_2 avoided
Domestic benefits	Access to electricity services will continue to be low and the demand suppressed as barriers that prevent the widespread application of renewable and/or off-grid technologies continue to exist. Economic development in rural areas will continue to hamper due to power availability constraints Very limited development of the commercial market of renewable energy technologies.	Large scale intervention to support the provision of grid extension, mini grids and off-grid power, leading to improved living standards by increased small power services to some 12000 (off-grid) households thru solar, 6 MW of grid-connected hydro and 850 kW micro hydro systems Institutional strengthening of the power sector in policy development, regulatory framework, pricing, contracts, etc. Renewable energy as integral part of power supply and rural electrification strategy. Stimulation of rural businesses to expand operations including renewable energy (hydro, SHS). Increased (rural) job opportunities.	Barriers (information, high upfront cost, institutional) to commercial renewable energy development removed. Successful demonstration of a wide range of sustainable technologies and alternative business approaches, allowing replication after the project's period of duration. Technology improvement that benefits small renewable energy producers and enhances competition with diesel-fueled sources.
	Baseline	**Alternative**	**Increment**
Project activities			
1. Investments in small hydro (grid-connected)	Cost: US$ 12.15 million Investment in diesel-based grid-connected electricity generation systems (6 MW).	Cost: US$12.15 million Grid-connected small hydropower schemes with an equivalent installed capacity.	Cost: US$ 0
2. Investments in village level hydro (isolated community grids)	Cost: US$ 1.84 million To provide 10 villages with diesel-based electricity generation systems (50-150 kW).	Cost: US$2.18 million To provide the 10 villages with an equivalent good-quality energy services by village/community level mini hydropower schemes.	Cost: US$0.34 million To ensure the techno-economic viability of investments in mini hydropower schemes by lowering the high initial cost barrier.
3. Investments in solar home systems (off-grid power)	Cost: US$ 4.00 million Off-grid households purchase kerosene for lighting and utilize car batteries, charged by diesel generators.	Cost: US$ 5.2 million To provide some 12,000 energy end users with good quality energy services by photovoltaic systems.	Cost: US$ 1.2. million To ensure the techno-economic viability of investments in solar home systems by lowering the high initial cost barrier.
4. Investments in REE grid extension	Cost: US$ 7.21 million Investment in diesel-based grid-connected electricity systems (45,000 new connections)	Cost: US$ 7.21 million Investment in diesel-based grid-connected electricity systems (45,000 new connections)	Cost: US$ 0
5. Technical assistance for investments, capacity building and training	Cost: US$ 1.66 million Developers, private enterprises and operators (e.g., REEs, battery chargers) have not sufficient knowledge of renewable energy technologies and market characteristics to invest.	Cost: US$ 4.3 million Increased confidence and positive experience with renewable energy technologies enables increased investments. To demonstrate the viability of renewable energy technology in adequate product delivery management models.	Cost: US$ 2.64 million The TA will provide pre-investment assistance to investors and project developers and ensure that technical and other problems encountered will be properly handled.

	Knowledge of market characteristics and skills by developers, financers and operators are not brought to bear on providing decentralized energy services based on renewable energy technologies. Limited information and awareness on renewables.	Increased public awareness and information on the deployment of renewable energy systems. Facilitate dialogue between the government, NGOs, private sectors and consumers. Enhanced project and business development skills and techniques.	Development of adequate project delivery and management models (e.g., fee-for-service model) Disseminate information through public awareness campaigns. Provide technical training to managers, operators and technicians. Provide financial and business management training. Project development training. Promote demonstrated project development models.
6. Policy development	Cost: US$ 0.43 Policy and regulations are directed to conventional grid extension.	Cost: US$ 1.05 million Policy and institutional arrangements are set up, considering sustainable and/or small, off-grid energy services. Development of standards and codes.	Cost: US$ 0.62 million To develop policy framework that will allow private enterprises to invest in renewable energy at cost-recovery basis.
7. Project Management Unit	Cost: US$ 1.92 million Limited capacity and staff in the REF on renewable energy program development.	Cost: US$ 2.87 million Increased capacity to manage, monitor and evaluate renewable energy activities and associated funds	Cost: US$ 0.95 million To transfer knowledge to the REF staff on renewable energy program management
COSTS:	**Total: USD 29.21 million** Users/private sector/donors/RGoC	**Total: USD 34.96 million** Including GEF, IDA and private sector contributions	**Total: USD 5.75 million** GEF (not including PDF costs and costs of monitoring and evaluation).

Sustainability and Replicability

The renewable energy market development program being undertaken in Cambodia involves development of an innovative institutional mechanism. The concept of REF is now widely recognized as a clear and transparent mechanism to promote rural electrification in the context of reforming the power sector. However, its pioneering nature also brings with it high risks. Strong government commitment to the creation of this institution during preparation, demonstrated by the passage of the Royal Decree and Sub-decree, have helped in better understanding. Adequate features in project design related to criteria for project evaluation, financial management, social and environmental safeguards, and output linked grant-disbursment have been included in the REF and are available in the REF operational manual. Further, implementation of the REF component will follow a phased approach whereby an initial phase of 6-10 projects will be implemented to gain experience, fine tune operations, before moving to the main phase. The REF will be sustained in the long-term through contributions from urban consumers and other donor assistance.

Extensive preparatory work has been undertaken during the PDF phase of this project to establish the market demand, feasibility of implementation, level of private sector capacity and affordability. Over 60 mini-hydro sites and 45 community hydro sites were screened and 4 PV market studies were conducted utilizing Bank, GEF, UNDP and NZ Government assistance. Further details regarding pipeline projects are available in a separate Annex. Based on the studies on ground, stakeholder consultations and project

implementation experience gained from other countries in the region such as Sri Lanka, it is expected that some grant assistance beyond the life of the project will be required for renewable energy technologies, especially village hydro and solar home systems. During the life of this project, the grant need will be reviewed on an annual basis by the REF Board, with a declining grant approach as a key criteria for review. For the initial phase of the REF component of the project, the level of GEF grants have been agreed as US$ 100/SHS and US$ 400/kW of micro/village hydro systems installed.

Social and Environmental Assessment

All the sub-projects to be considered under the REF would need to comply with the World Bank environmental and social guidelines. An environmental management action plan and resettlement action plan have been prepared for the project. Further, the guidelines and process to be followed for undertaking these social and environmental assessments are available in the REF operational manual. As mentioned above, GEF technical assistance support will also include policymaking support including in solar battery recycling. The project will also gain lessons from other ongoing GEF/IDA projects with significant solar home system (SHS) components. In particular, Sri Lanka and Bangladesh are currently in the process of developing guidelines in this area and Cambodia will build on this experience.

Annex 15
STAP Review at Work Program Entry (May 2001)
(Reviewer: Daniel M. Kammen)

Summary

The Cambodia Renewable Energy Promotion Project has the potential to significantly transform the rural energy sector characterized by a diverse, entrepreneurial, set of clean energy providers and a growing post of well-served customers. The project has the advantage of a suitable, long, time-frame.

Among the issues that the PCD could clarify are:

1. Optimal Use of Market and Public Sector Diverse

The technical assistance component (2.4.3(iv)) includes an innovative array of mechanisms (a-h). To determine which of these mechanisms to employ in each situation, it is recommended that the MIME solicit a set of pre-business plans from the current and potential future renewable energy entrepreneurs. From this set of business models, the MIME can determine what mixture of public-sector assistance, capacity building, or more market-dominated support would best fit a given locality. In this way the MIME can take maximum advantage of the growing private-sector expertise and make maximum use of its resources.

2. Support Expanding Markets Without Excluding New Entrants

A complex feature of the project is that the funds to support market developments could be exhausted without fully stimulating new private sector growth unless careful planning allocates resources (e.g. 2.4.3.iv (a-h)) to a diverse sets of existing and new market entrants, and methods for the public sector to support the private sector.

3. Household Versus Village and Community Markets

The project is intended to support both clean energy services to households and larger community-scale projects. Experiences in Kenya (Duke, et al, 2000) , the Dominican Republic, and elsewhere suggest that it can be difficult for companies to serve this diverse set of clients. MIME could establish an public-private (including NGO groups and entrepreneurs) to advise use of the capacity building, credit line and Rural Energy Fund so that small-scale and large customers are both supported by the fledgling renewable energy REEs.

4. Integration of Other Donors

For the project to succeed, additional donors will be required to support the large number of initiatives envisioned (e.g. 2.4.9.a). The international and in-country project team must remain vigilant that no cases of tied-aid are introduced into Cambodia.

5. Incremental Cost Calculation

At this stage many of the specific financial allocations remain undetermined. A full evaluation of the incremental cost analysis is thus not appropriate. However, analyses of the costs, assuming some additional donor involvement, is reasonable.

Response to the STAP review

1. Optimal use of market and public sector drivers

Agree with the comment. At this stage it is unclear which of the different delivery mechanisms will be optimal in Cambodia. Therefore, the operational TA is focussed on learning to know the market and indeed building on existing initiatives as well as new ideas by the entrepreneurs. The solicitation for ideas has started during the preparation of the project when a stakeholder workshop was held identifying the main barriers and *solutions* for renewable energy development as perceived by the representatives of 18 organizations. This soliciting process (including pre-business plans) will continue during project implementation. New ideas in principle will be supported on a co-financing basis to ensure ownership by the proponent.

2. Support expanding markets without excluding new entrants

Even though an estimated 600 Rural Electricity Enterprises exist in Cambodia, hardly any have experience with renewable energy systems. In fact, of the 45 REEs interviewed none of them had a renewable energy supply system. Further more, the number of existing renewable energy businesses is very small in Cambodia. Therefore, the support should very much act as a trigger for new companies to come forward to explore the renewable energy business opportunities. To lower the barriers for entrance of new businesses, larger, sub-sector-wide (not company specific), up-front market investments will be supported by GEF. This would include: nation wide market surveys, general awareness campaigns, and capacity building of management, technical and sales staff. Company specific, follow-on, activities can than be taken on by the businesses.

3. Household versus village and community markets

Agree with the comment. Experiences in other countries in the region (Sri Lanka, Indonesia, Vietnam, India) have shown similar conclusions. In many cases the two sub-sectors are serviced by two different types of organizations. In Sri Lanka for example, the village hydro development is very much driven by the NGOs, while the solar home systems market is serviced by commercial companies like Shell Solar and RESCO. Therefore, involvement of public-private participation in design of use of funds is important. This would be included in the design of the Rural Energy Fund with a trust board with representatives of the main stakeholders, as well as the continuation of the participatory consultation process with representation of the different types of organizations.

4. Integration of other donors

Agree with the comment. Part of the on-going preparation by MIME is the development of a 10 year Cambodia Renewable Energy Action Plan, where clear objectives, targets, priorities for implementation, and financing requirements will be outlined. MIME plans to use this Action Plan to coordinate donor interest in supporting renewable energy development.

5. Incremental cost calculation

Based on the information to date, an economic and financial analysis have been conducted and is summarized in the document. However, we agree that with the lessons learned and new information gained during project implementation, economic, financial as well as incremental cost calculation should be up-dated. This should also reflect the additional donor funds that might come available.