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The World Bank

Report No: 23887-BD

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 153.0 MILLION
(US$ 190.98 MILLION EQUIVALENT)

AND A GLOBAL ENVIRONMENT FACILITY
TRUST FUND GRANT

IN THE AMOUNT OF SDR 6.6 MILLION
(US$ 8.2 MILLION EQUIVALENT)

TO

THE PEOPLES REPUBLIC OF BANGLADESH

FOR A

RURAL ELECTRIFICATION AND RENEWABLE ENERGY DEVELOPMENT

PROJECT

May 31, 2002

Energy and Infrastructure Sector
South Asia Regional Office

CURRENCY EQUIVALENTS

(Exchange Rate Effective March 31, 2002)

Currency Unit = Bangladesh Taka (Tk.)
SDR 1 = US$1.24862
US$1 = Tk. 57.25

FISCAL YEAR
July 1 -- June 30

ABBREVIATIONS AND ACRONYMS

ACRE	Area Coverage Rural Electrification program
ADB	Asian Development Bank
BPDB	Bangladesh Power Development Board
BRAC	Bangladesh Rural Advancement Committee
BRDB	Bangladesh Rural Development Board
BSTI	Bangladesh Standards and Testing Institute
BUET	Bangladesh University of Engineering and Technology
CAS	Country Assistance Strategy
CBO	Community-Based Organization
EA	Environmental Assessment
EMP	Environmental Management Plan
ESD	Energy Services Delivery
GEF	Global Environment Facility
GOB	Government of Bangladesh
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IDCOL	Infrastructure Development Company Limited
JBIC	Japan Bank for International Cooperation
kW	Kilowatt
M&E	Monitoring and Evaluation
MFI	Micro-Finance Institution
MW	Mega-watt
NGO	Non-Governmental Organization
PBS	Palli Bidyut Samity
PO	Participating Organization
RAP	Resettlement Action Plan
RAPSS	Remote Area Power Supply System
REB	Rural Electrification Board
SHS	Solar Home System
TA	Technical Assistance

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BANGLADESH
RURAL ELECTRIFICATION AND RENEWABLE ENERGY DEVELOPMENT

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MAP(S)
IBRD 24206R1
Bangladesh PBS Service Area

BANGLADESH
Rural Electrification and Renewable Energy Development

Project Appraisal Document

South Asia Regional Office
SASEI

Date: May 31, 2002	**Team Leader:** Subramaniam V. Iyer
Country Director: Frederick T. Temple	**Sector Manager:** Penelope J. Brook
Project ID: P071794	**Sector(s):** DI - Private Infrastructure, PD - Distribution & Transmission, PY - Other Power & Energy Conversion
Lending Instrument: Specific Investment Loan (SIL)	**Theme(s):** Rural Development; Energy; Private Sector
	Poverty Targeted Intervention: N
Global Supplemental ID: P074040	**Team Leader:** Subramaniam V. Iyer
Focal Area: G	**Sector Manager/Director:** Penelope J. Brook
Supplement Fully Blended? Yes	**Sector(s):** PY - Other Power & Energy Conversion, VY - Other Environment

Project Financing Data

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

For Loans/Credits/Others:
Amount (US$m): IDA 190.98; GEF 8.20

Proposed Terms (IDA): Standard Credit

Financing Plan (US$m): Source	**Local**	**Foreign**	**Total**
BORROWER/RECIPIENT	92.34	0.00	92.34
IDA	12.61	178.37	190.98
LOCAL COMMUNITIES	6.78	0.00	6.78
GLOBAL ENVIRONMENT FACILITY	1.20	7.00	8.20
Total:	112.93	185.37	298.30

Borrower/Recipient: PEOPLE'S REPUBLIC OF BANGLADESH
Responsible agency: RURAL ELECTRIFICATION BOARD AND INFRASTRUCTURE DEV. CO. LTD.
Rural Electrification Board
Address: Head Office, 3rd Floor, Nikunja-2, Khilkhet, Dhaka-1229, Bangladesh
Contact Person: Syed Abu Adullah
Tel: 891-6420 Fax: 891-6400 Email: Rebpp@Citechco.Net

Other Agency(ies):
Infrastructure Development Company, Limited
Address: IDB Bhaban, 6th Floor, Agargaon, Dhaka, Bangladesh
Contact Person: Dr. M. Fouzul Kabir Khan
Tel: 8111-235 Fax: 8116-663 Email: idcol@dhaka.agni.com

P071794 Estimated Disbursements (Bank FY/US$m):

FY	2003	2004	2005	2006	2007	2008		
Annual	43.33	57.40	54.60	21.50	9.55	4.60		
Cumulative	43.33	100.73	155.33	176.83	186.38	190.98		

P074040 (GEF) Estimated Disbursements (Bank FY/US$m):

FY	2003	2004	2005	2006	2007	2008		
Annual	0.77	1.15	1.41	1.67	1.67	1.53		
Cumulative	0.77	1.92	3.33	5.00	6.67	8.20		

Project implementation period: FY2003-2008
Expected effectiveness date: 09/30/2002 **Expected closing date:** 06/30/2008

OCS PAD Form: Rev. March, 2000

A. Project Development Objective

1. Project development objective: (see Annex 1)

The Project's aim is to support Bangladesh's efforts to raise levels of social development and economic growth by increasing access to electricity in rural areas, where 85 percent of the country's nearly 63 million poor people live.

The detailed objectives include:

(i) assisting the Rural Electrification Board to expand the reach, capacity and reliability of rural grids and to improve the operational and financial performance of the rural electricity cooperatives (Palli Bidyut Samities or PBSs);
(ii) promoting the use of solar home systems in remote rural areas;
(iii) facilitating development of small power projects, using renewable energy sources where feasible, to be owned and operated by the private sector or by NGOs/community-based organizations; and
(iv) supporting initiatives in rural areas for productive use of electricity to increase household income and improve the delivery of such social services as health and education.

2. Global objective: (see Annex 1)

The **global objective** of the Project is to reduce atmospheric carbon emissions by overcoming market barriers for renewable energy development, including high implementation costs.

3. Key performance indicators: (see Annex 1)

The monitoring indicators for the proposed Project will measure outputs and impact.

In the first category, indicators of output include: (i) grid-based systems to serve about 700,000 additional households, rural small and medium enterprises and public institutions; (ii) off-grid systems to provide electricity to about 64,000 rural households or installations; (iii) a framework to be developed for pilot projects to implement hydro, wind, biomass and other types of small power projects; and (iv) establishment of an institutional system for measuring and documenting the impacts of electricity provision on poverty and quality of life.

As to impact, anticipated results include: (i) measurable increases in the incomes of households that gain access to electricity (to be assessed through periodic monitoring and evaluation); and (ii) strategies for the productive use of electricity and the improved delivery of rural services.

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)
Document number: 21326-BD **Date of latest CAS discussion:** December 12, 2000

The 2000 CAS acknowledges the success of rural, community-based institutions in providing electricity and micro-credit and encourages building on the achievements of rural energy cooperatives in addressing poverty and development challenges. The strategy emphasizes the central importance of widening access rapidly, increasing efficiency and undertaking reforms in the electricity sector. Consistent with these strategies, the proposed Project design would:

Enable the country to expand the reach of rural electricity rapidly by supplementing grid with renewable technologies provided by both government and non-government agencies;

Promote stronger partnerships with NGOs and community-based organizations to identify, finance and implement community-driven, decentralized means of supplying energy;

In rural areas, support sector reforms by re-demarcation of boundaries between the PBSs and the Bangladesh Power Development Board, through the transfer of distribution areas, especially 'pocket areas' -- usually small towns or settlements inside PBS jurisdictions that are served by the Bangladesh Power Development Board; and

Strengthen PBSs by improving their financial viability, assisting them to design and implement programs to promote productive use of electricity, and enabling measurement of poverty impacts of electricity provision;

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

The Project is fully consistent with the GEF's Operational Strategy and with its Operational Program No. 6 of "Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Costs." The major barriers it will address are the lack of government, private and financial sector capacity to plan, provide and finance renewable energy systems; the high initial costs of renewable energy equipment in the currently small Bangladesh market; and the lack of awareness and confidence in renewable energy among potential suppliers and consumers.

2. Main sector issues and Government strategy:

Main Power Sector Issues

The Bangladesh power sector is dominated by two parastatals, the vertically integrated Bangladesh Power Development Board, (BPDB), and the Dhaka Electricity Supply Authority (DESA), which serves the Dhaka metropolitan area. Although, they account for nearly 75 percent of power sales, their operational and financial performance has historically been poor. A program of institutional reform is under consideration to address their shortcomings. In contrast to these two utilities, rural electricity cooperatives have been more successful in delivering reliable services at much higher levels of operational performance with cost reflective tariffs. Included in this superior performance are lower system losses, better billing and collection results, and greater financial discipline. The operational and financial sustainability of PBSs depends on achieving economies of scale and higher revenues through continued growth of the rural system and areas covered, in particular, the transfer of rural and small town load centers from BPDB to the PBSs.

The implementation of broad reforms to establish an efficient and competitive power sector is crucial to the development of this sector. While Bangladesh has successfully opened power generation to private sector investments, reform measures to establish independent and effective sector regulation and create a competitive industry through BPDB unbundling and privatization of electricity distribution remain to be adopted. The Government has recently requested IDA support to help it complete power sector reform. As an important force in realigning distribution arrangements, this Project would contribute directly to ongoing reform efforts. It will support rationalization of distribution systems in the country and enable the transfer of a significant portion of the rural service areas from BPDB to the REB system.

Rural Electricity Sector Issues

The rural electricity system is based on the ownership and management of power distribution networks by independent, consumer-owned cooperatives (PBSs) functioning under the umbrella of an apex organization, the Rural Electrification Board (REB). The latter acts both as a quasi-regulator and a financial manager and provides a wide range of technical and institutional services to the PBSs. Both REB and the PBSs have maintained a good track record in terms of operational and financial management. The last IDA project (the Third Rural Electrification Project; Cr.2129-BD, which closed December 31, 1999) was rated as "highly satisfactory" both in achieving its objectives and in implementation performance by the REB/PBSs. In fact, consumer connections reached 270 percent of appraisal expectations, thanks mainly to the high degree of rationalization of rural distribution network boundaries and substantial transfers of 'pocket' areas to the PBSs.

Notwithstanding the commendable progress in the 20-year history of the rural electrification program and the fact that the PBSs are connecting about 350-400,000 households a year to the grid, more than three out of four of the nearly 15 million rural households lack access to electricity. At the current rate of expansion – and without taking population growth into account – Bangladesh would need nearly 30 years to make electricity universally available. Furthermore, the dispersed nature of rural settlements and the difficulty of physical access stemming from numerous rivers and watercourses that crisscross the country often make grid electrification difficult and expensive. Even in areas with grid electrification, a large number of households use less than 40 kWh a month, mainly for lighting purposes. Both to increase rates of electrification and reduce the cost of providing access and supply, the Government of Bangladesh is now looking to supplement the grid-based electrification program with off-grid options.

Against this background, key rural electrification issues are:

(i) Balancing the increasing costs of grid expansion with the need to expand rural access by rationalizing existing distribution systems;
(ii) Improving revenue generation, operational efficiency and the sustainability of less viable PBSs; and
(iii) Finding viable off-grid alternatives to grid-based supply so as to increase access in rural areas.

Government Strategy

The Government of Bangladesh and the Rural Electrification Board are pursuing a two-pronged strategy, first to deal with the grid-related issues and, second, to develop alternatives to grid electrification.

The main thrusts of the first approach are: (i) prudent selection of new areas for grid electrification based on revised and more rigorous revenue assumptions that can make the area coverage program economically sustainable; (ii) rationalization of distribution networks through BPDB's transfer of power systems in secondary towns and rural areas so as to avoid investment duplication and enable the PBSs to operate more efficiently; and (iii) emphasis on enhancing the PBSs' financial sustainability through selective financial restructuring measures, targeted loss reduction initiatives and efforts to promote productive electricity consumption.

The Government is promoting indigenous natural gas for meeting the bulk of power generation needs in Bangladesh and this will continue to be the choice for future generation. In parallel, off-grid energy options, with an emphasis on renewables, are being promoted for areas that are remote, or uneconomic to serve from the national grid. Private sector, NGOs and microfinance institutions are already promoting

solar home systems in rural Bangladesh. To stimulate the solar home systems program, the Government eliminated the import duty on these systems in April 2000. In the absence of adequate financing and marketing know-how, however, the solar program is limited and reaches only a small number of households. This Project, by addressing the financing and marketing barriers, will assist the private, NGO and cooperative sectors to expand the solar energy program and establish it on a commercial and sustainable basis. This assistance will be channeled through and coordinated by the Infrastructure Development Company Limited (IDCOL), a government-owned development finance institution. Besides solar, the Government would also like to realize opportunities for small private sector power projects in rural areas, that could besides natural gas and diesel, use renewable resources such as wind and hydro where feasible. It is proposed that such renewable energy projects as well as small (up to 10 MW) power generation and distribution projects referred to as 'Remote Area Power Supply Systems' or RAPSS will be offered to the private sector under suitable concession arrangements with the BPDB or REB. A Government investment promotion agency – Infrastructure Investment Facilitation Center (IIFC) – has the mandate to develop RAPSS for private sector participation.

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

The Project will address all the key rural electrification issues by: (i) promoting greater access through rationalization of distribution systems and expansion and intensification of the grid, with due regard to economic and financial viability; (ii) ensuring the financial sustainability of PBSs; and (iii) introducing viable off-grid supply alternatives.

Supporting grid expansion where feasible represents an economic choice. Generally, well implemented, the area coverage concept pursued by REB has been shown to yield predictable outcomes and benefits. The Project will not support grid investments in areas where these are unviable - as determined by a cost-benefit analysis of projected loads and consumer growth along new lines. The strategic alternative for such areas is support for off-grid options, such as SHS and RAPSS.

An important institutional choice also shapes off-grid project implementation. The PBSs, private sector and community-based stakeholders (NGOs, MFIs) will receive project support to implement off-grid options rather than a utility-based approach. This choice utilizes the strengths of the vibrant NGO/MFI sectors in Bangladesh and makes off-grid alternatives socially acceptable and commercially sustainable. The institutions cited have demonstrated strengths and advantages in operating at the community and household levels. The utilities, on the other hand, are not organized for social mobilization, have limited access at the village level and are not generally interested in off-grid options, since these constitute a small part of their overall business. Relying on state-sector implementation would also make it difficult to commercialize renewable energy options and benefit the consumer through competitive pricing and service provisions.

A financial choice turns the grants to be extended into instruments for removing barriers to market development for solar home systems. The design of the grant system reflects the notion that barriers will be gradually reduced with market expansion and, as that occurs, facilitates provision of SHS to poor rural households. Because grants will be in fixed amounts, smaller systems will receive a larger share of costs as grant, and, as the market expands, grants will generally decline over the life of the Project. The expectation is that the grant per system will reduce from US$ 90 to US$ 50 by the end of the Project.

C. Project Description Summary

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

Component	Sector	Indicative Costs (US$M)	% of Total	Bank financing (US$M)	% of Bank financing	GEF financing (US$M)	% of GEF financing
A1 Rural Electrification System Expansion, Intensification and Rehabilitation	Electric Power & Other Energy Adjustment	261.65	87.7	171.68	89.9	0.00	0.0
A2 REB Technical Assistance		2.98	1.0	2.85	1.5	0.00	0.0
B1 REB Solar Program		8.16	2.7	4.63	2.4	1.53	18.7
B2 REB Solar Technical Assistance		0.62	0.2	0.37	0.2	0.00	0.0
C1 IDCOL Renewable Energy Subloans		21.30	7.1	11.44	6.0	3.80	46.3
C2 IDCOL Technical Assistance		3.60	1.2	0.00	0.0	2.87	35.0
Total Project Costs		298.31	100.0	190.97	100.0	8.20	100.0
		0.00	0.0	0.00	0.0	0.00	0.0
Total Financing Required		298.31	100.0	190.97	100.0	8.20	100.0

The key project components are:

A1 Rural Electrification System Expansion, Intensification and Rehabilitation: This component will assist in expanding distribution facilities in 45 PBSs through the construction of 10,000 kms of new lines, the rehabilitation of 2,500 kms of lines previously transferred to PBSs and construction and augmentation of distribution substations and associated facilities. Under an agreed transfer and loss-reduction program, this component will also facilitate and finance the takeover, rehabilitation and loss-reduction of approximately 9,400 kms of lines from BPDB. The agreed transfer program is divided into three packages: 4,000 kms over 17 PBSs to be transferred in the first year of the Project, followed by about 3,000 kms in 17 PBSs the following year, and concluding with the transfer of remaining 2,400 km of distribution lines in 6 PBSs.

A2 REB Technical Assistance: The Project will support institutional development of REB and 45 PBSs, including financial restructuring, socioeconomic impact monitoring and evaluation, environmental safeguards compliance and poverty reduction aspects of electricity provision.

B1 REB Solar Program: This component provides support for implementing a fee-for-service SHS program to reach an estimated 14,000 households spread over 6 PBSs. Depending on the program's results, it can be extended to other PBSs. A GEF grant program for capital cost buy-down will augment the IDA credit by providing Installation Grants to the PBSs. The drawdown of the grants will be contingent on actual consumer installations of systems by the PBSs. Subject to the fee-for-service program being successful, grant funding for solar is expected to become a part of the REB/PBSs future investment financing.

B2 REB Solar Technical Assistance: REB will receive technical assistance to develop the solar program, build awareness among recipient communities and PBS staff, establish solar service units and train and deploy staff to implement the Project.

C1 IDCOL Renewable Energy Subloans: IDCOL will promote conditional sales of SHS program based on microfinance supplied through MFIs and NGOs in cooperation with private sector lenders to provide 50,000 households with SHS. IDCOL will make sub-loans under a credit program to participating organizations (POs) to refinance up to 80 percent of the loans households receive for SHS purchases. A GEF grant program will also operate in tandem with sub-loans to overcome solar market development barriers. The credit and grant components would also support pilot-level development and financing of RAPSS, wind energy, small hydro and biomass sub-projects by the private sector, NGOs and communities to introduce and promote renewable energy technologies that are commercial in other countries, but not yet in Bangladesh.

C2 IDCOL Technical Assistance: Technical assistance will aim at overcoming barriers to renewable energy market development, at project development and administration, at capacity building and project monitoring and evaluation. An additional focus will be the development of appropriate interventions for ensuring renewable energy market sustainability.

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

An existing policy framework for rural electrification underpins the Project. Sixty-seven PBSs now cover nearly 80 percent of the country's rural areas. The Government also pursues an open policy on off-grid options, and three to four companies and NGOs are currently involved in providing renewable energy systems, mainly solar, in Bangladesh. Not only is there no import duty on solar panels and solar system accessories, but such key accessories as batteries and fluorescent lamps are manufactured locally, albeit in small numbers. This Project would give this nascent industry added impetus.

The key policy and institutional reforms that the Project has supported and helped crystallize include:

(i) ***Distribution Rationalization.*** Under the 1993 decision, BPDB retains networks within municipal boundaries and certain 'exempt' institutions (e.g. universities) while handing over the remainder to REB/PBSs. The application of the 'municipal boundary' rule leaves many small geographic areas of low load with BPDB, and forces uneconomic supply to such areas from the BPDB network. Furthermore, to supply adjoining rural areas, PBSs are compelled to duplicate investments by establishing sub-stations. As a result of Project advocacy, the Government has now revised the 1993 decision and established a more rational policy that enables all pocket areas, including municipalities up to 3 MW loads, to be transferred to the PBSs. In addition, transfers are to take place on an economic basis, allowing entire lines and associated facilities in a pocket area to be transferred in one package, rather than in fragmented handovers. Based on these policy decisions, a transfer program of about 9,400 kms of lines, substations and associated facilities has been finalized and agreed to by the Government, REB and BPDB. That program includes about 30 towns of over 3 MW load being transferred on economic grounds as exceptions to the new policy. The first transfer – of 4,000 kms of lines and facilities over 17 PBSs – constitutes a condition of Credit Effectiveness. It is to be followed, by June 2003, with the handover of about 3,000 kms of distribution lines and associated facilities spread over another 17 PBSs, with the remaining 2,400 kms of distribution lines and facilities in 6 PBSs to be transferred by June 2004. This rational switch of pocket areas to PBS control would increase the overall efficiency and quality of supply and help several of the PBSs reach commercial viability as concentrated loads become available.

(ii) ***Loss Reduction Initiatives***: The REB will establish a special Loss Reduction Team for the newly transferred areas, especially towns with medium to high loads, to assist the General Managers of the concerned PBSs to achieve rapid loss reductions and distribution quality improvements. The team will be led by seasoned former REB/PBS staff who have a demonstrated record of success in loss reduction programs and public relations and will receive outcome-based remuneration under a clearly defined Performance Target Agreement that specifies measurable and time-bound targets. This initiative is expected to bring about rapid improvements in supply quality, efficiency and PBS profitability.

(iii) ***PBS Financial Facilitations***: REB-PBS financial arrangements have been based on the principle of 'uniform on-lending terms' to all PBSs. Although some PBSs with good consumer mix have thrived, the inflexible terms have limited the REB in providing special terms to less well-situated PBSs that require more time to reach viability. The Project's intervention has enabled the REB to obtain from the Ministry of Finance a significant policy ruling allowing the REB to offer differentiated lending terms on a case by case basis. A financial restructuring program to assist 15 of the 45 Project PBSs which are struggling to achieve financial viability will be implemented under the Project. In parallel, REB would start scaling down subsidies to PBSs that have crossed the commercial viability threshold and are operating profitably.

3. Benefits and target population:

The Project's primary beneficiaries are Bangladesh's rural population in the Project areas. The Project will provide electricity access to rural households through grid-based and off-grid supply alternatives and will introduce renewable energy that will also foster reductions in the global output of greenhouse gases.

Specific benefits of the Project would include:

Rural Households: Increased access to adequate and reliable supplies of electricity will generate significant benefits. Direct gains include improved convenience, safety, and quality of lighting, enhanced ability to operate small appliances and improvements in indoor air quality resulting from elimination of kerosene smoke. As indirect benefits, access to electricity would also lead to improved delivery of basic health and education services in the Project areas.

Rural Enterprises: These will benefit from increased productivity and income arising from electricity access and use. In particular, the availability of electricity will enable better irrigation and thereby promote higher agricultural growth and productivity.

PBS Owner/Customers: All PBS members will benefit from improved supply quality and operational efficiency as a result of project investments.

Social Capital Formation: The Project would foster collaboration and partnerships among PBSs, CBOs, NGOs, MFIs, and private suppliers, thus contributing significantly to social mobilization and social capital formation.

Global Benefits: The Project will displace about 257,664 tons of carbon dioxide (CO2) over a 15-year life by replacing kerosene use with electricity, yielding a cost-effectiveness of US$ 33.1 per ton.

4. Institutional and implementation arrangements:

Implementation period: The Project will be implemented over a five and half-year-period (FY2003 - FY2008)

Executing Agencies: (i) Rural Electrification Board (REB); and (ii) Infrastructure Development Company Limited (IDCOL). Detailed implementation and operating guidelines for IDCOL are summarized in Annex 12.

IDA Credit: The Government of Bangladesh will on-lend a portion of the proceeds of the IDA Credit under standard arrangements to REB to implement the rural electrification system expansion, intensification and rehabilitation component and the PBS-administered solar home system program. The balance of the Credit will be administered by IDCOL under an Agency and Administration Agreement with the Government to operate a credit program for renewable energy and RAPSS. The renewable energy credit will enable micro-finance institutions and private solar companies to access sub-loans to refinance the loans they make to households for solar home systems. IDCOL will also be able to make direct sub-loans to developers of pilot renewable energy projects and RAPSS.

GEF Grant: A portion of the grant will be given to selected PBSs to fund the fee-for-service SHS provision for rural consumers. REB will be eligible to draw the installation grant on an output basis and pass it through to the concerned PBS. The grant draw is due when the PBS provides documentation to REB evidencing the installation of a SHS and the consumer's acceptance. IDCOL will administer a portion of the GEF grant and provide capital buydown to households that purchase SHS. The grant would be drawn and disbursed by IDCOL against claims made by MFIs and suppliers on prescribed documentation and evidence that solar systems have been installed and accepted. Designed to contribute to the development of the market and to benefit low-income households, the GEF grant will also be available for specified TA with respect to renewable energy promotion, project development and barrier removal activities.

Project coordination: REB will coordinate all implementation activities with respect to the grid component and the off-grid solar component. IDCOL will coordinate the solar and renewable energy program to be implemented through the private sector and MFIs. IDCOL and REB have jointly established a technical committee and a publicity committee to coordinate common initiatives such as publicity, solar promotion and quality assurance programs.

Project oversight: Policy guidance for rural electrification and renewable energy will be provided through the Ministry of Energy and Mineral Resources, Power Division. Once established, the RAPSS are to be regulated under concession arrangements that vest sole responsibility for regulation in the concession agency (BPDB or REB). The regulation will be embodied in specific concession agreements.
Accounting, Financial Reporting and Auditing arrangements: The standards and arrangements established under prior rural electrification projects for REB have been effective and will be continued under the proposed Project. Where necessary, they are being further strengthened, while formats for financial reporting and arrangements for audits of new activities such as fee-for-service solar program are being established. Similarly, IDCOL, as an established financial intermediary with professional staff and adequate financial management controls and safeguards in place, is administering the IDA-funded Private Sector Infrastructure Development Project. IDCOL will provide quarterly progress reports and in particular provide evidence of continued compliance with the eligibility criteria for institutions participating in the solar home system program. Both REB and IDCOL will submit annual audit reports for the entity and for the Project components.

Financial Management: No separate Project Implementation Units (PIUs) will be established to implement this Project. Existing departments of REB and IDCOL will carry out project financial management functions under the oversight of their respective Boards.

Funds Flow: IDA credit and GEF Grant funds will be provided to: (i) REB under a Subsidiary Loan Agreement and a Subsidiary Financing Agreement respectively; and (ii) IDCOL under an Agency and Administration Agreement, all on terms and conditions acceptable to IDA. To this end, four Special Accounts, two each for the IDA Credit and the GEF Grant, will be established in a commercial bank and operated by REB and IDCOL. The Government will allocate counterpart funds for the Project on the basis of its Annual Development Plan (ADP). The Director, Finance of REB and the Chief Executive Officer of IDCOL will be the authorized persons to withdraw IDA Credit proceeds and GEF Grant.

Procurement: IDA-financed procurement of goods and works will follow the Bank's Procurement Guidelines. Consulting services and training will be procured in accordance with the Bank's Consultants' Guidelines. GEF-financed goods and services will follow the Bank's procedures.

About 90 percent of IDA financing is for purchase of goods, with the balance for small civil works contracts and consultancy assignments. Goods include: line materials, insulators, conductors, distribution transformers, poles, meters and accessories, solar panels and solar system accessories, vehicles, computers, and office equipment. Contracts for works involve mainly construction and installation of electrical lines, substations and solar home systems.

REB will handle most of the procurement under the Project, leaving a small amount to be carried out by IDCOL. Both REB and IDCOL have prepared Procurement Plans that are included in the PIP. About 98 percent of the goods will be procured in bulk through international competitive bidding (ICB). Small quantities of some goods will be procured through national competitive bidding (NCB) or shopping as these are unlikely to attract foreign bidders. Goods estimated to cost per contract: (a) US$ 300,000 or more will be procured using ICB; (b) less than US$ 300,000 following NCB; and (c) less than US$ 30,000 using shopping, with the exception of vehicles to be procured through shopping with contract value under US$ 60,000. Works will be procured following NCB. Depending on the nature of assignments, selection of consultants will be made following quality- and cost-based selection, fixed-budget selection, least-cost selection, single-source selection, and individual consultants methods.

For goods and works, IDA will carry out prior review of the following contracts: all contracts estimated to cost US$ 300,000 equivalent or more irrespective of procedures and the first two contracts for procurement under NCB regardless of value. All other contracts will be subject to post review by IDA. For consultants' services, IDA's prior review will be required for contracts estimated to cost US$ 100,000 equivalent or more for firms and US$ 50,000 equivalent or more for individual consultants. All single-source contracts will be subject to prior agreement by IDA.
Annex 6 provides more details in this regard.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

In continuing REB's 'area coverage concept,' an alternative considered and rejected would have allowed BPDB, on a business-as-usual basis, to supply higher-load pocket areas within PBS jurisdictions, limiting the latter only to villages. This alternative was rejected in light of: (i) BPDB's poor commercial and

technical performance; (ii) the significant duplication of investments in distribution that such an approach implies; (iii) PBSs' inability to provide good supply and customer service in fragmented jurisdictions; and (iv) the low likelihood of PBSs' achieving financial viability based on rural supply alone.

The Project has considered alternatives to grid-based rural electrification to address provision of electricity in areas where the grid is uneconomic. Such areas have been identified for promotion of solar home systems.

With respect to off-grid electricity, one of the alternative approaches considered was to leave the market for solar to be developed by commercial vendors. However, experience in many countries indicates that commercial vendors alone cannot reach adequate numbers of lower income households and provide credit to consumers. Microfinance institutions have played an important role in successful solar programs by enabling suitable rural credit mechanisms. Bangladesh already has a wide network of successful NGOs and MFIs with the potential to expand into credit activities for rural energy. Therefore, the Project seeks to ensure participation of these institutions in developing a large-scale SHS program for middle and lower income families.

Another alternative considered and rejected would have excluded PBSs from the SHS program. PBSs, while lacking alternatives for consumers situated in areas where grid supply is uneconomic, do have the core institutional infrastructure available to install and service SHS. Consequently, by involving them along with a variety of alternative suppliers, private dealers and NGO/MFIs, the SHS component design enables the most widespread promotion of a technology well suited to the low consumption patterns of rural communities in Bangladesh.

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

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed			
Institution Building	Power Distribution (16 Towns) Project Cr.2016-BD)	S	U
Expand Rural Electrification	Third Rural Electrification Project (Cr.2129-BD) Ongoing Projects	S	HS
Power Generation by IPPs	Haripur Power Project Partial Risk Guarantee (P065131)	S	S
Private Sector Delivery of Energy Services	Sri Lanka Energy Services Delivery Project (P010498)	HS	HS
Commercialization of Renewable Energy	India Renewable Resources Development Project (P02449)	S	S
Rural Access Through Renewable Energy	Laos Southern Province Rural Energy (P044973)	S	S
Renewable Energy - Dealer Model	Indonesia Solar Home Systems	S	S

	(P035544)		
Rural Transformation	Uganda Energy for Rural Transformation (P069996)	S	S
Renewable Energy - Off-gid Concessions	Argentina Renewable Energy for Rural Markets (P045048)	S	S
Renewable Energy	China Renewable Energy Development Project	S	S
	Planned Projects		
Renewable Energy and Economic Development - Micro-credit and Socio-economic Development	Sri Lanka Renewable Energy for Rural Economic Development		
Renewable Energy Community-based Hydro	Nepal Power Sector Development		
Sector Reform	Power Sector Reform Technical Assistance Project		
Other development agencies			
Transmission Expansion and Power Sector Reform	Ninth Power (ADB)		
System Development and Power Sector Reform	Dhaka Power System Upgrade Project (ADB, under Preparation)		
	West Zone Power Development Project (ADB)		

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

3. Lessons learned and reflected in the project design:

First, the Project takes into account the recommendations of a Bank review *Rural Electrification: A Hard Look at Costs and Benefits; OED Précis, May 1995.* Grid extension will only be selected for areas where it is demonstrated to be an economically viable option under conservative assumptions of economic costs and benefits. Additional lessons that have influenced the Project design come from *Rural Energy and Development, September, 1996,* which recommends five main principles for better access to electricity: consumer choice, cost-reflective pricing, overcoming first cost barriers, local participation and good sector policies.

Second, the project developers have incorporated knowledge acquired from similar Bank projects and studies including *India Renewable Resources Development, Indonesia Solar Home Systems, Indonesia Renewable Energy Small Power, Poverty and Gender in Indonesia and Sri Lanka, May 2001.*

Third, *the Energy Services Delivery Project in Sri Lanka* has produced valuable lessons for the proposed Project, in particular, a flexible design that makes each supervision mission an opportunity to adjust project design to address emerging problems and issues. The grant design and delivery models, moreover, are simple and easy to implement; credit lines and grant administration are commercially managed and the project promotes industry associations and advocacy groups as agents guiding industry growth and directions.

4. Indications of borrower and recipient commitment and ownership:

The Government is strongly committed to increasing electricity access in rural areas. The Constitution of Bangladesh requires the state to adopt effective measures to bring about rural transformation *inter alia* through electrification (Article 16). After a long history of reliance on grid-based development led by REB, and PBSs, the Government has recently adopted a policy of supporting renewable energy and private sector involvement. A number of enabling and facilitating policy decisions have been made to create the right conditions for greater and more rapid access to electricity in rural areas. (see section C 2 above).

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

The success to date of the rural electricity supply system in Bangladesh has prompted widespread support from donors, including USAID, ADB and JBIC. Their interest is a welcome development since the investment requirements of this sub-sector are very large. The Bank's comparative advantage lies largely in playing a catalytic role by assisting the Government to establish an appropriate policy framework to guide the rural electrification program. The Bank's involvement will enable the establishment of appropriate standards for selection of grid and off-grid options, thereby contributing to the sustainability of the rural electrification program.

The Bank's and GEF's world-wide knowledge with regard to practical experience in the field of renewable energy, based on related projects being undertaken in Asia, Africa and Latin America, will enable transfer of established international best practice as well as valuable emerging concepts for adaptation in Bangladesh. The Project team brings together professionals with a range of country and sector expertise in rural electrification and renewable energy projects in the Philippines, Zimbabwe, Vietnam, South Africa, Thailand, Laos, Cambodia, Indonesia, Pakistan, India and Sri Lanka.

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

1. Economic (see Annex 4):

○ Cost benefit NPV=US$ million; ERR = 16 % (see Annex 4)
○ Cost effectiveness
○ Incremental Cost
● Other (specify)

(a) Grid Electrification: The cost-benefit analysis undervalues benefits since certain benefits are difficult to quantify and are often excluded from the valuation. Examples of such positive externalities include improved safety, better health, improved education and better opportunities for leisure. Recent studies also conclude that past methodologies used for benefit assessment of rural electrification are often inadequate, resulting in substantially underestimated benefits. Conventional methods can miss as much as 60 percent of total benefits. One reason for the incompleteness of previous estimations of electrification benefits is a failure to define "benefits" in a way that permits valid monetary interpretation. For example, many previous estimates defined benefits as net revenues received by the electricity provider. While it is relevant in assessing the provider's financial viability, this measure fails to capture the full economic benefits. To overcome such undervaluation, this Project will define net benefits as the result of subtracting the actual cost of supply from what a rational user (household or business) would be willing to pay for electricity.

Based on this approach, average willingness-to-pay is estimated to be Tk 4.80/kWh. This is still an underestimation; it does not reflect other benefits like safety, better lighting, better indoor air quality, convenience, etc. Using the above estimate the economic evaluation of the grid component would have a

robust EIRR of 16 percent over a period of 20 years. The detailed assessment and sensitivity analysis are provided in Annex 4.

(b) SHS: The cost of off-grid SHS compares favorably with the costs of grid expansion. The solar component under this Project would provide electricity to nearly 64,000 households at a total investment cost of about US$ 27.6 million, i.e. US$ 430 per household. Extending the grid to marginal service areas in Bangladesh, according to REB estimates, would cost about US$ 400 per connection, not counting the cost of generation investment of US$ 500 per kW. In return, however, grid electricity provides a different and higher level of service with a much greater impact on economic development and social well-being than electricity from SHS, which meets basic needs, mainly lighting. However, as a large majority of rural households are low-intensity consumers using less than 40 kWh per month, the level of service from SHS, when used in conjunction with fluorescent lamps, is a reasonable alternative.

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

The financial rate of return is low because of the high costs associated with rural electrification and an assumption that the current regime of less-than-cost-reflective-administered tariffs will continue. Financial returns for PBSs are also low because of slow load growth, a consequence of the pattern of rural electricity use focusing mainly on low intensity domestic consumption. In order to mitigate the risks of low consumer and load growth, the Project is supporting a REB initiative to establish a socioeconomic monitoring cell which would work with the PBSs in promoting productive consumption of electricity in rural areas. This initiative is likely to produce positive results both in motivating rural households to gain access and to use electricity for income generation and improvements in quality of life.

Fiscal Impact:

The REB/PBS system receives capital subsidies in the form of grants from Government funds and concessionary on-lending term loans from donor funds. Under this Project, the Government is to provide REB about US$ 92 million equivalent, spread over five years, as grants for investments.

Impact on the Poor: As 90 percent of the country's poor are concentrated in the rural areas, the Project has a strong poverty alleviation focus. The REB and PBS system have a good record of integrating poor households into the distribution system through low initial connection cost. This focus has also been maintained in designing the solar program to promote smaller systems that poor households can afford.

Credit Availability: Debt finance for renewable energy developers and consumers is constrained in part because of the generally limited level of development of Bangladesh's financial sector and in part because lenders either perceive the risks associated with these activities as too high or doubt that the provision of SHS will lead to income generation. Furthermore, MFIs tend to have such low liquidity that they can reach only a small proportion of households. The Project interventions address both the risk perception and credit availability. Technical assistance will enable banks, as well as micro-finance institutions to expand the debt finance they provide on commercial terms that meet the needs of households and the renewable energy industry. The credit line will provide up to 80 percent refinancing to MFIs for the solar program.

Solar Program Grants: The Project proposes a flexible grant regime that will decline as the solar market grows. Over a five-year period, the household grants for the micro-finance program are expected to decline from US$ 90 per system to about US$ 50 per system. It is assumed that by the end of the Project period, affordability will have improved as system prices come down and commercial financing becomes available

and feasible. For the PBS fee-for-service program the grants do not decline during the Project. Once the REB and PBSs can establish that a fee-for-service program is viable, the future funding is expected from the mainstream rural electrification funding provided by the Government to REB and PBSs.

3. Technical:

There are no significant technical issues. The Project design incorporates the following two safeguards:

(a) The transfer of distribution areas from BPDB to REB/PBSs is based on economic and technical considerations. All pocket areas up to 3 MW have been identified and included in the agreed transfer program. REB has prepared the network intensification and rehabilitation works on this basis. This approach will enable cost-effective development of the rural electricity supply system. The existing REB guidelines for extension of lateral feeders to serve new areas have also been revised to improve financial profitability. The revenue criterion for selection of new lines has been raised to Tk 36,000 per km per annum; and

(b) A SHS quality assurance program has been developed by the implementing agencies in collaboration with the Bangladesh University of Engineering Technology and the Local Government Engineering Department (LGED). The Technical Committee and Public Committee would accept certifications from recognized labs worldwide for qualifying solar photo-voltaic systems, while developing local capacity in BUET and REB to test domestically manufactured components like batteries, controllers, bulbs and wiring etc.

4. Institutional:

4.1 Executing agencies:

REB will implement the grid components and SHS components. IDCOL will implement the non-REB off-grid components. Both are well-established entities with successful track records in program/project implementation.

4.2 Project management:

No separate Project Implementation Units (PIUs) will be established to implement this Project. Existing Departments of REB and IDCOL will conduct the Project management under the oversight of their respective Boards.

4.3 Procurement issues:

The Country Procurement Assessment Report (CPAR), broadly accepted by the Government in February 2001, pointed to poor procurement as a generic problem in Bangladesh and recommended a series of procurement reform actions. Hence, the Government has embarked upon public procurement reform with IDA technical assistance (*Public Procurement Reform Project -PPRP)*. The Project has adequate provision for providing procurement training to public sector staff.

For the proposed Project, REB will handle most of the procurement - totaling about US$ 273 million. It has experience in implementing IDA-supported projects and has adequate capacity to manage project procurement. In its Procurement Department, the Director and one of three Deputy Directors are conversant with the Bank's procurement procedures. Considering the volume of purchasing, one additional specialist with specific experience in Bank-related procurement is needed to manage project procurement. Given the track record of REB and its institutional capacity, the Project related procurement risk is average.

To mitigate the procurement risks associated with REB and to strengthen procurement management capacity, it has agreed to make available additional qualified personnel for procurement and actively participate in procurement management capacity improvement program under the PPRP.

IDCOL's procurement will be limited to small equipment and consultancy assignments of about US$ 5 million. IDCOL has some experience in using the Bank's Procurement Guidelines that will help its staff to carry out procurement in accordance with the Bank's procedure.

4.4 Financial management issues:

Adequacy of Financial Management: The Project's financial management system is adequate to account for project resources and expenditure. The two implementing agencies, REB and IDCOL have maintained a good track record in terms of operational and financial management and have been exposed to the Bank's disbursement procedures and financial reporting requirements.

Both REB and IDCOL maintain computerized accounting systems that use double-entry bookkeeping principles and accrual basis of accounting to generate timely Financial Statements. REB has demonstrated good financial discipline in the closed IDA Project Cr.2129-BD, submitting all audit reports, including those of PBSs, in a timely manner. In order to ensure that the financial management system functions effectively, REB has agreed to add a specialist with experience on IDA projects to strengthen its Financial Controller's office. IDCOL, being an implementing agency of the ongoing IDA credit Cr.2995-BD, has been complying with all financial covenants. Both agencies have Financial Management Manuals that outline the project financial management system and adequately meet the Bank's FM requirements.

Audit: The annual financial statements of REB would be audited by the Comptroller and Auditor General (C&AG). Private sector auditors will be engaged to carry out annual audits of: (i) REB's financial statements with respect to the Project; and (ii) financial statements of IDCOL and its financial statements with respect to the Project; according to TORs acceptable to IDA.

Funding Arrangements: IDA funds will be channeled to two Special Accounts in a commercial bank and operated by REB and IDCOL on terms and conditions acceptable to IDA. REB and IDCOL will receive a GEF grant for which they will maintain two separate Special Accounts. The Government will allocate counterpart funds for the Project on the basis of its Annual Development Plan (ADP). The Finance Division of the Ministry of Finance will provide IDA and GEF funds to REB under the REB Subsidiary Loan Agreement and REB Subsidiary Financing Agreement respectively, releasing the funds in local currency on a quarterly basis on REB's request. IDCOL's required counterpart funds will be supplied through its own resources and cost-sharing from beneficiary POs. IDCOL will manage the credit line and GEF grant funding on the basis of an Agency and Administration Agreement to be entered into with the Government. IDA and GEF funds will be used by IDCOL to refinance sub-loans and provide sub-grants to NGOs and MFIs.

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

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

Environmental Benefits: The Project is expected to have positive environmental benefits. The global objective is to reduce atmospheric carbon emissions through removing barriers and reducing costs for renewable energy. Locally, the SHSs would replace kerosene and other fuels used for lighting, enabling corresponding reductions in indoor air pollution. Expansion of renewable energy sources like wind and mini hydros would likewise reduce the need to burn natural gas or oil for power generation. The technical

assistance and financial support which would be provided to improve existing diesel-based small generation systems in remote rural areas would result in efficiency improvements and better housekeeping, leading to overall reduction of emissions. Also, institutions responsible for project implementation – REB, the associated PBSs and IDCOL - have demonstrated a high degree of social and environmental sensitivity and accountability in prior operations.

Environmental Safeguards: Activities to be financed under the Grid Component of the Project that have a potential to trigger environmental safeguard policies are, expansion, intensification and rehabilitation of electricity distribution systems in rural areas and the small power generation sub-component. While direct IDA investments will be made in rehabilitating and expanding the distribution system, the small power generation component will involve only the provision of technical assistance (TA) and possibly investments in associated basic infrastructure development such as the provision of gas supply facilities to plant locations (in accordance with REB's program of support for private sector financed small power generation). Even though IDA financing is not directly involved in the small power generation plants, REB is required to ensure that private sector generators comply with World Bank environmental safeguards , since the Project will be involved in provision of TA and possibly investments for supporting infrastructure. Under the off-grid component, the sub-components that may trigger Bank environmental safeguard policies are community or private sector initiatives involving mini-grids (distributed supply options), which would include small diesel or gas-based generation systems (systems in the range of 1 MW to 10 MW), micro-hydro and wind energy projects which may be operated either by the private sector or cooperatives.

Adverse Environmental Impacts: No significant negative environmental impacts arising out of this Project are anticipated. The foreseeable, marginal impacts include: (i) minor and temporary land disturbances arising out of laying new distribution lines -- but only where such lines do not follow existing way-leave or rights of way, along roads, streams, etc.; (ii) construction of substations to be undertaken on unproductive, government or community donated lands; (iii) a few pilot mini hydro and wind energy plants; and (iv) small-scale gas- or diesel-based power generation and distribution systems in remote rural areas to which existing environmental standards (both Government and World Bank) will apply. The General Environmental Guidelines in the World Bank's Pollution Prevention Handbook will form the basis for identifying mitigating measures for grid and off-grid sub-projects except for the RAPSS where the guidelines for thermal power plants will be used.

New Distribution Lines and Substations: The REB will be the main agency responsible for overseeing the design and implementation of new distribution lines executed by the respective PBS. The current practice is to limit land requirements by using existing way-leave, such as following roads and pathways or paddy fields. For new sub-stations, the practice is to use government lands or those made available by the community. Once the traces for the distribution lines have been identified, the extent of environmental impacts will be known. Distribution routes will not go through forest or wildlife reserves as well as other natural habitats. Potential impacts from construction and extension of distribution lines could result from clearing of vegetation from sites. Substations will be the primary source of construction-related impacts under the Project.

Pilot mini-hydro plants, wind energy and SHS systems: It is envisaged that the Project would support at most five mini-hydro and wind energy pilot projects of less than 5 MW capacity each. These sub-projects may cause some minor environmental impacts, particularly where an intake lowers river water levels for a section of the river bed until the water returns to the river below the powerhouse. There could be related impacts on aquatic life where water levels drop, potential soil erosion caused by flushing flows discharged from sedimentation basins and by overflows at the forebays, potential ground instability caused by canal/pipe construction, cutting of trees for use as power poles in micro-hydro projects and potential

interference with bird migration patterns in wind energy projects. There are virtually no adverse environmental impacts from SHS of the size financed under this Project. However, disposal of batteries used in conjunction with SHSs poses an environmental hazard that needs to be addressed.

Small-scale Power Generation Projects: Both the grid-connected small power generators as well as RAPSS have the potential for adverse environmental impacts such as air pollution due to combustion emissions and noise pollution, requiring that mitigating measures be incorporated into the sub-project designs. The Guidelines for Thermal Power Plants in the World Bank's Pollution Prevention Handbook will form the basis for integrating such measures into the sub-project designs.

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

Environment and Social Assessment Framework: Since sub-projects, particularly those involving grid-connected small power plants, micro- and mini-hydro plant locations and developers, as well as wind energy sites and distribution line traces have not been identified and/or finalized, site-specific EAs are not possible at this stage. In view of this, REB and IDCOL have jointly prepared an Environmental and Social Assessment Framework (the Framework) to serve as a template and form the basis of undertaking site- and sub-project-specific EAs. The Framework is based on Bangladesh's Environmental Protection Act 1 of 1995 and Environmental Protection Rules of 1997, as well as the World Bank's applicable Safeguard Policies. In accordance with the Framework, all sub-projects require an Environmental Assessment (an Initial Environmental Examination or a full Environmental Impact Assessment, as determined by the Department of Environment (DOE) based on the significance of environmental impacts). Project-specific EAs would include alternative analyses of sub-project designs and locations, adequate mitigation, fair compensation, as well as plans and rules of operations for environmental management, which will be incorporated in a subproject-specific Environmental Management Plan (EMP).

Adequacy of Government of Bangladesh's Environmental Clearance: Since the Government's environmental clearance process is mandatory under the Environmental Conservation Act 1 of 1995 and Environmental Conservation Rules of 1997, all sub-projects and components financed under the Project would require environmental clearance. While the EIA process is largely similar to the World Bank's OD 4.01, there is a significant deviation in that the Government's environmental guidelines and legislation encourage but do not require mandatory public consultation and disclosure. Regardless, REB and IDCOL have agreed with IDA that public consultation will take place on all sub-projects and components financed under this Project. REB had released the Environmental and Social Assessment Framework for public review and comment before its final adoption.

5.3 For Category A and B projects, timeline and status of EA:
Date of receipt of final draft: February 5, 2002

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

Consultation mechanisms with stakeholders established by REB are in place through the PBSs (which are consumer-owned cooperatives) and will be continued. REB will ensure that consultations on sub-project EAs are conducted at the PBS level. Existing consultation and community relation activities of REB and IDCOL will be documented and improved to meet the disclosure and consultation requirements of the Project. IDCOL has adequate consultation and external monitoring provisions in its Environmental and Social Appraisal Manual; and these would be followed in respect of sub-projects under the components that it is to implement.

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

Since the Project proponent of grid-connected works will be the PBSs, the EA preparation will be their responsibility. The actual preparation of the EA will be undertaken initially by a national consultant assisted by PBS staff until the PBSs develop adequate capacity to undertake the EA themselves. Training would be provided under the Project for PBS staff to strengthen their capacity in this regard. The PBSs will use the Environmental and Social Assessment Framework as the basis for preparing the EAs and will be submitted to REB for review and approval. The REB has recently established an Environmental Compliance Cell, headed by the Chief Engineer (Planning) and consisting of two officials with post-graduate degrees in Natural Resources. Capacity building of the Environmental Compliance Cell will be provided under the proposed Project in the form of a national consultant for a limited period as well as training in environmental impact assessment and monitoring for the permanent staff of the Cell. REB's Environmental Compliance Cell will review the EAs submitted by the PBSs to ensure that the EAs conform to the agreed Framework and meet technical quality standards. The Chairman of REB has identified a Board Member to give final approval of the adequacy of the EA, which will then be submitted to DOE as required under the Environmental Conservation Act of 1995, and the Environmental Conservation Rules of 1997.

In the off-grid component implemented by the private sector, the Project would provide technical assistance and possibly the provision of associated basic infrastructure development costs for RAPSS. The 1 MW to 10 MW generating plants to be established under RAPSS would be undertaken by the private sector with possible funding from IDCOL. Excluding SHSs, the potential for adverse environmental issues is greater in the off-grid component than in the grid component. However, IDCOL has a proven track record of ensuring environmental compliance in its current financing of large-scale infrastructure projects in Bangladesh. IDCOL has developed a detailed Environmental and Social Appraisal Manual that outlines the environmental and social appraisal procedures and guidelines necessary to ensure that IDCOL loans are made in accordance with the environmental, social and resettlement policies established by Government and the World Bank. The detailed Environmental and Social Appraisal Manual was reviewed and approved by the World Bank during establishment of IDCOL under the IDA-financed Private Sector Infrastructure Development Project (PSIDP) in 1997. Therefore, all off-grid components under this Project will follow the environmental and social appraisal procedure laid out in the Manual. The responsibility for preparing the EA is with the Project developer and not IDCOL. Once the EA is prepared, IDCOL reviews the documents to ensure compliance with Bangladesh Acts and Rules mentioned earlier and with World Bank guidelines. In addition, IDCOL's loan approval is contingent upon DOE's environmental clearance. Since the technical capacity to undertake the review of the environmental and social assessment of sub-projects at IDCOL is addressed adequately under the PSIDP, it will not be addressed under this Project.

6. Social:

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

Positive Social Impacts: The Project is expected to yield positive social impacts through improvements in the quality of power supplies and service. Greater access to electricity would mean higher levels of rural growth and poverty reduction, as well as socioeconomic transformation and marked improvement in the quality of life. Studies indicate that there have been strong positive impacts in terms of improving socioeconomic status of electricity users, particularly women and the poor. Their social indicators, e.g. health, education, awareness and participation in social activities, are higher than others in the same socioeconomic category. Households with electricity contributed positively to women's security, to income generation and to awareness by increasing the rural population's access to modern media, e.g. radio and

TV. The Project's proposed credit lines would enable NGOs to increase their reach and provide electricity services, especially to poor households living on marginal lands, remote areas and ethnic minorities. The social development outcomes of this Project would include improved quality of life and sustainable poverty reduction; equity and inclusion in society; strengthening of social capital and cohesion; and promotion of accountable and transparent institutions. Based on experience with similar projects in South Asia, it is very unlikely that individual subprojects will involve any resettlement or large-scale land acquisition since the current practice is to limit land requirements by using government lands or those made available by the community.

Social Safeguard Issues: While every effort will be made to limit land acquisition by using unencumbered government property or land made available by the community, negative social impacts/social safeguards may be triggered if land is needed for: (i) laying new distribution lines and (ii) for mini-hydro and wind energy pilots, especially if such acquisition leads to physical relocation, loss of shelter or assets and incomes. In such instances, proper analysis of social impacts and appropriate mitigation measures would be carried out. As noted earlier, the policy and practice is to use existing rights of way alongside public paths/roads and paddy field lands in establishing distribution lines. Village settlements and the displacement of houses are avoided. However, if issues of resettlement arise in individual sub-projects, these would be evaluated under the agreed Environmental and Social Assessment Framework and suitable mitigating actions will be taken, including the provision of compensation. No land issues are anticipated in the RAPSS projects (small generation) as these will be implemented by private enterprises on their own land or on land purchased commercially.

The social assessment of sub-projects and mitigation plans will follow the Environment and Social Assessment Framework described above (see 5.2). Assessments would examine the potential social impacts, identify and recommend mitigation measures and develop a Resettlement Action Plan (RAP) if needed and/or a Vulnerable Communities Development Plan (VCDP) in accordance with the Bank's Operational Directives 4.30 and 4.20 and with Government guidelines. Social assessments will be carried out as an integral part of the feasibility studies for each sub-project so as to maximize benefits and minimize any adverse impacts. As detailed in the Framework, the steps include: (i) early screening and social impact assessment; (ii) public consultations; (iii) census and baseline socioeconomic survey of potentially affected people; and (iv) preparation of a RAP and/or VCDP, if applicable.

The sub-project developer will carry out the social assessment in accordance with the principles and procedures laid out in the Environmental and Social Assessment Framework. The process for REB and IDCOL has been described earlier (see 5.5). However, if a RAP and/or VCDP is necessary for any sub-project, the EA including the RAP and/or VCDP as the case may be, will be reviewed and cleared with IDA prior to sub-project approval and disbursements.

Social Development Outcomes and Monitoring: Based on the socioeconomic development indicators summarized in Annex 1, the Project proposes a mechanism and process to systematically monitor and evaluate the impact of rural electrification in Bangladesh. The monitoring program will: (i) develop baseline indicators during the first year of project implementation; (ii) monitor socioeconomic changes and develop insight into the socioeconomic impact of rural electrification through periodic evaluation of the chosen indicators; and (iii) disseminate and use evaluation results to assess the performance of the rural electrification program in terms of socioeconomic outcomes.

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

The REB/PBS system is characterized by an established participation and consultation process. Social involvement in rural electrification is part of the cooperative system for delivering electricity services.

Member involvement in PBS administration is encouraged through a number of channels. Before a PBS is formed, members are involved directly in organizing it, giving direct input through focus group meetings and membership drives. Member services personnel from REB organize membership committees to encourage community participation in the organization and formation of the PBS. Prior to energization, and for all years afterward, members elect board officers during annual general meetings. Customer information bulletins circulated with monthly bills keep members aware of key issues, and information is also distributed in area consumer meetings and through village electrification committees. The village "advisor program" is a relatively new arrangement that invites community leaders to participate periodically with PBS member representatives in discussing the means by which customer concerns can be most effectively addressed by PBS management. The village advisors meet every six months and are most often selected from among school teachers serving their respective communities.

Another issue that is handled well by the REB/PBS electrification program is the coverage of households in an electrified village. Evidence from other countries indicate that greater access to electricity reduces economic and social inequities. The "area coverage" concept adopted by REB facilitates access and has proven quite successful in yielding satisfactory returns on investment in distribution assets. The Project will build on these positive features and increase the emphasis on 'intensification' of network coverage (i.e. more laterals rather than extended 'back bone' lines to new areas) to encourage greater electrification in the villages already supplied.

Furthermore, NGOs and MFIs are playing a lead role in implementing the solar program through grassroots mobilization and micro-finance; activities that add to the participatory aspect of the Project. The Project preparation process included extensive consultations with various stakeholders and participants. Two major studies were undertaken by the Bank and implemented through Bangladesh-based NGO consultants for project preparation. In both these studies the consultants identified stakeholders from villages, PBSs and NGOs and organized discussions/demonstration visits.

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

The Project would seek to document the consultation and communication process, pointing out what works and where supplementary action is needed. In addition to the strong participatory nature of the rural electrification program as outlined above, the involvement of community-based organizations and micro-finance institutions like BRAC Foundation and Grameen Shakti would be facilitated to improve the productive use of electricity and promote greater grass-roots participation in formulating rural energy solutions. See 6.2 above for more details.

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

In order to ensure that the Project achieves its social development outcomes, a special unit established in REB would provide continuous socioeconomic monitoring. The unit will monitor and evaluate socioeconomic indicators on an on-going basis through surveys and measures of physical achievements and socioeconomic benefits. Terms of reference for the proposed socioeconomic monitoring unit and provision of TA to operate the unit have been included in the Project.

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

Please see above (6.4).

7. Safeguard Policies:

7.1 Do any of the following safeguard policies apply to the project?

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

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

In addition to the safeguards and monitoring provisions described earlier, the following three conditions have been introduced to insure compliance with applicable safeguard policies:

(i) Any sub-projects involving resettlement, land acquisition or power generation of capacity exceeding 5 MW need to be reviewed and cleared by IDA;

(ii) Once distribution line traces have been identified in each PBS, an EA should be undertaken and made a subject of public consultation prior to DOE clearance, and IDA needs to be notified of the consultation process; and

(iii) Within two years of credit effectiveness, appropriate standards should be developed for recycling batteries used for solar home systems.

It is proposed to include the first two conditions in the Environmental and Social Framework and place suitable legal covenants in the agreements with the Government, the REB and IDCOL for insuring compliance. The third condition is proposed as a separate, dated covenant in the legal agreements. Project TA would be made available to facilitate development and implementation of such standards.

F. Sustainability and Risks

1. Sustainability:

The Project's sustainability is being ensured through the partner organizations that remain involved in pursuing the development objectives. Institutions like the PBSs, REB and NGOs/MFIs believe in long term planning and commitment to rural development and have a good record of implementing and sustaining development efforts. The strong rural credit culture and willingness to pay for services -- manifest in high loan recovery rates by MFIs and electricity bill collections by PBSs -- will insure that the Project outcomes are financially sustainable.

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

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective		
1. Consumer demand for grid services will become low; connection rates will decrease.	M	Focus on socioeconomic work by PBSs in association with local NGOs and community-based organizations. TA for socioeconomic focus being provided.
2. Performance of PBSs remains poor. They find it difficult to invest in expanding supply and providing better services. Reliability of supply not achieved to enable consumers to benefit from electricity use.	M	Up-front agreement on transfer of high-load areas to REB/PBSs; implementation of loss reduction program; better financial management in PBSs and continued regulatory oversight of REB. Increase in country's power generation capacity through gas based plants.
3. Households do not adopt solar as viable alternative; program is unable to supply systems in an affordable manner; microcredit channels are constrained and the supply chain for SHS develops slowly.	S	Barrier removal activities undertaken with GEF support; engaging established micro-credit institutions in solar program; capacity building for participating partner organizations; and quality assurance program established.
4. Sites are located in areas where electricity demand is not available or connectivity to grid is not possible. Pilots are unviable.	M	IDCOL to work closely with potential developers and electricity sector institutions to develop projects. TA support provided to finance high development costs.
5. Households do not prefer to use electricity for productive uses and lack capital to invest in income earning activities.	M	PBSs have to work closely with community-based organizations and agencies involved in rural development. TA support provided to enable this coordination and implementation.
From Components to Outputs		
1. Timely transfer of BPDB lines and facilities not carried out according to economic rationalization principles; economic criteria for new line selection is not strictly followed; loss reduction program is unable to meet targets; inadequate generation is available for supply.	H	Government commitment to continue effective coordination of area rationalization between BPDB and REB; well-defined agreed program developed before project effectiveness and disbursements tied to achievement of annual hand-over targets.
2. Barriers to awareness building, information dissemination, marketing and consumer service cannot be effectively addressed.	M	GEF support for barrier removal activities is included, and the program has been developed through participation by NGOs, MFIs and PBSs. A pool of suppliers and service providers is developing and would be facilitated by the Project.

3. Rural consumers are unable to afford and pay for alternative energy supply.	M	Project relies on successful micro-credit models; barriers to high capital costs are being addressed by Project interventions; and grants are dollar-denominated to mitigate exchange rate risk.
4. Participating organizations and partner groups are unable to mobilize interest in solar and establish effective business models.	S	Criteria for selection of partner organizations are based on successful track records; support for capacity building interventions where needed; and long-term capital requirement has been addressed through IDA credit line and grant financing.
5. Government provides inadequate counterpart funding for implementing the project components.	S	REB and the Government will enter into a Subsidiary Loan and Financing agreement, and Government and IDCOL will enter into an Agency and Administration Agreement to insure adequate funding.
Overall Risk Rating	S	Maintaining high supervision standards, close liaison with counterparts and stakeholders, and relying on the ability of the implementing institutions to address issues and problems as they arise.

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

3. Possible Controversial Aspects:

Historically, the transfer of lines and areas from BPDB to REB has been controversial. The comprehensive transfer program agreed to among the BPDB, REB and the Government and communicated to the Bank minimizes the risk of future disagreement. However, timely and effective implementation of the transfer program continues to be a risk and will be closely monitored during project supervision. The risk has been further addressed by tying disbursements to actual progress in effecting the transfers.

G. Main Credit Conditions

1. Effectiveness Conditions

(a) The Government has cleared at least 25 percent of its arrears to REB, currently outstanding at about 400 million takas (equivalent to about US$ 7.0 million).

(b) REB has established a special task force for the Loss Reduction Program, satisfactory in form and substance to the Bank.

(c) REB has: (i) furnished the Bank for its review and approval the financial restructuring package for the 45 project PBSs; and (ii) completed the takeover of the lines, areas and associated facilities from BPDB as detailed in the first package of the agreed Transfer Program.

(d) IDCOL has entered into at least three legally binding Participation Agreements with Participating Organizations (NGOs/MFIs/private companies) with terms applicable to all the respective parties.

(e) The IDCOL Project Agreement and the REB Project Agreement have been duly authorized or ratified by IDCOL and REB respectively, and are legally binding upon IDCOL and REB respectively, in accordance with their terms.

(f) The IDCOL Agency and Administration Agreement, the REB Subsidiary Loan Agreement and the REB Subsidiary Financing Agreement have been duly executed and authorized or ratified by Government and IDCOL, and the Government and REB respectively, and are legally binding on the three, respectively, in accordance with their terms.

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

In addition to the standard financial and legal covenants relating to timely reporting of project progress and use of funds, timely conduct of audits, diligent accounting and reporting, and compliance with environmental and social safeguards and fiduciary requirements, the following implementation covenants will apply:

Government

(a) Government is to ensure that the Area Rationalization and Transfer program is implemented in a timely and agreed manner. Disbursements from the Credit are tied to successful implementation of the transfer program. The credit effectiveness condition, among others, is the transfer of about 4,000 km of distribution lines from BPDB to REB covering 17 PBSs. Once that effectiveness is established, disbursement with respect to Goods Category 2a (i) will be available, up to a maximum of US$ 75.0 million equivalent. Subject to the satisfactory hand-over of the second package of lines (amounting to about 3,000 km in 17 PBSs), the next category of goods 2a (ii) up to a maximum of US$ 45.0 million will be available. The remaining credit proceeds under category goods 2a (iii) will be available for disbursement on the successful transfer of the third package of remaining 2,400 km of distribution lines in 6 PBSs.

(b) The Government will ensure that all outstanding electricity dues to REB are paid: (i) 25 percent of outstanding by June 30, 2003; and (ii) balance 50 percent of outstanding electricity billing dues to be paid up by June 30, 2004. Furthermore, the Government will establish an appropriate payment mechanism, satisfactory to IDA, for timely settlement of electricity dues to PBSs for electricity supply to government departments and agencies, and to religious institutions, by December 31, 2002.

(c) Government shall, in consultation with REB and IDCOL, develop appropriate standards for recycling batteries used for solar home systems within the first two years of the project implementation.

REB

(a) REB's internally generated funds are not less than 1.5 times its debt service requirements.

(b) REB's annual operating expenses and the amounts paid by REB as interest and other charges on its debt do not exceed 66 percent of the aggregate amounts received by REB as interest on its loans and investments and as other revenues.

(c) REB shall furnish its draft annual performance targets of 45 PBSs to the Bank for its review and comments by August 10 of each year. Upon receiving Bank's comments, REB shall enter into agreements with the 45 PBSs on their performance targets and shall share the Performance Target Agreements (PTA) with the Bank for its information and record.

(d) REB shall insure that it takes all necessary measures to be in compliance with the environmental and social impact assessment, mitigation, disclosure, and consultation provisions under the Environment and Social Assessment Framework. Furthermore, REB will provide environmental assessments for IDA's review and approval, including resettlement action plans, in respect of all distribution lines and associated construction activities involving land acquisition or resettlement; and will arrange – before seeking DOE's clearance -- to carry out timely and adequate public consultations at the PBS level in connection with the environmental assessments it prepares.

IDCOL

(a) IDCOL will carry out an annual review of the eligibility of Participating Organizations and report the results of such review to the Bank.

(b) No disbursements against sub-loans (or sub-grants), will be made until IDA is satisfied that the sub-loan (or sub-grant) has been made in accordance with the eligibility criteria and procedures and on the terms and conditions set forth or referred to in the Operating Guidelines.

(c) IDCOL shall insure that it takes all necessary measures to be in compliance with the environmental and social impact assessment, mitigation, disclosure, and consultation provisions under the Environment and Social Assessment Framework. Furthermore, it will furnish for IDA's review and approval appraisal reports, including resettlement action plans, concerning sub-projects that involve resettlement, land acquisition or power generation of capacity exceeding 5 MW.

H. Readiness for Implementation

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

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

I. Compliance with Bank Policies

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

Subramaniam V. Iyer	Penelope J. Brook	Frederick T. Temple
Team Leader	**Sector Manager**	**Country Director**

Annex 1: Project Design Summary

BANGLADESH: Rural Electrification and Renewable Energy Development

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Sector-related CAS Goal: 1. Support power sector reform and restructuring in the rural sector by: (a) rationalization of rural distribution areas and expansion of the Rural Electrification System; and (b) greater private sector and community participation in electricity supply.	**Sector Indicators:** 1. Rural distribution areas transferred to electricity cooperatives (PBSs) in an economically efficient way. Targets are nearly 4,000 kms of lines and associated facilities transferred to PBSs from BPDB by credit effectiveness; 3,000 kms of lines and associated facilities by June 2003 and the remaining 2,400 kms of lines to be transferred by June 2004.	**Sector/ country reports:** 1. Project supervision reports.	**(from Goal to Bank Mission)** 1. Rationalization of rural distribution has significant impact on sector reforms.
	2. Private sector and NGOs involved in supply, financing and services of off-grid electricity through solar and other options. Targets are (i) 50,000 solar systems by private and NGO sources over five years; 20,000 at mid-term (ii) 14,000 systems to be installed by PBSs on fee-for-service over five years; 4,000 at mid-term. At least three wind and hydro projects developed and implemented by private sector by the close of the project.	2. Project supervision reports.	2. Off-grid electricity markets grow and gain commercial viability and have a measurable share of the electricity industry.
GEF Operational Program: 1. Promote adoption of renewable energy by removing market barriers and reducing implementation costs	1. Number of consumers being served by renewable energy systems	1. Customer surveys and Project reports	1. Project interventions will enable barrier removal; rural households prefer to connect to renewables rather than wait for grid connection.
2. Reduction of greenhouse gas emissions	2. Quantity of CO2 avoided	2. Project reports.	2. Addition of incremental capacity is based on fossil fuels.

Project Development Objective:	Outcome / Impact Indicators:	Project reports:	(from Objective to Goal)
1. Increase access to electricity in rural areas by grid and off-grid options.	1. Number of rural consumers provided access from grid. At midterm: 400,000 At Close: 700,000 2. Number of rural consumers serviced from renewable energy sources At midterm: 24,000 At Close: 64,000	1. Project progress reports and supervision.	
2. Enhance socioeconomic impact of electricity provision in rural areas.			
3. Education – enhanced through improved lighting.	3. Increase in number of hours school aged children in the household study at night.	3. Would use the following methods for monitoring and evaluation: (i) Households in the project areas will be randomly selected for interviews to collect baseline data and then resurveyed to determine changes after electrification (on an annual basis for five years.); and (ii) Annual M&E report will be prepared and reviewed.	3. SHS will be accepted by rural populations as appropriate alternative to grid electrification.
4. Quality of Life – improved from higher safety, comfort and convenience; such as improved lighting inside and outside, replacing kerosene and use of appliances (TV, radio, fan, refrigerator).	4. Higher percentage of households in the electrified areas feel secure and more comfortable; increase number of lumen-hour for lighting inside home; and number of households use space cooling (fan) cold food storage (refrigerator), and TV/radio (for information and leisure).		4. Safety and comfort can be measured through household surveys and households can afford to buy appliances.
5. Women Empowerment: Improved education among girls and easier access to news and information specifically on women developmental issues through TV and radio.	5. Number of hours school aged girls in the household study at night; percentage of women getting access to news and information; and number of women knowledgeable about reproductive health, HIV/AIDS and other women issues.		5. Children have easy access to school (school is located within reach of children); girls are encouraged to go to school, information about reproductive health and HIV/AIDS prevention are disseminated through radio and TV, and households can afford radio and TV at home.
6. Direct impact on income:	6. Decrease cost of lighting		6. Prior to electrification

reduced cost for access to: (i) lighting; (ii) news, information and entertainment; and (iii) electricity for those using electricity from other sources prior to formal access such as batteries.	for households (measured in terms of lighting per lumen hour); reduced cost of electricity for listening to radio and watching TV (measured in terms of cost of electricity to operate radio and TV per hour); reduced cost of electricity per kWh for household that were using car batteries, or diesel gen-set prior to switching to grid electrification.		households used dry cell batteries for radio and car batteries for TV; after electrification households use plugged in (electricity from the grid or solar panel) for radio and TV; households can afford audio and video equipment or video services operator available in the electrified area.
7. Enhance rural productivity, development opportunities and reduce poverty through increased access to electricity.	7. Measures of rural productivity, development and poverty such as households using electricity for income generation like water pump, motor, electric fan, refrigerator and other electric appliances or tools; and farmers using electric water pump and motor for agricultural production and processing.		7. Rural enterprises can afford to buy electric appliances for business; price of agricultural products allow reasonable profits; no major flood or other natural disasters that may destroy crops; and costs of inputs remain stable or decline to allow reasonable profits.
8. Safe drinking water: clean water for drinking, especially in areas where ground water contains arsenic.	8. Number of deep wells that supply drinking and clean water that use electric pumps; especially in areas where ground water contains arsenic.	8. Survey of deep wells that supply drinking and clean water before and after electrification.	8. .There are deep wells that supply drinking and clean water to the public in the electrified area; ground water contains arsenic and deep wells were dug to solve the problem; and area covered by the project has arsenic problem in the ground water.

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Output from each Component:	**Output Indicators:**	**Project reports:**	**(from Outputs to Objective)**
1. Grid expansion and intensification.	1a. Length of lines transferred and rehabilitated. At midterm: 4,000 kms At Close: 9,400 kms 1b. Length of new lines. At midterm: 4,000 kms At Close: 10,000 kms	1. Project reports, REB MIS, quarterly progress reports, supervision missions, sub-project completion reports, performance target agreements.	1. Consumer demand for grid services will remain strong, connection rates will improve and new consumers in served areas can be motivated to use electricity.
2. Improving operational performance and financial position of PBSs.	2a. Better consumer mix and higher loads through area rationalization, measured by share of domestic 0-100 kWh per month consumers in project PBSs. 2b. Reduction in system losses of handed over areas – measured based on Performance Target Agreements for each PBS. 2c. Improved collection performance of project PBSs – measured based on Performance Target Agreements. 2d. Enhanced financial viability of PBSs measured by debt service coverage ratios of PBSs.	2. REB MIS, quarterly progress reports, performance target agreements; supervision mission reports and audit reports.	2. With improved performance PBSs can invest more in expanding supply and providing better service and PBSs are able to provide reliable supply to enable consumers benefit from electricity use.
3. Providing rural access by Solar Home Systems in areas inappropriate for grid extensions.	3. Number of solar home systems (SHS): 50,000 SHS installed by private and NGO sources over five years; 20,000 at mid-term; and 14,000 systems to be installed by PBSs on fee-for-service over five years; 4,000 at mid-term.	3. Project progress reports from IDCOL and REB.	3. Households adopt SHS as viable alternative, program is able to supply systems in an affordable manner, microcredit is available to finance households; and that the supply chain for SHS is rapidly developed.
4. Improving rural access by mini-grids and other renewable energy options – wind and hydro.	4. Three pilot projects developed and implemented. At least one completed by mid-term and three by project close.	4. Project reports from IDCOL.	4. Sites are located in areas where electricity demand is available, connectivity to grid is not possible and are demonstrated as viable options.

5. Promoting productive use of electricity to increase rural household incomes and improve delivery of services	5. Number of Households enjoying improved indicators of economic and social well-being.	5. Baseline data and annual updates provided by REB's Socioeconomic Monitoring Cell. (see 2.2 above)	5. Households prefer to use electricity for productive uses and have capital to invest in income earning activities.
Project Components / Sub-components: 1. Rural grid extension: distribution lines, substations, transformers, service connections, meters etc.	**Inputs: (budget for each component)** 1. US$ 261.65 million.	**Project reports:** 1. Progress reports and disbursement reports; supervision mission reports	**(from Components to Outputs)** 1. Timely hand over of BPDB lines and facilities carried out according to economic rationalization principles; economic criteria for new line selection is followed; loss reduction program meets targets and adequate generation is available for supply.
2. Renewable Energy and off-grid (including solar).	2. REB: US$ 8.78 million IDCOL 24.89 million Total US$ 33.67 million	2. Progress reports and disbursement reports; supervision mission reports.	2a. Barriers to awareness building, information dissemination, marketing and consumer service can be effectively addressed. 2b. Rural consumers are able to afford and pay for alternative energy supply. 2c. Participating organizations and partner groups are able to mobilize interest in solar and establish effective business models.

Annex 2: Detailed Project Description

BANGLADESH: Rural Electrification and Renewable Energy Development

By expanding access to electricity, especially for rural households and communities, Bangladesh aims to accelerate economic growth and improve the quality of life. This project supports the Government's strategy to expand access by providing assistance to extend electricity coverage through both grid and off-grid options. It also aims to improve the productive use of electricity and the efficiency of rural supply through several institutional development and financial restructuring measures directed at the Rural Electrification Board (REB) and the Palli Bidyut Samitis (PBSs). The following interventions should advance those goals:

- Assisting REB to expand and intensify rural grids, improving the operational and financial performance of the PBSs and reducing power outages in the rural grid systems;
- Promoting the use of solar home systems in rural areas where grid expansion is inappropriate;
- Facilitating development of decentralized mini-grids based on natural gas, diesel, and where feasible on renewable energy sources like wind and hydro; and
- Increasing the productive use of electricity as a more effective anti-poverty instrument.

The Rural Electrification Board (REB) and the Infrastructure Development Company Limited (IDCOL) will be the Project's two implementing agencies. REB will implement the expansion, intensification and rehabilitation of the grid-based rural electrification system. It will also have responsibility for promoting solar home systems on a fee-for-service basis and will receive technical assistance for environmental assessment, socio-economic impact monitoring and evaluation, institutional development and awareness campaigns and market promotion to remove barriers to the solar program. IDCOL will intervene through financial intermediation to make longer term refinance and grants available to NGOs and MFIs, as well as to SHS suppliers, to finance household purchases of solar home systems and to provide technical assistance to remove barriers to the development of a solar market. IDCOL will also make available a credit line for investment and grant financing for project development to promote mini grids and other renewable energy projects based on wind, hydro and biomass energy.

The project is divided into three parts – a grid investment and technical assistance component implemented by REB (part A); a solar component and related TA to promote the solar program to be implemented by REB (Part B) and a Renewable Energy component of investments, financial intermediation and technical assistance implemented by IDCOL (Part C). The following table summarizes the different components, their costs and financing sources.

Table 1: Project Costs and Financing by Components

US$ Million

	Government	MEI	HH equity	IDA	GEF	Total
PART A - Grid Component						
A1 - Rural Electrification System Expansion, Intensification and Rehabilitation	89.97	-	-	171.68	-	261.65
A2 - REB Technical Assistance	0.12	-	-	2.86	-	2.98
Sub Total PART A	90.09	-	-	174 54	-	264.63
PART B - Renewable Energy Component (REB)						
B1 - REB Solar Program	2.00	-	-	4.63	1.53	8.16
B2 - REB Solar Technical Assistance	0.25	-	-	0.37		0.62
Sub Total PART B	2.25	-	-	5.00	1.53	8.78
Sub Total REB	**92.34**	-	-	**179.54**	**1.53**	**273.41**
PART C - Renewable Energy Component (IDCOL)						
C1 - IDCOL Renewable Energy Subloans	-	2.86	3.20	11.44	3.80	21.29
C2 - IDCOL Technical Assistance	-	0.73	-		2.87	3.60
Sub Total PART C	-	3.58	3.20	11.44	6.67	24.89
Sub Total Renewable Energy	**2.25**	**3.58**	**3.20**	**16.44**	**8.20**	**33.67**
Total	**92.34**	**3.58**	**3.20**	**190.98**	**8.20**	**298.30**

By Component:

Project Component 1 - US$261.65 million

A1: Rural Electrification System Expansion, Intensification and Rehabilitation

The rural electricity program operated by independent, consumer-owned cooperatives or PBSs functions under the umbrella of an apex organization, the REB. The latter functions both as a quasi-regulator and a financial manager and provides a wide range of technical and institutional support to the PBSs. The Rural Electrification Board has successfully registered a high rate of electrification providing access to nearly 400,000 new rural consumers each year. However, given the low coverage (under 25 percent of rural households have access), electrification rates have to increase dramatically. In the way of that expansion are: (i) the high cost of grid extension; (ii) the shortage of power supply from BPDB to the rural grid; and (iii) the financial sustainability of PBSs.

To address these constraints the Government is promoting rationalization of distribution networks by handing over BPDB-operated power systems in secondary towns to REB to increase efficiency of supply and reduce overall costs of electrification. Furthermore, REB is introducing greater prudence in selection of lines and revisiting revenue and cost assumptions that have governed the area coverage program thus far. Off-grid options are being promoted for uneconomic areas. To address the shortage of adequate bulk power supply, REB and the Government have introduced a policy to promote localized power generation through small, privately operated plants that serve PBSs directly. This is in addition to increase in the natural gas-based generation capacity of the main grid. Finally, a package of measures aimed at the financial viability of the PBSs include: (i) revenue-enhancing actions such as transfers of pocket areas and critical load centers from BPDB; (ii) debt restructuring in the form of lengthened grace periods or adjustment of debt against grants; (iii) selective investments that could enhance revenue and performance

profiles; and (v) expanding productive uses of electricity to increase consumption.

This component will support the expansion of distribution facilities in 45 PBSs, including construction of 10,000 kms of new lines, rehabilitation of 2,500 kms of lines taken over previously and construction and augmentation of distribution substations and associated facilities. It will also facilitate and finance the takeover, rehabilitation and loss reduction of approximately 9,400 kms of lines from BPDB under an agreed transfer and loss reduction program. The investments will enable the intensification and expansion of the distribution network to cover about 36,000 villages containing 400,000 new consumer households. The loss-reduction component will provide access to an additional 300,000 consumers, bringing the total number of households gaining access to electricity under the project to 700,000 households over five years.

REB's Role: REB functions as an autonomous, quasi-regulator and financial intermediary for rural electrification sector. In relation to the 67 PBSs under its jurisdiction, it is responsible for the following activities: (i) approving PBS system design and construction of sub-station and electric distribution lines; (ii) staffing and training of REB/PBS personnel; (iii) financing development activities, including re-lending program; (iv) monitoring PBS operations and management activities; (v) providing liaison with other utility organizations in the power sector with regard to power purchases and other related issues; (vi) coordinating with other governmental agencies; (vii) conducting PBSs' Board of Directors' elections; (viii) conducting management audits to oversee and coordinate the PBS activities to insure smooth operation of the system; (ix) procuring, erecting and installing distribution lines and substations; (x) approving tariffs proposed by PBSs for all consumer categories; and (xi) negotiating a performance target agreement with each PBS annually and semiannual review of the same. The REB/PBS operations are regarded as a center of excellence among the poorly performing public sector institutions in Bangladesh. The REB/PBSs have been showing good performance and delivering results since their inception some two decades ago. They are also capable of assuming additional roles and responsibilities with minimum training and assistance and can produce results. The Bank's last credit to REB concluded on a highly satisfactory note in achieving its development objectives, physical works and institution-building targets. The program needs further strengthening in the following areas: (i) nearly a third of the PBSs are not meeting costs and debt-service requirements and revenue enhancing measures are needed to improve their viability; (ii) the expansion of electricity access is slow and internal resource generation should be enhanced; (iii) loss-reduction efforts need to be sustained, especially in the taken-over areas; and (iv) continued economic basis for selection of new lines needs to maintained, avoiding the risks of possible political decision making.

Area Rationalization Program: The objective of the area rationalization program that will transfer distribution areas (including sub-stations, lines and associated facilities) currently under the control of BPDB to PBSs is to integrate rural networks into the PBS networks, avoiding duplication of investment so that reliable and efficient distribution services reach consumers at least cost. Though several thousand kms of lines have been transferred in the past, these shifts have not been carried out in an economic manner. Fragmented transfers of portions of areas, leaving stranded pockets served by BPDB or REB have impeded the creation of contiguous service areas. In the current situation, a particular rural distribution network in the geographical supply territory of PBS is owned both by REB and BPDB but in such a scattered fashion that the PBS supplies rural loads outside concentrated BPDB load centers (towns, municipalities, industries etc.). This disorderly patchwork results in poor integration and expensive duplication of assets.

Under this project, the area rationalization program has been re-formulated along the following economic principles: (a) contiguous areas to be transferred will include towns, municipalities etc, thus avoiding fragmented transfers and perpetuation of 'pockets'; (b) full assets will be transferred starting from outgoing 33 kv lines, with electric supply units to be closed if they are serving unviable loads; and (c) agreed

transfers are to be effected in a single installment that precludes fragmenting. These principles would help both BPDB and REB realize economic gains and serve rural consumers more efficiently.

Consistent with these principles, the Government has taken a decision to transfer all pocket areas in the 45 project PBSs, including municipalities and towns of up to 3 MW loadsfrom BPDB to REB. BPDB and REB have agreed to a three-year transfer program of 9,400 kms of lines and associated facilities (Table 2). The Government has agreed that the first-year batch of lines and areas will be transferred prior to credit effectiveness as per agreed conditions, with the remaining annual programs to be implemented in 2003 and 2004, respectively. The disbursement for the grid component of the project would be conditional on execution of each package of transfers.

Table 2: Summary of Agreed Line Takeover Program From BPDB to REB

By	Number of PBSs	km of Lines
Project Effectiveness	17	4,000
June 15, 2003	17	3,000
June 15, 2004	6	2,400
Total	**40**	**9,400**

Loss Reduction Program: PBSs are forced to bear substantial financial losses when they take over old, poorly planned and structured and dilapidated loss-making networks. Since quick performance turn-around is necessary to minimize PBS losses in such situations, REB has formulated a loss-reduction program involving the creation of Special Task Forces and performance-incentive-based compensation (defined under a Performance Target Agreement). The incentives are directly linked to achieving defined cuts in losses and increases in collections, while being inversely linked to the time required for such improvements. Such special efforts have the full support and commitment of Government and its political leadership. Additional resources in terms of special magistrates and police assistance will be made available to facilitate smooth transfer in cases where illegal consumers or other vested interests attempt to subvert the transfer program. The program will start operations before Credit Effectiveness. Under the loss-reduction program, the overall target is to bring down the losses in all transferred areas to an average of 15 percent from the 45-50 percent existing at takeover time.

Construction Program: In order to insure that new line constructions take place in an economically sustainable manner, the revenue cut-off has been kept at Tk 36,000 per km of line per annum. In every PBS program, the proposed new lines are sequenced on the basis of decreasing potential to earn revenue. Only lines with the ranking priority higher than the threshold revenue per km will qualify for the project investments, a cutoff that will help REB to prevent construction of uneconomic lines.

Financial Restructuring of PBSs: The REB has formulated and the Government has endorsed a financial restructuring program for PBSs. These measures include: (i) permitting REB to determine PBS tariff bands, consistent with established cost-recovery practice, i.e. tariffs sufficient to cover operational and financial costs; (ii) confirming autonomy to REB for determining lending terms and conditions to PBSs without affecting the financial terms between Government and REB; and (iii) providing suitable waivers to REB for finalizing budgets without reference to Government in respect of PBSs that are no longer receiving subsidies. The Government has put these facilitating policies in place, and the project will support the REB in undertaking the financial restructuring measures as per the agreed program.

Project Implementation: This project represents a quantum jump in the size of investments being managed

by REB, involving more than US$ 60 million investments each year over a five-year period. REB has established a project team under the leadership of a seasoned Chief Engineer Projects (designated as Project Coordinator) and brought adequate personnel for Procurement and Financial Management into the team. A high-level team under the leadership of Chairman, REB has been established to develop and implement the system loss-reduction program. The team will advise and assist the Directorate of System Loss Reduction in designing and implementing loss-reduction programs. The team will review these plans and projects and monitor performance and make suitable and timely corrections to strategies for achieving loss-reduction targets.

Environmental and Social Issues: Since the proposed distribution lines are at the low voltage level with simple structure and low effect on the ambient environment, environmental effects are considered negligible. The line routes and substations defined in the project will be mostly drawn or constructed in fields and outside forest areas, with effects on the ecology and natural surface structure of the soil that are considered inconsequential. Electrical lines will be drawn and constructed based on the international standard and keeping in view the safety clearance for residential areas. Land requirements are small, since existing rights-of-ways are to be used for the most part. Hence land acquisition and resultant displacement of residences or economic activity are not significant. In cases where such land acquisition is needed, the Government has agreed to follow the provisions of the Environmental and Social Framework summarized in the PAD. Institutional arrangements for compliance with safeguards is covered in the section under TA.

Project Component 2 - US$2.98 million

A2: REB Technical Assistance

Institutional Development: To address REB's continuing institutional development needs, this component will support a number of activities. These include:

(i) *Installation of Local Area Network (LAN):* Networking for internal communications and information systems is critical for improved efficiency and information exchange within various units of REB and PBSs. Technical assistance will support hardware, software and training for REB and PBSs to be fully networked and use state-of-the-art information technology in their operations.

(ii) *Expansion of GIS Mapping System:* REB is carrying out a pilot study on GIS Mapping System under USAID funding. Adopting the GIS Mapping System as a planning tool will enable better project selection and make system expansion and/or intensification initiatives more efficient. TA to assess the results of the pilot and scale-up GIS adoption for REB and PBSs is envisaged under the project.

(iii) *Training:* To enhance the capability of REB/PBS personnel with specific, up-to-date technology and systems, training in the following areas will be supported: procurement; system design and distribution planning; operation and maintenance; computerization and information systems; and management.

(iv) *Development of Additional Customized Software:* Customized software for various operational and financial needs will be developed through outsourcing together with training as needed.

Environmental Compliance Unit: The project TA will support the establishment and initial operation of an environmental compliance unit (ECU) in REB and capacity building that will help PBSs carry out EAs and

manage environmental mitigation at the project level.This assistance includes training REB and PBS staff to carry out and review Environment Assessments of sub-projects, to develop processes and formats for assessments and to conduct public disclosure, consultations and monitoring. REB has already established the ECU headed by a Director and supported by a Deputy Director. The Director, ECU will report to the member PBSs to insure overall application and compliance with safeguard policies. To help REB properly carry out the assessment work a consultant, experienced in environment impact assessment would be appointed to train REB staff on carrying out Environment Assessment work and would prepare several EAs of initial projects. The first five EAs will be submitted to IDA for review and clearance prior to disbursements for associated investments. Subsequent EAs will be submitted to IDA for review as and when the need arises or requested by IDA, to insure conformity with World Bank safeguard policies.

Socio-Economic Evaluation and Monitoring Cell: The Bangladesh rural electrification program does not have a mechanism that systematically monitors and evaluates impacts of electrification. The REB has established a Socio-Economic Evaluation and Monitoring Cell (SEEMC) to monitor and evaluate the impact of rural electrification. The project will provide technical assistance to make the group operational and to conduct data gathering and analysis. The Cell will engage suitable consultants to: (1) establish monitoring and evaluation mechanism for REB/PBSs; (2) provide on-the-job and in-class training on monitoring and evaluation research methods, surveys, data analysis and report writing; and (3) demonstrate evaluation research design, sampling design, field surveys, data collection, data analysis and reporting methods through field-level work. It is expected that consultants would take a leading role during the first three years of the project, gradually transferring know-how and skills to the REB staff in the Cell and in the PBSs.

Socio-economic Development: TA will be provided to REB and PBSs to develop load promotion and productive-use initiatives in rural areas in collaboration with other rural development and service institutions. The focus will be awareness building and education for both consumers and service providers to integrate electricity use into economic development and service delivery activities.

Project Component 3 - US$ 8.16 million

B1: REB Solar Program

The Government strategy emphasizes promoting off-grid options in areas that are unsuitable for grid expansion. The potential market for off-grid systems, especially solar, is substantial. A recent study has estimated that nearly two million households could potentially benefit from solar systems. However, the limited nature of current initiatives and daunting institutional, policy and financial barriers have prevented any significant adaptation of solar systems. This project, therefore, seeks to develop a sound, commercial and sustainable framework for off-grid energy in Bangladesh by addressing these barriers.

Baseline: The REB undertook the Narshingdi Solar Electrification Pilot Project in 1995, arranging for about 900 households within a 29 sq. km riverine island area to receive electrification through three solar charging stations and stand-alone systems. By demonstrating clearly the technological suitability of SHS based electricity service for Bangladesh rural populations, the Narshingdi experience has provided REB and PBSs with experience in implementing a fee-for service SHS project. Since the program was predominantly grant-based, other than indicating the potential of the fee-for-service approach, it has not provided adequate basis for financial viability or operational sustainability. However, it has demonstrated a high level of customer satisfaction, justifying efforts to move to another phase that takes financial and commercial feasibility as key objectives.

There is evidence that a solar program rooted in private and community based initiatives could also be successful. Grameen Shakti, a subsidiary of the Grameen Bank, has been involved in supplying and financing SHSs for the last two years, during which nearly 5,000 systems have been installed. Bangladesh Rural Advancement Committee (BRAC), the largest national NGO, is also involved in similar efforts and has supplied nearly 1,200 systems. Besides Grameen Shakti, only one other local company, Rahimafrooz, has been active so far in supplying SHSs. In these cases, although financial viability is an objective, it is too early yet to see if this is realized, as the operations have not yet reached the maturity that would permit such measurements. Due to the pilot nature of the operations, moreover, financial reporting does not yet provide adequate information in every case. Nonetheless, preparations by several private sector dealers, including BP Solar, Shell/Siemens and Kyocera to enter the market are creating an expectation of future competition. With the current solar initiatives, the estimated baseline is 12-15,000 households gaining access in the next five years. Such households are also more likely to be in the relatively higher-income bracket, earning incomes around US$ 1,000 per annum. For poorer families, the cost of a solar system is too high and affordability is an issue. The less developed marketing and supply/service side is also a barrier. Quality standards and consumer assurance mechanisms need to be introduced as well to develop a sustainable and credible market for SHS.

The Baseline scenario is based on no project interventions taking place. The alternative is based on IDA, GEF, GOB participation in barrier removal, credit and grant support. The key baseline elements are summarized in the following table.

Table 3: Project Expectation

Baseline Element	Status as of April 2002	Expected at end of Project
Number of households using solar home systems on ownership basis	Approximately 8,000, expected to reach 12-15,000 over the next five years in the absence of assisted development	At least an increase of 50,000 systems over baseline
Number of households using fee for service provision through PBSs	Not more than 2,000 systems over the next 5 years	Awareness nationwide, with actual fee for service programs operating in 6 PBSs installing and operating nearly 14,000 systems
Number of institutions (public, private, community based) directly involved in promoting, marketing or financing solar home systems	Six; two public (LGED, REB), two private dealers (Rahima frooz, Grameen Shakti) and two NGOs/MFIs (BRAC and Grameen Shakti)	At least fourteen organizations, including private sector, MFIs, NGOs, and PBSs, involved in promotion, finance and sale of SHS
Other renewables, wind and hydro	Small isolated projects tried by various agencies with mixed results	Complete at least two pilot projects and evaluate prospects for commercial development of small hydro and wind projects.

Alternative: The alternative is to develop renewable energy access models that are commercially viable and can be scaled-up in a sustained manner, with a lower level of capital support in the future. The specific focus of the solar program is to develop such implementation models for 64,000 SHS on a fee-for-service, micro-finance or direct-purchase basis. This represents more than 10 percent of the short term solar market of 500,000 households. The alternative for wind and hydro energy is to develop pilots to promote learning, overcome barriers and identify interventions needed to establish a commercial and sustainable foundation for these technologies.

Barriers: A number of barriers that impede the achievement of the alternative have been identified on the basis of past experience in project implementation from Bangladesh and other countries, and studies commissioned during project preparation.

(i) *Policy barriers*: The Government has established a non-exclusive regime for provision of rural energy. The REB now has a framework for SHS implementation through the PBSs under fee-for-service mode. However, for hydro and wind, there is no framework under which electricity generated can be sold directly to customers or purchased by the utility. Part of the reason for this policy vacuum is that in Bangladesh (unlike some countries) such technologies have not yet been developed in a commercial manner, and it is still unclear whether they could be viable in Bangladesh. Prior studies indicate limited potential for hydro in the hilly areas of Bangladesh, where implementation is difficult. Studies on wind also indicate potential in some coastal areas. It would be premature to address the policy barrier without commercial viability being confirmed. Hence, the project proposes to involve the private sector in establishing commercial viability through selected pilot projects. The policy regime could then develop from evaluation of those pilot projects.

(ii) *Institutional barriers*: The project aims to take advantage of well-functioning rural institutions in energy, microfinance and social mobilization. Limited managerial and implementation capacity in the area of renewable energy is the main barrier for these institutions. This hindrance arises from lack of: (i) knowledge about available solutions and products; (ii) trained technicians to install and operate SHSs; (iii) ability to identify and mobilize target groups; (iv) presence of well-capitalized SHS supply companies able to benefit from successful experiences in similar circumstances in other countries, and (v) mechanisms to finance household acquisition of SHS. Similarly, though PBSs have pushed for solar programs, they have done so without developing sustainable provision models, such as fee-for-service provision.

(iii) *Financial/Economic barriers*: Recent studies confirm that the high initial capital costs of renewables, in particular those for SHS, pose a significant barrier to adoption. High costs of solar modules, batteries and lamps, together with the need for foreign currency for imports are notable barriers. Though there are several well-established and financially sound credit providers, availability of sufficient credit to households for SHS remains a problem. MFIs prefer to lend for income-generating activities only, with maturities limited to 24 months. For SHSs, loan maturities of three to five years are required. Therefore, MFIs would require credit enhancement support to create three to five years liquidity and build capacity to conduct a micro-credit program for SHS.

(iv) *Social and Information barriers*: The program could suffer from a perception that SHS adoption could delay or preclude grid access. The lack of awareness and information dissemination about: (i) renewable energy technologies including SHS; (ii) socio-economic characteristics of potential rural consumers, including the unserved population; (iii) possibilities to use solar systems for purposes other than home lighting such as community level/public usage in educational institutions, hospitals, clinics, mosques etc.; and (iv) availability of adequate supply and service, would need to be addressed. Furthermore, there is lack of awareness about how to select the right system to take into account economic condition, load requirement and ability to pay, performance expectations and proper battery usage.

Global Objectives: The global objective, consistent with GEF Operational Program 6 in Climate Change, is to achieve GHG reductions through the removal of policy, information, and financing barriers that currently hinder renewable energy technology dissemination and market development in Bangladesh, specifically with respect to SHS. The proposed project will actively engage the PBSs, NGOs and the private sector in commercially sustainable activities in order to reduce long-term implementation costs and will offer strong potential for learning and replication.

GEF assistance would be essential in evolving multiple off-grid electrification initiatives, implemented through the PBSs and NGOs. The core objective of the GEF supported project is to accelerate solar market development by these organizations in (a) isolated and remote areas with little or no prospect of grid electrification service, and (b) areas not to be served by the national rural electrification grid within the next five to ten years. The project would need to establish mitigation mechanisms such as buy-back programs to address consumers' inability to use SHS in villages where grid service arrives within 10 years of SHS installations.

While only about 64,000 households will experience the project's direct impact, a key contribution of this program would be the development of implementation models that could be replicated and scaled-up in a sustained manner at lower levels of capital support in the future. The specific focus of the program would be to develop implementation (business) models to serve the lower end of the market segment on a fee-for-service basis, hire purchase or direct purchase.

Outputs: T he off-grid part of the project has the following three sub-components:

(i) A five-year, fee-for-service SHS program implemented by REB and PBSs, reaching an estimated 14,000 households (nearly 0.7 megawatt-peak - MWp). PBS, will supply and service the solar systems to households and institutions in isolated, electricity-less rural communities to power lights, small fans, radios, televisions, and other small electrical appliances. Initially, six PBSs have been selected for this purpose with the intent to extend it to others if the program gains in popularity and acceptance. The project is expected to exert positive socio-economic developmental impact by improving the quality of rural life and augmenting household income to some extent. The investment will be supported by technical assistance to build awareness among recipient communities and PBS staff, establish solar service units among the selected PBSs, train and deploy staff and develop and implement the project.

(ii) A five-year, micro-finance-based program of direct sales implemented by IDCOL to support electricity access for 50,000 households with SHSs (nearly 2.5 megawatt-peak–MWp). Private companies will supply and service the systems in partnership with micro-finance institutions (MFI) and NGOs. IDCOL will administer a credit program for participating NGOs and MFIs to obtain refinance for loans made to households purchasing SHSs. The NGO/MFIs leading the program will identify potential consumers, make consumer loans, form alliances with SHS suppliers for installations and service and receive and pass-through GEF grants to consumers.

(iii) A GEF-supported grant program for capital cost buy-down and technical assistance for barrier removal activities. The grant program would operate in tandem with the fee-for-service and micro-finance models for solar and also assist in developing demonstration projects in wind and small hydro.

Component Description: Although the effectiveness of PV technology for domestic and shop lighting, to run small appliances, to power refrigeration for health centers and clinics, small scale water lifting etc. has

been established in Bangladesh, no systematic promotion of SHS on commercial lines has taken place. The project is making a very modest dent in the solar fee-for-service market -- estimated in a recent study to be nearly 500,000 households. To begin with, the REB is launching systematic solar program in the following six PBSs – (i) Sirajgonj: (ii) Pabna-2; (iii) Barisal; (iv) Natore-2; (v) Cox's Bazar; and (vi) Sunamgonj. The selected areas for installation of SHS in these PBSs are at the tail-end of the grid electrification and line construction master plan. In the normal course of events, residents of these areas would have to wait another 10 to 15 years for electricity through the grid. Initial market surveys undertaken in these areas show a significant demand for SHS; nearly 6,000 potential consumers have been identified in these 6 PBSs. Additional areas and consumers will be identified as the project progresses toward its target: to install and successfully service 14,000 systems over the five-year project period. A GEF grant program for capital cost buy-down will augment the IDA credit by providing Installation Grants to the PBSs. The drawdown of the grants will be contingent on actual consumer installations of systems by the PBSs. Subject to the fee-for-service program being successful, grant funding for solar is expected to become a part of the REB/PBSs future investment financing which is provided by the Government. The year-wise and system-size targets are shown in Table 4, below.

Table 4: RERED Project – REB/PBS Solar Systems Targets

Implementing organization REB / PBS (6)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
System-1 (36 Wp)	400	1000	1600	1200	1800	6000
System-2 (50 Wp)	100	200	1200	1400	1100	4000
System-3 (72 Wp)	100	200	1200	1400	1100	4000
Total	**600**	**1400**	**4000**	**4000**	**4000**	**14000**

The targets shown in the first two years, though ambitious, can be reached with the envisaged number of 6 PBSs. For the following years, an additional number of PBSs may be needed to reach these goals. An evaluation will be made to determine the need to increase the number of PBSs and, if necessary, to change the approach, including a review of terms and conditions. Since the PBSs have an established institutional and financial structure, their incremental costs of marketing fee-for-service solar is limited. The PBSs would need to carry out social mobilization and marketing in the selected areas, engage and train suitable local staff to install, service the systems and collect monthly bills, monitor implementation and evaluate results. Furthermore, solid partnerships with one or more SHS suppliers will be needed to insure high quality of systems and to learn from experiences in other countries. The various implementation steps are summarized.

- Selection of locations by the PBS with the help of available master plan and socio-economic data;
- Pre-qualification of SHS-suppliers and determination of the scope of supply and the roles of the suppliers and the PBSs;
- Preparation of consumer lists by PBS staff, together with engineering design of SHS;
- Membership drive - motivation, demonstration, customer drive and training;
- Signing contracts with member consumers;
- Consumer house wiring;
- Solar PV installation and consumer connection; and
- Regular billing and collections and periodic training and maintenance visits.

Implementation Responsibilities: REB and PBSs have jointly identified the respective staff and consultants required to implement the project. These are: (i) the Electrical Retainer consultant available at each PBS

for identifying the areas, engineering aspects, technical training, contracting and installation/service; (ii) local consultant to be hired for consumer membership drives and awareness building – could be a locally active NGO; and (iii) PBS management to oversee implementation with the REB Solar Cell playing an advisory and oversight role. These activities will be prepared and undertaken in close cooperation with the SHS supplier(s). The construction contractor will perform the activities of SHS installation after completion of a customer training program. On completion of installation by contractor and final inspection by the PBS retainer consultant, the contractor will get final approval from REB's renewable energy cell and hand over the assets to the concerned PBS. The SHS fee-for-service program will operate from the time of handover to PBS. Consumer education for efficient operation of SHS is very important. Battery maintenance/operation and the ability to conduct minor trouble-shooting by the consumer will be very helpful for smooth operation of SHS. The pool of village electricians being trained for solar house wiring will also be able to provide such assistance and training to consumers from time to time. The maintenance of SHS and billing and collection tasks will be performed by PBS technicians/staff.

Specification and Standards: Since REB is planning to extend continued service to its consumers on the basis of 'fee for service' for 15-20 years (or, if earlier, until grid connections are established), there have to be quality standards in place to assure customers that the systems will continue to work throughout their anticipated economic life. A technical committee has been established to set appropriate technical standards and specifications for SHS materials and equipment to be used in this project. This committee will also be responsible for establishing service standards for SHS consumers. The core committee comprises REB and IDCOL personnel as members, supported by technical experts from the Bangladesh University of Engineering and Technology (BUET) and the Bangladesh Standards and Testing Institute (BSTI) as appropriate. The committee will qualify specific solar modules and accessories, as well as complete solar home systems, for inclusion under the program based on appropriate testing certificates furnished by suppliers from recognized laboratories. A small testing laboratory is also being established in REB under the project to carry out testing and standardization of locally manufactured components such as batteries, controllers, lights, wiring etc.

A more detailed treatment of REB solar program through TA activities is provided below.

Project Component 4 - US$0.62 million

B2: REB Solar Technical Assistance

The following sub-components will be supported through TA.

Market development and Capacity Building (PBSs and REB): REB will take a program approach to support solar market development in PBS areas, helping the PBSs identify target areas for solar promotion, conducing outreach to prospective consumers and developing marketing and service programs. It would also enable PBSs to establish specific solar program units, with adequately trained staff and systems to implement and monitor the program. The assistance is being provided on the basis of business plans and capacity-building proposals for each PBS. Part of this support is already in place through the GEF PDF B grant. The project TA will be available over a five-year period, initially starting with the six selected PBSs.

Quality Assurance Program (PBSs and REB) REB will operate a quality assurance program to establish and monitor technical standards for SHS components and systems, including post installation testing as well as service standards for SHS consumers. REB and IDCOL have set up a Technical Committee for the Quality Assurance Program with the participation of Bangladesh University of Engineering and

Technology and the Bangladesh Standards Testing Institute. As part of the quality assurance efforts, REB will establish a small testing laboratory to test the performance of the SHS components and systems and also to serve as a technical training site for PBS technicians. The Technical Committee shall be responsible for overseeing the quality assurance program and the setting of quality and output specifications.

Monitoring and Evaluation: REB's Renewable Energy Cell will monitor the solar program to insure that: (a) PBSs follow established technical, after-sales service and consumer education standards; (b) Adequate and effective program outreach is being undertaken; (c) Customers are satisfied with their SHSs, and (d) Proper follow-up, billing and collections are conducted. Monitoring methods would include: (i) end-user level audits of 10 percent of installed systems to insure satisfactory product quality and service; (ii) customer surveys using simple, short postcards and questionnaires; (iii) small focus group sessions with consumers in different PBS areas conducted as part of the market monitoring; and (iv) complaint-based, end-user audits and other data gathering in response to complaints or information received from customers or others. Results of the monitoring and evaluation efforts will be incorporated in the quarterly progress reports.

Project Component 5 - US$21.30 million

C1: IDCOL Renewable Energy Subloans

This component will enable IDCOL to provide project development support and financing through sub-loans and grants for renewable energy development. The primary focus is on expanding electricity access to 50,000 households through SHS (nearly 2.5 megawatt-peak–MWp), over a period of five years, on a micro-finance-based, direct sales program. The SHSs will be supplied and serviced by private companies in partnership with micro-finance institutions (MFIs) and NGOs. IDCOL will administer a credit program that enables participating NGOs and MFIs to obtain refinance for loans made to households for purchase of SHS. The program will be led by NGO/MFIs who will identify potential consumers, make consumer loans, form alliances with SHS suppliers for installations and service and receive and pass-through GEF grants to consumers. The credit and grant programs are also open to support wind energy, small hydro sub-projects, biomass and RAPSS (credit only) developed by the private sector, NGOs and communities.

The credit program established through the IDA credit will be administered by IDCOL on behalf of the Government and will be open to all NGOs/MFIs that meet the selection criteria detailed in Annex 12. Suppliers and dealers of SHS will be allowed access to the credit program through MFIs or directly through IDCOL, depending on their business approach. Participating MFIs, NGOs and SHS dealers will be free to target any number of SHSs that are commensurate with their organizational capabilities and that they reasonably believe can be promoted over a five-year period. The participating NGOs, MFIs and SHS dealers will identify/motivate potential households that can pay 10-20 percent of the system cost as downpayment to adopt SHS. The balance of the costs are to be met by a GEF grant of US$ 90 per system to buy-down the system cost and a microfinance loan covering the balance. MFIs would be eligible for refinance from the IDCOL credit program up to 80 percent of the amount of loan extended to the households and a reimbursement of any GEF grant to a maximum of US$ 90 per system upon satisfactory evidence of installation and customer satisfaction. The un-refinanced portion of the MFI credit is the investment amount that MFIs shall have at risk under the program.

The credit program will have the following two sub-components:

(i) *Grant Sub-Component*: A total of US$ 3.80 million in grants to be administered by IDCOL will be

available to buy down the capital cost of SHS and to meet the incremental operating costs of the NGOs/MFIs in promoting SHS (Table 5). Only one subsidy entitlement per household customer will be provided. Subsidy will follow a declining scale as the market expansion leads to declining prices and the removal of commercial barriers. The indicative subsidy profile illustrated in the following table is subject to review and change depending on implementation experience and evolution of the market. In cases where suppliers effect sales of SHS directly to consumers without any MFI credit, the suppliers can access the grant on behalf of the customer. However, in order to do so, suppliers would have to pre-register with IDCOL and meet specified eligibility conditions. Specific eligibility guidelines for MFIs, NGOs and suppliers are described in the Operating Guidelines (Annex 12).

Table 5: Declining Subsidy Regime

Amounts in US$

Item	Price Buy-down Subsidy Available to Implementing Agency	Operational Costs Max. Subsidy that can be Retained
First 20,000 systems	90	20
Next 20,000 systems	70	15
Next 20,000 systems	50	12

(ii) *Line of Credit Sub-Component*: IDA/Government of Bangladesh would make available US$ 11.44 million to IDCOL to provide long-term credit refinance to eligible MFIs to finance households' or individuals' purchases of SHS as well as direct sub-loans to developers of RAPSS, small hydro, wind energy and biomass projects, on a case-by-case basis. Suppliers/dealers of SHS will be allowed access to the credit program through MFIs or directly through IDCOL, depending on their business approach.

Table 6: Project Targets

Period	Year 1	Year 2	Year 3	Year 4	Year 5	Total
No. of Systems to be financed	6,000	8,000	11,000	13,000	12,000	**50,000**
Equivalent kWs to be financed over the Project Life (kWp)	292	420	582	605	544	**2443**
GEF Grant (US$ million)	0.54	0.72	0.88	0.92	0.74	**3.80**

Implementation: IDCOL and five selected suppliers, NGOs and MFIs are in the process of implementing a Phase I program of nearly 250 systems, using the project's program conditions and procedures. Phase I has been funded by a GEF PDF B grant of US$ 340,000. The implementation program described below is modeled on experience gained from PDF B related work. IDCOL will be responsible for establishing and publicizing: (i) eligibility criteria for participating NGOs, MFIs, suppliers; and (ii) credit and grant program eligibility criteria, including quality standards and certification requirements for equipment eligible for refinance/grants. The other key implementation responsibilities of IDCOL are described in the following paragraphs.

Program Administration: IDCOL will administer the credit program in an output-based fashion.

Disbursements of the sub-loan and grant will take place only after the system installation has been completed and the customer has documented his/her satisfaction through an installation certificate issued by the supplier of the system and countersigned by the concerned MFI/NGO along with submission of a Customer Acceptance Receipt in an agreed format. In order to administer the credit sub-component, IDCOL will: (i) enter into separate Participation Agreements with MFIs, specifying the covenants binding MFIs; (ii) process disbursement requests for loans approved by MFIs based on the evidentiary documents to be formalized in the such Participation Agreements; (iii) maintain separate disbursement records and accounts with respect to each MFI under the Project; (iv) keep on file supporting disbursement documents as well as bank accounts relating to disbursements; and (v) maintain a project account. All records, documents and accounts are to be maintained in accordance with sound accounting practices for independent audits and for review by IDA and GEF missions. In addition, IDCOL will maintain statistical records, incorporating, among other things, approval of subloans and disbursement made and provide IDA with regular reports.

Project Component 6 - US$3.60 million

C2: IDCOL Technical Assistance

The TA for renewable energy development will consist of:

Technology promotion, capacity building and market development: IDCOL will take a program approach to supporting market development, including introducing new ideas and renewable energy technologies and applications. IDCOL will be responsible for developing and managing the program, through active efforts to seek requests for proposals from consumers, communities and companies, and to develop ideas for activities that respond to market conditions. The GEF grants would provide a major share of the funding, including for pilot marketing efforts proposed by the PV dealers, depending on the type of activity and the availability of co-financing from sponsors (TA co-sharing). The market development program, including initiatives to attain financial and economic sustainability, aims at creating the basis for a marketplace for off grid rural electrification. The program will be prepared in consultation with representatives of MFIs, consumers, other agencies, and communities that are stakeholders in the Project. The program would include support for activities such as public information campaigns, developing the commercial capabilities of SHS dealers, developing mechanisms for consumer financing, developing suitable standards and facilitations for environmentally safe disposal of batteries used with SHS and other activities to be defined during Project implementation.

Project Administration IDCOL (1st-5th Year): Support for IDCOL will help it insure smooth operation of the grant program, emphasizing simplicity, efficiency, and speed consistent with the need for fiduciary and safeguard compliance. As part of this activity, IDCOL will undertake and support representation and promotion of the project both domestically and internationally. This will include convening local meetings, seminars, and workshops, making presentations at selected conferences and hosting international groups seeking to learn from Bangladesh's solar experience or to enter its solar market. The Ministry of Finance (ERD) will enter into a contract with IDCOL to carry out the credit and grant administration. IDCOL will undertake its work in accordance with a set of agreed Operating Guidelines and receive a fee of up to US$ 600,000 for administering the grant program over the five-year project period. The fee will be released against an approved budget satisfactory to IDA and based on actual expenses as per the budget. IDCOL will also receive an appropriate fee from the Government for administering the Credit Program from year 5 to 15.

Monitoring and Evaluation: IDCOL will monitor participating organizations to insure that: (a) grant funds are being used for the intended purpose; (b) the SHS dealers comply with established technical, after-sales service and consumer protection standards; and (c) customers are satisfied with their SHSs. TA-supported monitoring methods would include: (i) end-user level audits of 25 systems sold by each company to insure satisfactory product quality; (ii) random, unannounced, independent end-user level audits of subsequent reported sales, as needed; (iii) customer surveys using simple, short postcards and questionnaires; (iv) small focus group sessions with companies and consumers in different regions conducted as part of the market monitoring; (v) complaint-based end-user audits and other data gathering in response to complaints or information received from customers or others; (vi) reviews of documentation and reports provided by PV companies, local and international suppliers and others; (vii) direct observation and verification during regular field visits; (viii) annual reviews of the audited financial statements submitted by each company, including counter-audits as necessary to verify information; and (ix) performance reviews with individual companies, their accountants, auditors and commercial banks as necessary; and annual meetings with companies to discuss ways to improve the compliance monitoring system. In addition to the end-user audits and other compliance monitoring activities, IDCOL in partnership with REB, will conduct technical performance audits of PV systems or components.

Renewable Energy Development (Wind, Hydro, biomass): The project will support efforts by IDCOL to introduce and promote renewable energy technologies that are established in other countries but not yet commercial in Bangladesh and to integrate new stakeholders into the project. Technology introduction, promotion, and capacity building will be undertaken primarily in the context of wind, hydro, biomass and remote area power supply systems (mini-grids). The emphasis will be in the following areas: (i) Mini-grid connected wind, where the aim is to develop and implement a modest wind project that can demonstrate the technology's commercial viability. Support will be provided for resource assessment through wind-mapping to better determine sites suitable for economic power generation and to the electric utilities for developing an enabling policy framework for commercial project development and to study the feasibility of demonstration projects; (ii) Off-grid or grid-connected hydro, including support for resource assessment, promotion, project development and handling of technical and commercial issues; (iii) Development support for mini-grids on a generation-technology-neutral basis. IDCOL will facilitate the integration of new stakeholders, such as micro-finance institutions, private sector companies, rural retail companies and NGOs on an as-needed basis to develop these technologies. Whether or not these organizations wish to access the Credit Program, they may still benefit from technical assistance under the program; and (iv) Develop the nascent renewable-energy industry in Bangladesh through support for awareness building, information dissemination and business awareness workshops to stimulate private sector interest in renewable energy. Such assistance could be channeled through institutions and agencies active in this field, such as Bangladesh Renewable Energy Association (BREA) and the Renewable Energy Information Network (REIN) of stakeholders established by the UNDP and LGED.

To the maximum extent possible, the activities will be refined and executed by relevant Bangladesh institutions. Administering this activity, IDCOL will conduct/facilitate the necessary formulation of TA packages, including terms of reference, selection of consultants and supervision of contracts.

Annex 3: Estimated Project Costs

BANGLADESH: Rural Electrification and Renewable Energy Development

Project Cost By Component	Local US $million	Foreign US $million	Total US $million
A1 Rural Electrification System Expansion, Intensification and Rehabilitation	102.04	159.61	261.65
A2 REB Technical Assistance	1.94	1.04	2.98
B1 REB Solar Program	2.00	6.16	8.16
B2 REB Solar Technical Assistance	0.40	0.22	0.62
C1 IDCOL Renewable Energy Subloans	5.11	16.19	21.30
C2 IDCOL Technical Assistance	1.44	2.16	3.60
Total Baseline Cost	112.93	185.38	298.31
Physical Contingencies	0.00	0.00	0.00
Price Contingencies	0.00	0.00	0.00
Total Project Costs	112.93	185.38	298.31
Total Financing Required	112.93	185.38	298.31

Identifiable taxes and duties are 0 (US$m) and the total project cost, net of taxes, is 290.1 (US$m) Therefore, the project cost sharing ratio is 65.83% of total project cost net of taxes

Annex 4: Cost Benefit Analysis Summary
BANGLADESH: Rural Electrification and Renewable Energy Development

General Approach

This annex summarizes the economic and financial analysis of the project components. The project has two main components: (i) grid component; and (ii) off grid component. The grid component would be implemented by REB and the off grid components would be implemented by REB as a solar fee-for-service scheme, and the other through IDCOL, by providing sub-loans to NGOs and MFIs for extending micro finance to households to purchase solar home systems, and assistance to private sector to develop, finance and implement other renewable energy projects.

The economic analysis of the grid component indicates that the project is economically robust and entails economic benefits to the consumers as well as to the country. The financial analysis of the grid component and the two off grid components also specify that those are financially viable alternatives and if implemented would generate positive returns for the implementing agencies and the beneficiaries. All the analysis are done on 2001 constant prices.

Grid Line Extension and Intensification

The analysis of the grid component is based on the following assumptions:

- Consumer growth after the construction period would be 12 percent from FY2006 to FY2013 in the project area. Afterwards, it would be around 10 percent from FY2014 to FY2016; 8 percent from FY2017 to FY2018; and 0 percent after FY2019 to the end of the project life. This is based on historical trends of consumer growth in newly electrified areas;
- The load growth after the construction period would be 10 percent from FY2006 to FY2013 in the project area. Afterwards, it would be around 9 percent from FY2014 to FY2016; 7 percent from FY2017 to FY2018; and 0 percent after FY2019 to the end of the project life. This is based on historical trends of consumer growth in newly electrified areas;
- The variable costs of energy price, operation and maintenance and other overheads are assumed to be Tk 1.84/kWh; Tk 0.30/kWh; and Tk 0.10/kWh respectively;
- The Standard Conversion Factor for Bangladesh is 0.91. This factor was used to adjust the financial cost of local goods, works, and services to get their economic values;
- Average tariff charged by PBSs to its consumers is assumed to be Tk 3.32/kWh;
- The tariff rate is administered and subsidized. Hence, it does not adequately reflect economic benefits. This analysis has equated consumer benefits with savings from using electricity for lighting, irrigation and other works, replacing kerosene, diesel and batteries respectively. This method is preferred since it more appropriately represents willingness to pay. The average willingness to pay is assumed to be Tk 4.80/kWh. This is a conservative estimate as it does not capture the benefits of increased safety, better indoor air quality and convenience; and
- REB on-lends funds to PBSs at a 3 percent interest rate, which constitutes their long-term cost of fund. For the economic analysis 12 percent discount rate has been used.

Under these assumptions, the economic analysis shows a EIRR of 16 percent and the financial analysis shows a FIRR of 5 percent.

Risks that could constrain these positive results are:

- Capital cost required for the project increases due to exchange rate fluctuation or other externalities in the market;
- Cost of energy increases rapidly;
- Realizing lower consumer growth than expected; and
- Costs of conventional energy, such as diesel and kerosene, decline, thereby reducing the consumer savings from switching to electricity

Sensitivity analysis (switching value analysis) of these risk factors show that the net economic benefits are quite robust and a significant change is required in these variables of interest to make EIRR less than 12 percent.

Valuation of Costs

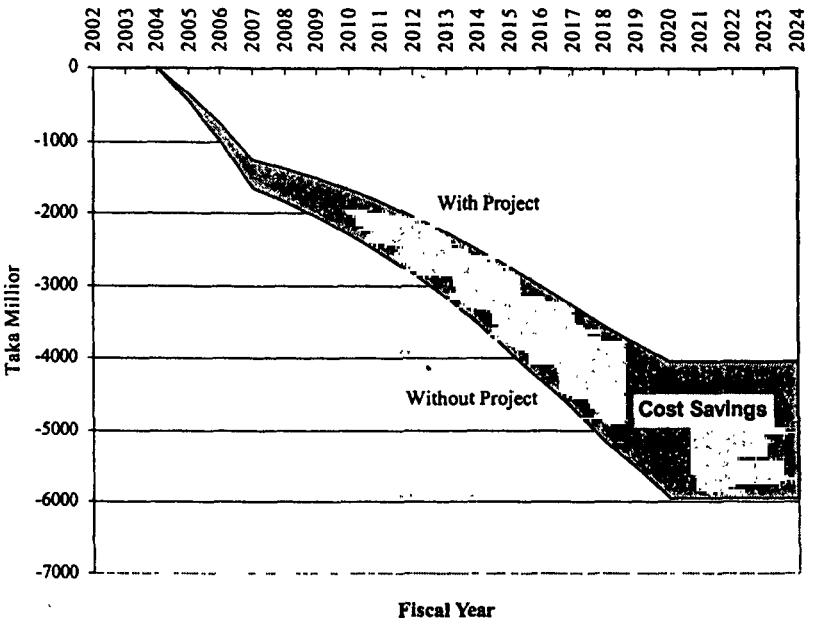
All costs are expressed in terms of constant 2001 Taka. The foreign costs were converted to taka cost at border price level. The local costs are obtained at market level and then converted to economic cost based on the Standard Conversion Factor (SCF) for Bangladesh. The SCF for Bangladesh is 0.91. This was used to convert the local cost of the project to get the economic input cost.

Based on historical trends, the project assumes that consumer growth rate would be around 12 percent at the initial years and then reduce gradually to 0 percent by FY2019. The total consumer connected by the project would be around 1.4 million with the highest concentration in residential category, around 86 percent. The next bigger consumer category is expected to be the commercial sector with 10 percent connection. Irrigation, industry and other categories would cover the rest 4 percent of the consumers. It is estimated that a residential and commercial consumer would consume about 40 kWh of energy per month, with irrigation and industry consuming about 350 kWh and 1,800 kWh of energy per month. From these assumptions total energy sale is calculated which is then adjusted for system loss to get the total demand of energy to be purchased by PBSs. Applying the energy purchase tariff and other associated costs mentioned in the assumptions section of this annex total input cost is obtained.

Valuation of Benefits

For the financial analysis part, the weighted average tariff of PBS in FY2001 is used. The weighted average tariff of PBS in FY2001 was Tk 3.32/kWh. This tariff rate is used to estimate the revenue received by the PBSs and was used as the financial output of the project. For the economic analysis, to obtain the benefits of the project, the consumers savings by switching to electricity from other modes of energy use is considered. For example, a household consumes kerosene for lighting purpose and also uses battery charging for watching TV and listening to radio. Shops and other small outlets also have similar consumption. Farmers use diesel and lubrication oil to run pumps for irrigation. Small industrial set up in village areas use power generators run by diesel for their energy needs. Once consumers get electricity access, their energy costs decrease and their quality of life is enhanced due to better lighting, convenience, safety, etc. The analysis has valued only the cost savings of the consumer from switching to electricity as the benefits, illustrated in Chart 1. Since the quality of life benefits have not been quantified and used, the analysis actually undervalues the benefits and presents a conservative view of the economic value of electricity access.

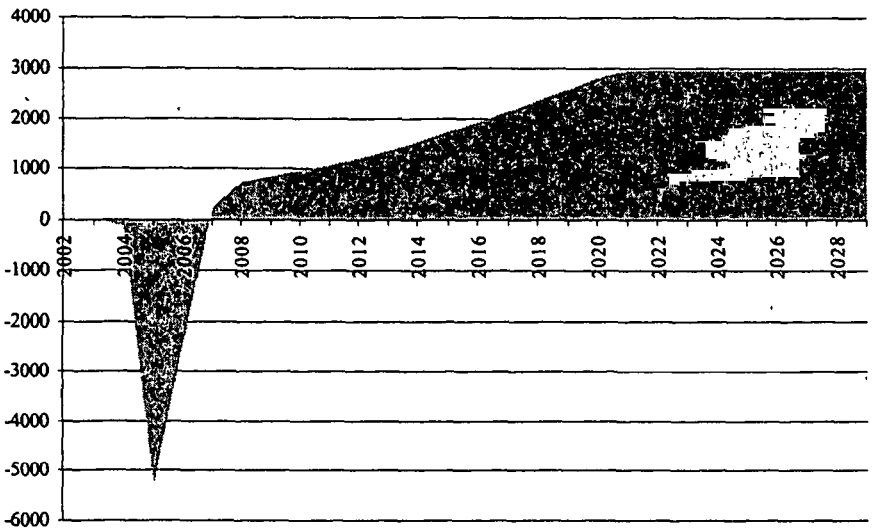
Chart 1: Cost To Consumers



Results

Economic Analysis: In the economic analysis of the project, the economic costs of the input are netted out from the economic benefits to calculate the net benefit of the project (Chart 2). The benefits are then discounted using 12 percent discount rate to calculate the NPV. The NPV of the project stands at US$ 58 million. The EIRR of the project is 16 percent. These results are based on the assumptions that the project would experience a sales growth of 10 percent upto FY2013 and then shall reduce to 7 percent by FY2018. From FY2019 onwards the sales would be constant. The analysis is based on constant 2001 prices. And no escalation of variable cost and benefits over the years are assumed. These results are sensitive to some risk factors and hence a risk analysis was conducted to check the robustness of the project.

Chart 2: Net Annual Benefits



Financial Analysis: Based on the above assumptions the project shows a FIRR of 5 percent. Given that REB receives grant financing from government funds and donor credits, through the government as loans at 2 percent annual rate of interest, from REB's standpoint the project has net financial benefits. However, from a country perspective the FIRR is low and this is explained by: (i) the high capital cost of rural electrification; and (ii) the slow pick-up of loads in rural areas and the low intensity of electricity use; and (iii) administered tariffs that are not fully cost reflective. It is anticipated that as the sector matures and tariffs rise this issue will be mitigated. Also, recognizing the need to increase intensity of electricity consumption and to make its use more productive from an economic standpoint, the project is supporting certain key socioeconomic interventions.

Sensitivity Analysis

The project outputs are sensitive to several key variables. These could be adverse changes in: (i) capital cost; (ii) energy supply cost; (iii) actual consumers connected; and (iv) levels of willingness to pay, etc. To analyze the impact of any changes in the level of these variables on the project viability switching value analysis was conducted. The result of the switching value analysis are presented below.

Table 1. Switching Value Analysis

Variable	Switching Value (%)
Capital Cost Fluctuation	40
Energy Supply Cost	30
Connection Rate	-14
Willingness to Pay	-13

The above table states that the capital cost of the project can increase by 40 percent before the EIRR falls below 12 percent. This level of fluctuation is highly unlikely given the short project implementation period. The energy supply costs will have to increase by 30 percent to bring the EIRR below 12 percent, with everything else remaining constant. Given the pricing regime in Bangladesh still administered by the government, such increase in power purchase tariff is unlikely to take place. However, any price increase in purchase price should be reflected in the sales tariff. As a result, the financial viability of the project would be enhanced.

While estimating the number of connections, REB estimated to connect around 23 consumers per kilometer of line. While this is a reasonable assumption, the project would be economically viable as long as the number of consumers per km does not fall below 20. While this could reasonably happen in some lines, on an average the number of consumers per km of line tends to grow with time and reaches about 40 consumers per km. Hence, if some lines do not meet this criteria, overall it is unlikely that the number of consumers would reduce to that level. The economic benefits mirrored in this project based on the savings of a consumer switching to electricity from kerosene or diesel. If the cost of these non-electricity resources reduces by more than 13 percent, the consumer would be indifferent in terms of monetary value between these two alternatives. However, given the other benefits like safety, convenience, better lighting, etc. a consumer would still prefer electricity and therefore this scenario is not likely to occur.

Conclusion

The economic and financial assessment of the project indicates that the project will deliver net economic benefits to the beneficiaries of the project, even under adverse conditions, and would deliver financial benefits to the implementing agency. These results can be regarded as conservative estimates of the benefits as it is not possible to quantify all the benefits that people receive in various forms which improves the quality of life of the consumers. Bangladesh has one of the lowest electricity access (around 30 percent) rate in the world. During the line construction period, the number of consumers gaining access would be around 400,000. Once the constructed facilities are transferred to the PBSs, given the historical consumer growth rates for the next 12 years, the project investments would enable nearly 1.4 million consumers, of which 1.2 million are rural households, to gain access. The project will thus contribute significantly to the economic and social well being of nearly 7 to 8 million rural Bangladeshis.

Solar Home System

Solar Home Systems: The cost of off-grid solar home system compares favorably with the costs of grid expansion. The solar component under this project would provide electricity to nearly 64,000 households at a total investment cost of about US$ 27.6 million, i.e. US$ 430 per household. The marginal cost of providing peak energy to the rural consumer is about US$500 per kW and the cost of extending the grid to the marginal rural consumer in Bangladesh is more than US$ 400 per consumer as per REB's informal estimates. This is much higher than the cost of supplying the same consumer through solar home system. The levelized costs of a 20 Wp system are estimated to be US$ 344 and that for 40 Wp system US$ 556. However, it is not correct to compare the costs of grid and solar because grid electricity provides a different and higher level of service to the consumer and has a much higher impact on economic development and social well-being than the electricity made available from off-grid sources. The solar system supports a very basic level of service, mainly lighting. However, a large majority of rural households are low-intensity consumers, using less than 40 kWh (or units) per month, mainly for lighting purposes. This level of service is consistent with that available from solar systems, when used in conjunction with compact fluorescent

lamps (CFLs), and hence the comparison is reasonable in the case of the small rural household consumer.

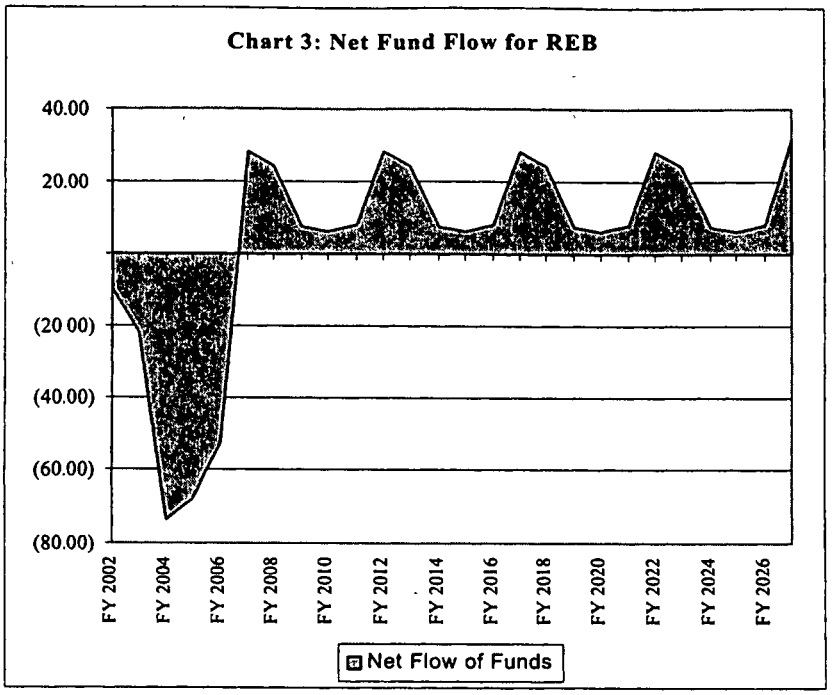
The approach for economic evaluation for the solar program considers the replacement of kerosene lamps by solar lighting. This approach is also used in evaluating the incremental cost for solar home system, which is found to be about US$ 3.3 per Wp. (Annex 11). The incremental cost calculation represents a financial valuation of the cost of eliminating barriers and making the solar system affordable. On this basis the IRR would be 12 percent since the incremental cost calculations use this discount rate for computing the levelized costs and benefits over a 20-year solar home system life-cycle. In this case there is little difference between a financial and economic computation. It can be safely assumed that the economic rate of return would be higher than 12 percent since the economic benefits are likely to be much higher than the mere replacement cost of kerosene. The indirect benefits of replacing kerosene with solar lighting – better quality of lighting, higher safety and freedom from indoor pollution, are not captured in the economic benefit valuation. Given these factors and uncertainty about the evaluation of actual benefits, a separate EIRR calculation for solar has not been presented here.

Solar Home System: Fee-for Service

The following assumptions are made to evaluate the financial viability of the Fee-for Service scheme of the Solar Home System component of the project at the REB's level.

- The scheme would be implemented by REB/PBSs under their current setup;
- Consumers' would pay a monthly fee for the use of the system;
- The Solar panels are assumed to have a life of 20 years;
- Battery life is considered to be five years;
- At the end of fifth year battery would be replaced by REB;
- GEF provides US$ 90 grant per system per household;
- As in the case of Grid, Government provides 20 percent of investment in REB solar as grant financing; and
- Discount rate of 3 percent is used as in the case of grid component.

Based on the above assumptions, and taking 2001 constant prices, the cash flow analysis for the project has been carried out. Monthly tariffs for different size of systems are set by REB under the fee-for-service program. For 36 Wp, 50 Wp and 76 Wp the monthly tariff calculated is around Tk 170, Tk 210 and Tk 297 respectively. This tariff takes into account the US$ 90 GEF grant per system to buy down capital costs. In addition, the GOB counterpart contribution of 20 percent to meeting project costs is to be passed on to PBSs as a grant as opposed to the current practice of providing it as a low-interest loan for grid investments. In Chart 3, the cash flow of the project is provided shown graphically.



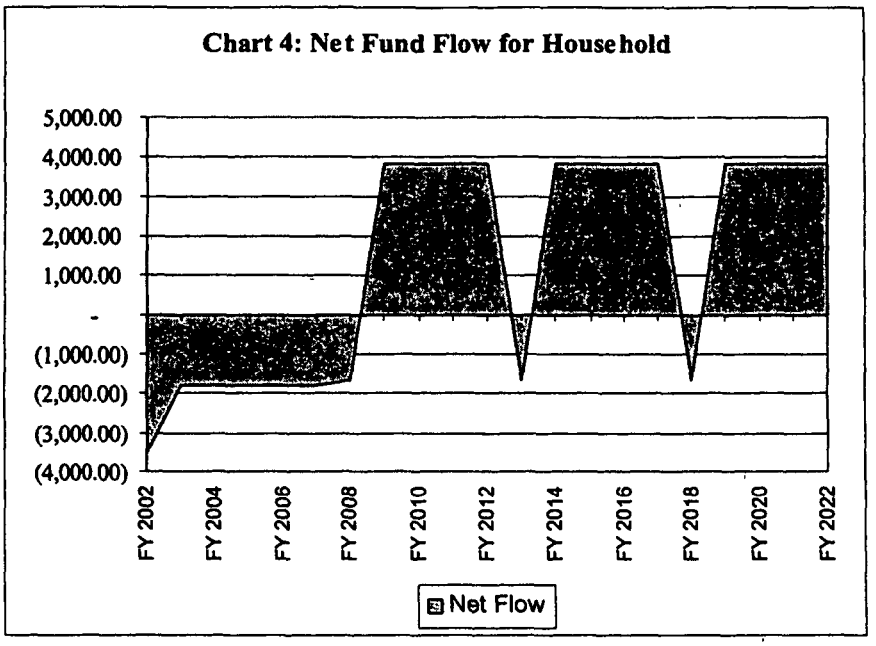
The subsequent decrease in the cash inflows from FY 2006 onwards are due to the replacement costs of the batteries. The FIRR for REB is 3 percent. The low FIRR is arising from the REB's attempt to keep the monthly payments affordable for rural households and to promote the program as a viable alternative to the grid in remote areas.

Solar Home System: IDCOL Scheme

The financial analysis of this component considers the financial position of a household who adopts the scheme. The assumptions based on which the analysis is carried out are:

- The scheme would be implemented by IDCOL through providing refinancing to MFI/NGOs to extend micro finance to households to buy SHS;
- The Solar panels are assumed to have a life of 20 years;
- Battery life is considered to be five years;
- At the end of fifth year the household would replace the battery at their own cost;
- Households would pay down-payment of minimum 15 percent of the total system cost;
- With grant declining over the years, average GEF grant amounts to around US$70 per system per household;
- The balance amount is met by loan received from MFI/NGOs;
- IDA refinances 80 percent of the loan amount made by MFI/NGOs; and
- The loan terms are flexible within a limited range specified by IDCOL. For this exercise it is assumed that the loan period would be of three to five years, with monthly payments and the interest rate being 15 percent flat over the repayment period.

The cash inflows to the household are the Takas saved from avoiding using kerosene lamps. Based on the above assumptions, the expected cash flow of a household purchasing a SHS can be presented as in Chart 4 below.



The initial cash outflow shown in the chart is due to the down-payment and DSL payments to the MFI/NGOs by the households. After they have repaid the loan, they start getting the benefit of the system. In every fifth year, the households would have to replace the battery which is considered as additional capital cost required by the households. This is reflected in the chart as the periodic decrease in household cash inflows. Based on this analysis, the FIRR is 12 percent.

Annex 5: Financial Summary

BANGLADESH: Rural Electrification and Renewable Energy Development

The Rural Electrification and Renewable Energy Development Project has two main components and two main implementing agencies. These two main components are grid electrification and renewable energy development. Rural Electrification Board (REB) through its Palli Bidyut Samities (PBSs) would implement the grid component of the project. The renewable energy component of the project would be implemented in two tracks, following two different methodologies. REB will supply the Solar Home Systems through its PBSs by a fee for service scheme and Infrastructure Development Company Limited (IDCOL) would implement it through the participating organizations, which could be NGOs, MFIs and Private sector agencies. This annex summarizes the financial strength of REB and its PBSs along with the eligibility criteria that IDCOL follows to select its participating organizations.

Rural Electrification Board

General Introduction

Rural Electrification in Bangladesh began with the creation of REB by a Presidential Ordinance in late 1970 with some initial rural electric cooperatives (Palli Bidyut Samities-PBSs). The objective of this program was to electrify most of the rural Bangladesh within 20 years. The Board (REB) was made a corporate body having perpetual succession and a common seal, with power subject to provisions and rules made thereof.

The first PBSs were developed in areas with the greatest chance of financial success. As time progressed, additional PBSs were created in less viable areas. This was a rational and expected progression.

Composition of REB Board

The Board consists of a Chairman nominated by Government, four full-time Members and four part-time Members from four different organizations namely, Bangladesh Power Development Board (BPDB), Bangladesh Small and Cottage Industries Corporation (BSCIC), Bangladesh Rural Development Board (BRDB) and Bangladesh Agricultural Development Corporation (BADC). The Members of the Board are selected and are appointed by the Government.

Relation with PBS

The Functions of the Board are to establish electricity generation, transmission, transformation and distribution among the rural people through the creation of PBSs by organizing the prospective consumers of electricity into formal groups.

The steps that REB follows in creating a PBS can be summarized as follows:

1. REB determines with the approval of the Government the criteria for rural electrification and associated works to ensure optimum uses of resources and maximum socioeconomic benefits;
2. Prescribes by-laws for the Samities (cooperatives) for their registration with the Board (REB) and determines the manner of their functioning;
3. Receives grants and raise loans from the Government and other bodies for creating funds to carry out its objectives;

4. Advances funds to PBSs for the execution of approved schemes, operations & management of works and services;
5. Handover completed schemes to PBSs on certain terms and conditions;
6. Prescribes on-lending terms for the Samities regarding borrowing of funds from REB; and
7. Prescribes regulations for project appraisal and credit administration.

To date, 67 organized PBSs cover most of geographical Bangladesh. More than three million consumer meters are in place, providing needed electricity to about 24 million rural Bangladeshis. Rapid growth and geographical coverage has been note worthy.

With a view to achieve the Area Coverage Rural Electrification program (ACRE) and in line with the vision statement of the Government, REB is preparing few more new projects to bring the un-served area under rural electrification. Along with this, REB has also taken initiative to undertake new Intensification and Expansion Projects for more area coverage of the already existing PBSs. Hence, REB creates, nurtures and helps the PBSs develop smoothly from the very inception of the Rural Electrification (RE) program in 1977.

Financial Strength

The total investment in RE Program up to June, 2000 stood at Tk. 53.94 billion (US$ 930 million), of which the Government has contributed Tk. 28.41 billion (US$ 490 million).

Funds received by Government from donors for rural electrification are on-lent to REB in Local Currency under UOLT (uniform on-lending terms) at 2 percent interest, eight years grace and 33 years repayment period. Besides the above, Government funds available for rural electrification are provided to REB in local currency as grant, which create the equity base of REB.

REB on-lends the total funds received from Government (Donor funding and Government funding) in local currency to the PBSs at 3 percent interest rate, five years grace and 30 years repayment period. During the grace period REB and PBSs calculate interest at 0.75 percent, which is subsequently capitalized after the end of grace period.

It is to be noted that, REB meets its operating expenses from the interest income and enjoys good financial health. A summary of financial statement of REB is provided in Table 1 below. The table consists of audited statements for FY1996 to FY2000 and projections from FY2001 to FY2007. REB's Operating Margin ratio is usually above 75 percent. With a spread of only 1 percent on their lending, REB had been able to maintain their return on investment higher than 0.5 percent in recent years.

Table 1: Financial Position of REB

RURAL ELECTRIFICATION BOARD

SUMMARY OF AUDIT REPORT FOR FIVE YEARS ACTUAL AND SEVEN YEAR PROJECTION

Figure in Crore Taka

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
1 Operating income	47 534	2.41	44 42	62.42	76.87	79 46	89.16	100 03	112 24	125 94	141.30	158 54
2 Operating expenses	9.88	10.22	11.16	12.69	13.98	18.62	21.22	24.17	27.54	31.38	35.76	40.74
3 Operating Margin (1-2)	37.653	2.19	33 26	49 73	62 89	60 84	67 94	75 86	84 70	94 55	105 54	117.80
4 Interest expences	13.05	20.49	21.22	23.75	25.55	16 19	17 60	19 13	20 79	22.59	24.56	26.69
5 Net Margin (3-4)	24 601	1.70	12 04	25 98	37 34	44 65	50 34	56 74	63.91	71 96	80 99	91 11
6 Previous year balance (5+6)	75.99	95 44	107.24	113.48	139 45	176.79	209.83	249.04	295 58	350 82	416 38	494 19
	100 59	107 14	119.28	139 46	176 79	221 44	260.17	305 78	359 49	422 78	497 37	585 30
7 Previous year adjustment	(5 15)	0.10	(5.80)	0	0	0	0 00	0.00	0 00	0 00	0 00	0.00
8 Net Balance transferred to Balance Sheet (5+6+7)	95 44	107.24	113.48	139.46	176.79	221 44	260.17	305.78	359.49	422.78	497.37	585.30
Owners Equity :												
9 Govt. Grant	1072 67	1409 8	1711 97	2002 09	2433 81	2934.28	3591 18	4395 14	5379 09	6583.31	8057 13	9860 89
10 Foreign Grant	0	0	0	0	0	0	0 00	0 00	0 00	0 00	0 00	0 00
11 Capital Gain	110 46	136 43	171 2	198 31	238 03	269 59	322 49	385 78	461 49	552 05	660 38	789 97
12 Retained Earnings	95 44	107.24	113.47	139.45	176.79	221.35	262.54	311.40	369 36	438.09	519 62	616.33
13 Total Owners Equities (9 to 12)	1278 57	1653 4	1996 64	2339 85	2,848 63	3,425.22	4,176 22	5,092 33	6,209 93	7,573 45	9,237 13	11,267 19
Liabilities:												
14 Current liabilities	19 432	3 99	27 26	38 04	56 70	102.35	144 56	204 18	288 39	407.33	575 32	812 59
15 Long-term liabilities	1627 14	2053 4	2180 63	2346 97	2427 47	2484 68	2712 32	2960.81	3232 07	3528 18	3851 42	4204.27
16 Deffered liabilities	89.44	120 42	127 68	141.46	153 14	163 35	185.04	209.60	237.43	268 96	304 66	345.11
17 Total liabilities (14 to 16)	1736 01	2197 9	2335.57	2526 49	2637.31	2,750.38	3,041.92	3,374 59	3,757 89	4,204 46	4,731.40	5,361 97
18 Total Owners Equities & Liabilities	3014.58	3851.3	4332.21	4866.34	5485.94	6175.60	7218.13	8466.92	9967.82	11777.91	13968.53	16629.16
Assets:												
19 Fixed assets	182.35	115 17	79 36	115.21	116 99	106 37	99 93	93 87	88 18	82.84	77 82	73 11
20 Other assets & Investment	1797 67	2163 2	2765.91	3093 26	3450.77	3875.67	4526 02	5285 50	6172 42	7208 17	8417 73	9830 24
21 Current assets	787 82	1253.4	1185.31	1369 91	1603.73	1853.45	2231 10	2685 70	3232.93	3891 65	4684 60	5639 11
22 Deffered assets	246.74	319.51	301.63	287 96	314 45	340.11	361.09	401.85	474 29	595 25	788 38	1086.70
23 Total assets(19 to 22)	3014.58	3851.3	4332.21	4866.34	5485.94	6175.60	7218.14	8466.92	9967.82	11777.92	13968.53	16629.16
Financial Ratio												
Operating Margin Ratio	79 21%	75 90%	74.88%	79 67%	81.81%	76 57%	76 20%	75 83%	75 46%	75 08%	74 69%	74 30%
Net Margin Ratio	51.76%	27.59%	27 10%	41.62%	48.58%	56 19%	56 47%	56 72%	56 94%	57 14%	57.31%	57 47%
Return on Investment	0 82%	0 30%	0 28%	0 53%	0 68%	0 72%	0 70%	0 67%	0 64%	0.61%	0.58%	0 55%
Method of Financial Ratios												
Operating Margin Ratio	Operating margin (SI-03)/Operating Revenue (SI-01) x100%											
Net Margin Ratio	Net Margin (SI-05)/Operating revenue (sI-01) x 100%											
Return on Assets	Net Margin (SI-05)/Total Assets (SI-34) X100%											
Remarks	Projection for seven year based on 10%- 20% increase of previous Year											

PALLI BIDYUT SAMITIES

General Introduction

The Rural Electric Cooperatives are called Palli Bidyut Samities (PBSs). The main function of these cooperatives is to provide electricity in rural areas. Generally an electric cooperative is formed taking three to seven Thanas (Administrative Units), comprising an area covering around one to two thousand square kilometers. The inhabitants of that area are the member consumer of that electric cooperative.

A PBS is divided into five to nine Elakas (Areas) and 1 (One) Director is elected from each Elaka by the member–consumers. These Directors form a Board known as PBS Board having a President and a Secretary elected by the Board of Directors. Besides these, there are Two Lady Advisors nominated by the PBS Board. The main function of the Board is policymaking. The executive function of the PBS is performed by appointed officers and staff headed by the General Manager.

The PBSs are registered with REB and are governed by the prescribed by-laws and policy instructions formulated by REB, which serves as guidelines to almost all operations of the PBS.

Financial Strength

The PBSs are provided with loan under a Loan agreement with REB. Under this agreement the PBS are provided with loan at 3 percent interest per annum with five years grace period. During grace period interest at 0.75 percent per annum is capitalized. Onward for next 25 years, the PBSs meet their debt service liabilities by repaying in two installments every year.

At present a good number of PBSs are financially solvent and regularly repaying their debts. Table 2 presents the summary Income Statement of the 45 PBSs included under the Rural Electrification and Renewable Energy Development Project.

Table 2: Statement of revenue and expenses of 45 PBSs (July 2000 to June 2001
Figures in Taka million

NAME OF THE PBS	Energization Date (mo/day/yr)	GWH Purchased	GWH Sold	System Loss (%)	Opt Revenue	Non-Operating Revenue	Total Revenue	Cost of Purchased Power	O&M + Financial Expenses	Total cost	Net Income/Loss
1. DHAKA PBS-1	6/2/80	406	366	10	1,243	123	1366	773	114	888	478
2. TANGAIL PBS-1	8/15/81	79	70	11	231	16	247	148	72	220	27
3 COMILLA PBS-1	1/12/81	148	133	10	408	22	430	285	102	387	44
4 CHANDPUR PBS	12/14/81	72	60	16	211	10	221	136	84	220	1
5 HOBIGONJ PBS	5/2/82	56	49	12	171	15	187	104	66	170	17
6. MOULVIBAZAR PBS	6/25/81	66	58	11	196	20	216	121	62	183	34
7 PABNA PBS-1	12/12/82	28	25	12	82	4	86	53	40	93	(7)
8. PABNA PBS-2	1/21/82	31	28	11	97	6	102	58	40	98	4
9. SERAJGONJ PBS	4/14/81	93	81	13	267	20	287	172	100	271	16
10. JESSORE PBS 1	6/26/81	72	63	13	216	11	228	134	75	210	18
11 JESSORE PBS-2	2/2/81	75	63	15	221	14	235	137	83	220	15
12. NATORE PBS-1	2/15/81	52	45	14	151	9	160	96	52	148	12
13. NATORE PBS-2	12/12/81	47	40	14	140	12	152	86	54	140	12
14. RANGPUR PBS-1	3/11/84	60	53	12	164	8	172	111	72	183	(11)
15 SATKHIRA PBS	2/9/84	33	28	13	92	6	98	59	45	104	(6)
16. FENI PBS	2/16/84	66	57	14	197	10	207	122	90	213	(5)
17. MYMENSINGH PBS-1	3/16/84	55	48	12	163	8	171	108	72	180	(9)
18. DINAJPUR PBS-1	11/1/84	50	43	13	156	11	167	92	66	158	9
19. KUSHTIA PBS	10/16/85	41	35	14	119	7	126	75	71	146	(19)
20. JOYPURHAT PBS	2/9/86	41	36	12	123	7	130	80	57	137	(7)
21. PIROJPUR PBS	5/8/86	25	19	21	69	4	73	46	46	92	(18)
22. RANGPUR PBS-2	3/30/86	34	28	15	100	5	105	63	53	116	(11)
23 JAMALPUR PBS-1	6/1/86	23	19	15	68	8	76	43	48	91	(15)
24. CHITTAGONG PBS-1	3/7/88	67	55	18	175	10	185	118	85	203	(18)
25. BOGRA PBS	9/23/86	83	73	12	247	12	259	154	101	256	3
26. THAKURGAON PBS	11/11/86	27	24	13	79	10	89	50	57	106	(18)
27. MADARIPUR PBS	10/12/85	38	33	14	103	5	108	70	49	119	(11)
28. BARISAL PBS-2	11/22/85	35	32	9	94	5	99	65	52	117	(19)
29. CHITTAGONG PBS-2	11/7/86	85	70	17	238	6	244	158	108	266	(22)
30. MEHERPUR PBS	2/16/87	39	33	16	111	7	118	71	69	139	(21)
31. NOAKHALI PBS	12/8/86	51	43	14	150	6	157	93	70	163	(6)
32 BAGERHAT PBS	4/1/86	33	28	15	98	5	102	60	51	111	(9)
33. NARSINGDI PBS-1	10/29/86	482	400	17	1,204	20	1223	874	158	1,032	191
34. KISHOREGANJ PBS	3/30/90	34	29	15	103	8	111	63	53	115	(5)
35 NARSINGDI PBS-2	4/5/90	153	118	23	400	8	408	314	84	398	10
36. NAOGAON PBS	4/19/90	65	56	13	191	7	199	126	79	205	(6)
37. SYLHET PBS	6/2/90	49	41	17	134	7	141	93	70	162	(21)
38. LAXMIPUR PBS	8/16/90	31	27	16	96	5	101	58	54	112	(11)
39. BARISAL PBS-1	11/1/90	17	15	13	53	5	58	31	49	80	(22)
40. PATUAKHALI PBS	10/10/92	19	15	23	55	3	58	36	48	83	(25)
41. MANIKGANJ PBS	11/13/92	87	71	18	233	6	240	167	87	254	(15)
42. COMILLA PBS-2	4/1/94	73	60	18	198	6	204	134	73	207	(3)

The consolidated statement of all the PBSs shows that on average the 45 PBSs system loss is around 15

percent and in FY 2001 all of them together earned a total of Tk 455 million. When the breakdown of each PBS is looked at the table shows that the system loss of the PBSs ranges from 10 percent to 26 percent. And the Net Income/Loss ranges from loss of Tk 38 million to income of Tk 478 million. The losses are mainly due to poor consumer mix. Some of the PBSs are operating at high system loss as they have recently taken over BPDB and DESA lines that inherited high system loss and as a result the PBSs total system loss have increased.

The financial viability of these PBSs highly depends on the pace of reducing the system loss of these newly taken over lines and improving consumer mix of low earning PBSs. The proposed project focuses these two issues. Through a component of System Loss Reduction Scheme, Financial Restructuring Program and Technical Assistance to increase the productive uses of energy, the project intends to improve the financial viability of the PBSs.

Infrastructure Development Company Limited (IDCOL)

General Information

The Infrastructure Development Company Limited is a 100 percent government owned company registered under the Company's Act of Bangladesh 1994. It is also registered as a non-banking financial institution under the Financial Institution Act 1993. Till date, this company has provided a loan of US$ 80 million to construct a private power plant of 450 MW of capacity, the largest power plant in Bangladesh. To diversify its business IDCOL became interested to act as a financial intermediary to channel Government funds received from IDA to participating organizations like NGOs and MFIs so that they can extend micro credit to households to buy Solar Home Systems. The eligibility criteria that IDCOL follows to select NGOs/MFIs for the program are as follows.

Eligibility Criteria for Participating Organizations

Applicable to all Participating Organizations (POs)

In order to become eligible to participate in IDCOL Refinancing Facility under the Project and to maintain their eligibility, credit institutions must be privately owned and controlled, and meet the following criteria.

(a) Satisfactory business plan approved by the PO's Board of Directors as to the overall planning in relation to the use of the IDCOL Refinancing Facility under the Project, and containing *inter-alia*; proposed internal organization to implement the business plan, details of responsible business team, capacity to originate, evaluate and approve lending proposals, manage subsequent follow-up monitoring and loan recoveries and the details related to similar financing schemes that the PO operates.

(b) Particulars of the operational and financial results of the PO for at least the previous two (2) years based on an acceptable audited report. The PO's operations should be profitable for at least the past two years. However, in reaching an assessment about potential profitability, IDCOL will also consider (i) forward looking business prospects and potential for profitable operations; and (ii) if the PO is operating a solar program, the performance of their solar business.

(c) The PO should furnish proof to IDA that the financial performance of the PO concerned is in conformity with the applicable financial criteria outlined below.

(d) After fulfilling the eligibility criteria by PO, the PO shall continue to meet the eligibility criteria aforementioned, satisfactory to IDCOL and IDA, which shall monitor PO's compliance therewith annually. If the PO fails at any time to satisfy the above specified criteria IDCOL and IDA reserve the right to suspend "Sub Loan" authorizations under the Project until the PO has taken specific steps to address its problems in a manner satisfactory to IDCOL and IDA.

(e) The PO has established and maintained sound and transparent accounting, MIS and internal audit system.

(f) Accounts are audited by a reputable external auditor on an annual basis.

Selection/Eligibility Criteria for MFIs

(a) General Criteria

- Must be registered with appropriate registration authority to conduct microfinance services;
- Currently conducting microfinance services with soft loan funds from:
  - PKSF as a PO,
  - Bank of Small Industries and Commerce ("BASIC") Limited, and
  - Any other similar national or international funding source;
- Have microfinance operations in Project areas identified in the priority list for the SHS program;
- Number of beneficiaries is not less than 10,000; and
- Capable of managing rural renewable energy program.

(b) Specific Financial Criteria

- Minimum Tk. 1,000,000 of equity.
- Debt to equity ratio of the MFI not in excess of 3.0.
- Minimum total cash collection ratio of principal and interest on current loan portfolio calculated on a rolling twelve month basis of 80 percent;
- In case of an existing SHS loan portfolio, minimum total cash collection ratio of principal and interest calculated on a rolling twelve month basis of 80 percent;
- Minimum after tax profit equivalent to 4 percent p.a. on revolving loan fund (RLF);
- In cases where prospective business profitability is considered to be positive, the PO should be at least breaking even after meeting operational expenses and debt service. However, in such cases, continued eligibility will be conditional on being able to meet the 4 percent p.a. after tax profit criterion the following year; and
- Minimum debt service cover ratio of 1.25 times.

Selection Criteria for Other Private Entities (PEs)

- A lawful private entity organized under the laws of Bangladesh, complying with pertinent laws and regulations regarding capital adequacy, classification of assets, non-accrual of interest and provisioning, exposure limits, etc.
- A verification that PE meets satisfactory financial criteria, ratio requirements and exposure limits; and
- Capable of managing rural renewable energy program.

Financial Highlights of Potential POs

Five NGOs/MFIs have been selected for the project development phase to implement the SHS scheme on pilot basis. These five (5) NGOs/MFIs are Bangladesh Rural Advancement Committee ("BRAC"), Coastal Association for Social Transformation Trust ("COAST"), Grameen Shakti ("GS"), Srizony Bangladesh ("SRIZONY"), and Thengamara Mohila Sabuj Sangha ("TMSS"). The financial highlights of these five (5) NGOs/MFIs are shown below in the Table 3. A preliminary appraisal has been carried out for the same five institutions and the results are summarized in the following tables. Based on these preliminary assessments, it appears that Srizony would have to improve its Debt-Equity Ratio from 3.4 to 2.5 in order to qualify. Similarly Grameen Shakti will need to improve its return on equity to eligible levels in order to qualify. However, a detailed analysis of the financial soundness of all potential POs would be undertaken prior to the commencement of the credit program to ensure their compliance with the applicable eligibility criteria of the credit program.

The financial performance of these POs for the financial year ending December 31, 1998-2000 are compared with the eligibility criteria in the table below.

Financial Ratios for the Three Year's Average						
Item	**Criteria**	**BRAC**	**COAST**	**Grameen Shakti**	**Srizony**	**TMSS***
Amount of Equity (Tk./)	10,000,000	5,794,997,168	42,533,037	88,584,595	10,458,790	267,339,951
Return on Equity	4.00%	7.56%	2.90%	-10.79%	19.81%	16.05%
Debt to Equity Ratio	2.50	1.17	1.01	1.10	3.40	1.92
Times Interest Earned	1.25	2.63	2.08	-1.38	5.96	7.66
Total Cash Collection Ratio**	80%	98%	96%	100%	96%	99%
Percentage of Classified Loans**	20%	2%	4%	0%	4%	1%
Financial Ratios for the Year Ending on December 31, 2000						
Item		**BRAC**	**COAST**	**Grameen Shakti**	**Srizony**	**TMSS***
Amount of Equity (Tk./)		6,025,126,496	40,080,428	226,718,832	13,057,533	311,827,392
Return on Equity		8.64%	-12.34%	-0.84%	17.90%	14.15%
Debt to Equity Ratio		1.38	1.19	0.19	4.10	2.19
Times Interest Earned		2.24	-4.66	-0.38	3.21	5.24
Total Cash Collection Ratio**		98%	96%	100%	95%	99%
Percentage of Classified Loans**		2%	4%	0%	5%	1%
Financial Ratios for the Year Ending on December 31, 1999						
Item		**BRAC**	**COAST**	**Grameen Shakti**	**Srizony**	**TMSS***
Amount of Equity (Tk)		5,532,815,351	46,883,419	22,353,386	10,413,899	273,330,965
Return on Equity		6.62%	0.66%	-4.54%	21.11%	20.71%
Debt to Equity Ratio		1.34	0.87	2.05	3.25	1.96
Times Interest Earned		2.32	1.42	0.16	4.62	10.73
Total Cash Collection Ratio**		98%	96%	100%	95%	99%
Percentage of Classified Loans**		2%	4%	0%	5%	1%

Financial Ratios for the Year Ending on December 31, 1998					
Item	**BRAC**	**COAST**	**Grameen Shakti**	**Srizony**	**TMSS***
Amount of Equity (Tk.)	5,827,049,658	40,635,265	16,681,566	7,904,937	216,861,495
Return on Equity	7.41%	20.37%	-27.00%	20.41%	13.29%
Debt to Equity Ratio	0.80	0.97	1.06	2.84	1.61
Times Interest Earned	3.34	9.49	-3.91	10.04	7.00
Total Cash Collection Ratio**	98%	96%	100%	97%	99%
Percentage of Classified Loans**	2%	4%	0%	3%	1%
* All of the MFIs except TMSS fiscal year run from January 1 to December 31. TMSS's fiscal year is from July 1 to June 30.					
** The financial statements of MFIs do not refer to total cash collection ratio and percentage of classified loans.					

Annex 6: Procurement and Disbursement Arrangements
BANGLADESH: Rural Electrification and Renewable Energy Development

Procurement

The total project cost is US$ 298.30 million, for which IDA will finance US$ 190.98 million and Global Environment Facility (GEF) will provide a grant of US$ 8.20 million. Bulk of procurement under the project will involve goods; the balance is for small civil work contracts and consultancy assignments.

All IDA financed procurement of goods and works will follow procedures outlined in the Bank's *"Guidelines for Procurement under IBRD Loans and IDA Credits"*, published in January 1995, and revised in January and August 1996, September 1997, and January 1999. Consulting services and training will be procured in accordance with the Bank's *"Guidelines: Selection and Employment of Consultants by World Bank Borrowers"*, published in January 1997, and revised in September 1997 and January 1999. GEF financed procurement of goods and consultants' services will follow IDA procedures. Procurement of goods, works and services will follow the Bank's approved/standard documents.

Goods (US$ 247.42 million)

IDA credit and GEF grant will jointly finance about US$ 169 million worth of goods. About 98 percent of the goods will be procured through international competitive bidding under 102 contract packages ranging in value from US$ 0.3 million to US$ 18 million per package. Some goods in small value contracts through national competitive bidding or shopping as these are unlikely to attract foreign bidders. Goods valued about US$ 240 million are for the grid component, to be implemented by the Rural Electrification Board (REB). Small amounts of goods and equipment under the off-grid component, will be procured by REB and Infrastructure Development Company Limited (IDCOL). Goods include line hardware, insulators, conductors, distribution transformers, poles, meters and accessories, solar panels and accessories, vehicles, computers, office equipment, off-the-shelf software, fax machines, photocopiers, etc.

(i) ***International Competitive Bidding (ICB)***: Goods and equipment contracts estimated to cost US$ 300,000 equivalent or more per contract will be procured using ICB. This will include line hardware, insulators, conductors, distribution transformers, poles, meters and accessories, sectionalizing devices, guy accessories, substation equipment, connectors, etc. Procurement of other equipment in bulk will also follow ICB.

(ii) ***National Competitive Bidding (NCB)***: Goods and equipment contracts estimated to cost less than US$ 300,000 equivalent per contract may be procured using NCB, up to an aggregate limit of US$ 3,000,000. This includes electrical goods required in small quantities for rehabilitation and timely attention to services and includes small quantities of: poles, transformers, line tools, street lights, grounding wires, etc. Also, procurement of computers, printers, office equipment, etc. in small quantities may follow NCB.

(iii) ***International/National Shopping (NS)***: Up to an aggregate limit of US$ 400,000, goods of very small contracts or individual purchases of off-the-shelf items may be procured, through prudent shopping procedures, in packages with an estimated value less than US$ 30,000 equivalent per contract, with the exception of vehicles which may be procured following shopping procedure with an estimated value less than US$ 60,000 equivalent per contract. Procurement of vehicles,

furniture, office equipment, computer desks, etc. will follow NS.

(iv) ***Direct Contracting (DC)***: Computer software, books, and training materials with individual contract costs US$ 2,000 equivalent or less, up to an aggregate limit of US$ 100,000, may be procured following DC.

Works (US$ 19.90 million)

Civil works worth about US$ 7.34 million, will be financed under the Credit. Contracts for works include mainly construction and installation such as, foundation for lines and substations, erection and installation of poles, installation of meters, fabricating concrete poles, cross arms, etc. Since the estimated cost for each package is less than US$ 100,000 equivalent, all works will follow NCB.

Consultants' Services and Training (US$ 6.63 million)

IDA credit and GEF grant will finance part of the services, valued about US$ 5 million. Major consulting services include: (a) for the grid component- technical assistance for institution development and training of REB and Palli Bidyut Samities (PBSs), financial restructuring, engineering design and supervision of system loss reduction of taken-over lines, socioeconomic monitoring and impact evaluation, environmental assessment and management training; and (b) for the off-grid component- technical assistance to REB and IDCOL for solar promotion, installation of solar home system (SHS), motivational activity, legal and technical support, publicity and awareness campaign.

(i) ***Quality- and Cost- Based Selection (QCBS)***: Consulting services through firms estimated to cost US$300,000 equivalent or more per contract will be procured following QCBS. Major contract includes: socioeconomic monitoring and impact evaluation of rural electrification program.

(ii) ***Fixed Budget Selection (FBS)***: Services through firms estimated to cost less than US$ 300,000 equivalent per contract may be procured following either QCBS or FBS, depending on the nature of assignment. Such contracts include: promotional and motivational activity, installation, supervision and monitoring of SHS, computer training, audit services, etc. Depending upon the needs of project implementation, supervision consultants can also be hired under this method.

(iii) ***Least-Cost Selection (LCS)***: Services through firms estimated to cost less than US$ 100,000 equivalent per contract may be procured following FBS or LCS, depending on the nature of assignment. Such contracts include engineering design and supervision of system loss reduction program in the 40 PBSs where lines are being taken over from BPDB.

(iv) ***Single Source Selection (SSS)***: With estimated value of US$ 75,000 equivalent or less per contract, up to an aggregate limit of US$ 1,500,000 equivalent, services for assignments that meet the requirement of paragraph 3.9 of the Consultants Guideline may be procured following SSS, subject to IDA's prior agreement. Contracts include: environmental impact assessment and training activities relating to: globalization and perspective reform, system design, material inspection, IT, MIS, project financing, management, etc.

(v) ***Individual Consultants (IC)***: Services for assignments for which teams of personnel are not required and the experience and qualifications of the individual are important, will be procured in accordance with Section V of the Consultants Guidelines. Individuals will be selected on the basis of their qualifications for the assignment. Contracts for specialists include renewable energy and

SHS specialists, legal advisors, business development and capacity building specialists etc.

Credit and Grant component- Equity and Loan (US$ 21.29 million)

For the equity and loan, IDA credit will finance US$ 11.44 million and GEF grants US$ 3.8 million. Off-grid operations for SHSs and mini-grid development will be implemented by REB and IDCOL through PBSs and microfinance institutions (MFIs)/NGOs. IDCOL will implement the microfinance-based direct sales program to support electricity access for 50,000 households with SHSs. The SHSs will be supplied and serviced by private companies in partnership with MFIs and NGOs. IDCOL will make sub-loans under a credit program to participating NGOs and MFIs for refinancing up to 80 percent of loans made to households for purchase of SHSs. The program will be led by NGO/MFIs who will identify potential consumers, make consumer loans, form alliances with SHS suppliers for installations and services. The POs like MFIs and NGOs, will be selected in accordance with procedures acceptable to IDA. The grant program would cover both the fee-for-service and microfinance models. Grants would be output-based and released by REB or IDCOL as the case may be, after solar systems are installed and accepted by the consumers.

Installation Grants (US$ 1.53 million)

GEF will provide a fixed grant to PBSs for successful installation of each SHS. A total amount of US$ 1.53 million has been allocated for this cost from GEF Grant proceeds.

Incremental Operating Costs (US$ 0.92 million)

Incremental operating costs of about US$ 0.18 million will be financed by IDA on a declining basis. This includes salary of project staff, office utilities, supplies, fuel, maintenance of equipment and vehicles, etc.

IDCOL Administration Fee (US$ 0.60 million)

IDCOL will be eligible to a administration fee up to US$ 0.60 million for meeting expenses in respect of implementing GEF grant financed activities.

Procurement and Selection Planning

The Procurement Plan for goods and works, and Selection Plan for services have been prepared and attached in the PIP. Prior to issuance of any invitation for bids for procurement of goods and works and selection of services, the same shall be furnished to IDA for its review and approval, in accordance with the provisions of paragraph 1 of Appendix 1 to the respective Guidelines. Procurement of goods and selection of all consultants will be undertaken in accordance with Plans approved by IDA and with the provisions of said paragraph 1 of Appendix 1 of the respective Guidelines.

Use of Standard Documents

For ICB procurement of goods, the use of IDA's Standard Bidding Documents (SBD) is mandatory. For NCB procurement, REB/IDCOL will use the SBDs for Goods approved by IDA. For selection of consulting firms, the Bank's Standard Request for Proposals (RFP) including standard contract form will be used. The Bank's Standard Bid Evaluation Form for goods and Sample Form of Evaluation for consultants' services will be followed for submission of evaluation reports to IDA.

Prior Review Thresholds

Goods and Works: IDA will carry out prior review of the following contracts: all contracts estimated to cost US$ 300,000 equivalent or more irrespective of procedures and the first two contracts for procurement under NCB regardless of value. All other contracts will be subject to post review by IDA.

Consultants Services: IDA's prior review will be required for consultants' services contracts estimated to cost US$ 100,000 equivalent or more for firms and US$ 50,000 equivalent or more for individuals.

Post Review

For compliance with the Bank's procurement procedures, IDA will conduct post review of contracts that are below the prior review threshold.

Review of Procurement Performance

IDA will monitor the compliance with the procurement arrangements set out in the Development Credit Agreement for procurement of goods, works and services required for the project. As part of the project's mid-term review, a comprehensive assessment of procurement performance will also be carried out. Based on the review, in consultation with the Government, IDA may revise the prior review threshold and/or the procurement and selection methods.

Acceptability of NCB

In order to ensure economy, efficiency, transparency and broad consistency with the provisions of Section I of the Procurement Guidelines:

(i) standard bidding documents approved by the Association shall be used;

(ii) invitations to bids shall be advertised in at least one widely circulated national daily newspaper and bidding documents shall be made available to prospective bidders, at least 28 days prior to the deadline for the submission of bids;

(iii) bids shall not be invited on the basis of percentage premium or discount over the estimated cost;

(iv) bidding documents shall be made available, by mail or in person, to all who are willing to pay the required fee;

(v) foreign bidders shall not be precluded from bidding and no preference of any kind shall be given to national bidders;

(vi) qualification criteria (in case pre-qualifications were not carried out) shall be stated in the bidding documents, and if a registration process is required, a foreign firm determined to be the lowest evaluated bidder shall be given reasonable opportunity of registering, without any let or hindrance;

(vii) bidders may deliver bids, at their option, either in person or by courier service or by mail;

(viii) all bidders shall provide bid security as indicated in the bidding documents. A bidder's bid security shall apply only to a specific bid;

(ix) bids shall be opened in public in one place immediately, but no later than one hour, after the deadline for submission of bids;

(x) evaluation of bids shall be made in strict adherence to the criteria disclosed in the bidding documents, in a format and specified period agreed with the Association;

(xi) bid shall not be rejected merely on the basis of a comparison with an official estimate without the prior concurrence of the Association;

(xii) split award or lottery in award of contracts shall not be carried out. When two or more bidders quote the same lowest price, an investigation shall be made to determine any evidence of collusion, following which (a) if collusion is determined, the parties involved shall be disqualified and the award shall then be made to the next lowest evaluated and qualified bidder; and (b) if no evidence of collusion can be confirmed, then fresh bids shall be invited after receiving the concurrence of the Association;

(xiii) contracts shall be awarded to the lowest evaluated bidders within the initial period of bid validity so that extensions are not necessary. Extension of bid validity may be sought only under exceptional circumstances;

(xiv) extension of bid validity shall not be allowed without the prior concurrence of the Association (a) for the first request for extension if it is longer than eight weeks and (b) for all subsequent requests for extensions irrespective of the period;

(xv)n egotiations shall not be allowed with the lowest evaluated or any other bidders;

(xvi) re-bidding shall not be carried out without the Association's prior concurrence; and

(xvii) all contractors or suppliers shall provide performance security as indicated in the contract documents. A contractor's or a supplier's performance security shall apply to a specific contract under which it was furnished.

Reporting

REB and IDCOL will prepare quarterly Procurement Monitoring Report (PROCMOR) as per specific formats agreed with IDA.

Procurement Management Capacity

Capacity review and Risk Assessment: The Country Procurement Assessment Report (CPAR), broadly accepted by the Government in February 2001, stated poor procurement as a generic problem in Bangladesh. The CPAR recommended for procurement reform with a series of actions. The Government has embarked upon public procurement reform with IDA technical assistance (*Public Procurement Reform Project -PPRP)*. The project has adequate provision for providing procurement training to public sector staff.

At the agency level, most of the procurements will be handled by REB. IDCOL's procurement will be limited to small equipment and consultancy assignments. Keeping this in mind, the team reviewed the

procurement management capacity of REB with a view to evaluate the capability of the implementing agency and of the adequacy of procurement systems in place to administer Bank-financed procurement, assess the risks that may negatively affect ability of the agency to carry out the procurement process, and develop an action plan to be implemented as part of the project to address the deficiencies. The assessment included organizational aspects, skills of staff, and suitability of rules and regulations applicable to the agency.

REB has experience of implementing IDA projects and has the capacity to carry out procurement. It has a Procurement Department, headed by a Director, who is assisted by three Deputy Directors. The Director and one Deputy Director are conversant with the Bank's procurement procedures. Considering the volume of procurement one additional procurement specialist is needed to manage project procurement with specific experience in Bank-related procurement. Given the track record of REB and the institutional capacity, the project related procurement risk is average.

Strengthening Procurement Capacity: To mitigate the procurement risks associated with REB and to strengthen procurement management capacity, the following arrangements have been made: (i) REB has agreed to make available qualified additional personnel for procurement; and (ii) REB will actively participate in the procurement management capacity improvement activities under the PPRP.

Action Plan: In addition to the above, the following time-bound action plan for completing tasks has been agreed with IDA:

Time Bound Action Plan

Actions	*Time Bound*
(a) Procurement Capacity Improvement:	
1. Appoint two procurement specialists in REB	Before Effectiveness
(b) Goods: At least two contract packages from first year program (Line hardware and Insulators)	
1. Send initial draft bidding documents to IDA	April 10, 2002
2. Review of initial documents by IDA	April 21, 2002
3. Send draft bidding documents to IDA	May 15, 2002
4. Review of draft bidding documents by IDA	May 30, 2002
5. Send final bidding documents to IDA	June 13, 2002
6. Publish invitation for bids	June 13, 2002
7. Receipt of bids	August 14, 2002
8. Send bid evaluation reports to IDA	September 12, 2002
9. IDA clears bid evaluation reports	September 25, 2002
10. Issue notification of awards	September 30, 2002
11. Sign contracts	October 30, 2002
(c) Consultants Service (socioeconomic monitoring: QCBS)	
1. Issue request for expressions of interest in UNDB	May 15, 2002
2. Send draft request for proposals to IDA	May 30, 2002
3. IDA reviews RFP	June 10, 2002
4. Send short list to IDA	June 30, 2002
5. IDA clears short list	July 7, 2002
6. Issue RFP to short listed firms	July 10, 2002

7.	Receive proposals	August 12, 2002
8.	Send technical evaluation report to IDA	August 30, 2002
9.	IDA clears technical evaluation	September 10, 2002
10.	Open financial proposals	September 29, 2002
11.	Send combined evaluation report to IDA	October 7, 2002
12.	IDA clears combined report	October 15, 2002
13.	Send draft-negotiated contract to IDA	October 25, 2002
14.	IDA clears draft contract	October 31, 2002
15.	Sign contract	November 3, 2002

Financial Management and Disbursement

An assessment of REB and IDCOL has been carried out during project appraisal. The results are summarized below.

Country Issues:

The issue of timely availability of Government counterpart funding is a relevant country issue. Delays in the release of government counterpart funds are commonly experienced by IDA assisted projects. To overcome this problem and ensure timely financing to REB, a Subsidiary Loan agreement under uniform-onlending-terms (UOLT) will be entered into between REB and the Finance Division of MOF. Under this agreement, REB will ensure quarterly submission of financial statements reflecting contractual obligations to the Finance Division and request for funds based on ADP. Since REB and IDCOL maintain their respective book of accounts using double entry bookkeeping principles and on an accrual basis, the issue of prevalent cash-basis accounting in government agencies is not relevant to this project.

Risk Analysis:

There is a modest risk that NGO/MFIs who participate in IDCOL's credit and grant programs may fail to comply with the contractual agreements. To mitigate this risk, IDCOL has prepared standard selection criteria for NGO/MFIs. In addition, terms and condition of the Participation Agreement between IDCOL and NGOs/MFIs would include; (i) quarterly financial reporting requirements for MFIs/NGOs; (ii) the eligibility criteria for fund release and remedial clause in case of noncompliance with financing agreement; (iii) requirements for three years audited financial statements of the fund provided by IDCOL; and (iv) output based contractual agreement.

Strengths and Weaknesses:

Strengths: The project has the following strengths in the area of financial management:: (a) the project implementing agencies, REB and IDCOL have maintained a good track record in terms of operational and financial management and have been exposed to the Bank's disbursement procedures and financial reporting requirements; (b) REB has demonstrated good financial discipline in the closed IDA project (Cr.2129-BD), and all audit reports including those of PBSs were submitted in a timely manner; (c) IDCOL, being an implementing agency of the on going IDA credit Cr.2995-BD has computerized financial management system and has been complying with financial covenants; (d) both the agencies have financial management manuals which outline the project financial management system, and are adequate to meet Bank's FM requirements; (e) REB and IDCOL maintain computerized accounting system using double entry bookkeeping principles and accrual basis of accounting, which generate timely Financial Statements.

Weaknesses and Resolutions:

The only potential weakness is in the area of adequate staffing of REB's financial management function. In order to ensure that the financial management system functions effectively, REB needs to strengthen its Financial Controller's office with an additional specialist having experience of working on IDA projects. REB has agreed to do so before the Credit becomes effective.

Implementing Entities:

The details of the implementing entities are as follows:

- The Power Division of the Ministry of Energy and Mineral Resources (MEMR) will provide policy guidelines relating to the project and facilitate the project implementation. REB will be responsible for implementing the Grid and PBSs administered solar home components and IDCOL will provide grant and finance the off-grid renewable energy projects and RAPSS implemented by private sector, NGOs and MFIs;

- REB and IDCOL have extensive experience in implementing IDA projects. To implement Rural Electrification and Renewable Energy Development Project, no separate Project Implementation Units (PIUs) within these entities will be established. Various departments of REB and IDCOL will do the related project functions under the overall guidance of Executive Board in REB and Board of Directors in case of IDCOL. The respective Boards will periodically monitor project performance and take project related decision;

- The Chairman of REB is assisted by the members of four departments: Administration, Engineering, Finance and PBS. Each of these departments are adequately staffed and have separate organogram showing the reporting relationships. The Finance department under the overall supervision of the Member (Finance) will be responsible for project financial management system; and

- The Chief Executive Officer of IDCOL is assisted by three cells: Investment, Loan and Administration and Finance. The Administration and Finance Cell is adequately staffed with qualified accountants and will be responsible for project related financial management.

Funds Flow:

The funds flow process for the project would be as follows:

- IDA funds will be channeled to two special accounts in a commercial Bank and will be operated by REB and IDCOL on terms and conditions acceptable to IDA;

- REB and IDCOL will receive Global Environment Facility (GEF) Grant for which two separate Special Accounts will be maintained by the recipients;

- The Government will allocate matching funds for the project on the basis of annual development plan (ADP). The Finance Division of the Ministry of Finance would provide IDA and GEF funds to REB under the Subsidiary Loan and Financing Agreements between the Government and the REB. The Finance Division will release funds in local currency on a quarterly basis upon request of REB;

- IDCOL will arrange counterpart funding from its own sources and cost-sharing with POs. IDA and GEF funds will be used by IDCOL to refinance and provide grants to NGOs and MFIs; and

- The Director, Finance of REB and the Chief Executive Officer of IDCOL will be the respective authorized persons to withdraw IDA Credit proceeds and GEF Grant.

Accounting policies and procedures:

The overall accounting framework would be as follows:

- The financial management system would cover all project related transactions i.e. all sources and use of funds would be accounted for and reflected in the financial statements;
- The existing Chart of Accounts in REB and IDCOL will be used. The Chart of Accounts enables expenditure data to be captured and classified by project activities, component and disbursement categories;
- Accounts will be maintained using the existing Computerized Accounting system in REB and IDCOL. The system would provide information on the receipts and use of funds and will be able to produce financial reports comparing budget with actual expenditure at any given time. The system would be able to provide financial data to measure performance linking to the outputs of the project;
- As per standard practice in REB and IDCOL, books of accounts would be maintained on an accrual basis and using double-entry bookkeeping principles. Separate project books/records relating to IDA, GEF and Government (cash and bank-book, ledger, trial balance etc) would be maintained at the Finance departments of both the agencies; and
- The existing Financial Management Manual in REB and IDCOL include applicable accounting policies and procedures and provide appropriate project financial management framework. The manuals will be useful guidance to meet project specific financial management requirements.

Staffing:

The relevant staffing issues are:

- The Finance Department of REB is headed by Member (Finance) who is well versed with IDA financial management requirements. He is supported by Controller (Accounts and Finance) who has also worked in IDA funded project in various capacities. There are about 16 senior and mid-ranking officers in the Finance Department (Finance, Accounts, Loans and Audit). Duties of these positions are clearly and adequately segregated. Director Finance and Director Accounts will be responsible for overall project financial management and will report to the Controller (Finance and Accounts) for Project matters. REB has agreed to induct an additional financial specialist conversant with the Bank projects in the Controller's office before the credit becomes effective; and
- The Manager, Finance and Administration Cell of IDCOL is supported by two staff who are well experienced in handling project financial management system in the on-going project. The same team will be responsible for the proposed project. In addition, IDCOL is in the process of recruiting two additional staff to support its accounts and investment functions and these are expected to be in place by July 2002.

Internal Audit:

REB has an on-going internal audit mechanism. The Loans and Audit Directorate of REB carries out periodic internal audit under specific audit plan and submits reports to the Chairman, REB. Under this audit plan, the activities of PBS and their contractual obligation under REB financing will be reviewed and reported. Internal Audit Reports of the project PBSs will be furnished to IDA. IDCOL has no internal audit mechanism but has strong internal control environment. The periodic performance audit would supplement the existing internal controls.

External Audit:

Regarding external audit, the project will have the following provisions:

- The audit covenants of the closed REB project, Cr. 2129, and the ongoing project being implemented by IDCOL, have been complied with, replies given and necessary action taken on observations that needed clarifications from Bank's perspective;
- The Comptroller and Auditor General (C&AG) will carry out an annual project audit of REB since it is a statutory government organization that receives government and donor funds. The audit report would be submitted to the Bank within six months of the end of each fiscal year. The audit report will include a separate opinion on Project Financial Statements, Special Accounts and SOEs covering GEF and IDA funds. REB, being a revenue earning entity will provide the Bank with annual financial statements certified by private auditor in respect of its part of the project;
- IDCOL, being a public limited company under the Companies Act, its project financial statement will be audited by a firm of Chartered Accountants under a TOR acceptable to IDA. The audit report would be submitted to the Bank within six months of the end of each fiscal year. The audit report will include a separate opinion on Project Financial Statements, Special Accounts and SOEs covering GEF and IDA funds; and
- In addition to the financial audit, a performance audit of the project before the mid-term review will be carried out. The TOR of the performance audit is included in the PIP. REB and IDCOL will carry out the performance audit of the their respective parts of the project under TORs satisfactory to IDA. The cost for conducting the performance audits will be eligible for financing under the credit.

Thus, the following audit reports would be monitored in the Audit Report Compliance System (ARCS):

Implementing Agencies	Audit	Auditors	Whether financed under the Project
REB	Project Accounts/SOEs/Special Accounts (IDA and GEF)	C & AG	no
REB	Entity	Private Auditor	no
IDCOL	Project Accounts/SOEs/Special Accounts (IDA and GEF)	Private Auditor	yes
IDCOL	Entity	Private Auditor	no
REB and IDCOL	Performance audit during mid-term review	Private Auditors	yes

Financial Reporting and Monitoring:

The mechanism for reporting and monitoring would be as follows:

- The Finance department in REB and IDCOL will be responsible for consolidation of financial information from various cost centers and preparing timely consolidated Financial Statements on a monthly basis;
- The two implementing agencies are responsible for preparing Financial Monitoring Reports (FMRs) on a quarterly basis, monitoring of actual expenditure against forecast and reconcile timely financial information. A set of customized formats of FMRs has been agreed and is included in the PIP; and
- Quarterly FMRs showing IDA and Government expenditure would be submitted to the Bank. The Finance Department of REB will also prepare various financial statements required by Audit Directorate, IMED and the line ministry. The contents and formats of these reports are laid down in the Project Accounting Manual of the Government.

Information System:

Both REB and IDCOL have good management information systems (MIS). The MIS of IDCOL is linked to the accounting software which not only stores and analyzes financial information, but is also used as a control for day to day financial transactions. The MIS in REB generates reports linking the project output or milestones to financial information. These existing MIS systems would be used for the new project and both agencies would provide timely and reliable financial management information to the Bank, respective Boards and other stakeholders of Ministry of Energy and Mineral Resources for monitoring financial and physical progress of project implementation and taking appropriate decisions.

Supervision Plan:

The project will need intensive supervision and would be conducted twice a year. The initial supervision focus will be on the implementation progress of agreed actions. The other focus during the supervision will be on the internal audit reports of REB and the corrective actions taken by the agency.

Procurement methods (Table A)

Table A: Project Costs by Procurement Arrangements [a] (US$ million equivalent)					
	ICB	NCB	OTHER [b]	NBF	Total Cost
1. Works (only REB)	-	19.90	-	-	19.90
	(0.00)	(7.34)	(0.00)	(0.00)	(7.34)
2. Goods	244.81	2.22	0.31	0.09	247.42
	(167.30)	(1.67)	(0.20)	(0.00)	(169.17)
(a) Grid Component REB	239.38	1.17	0.12	-	240 67
	(163 50)	(0 93)	(0.09)	(0 00)	(164.53)
(b) Off-grid. SHS component (REB)	5.43	1.05	0.15		6.63
	(3 80)	(0 73)	(0.11)	(0.00)	(4 64)
(c) Renewable Energy Program (IDCOL)	-	-	0.04	0.09	0.13
	(0 00)	(0.00)	(0 00)	(0.00)	(0 00)
3. Consultant Services, Including Training	-	-	4.45	2.18	6.63
	(0.00)	(0.00)	(2.85)	(0.00)	(2.85)
(a) Grid Component REB	-	-	3.10	-	3.10
	(0.00)	(0 00)	(2.48)	(0.00)	(2.48)
(b) Off-grid SHS component (REB)	-	-	0.62	-	0.62
	(0.00)	(0 00)	(0.37)	(0.00)	(0.37)
(c) Renewable Energy Program (IDCOL)	-	-	0.73	2.18	2.91
	(0.00)	(0.00)	(0.00)	(0.00)	(0 00)
4. Sub-loans & Grants (IDCOL)	-	-	17.49	3.80	21.29
	(0.00)	(0.00)	(11 44)	(0 00)	(11.44)
5. Installation Grants (REB)	-	-	-	1 53	1.53
	(0 00)	(0 00)	(0.00)	(0.00)	(0 00)
6. Incremental Operating Costs	-	-	0.92	-	0.92
	(0.00)	(0.00)	(0.18)	(0.00)	(0.18)
(a) Grid Component REB	-	-	0.82	-	0.82
	(0.00)	(0 00)	(0 15)	(0 00)	(0 15)
(b) Off-grid. SHS component (REB)	-	-	0.10	-	0.10
	(0.00)	(0 00)	(0 03)	(0.00)	(0 03)
(c) Renewable Energy Program (IDCOL)	-	-	-	-	-
	(0 00)	(0 00)	(0.00)	(0.00)	(0 00)
7. IDCOL Administration Fee	-	-	-	0.60	0.60
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Total	244.81	22.12	23.17	8.20	298.30
	(167.30)	(9.01)	(14.67)	(0.00)	(190.98)

a Figures in parenthesis are the amounts to be financed by IDA. All costs include contingencies

b . Includes- (i) goods to be procured through shopping and direct contracting; (ii) consultants' services to be procured following quality- and cost-based selection, fixed-budget selection, least-cost selection, single source selection, and individual consultants methods, (iii) sub-loans, and (iv) operating costs.

NBF Not Bank-financed- Global Environment Facility (GEF)

Table A1: Consultants Selection Arrangements
(US$ million equivalent)

Consultant Services Expenditure Category	Selection Method					Total Cost
	QCBS	FBS	SSS	LCS	IC	
A. Firms	0 39	1 04	1 27	1.55	-	4.26
	(0 23)	(0 64)	(0 56)	(0 62)	(0.00)	(2.05)
B. Individuals	-	-	-	-	2 38	2 38
	(0 00)	(0 00)	(0 00)	(0 00)	(0 80)	(0 80)
Total	0 39	1 04	1.27	1.55	2 38	6 63
	(0 23)	(0.64)	(0.56)	(0.62)	(0 80)	(2 85)

Prior review thresholds (Table B)

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

Expenditure Category	Contract Value Threshold	Procurement Method	Contracts Subject to Prior Review
1. Works	<US$100,000	NCB	First two contracts irrespective of value, remaining contracts post review
2. Goods	>=US$300,000	ICB	Prior review
	<US$300,000	NCB	First two contracts irrespective of value, remaining contracts post review
	<US$30,000 (for vehicles <US$60,000)	IS/NS	Post review
3. Services	>=300,000	QCBS	Prior review
	<US$300,000	QCBS, FBS	Prior review
	<US$100,000	FBS, LCS	Post review
	>=US$50,000	IC- Qualifications, references	Prior review
	<US$50,000	IC- Qualifications, references	Post review
	Selective contracts <=US$75,000	SSS- Single Source Selection	Prior agreement

Total value of contracts subject to prior review:

Overall Procurement Risk Assessment

Average

Frequency of procurement supervision missions proposed: One every six months (includes special procurement supervision for post-review/audits)

Besides, as part of the fiduciary control, Bank's staff as deemed appropriate will carry out post review of contracts. *(see Para 14)*

Overall procurement risk is average, and mitigation measures are described in Paragraphs 18-22.

[1] Thresholds generally differ by country and project. Consult OD 11.04 "Review of Procurement Documentation" and contact the Regional Procurement Adviser for guidance.

Disbursement

Allocation of credit/grant proceeds (Table C)

Table C1 shows the allocation of IDA Credit proceeds and the financing percentages for the various categories of project expenditures. Preparation and submission of withdrawal applications would be the responsibility of REB and IDCOL.

The proposed Credit project is expected to be disbursed over a period of five years and six months. The closing date of the proposed Credit will be December 31, 2007. Disbursement estimates of IDA proceeds over the project period are presented on page 2 of the PAD.

Table C1: Allocation of Credit Proceeds

Category No.	Category Name	Amount of the Credit allocated (expressed in US$ equivalent)	Percent of Expenditures to be Financed
1.	Works (Under Parts A and B)	6.83	85
2.	Goods (a) Under Part A: *(i) All goods, excluding those covered in (ii) & (iii)* *(ii) Goods for the Second Package* *(iii) Goods for the Third Package*	 75.00 45.00 29.88	100 percent of foreign expenditures, 100 percent of local expenditures (ex-factory cost) and 85 percent of local expenditures for other items procured locally.
	(b) Under Part B	4.32	
3.	Consultants' services and training Under Parts A and B	3.00	80
4.	Incremental Operating Costs Under Parts A and B	0.16	80 percent until the end of FY04; 60 percent until the end of FY 06; and 50 percent thereafter.
5.	Subloans Under Part C	10.75	100
6.	Unallocated	16.04	
Total		**190.98**	

Table C2 shows the allocation of GEF Grant proceeds and the financing percentages for the various categories of expenditures. Preparation and submission of withdrawal applications would be the responsibility of the REB and IDCOL.

Table C2: Allocation of GEF Grant Fund Proceeds

Category Number	Category Name	Amount of the Credit allocated (Expressed in US$ equivalent)	Percentage of Expenditures to be Financed
1.	Installation grants under Part B	1.40	100
2.	Goods under Part C	0.08	100 percent of foreign expenditures, 100 percent of local expenditures (ex-factory cost) and 85 percent of local expenditures for other items procured locally.
3.	Consultants' services and training under Part C	2.50	80
4.	Subgrants under Part C	3.50	100
5.	IDCOL Fees	0.60	100
6.	Unallocated	0.12	
Total		**8.20**	

Use of statements of expenditures (SOEs):

Transaction-based disbursement procedures will be applicable for withdrawal of funds from the Credit and the GEF grant. With each withdrawal application, IDA will require full documentation where contracts for: (i) civil works or goods exceed US$ 300,000 equivalent; (ii) consulting firms exceeds US$ 100,000 equivalent; and (iii) individual consultants exceeds US$ 50,000. Expenditures below the above thresholds and expenditures for: (a) training; (b) incremental operating cost; (c) subloans; (d) subgrants; (e) installation grants; and (f) IDCOL administration fee from GEF Grant will be claimed through SOEs.

Special account:

To facilitate project implementation and to make timely payments of IDA's shares of eligible expenditures to contractors, suppliers and consultants, Special Accounts (SAs) in Convertible Taka in a commercial bank will be opened and maintained, on terms and conditions satisfactory to IDA. The Director Finance, REB and the CEO IDCOL will open and maintain their respective SAs, and will be responsible for preparation and submission of withdrawal applications to IDA and reconciliation of accounts. The authorized allocation for REB SA will be BDT 670,000,000.00 which is about four-months estimated expenditures. At start of the project, the initial deposit to the REB SA will be limited to BDT 500,000,000.00. The remaining amount of the authorized allocation may be requested only after the cumulative disbursements reach the equivalent of SDR 20.00 million. In the case of IDCOL SA the authorized allocation will be BDT 50,000,000.00. However, at the start of the project the initial deposit will be limited to BDT 30,000,000.00. The remaining amount of the authorized allocation may be requested only after cumulative disbursements reach the equivalent of SDR 2.00 million.

Similarly there will be two Special Accounts under GEF Grant. The Director Finance, REB and the CEO IDCOL will open and maintain their respective Grant SAs, and will be responsible for preparation and submission of withdrawal applications to the Bank and reconciliation of accounts. The authorized allocation for REB Grant SA will be BDT 7,000,000.00 which is about four months estimated expenditures. In the case of IDCOL Grant SA, the authorized allocation will be BDT 25,000,000.00.

The credit effectiveness condition, among others, is to transfer about 4,000 km of distribution lines from BPDB to REB covering 17 PBSs. Upon effectiveness of the credit, disbursement with respect to Goods Category 2a (i) will be available, upto a maximum of US$ 75.0 million equivalent. Subject to the satisfactory handover of the second package of lines (amounting to about 3,000 km in 17 PBSs) in the agreed transfer program, the next category of goods 2a (ii) upto a maximum of US$ 50.0 million will be available. The credit proceeds under category goods 2a (iii) upto a maximum of US$ 38.3 million will be available for disbursement on the successful transfer of the third package of remaining 2,400 km of distribution lines in 6 PBSs.

Annex 7: Project Processing Schedule

BANGLADESH: Rural Electrification and Renewable Energy Development

Project Schedule	Planned	Actual
Time taken to prepare the project (months)	24	20
First Bank mission (identification)	01/15/2001	01/16/2002
Appraisal mission departure		02/25/2002
Negotiations	06/25/2002	04/29/2002
Planned Date of Effectiveness	09/01/2002	

Prepared by:

Government of Bangladesh, Ministry of Energy and Mineral Resources, Power Division
Rural Electrification Board Infrastructure Development Company Limited (IDCOL).

Preparation assistance:

Asia Alternative Energy Program Trust Funds.

Bank staff who worked on the project included:

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Alfred Friendly	Consultant-Editor
Zibun Nessa Pinu	Team Assistant
Anna Goodman	Program Assistant

Annex 8: Documents in the Project File*

BANGLADESH: Rural Electrification and Renewable Energy Development

A. Project Implementation Plan

1. Rural Electrification Board, Solar Home System Component Project Implementation Plan (PIP).
2. Rural Electrification Board, Grid Component Project Implementation Plan (PIP).
3. Infrastructure Development Company Limited, Renewable Energy Project Implementation Plan (PIP).

B. Bank Staff Assessments

1. Economic And Financial Analysis for Grid and Off-grid Components.

C. Other

1. Prokaushali Sangsad Limited, Feasibility Study for a Solar Home Systems Project within the Context of Alternative Options for Rural Electrification (1999).
2. Prokaushali Sangsad Limited, Bangladesh Rural Electrification Solar Home Program Preparation (2002).
3. GEF Project Brief: Bangladesh Rural Electrification and Renewable Energy Development Document.
4. GEF PDF B Grant Proposal: Multiple Approaches for Off-grid Electrification.

*Including electronic files

Annex 9: Statement of Loans and Credits

BANGLADESH: Rural Electrification and Renewable Energy Development

02-May-2002

			Original Amount in US$ Millions					Difference between expected and actual disbursements*	
Project ID	FY	Purpose	IBRD	IDA	GEF	Cancel	Undisb.	Orig	Frm Rev'd
P044876	2002	Female Secondary School Assis. II	0 00	120.90	0.00	0 00	121 48	0.00	0 00
P044810	2001	Legal & Judicial Capacity Building	0 00	30 60	0 00	0 04	27 44	4.09	0 00
P059143	2001	Microfinance II	0.00	151 00	0.00	0 00	98.24	10 16	0 00
P050752	2001	Post-Literacy & Continuing Education	0 00	53.30	0.00	0 00	49.87	0.41	0.00
P069933	2001	HIV/AIDS Prevention	0 00	40 00	0 00	0 00	36.40	6 74	0 00
P057833	2001	Air Quality Management Project	0 00	4 71	0.00	0 00	3.88	1.53	0 00
P044811	2000	Financial Institutions Development	0.00	46 90	0.00	0.00	20 10	15 11	0 00
P009468	2000	Fourth Fisheries	0 00	28 00	5.00	0 00	22.02	18 00	0 00
P058468	2000	Agricultural Serv Innovation & Reform	0 00	5 00	0 00	0 00	1 38	0 85	0 00
P049587	2000	Aquatic Biodiversity Conservation	0 00	0.00	5.00	0 00	4 22	3 05	0 00
P050751	2000	National Nutrition Program	0.00	92.00	0 00	0 00	82.57	17 30	0 00
P049790	1999	Export Diversification	0 00	32 00	0 00	0 00	12 03	10 76	0 00
P050745	1999	Arsenic Mitigation Water Supply	0 00	32 40	0 00	0 00	24 45	26 31	0 00
P009524	1999	Dhaka Urban Transport	0 00	177 00	0.00	0 00	133 48	102.23	0.00
P041887	1999	Municipal Services	0 00	138 60	0.00	0 00	99.37	111.18	0 00
P037294	1999	Third Road Rehabilitation & Maintenance	0 00	273 00	0 00	0 00	169 97	182.59	0 00
P009550	1998	Primary Education Development	0 00	150 00	0 00	25 07	58 44	52.38	6 81
P037857	1998	Health and Population Program	0 00	250 00	0 00	0 00	73 62	22.14	0 00
P044789	1998	Private Sector Infrastructure Dev	0 00	235 00	0.00	0.00	157 11	165.33	0 00
P040713	1998	Silk Development Pilot Project	0 00	11.40	0 00	3 53	3 80	7 66	-0 02
P009482	1997	Dhaka Water & Sanitation IV	0 00	80 30	0 00	15.26	11 20	39 65	0 00
P009518	1997	Second Rural Roads & Markets Improvement	0 00	133 00	0 00	0.00	3 42	-5 01	16 32
P009549	1996	Coastal Embankment Rehabilitation	0 00	53 00	0 00	0.00	2 89	-6 33	12 81
P009496	1995	Bangladesh Integrated Nutrition	0 00	59 80	0 00	0 58	6 61	14 39	0 00
		Total	0 00	2197 91	10 00	44 48	1224.00	800 53	35.92

BANGLADESH
STATEMENT OF IFC's
Held and Disbursed Portfolio
Jan - 2002
In Millions US Dollars

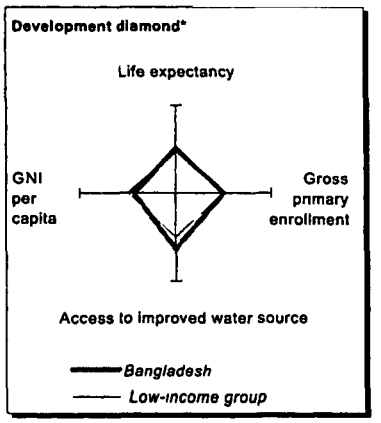
		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1997	DBH	0.00	0.65	0.00	0.00	0.00	0.65	0.00	0.00
1991	Dynamic Textile	1.86	0.00	0.00	1.48	1.86	0.00	0.00	1.48
1998	Grameen Phone	15.00	1.58	0.00	0.00	15.00	1.58	0 00	0.00
1985/95	IDLC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980/98	IPDC	8.75	0.00	0.00	0.00	8.75	0.00	0.00	0.00
1998	Khulna	18.20	0.00	0.00	0.00	18.20	0.00	0.00	0.00
1998	Lafarge/Surma	35.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	Scancem	10.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
	Total Portfolio:	88.81	12.23	0.00	1.48	53.81	2.23	0.00	1 48

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic
2001	BRAC Bank	0.00	0.00	3.00	0.00
2001	Dhaka Westin	8.75	0.00	0.00	0.00
1998	Khulna	0.00	0.00	3.30	0 00
2000	ULC - Bangladesh	5.00	0.00	0.00	0 00
2000	USPCL	0.00	4.00	3.00	0.00
	Total Pending Commitment:	13.75	4.00	9.30	0.00

Annex 10: Country at a Glance

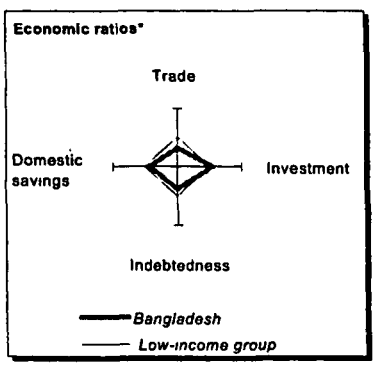
BANGLADESH: Rural Electrification and Renewable Energy Development

POVERTY and SOCIAL	Bangladesh	South Asia	Low-income
2000			
Population, mid-year *(millions)*	129 8	1,355	2,459
GNI per capita *(Atlas method, US$)*	370	460	420
GNI *(Atlas method, US$ billions)*	47.9	617	1,030
Average annual growth, 1994-00			
Population *(%)*	1.6	1.9	1 9
Labor force *(%)*	2 9	2 4	2.4
Most recent estimate (latest year available, 1994-00)			
Poverty *(% of population below national poverty line)*	36		
Urban population *(% of total population)*	25	28	32
Life expectancy at birth *(years)*	61	63	59
Infant mortality *(per 1,000 live births)*	61	74	77
Child malnutrition *(% of children under 5)*	56	47	..
Access to an improved water source *(% of population)*	97	87	76
Illiteracy *(% of population age 15+)*	59	45	38
Gross primary enrollment *(% of school-age population)*	96	100	96
Male	96	110	102
Female	96	90	86

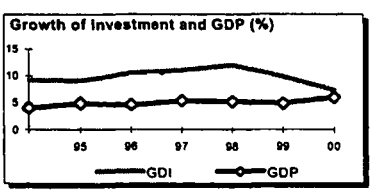


KEY ECONOMIC RATIOS and LONG-TERM TRENDS	1980	1990	1999	2000
GDP *(US$ billions)*	17 6	30 1	46.0	47.1
Gross domestic investment/GDP	19 8	17 1	22 2	23 0
Exports of goods and services/GDP	4 2	6 2	13 2	14.0
Gross domestic savings/GDP	8 2	9 7	16 7	17 8
Gross national savings/GDP	12 8	11 9	21 3	23 0
Current account balance/GDP	-4.8	-5 2	-0 9	0 0
Interest payments/GDP	0 3	0 6	0 4	0.4
Total debt/GDP	24 0	42 4	37 9	35 2
Total debt service/exports	23 7	28.9	9 5	8 8
Present value of debt/GDP			23.9	..
Present value of debt/exports		..	140 4	..

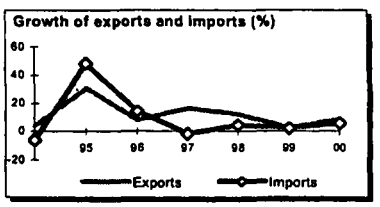
	1980-90	1990-00	1999	2000	2000-04
(average annual growth)					
GDP	4 3	4 8	4 9	5 9	4 7
GDP per capita	1 8	3 1	3 2	4 2	2 8
Exports of goods and services	7 7	12 8	2 3	8 6	6 4



STRUCTURE of the ECONOMY	1980	1990	1999	2000
(% of GDP)				
Agriculture		30 3	26 2	25 5
Industry		21 5	25 2	25 3
Manufacturing		13 1	15 5	15 2
Services		48 3	48 7	49 2
Private consumption	89 9	86 1	78.7	77.7
General government consumption	1 9	4.2	4 6	4 6
Imports of goods and services	15 8	13 6	18 7	19 2



	1980-90	1990-00	1999	2000
(average annual growth)				
Agriculture		2 7	2.9	4 8	7 4
Industry		4 9	7.3	4 9	6 2
Manufacturing		3 0	7 2	3 2	4 8
Services		4 4	4 5	5 2	5 5
Private consumption		4 5	3.4	1 3	4.1
General government consumption		5 0	4 7	0 6	0.9
Gross domestic investment		1 4	9 2	9 9	7.3
Imports of goods and services		5 6	9 5	2 3	5 7

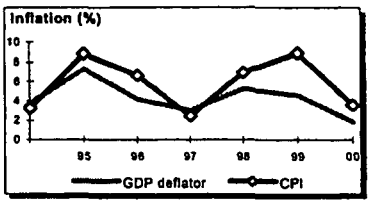


Note: 2000 data are preliminary estimates.

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

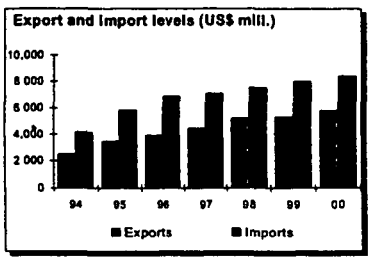
PRICES and GOVERNMENT FINANCE

	1980	1990	1999	2000
Domestic prices				
(% change)				
Consumer prices		3.9	8 9	3 6
Implicit GDP deflator	13 4	4.9	4.7	1.9
Government finance				
(% of GDP, includes current grants)				
Current revenue	..	6 9	9.0	8 5
Current budget balance	..	0 4	1 4	0.7
Overall surplus/deficit	.	-5 8	-4 8	-6.2



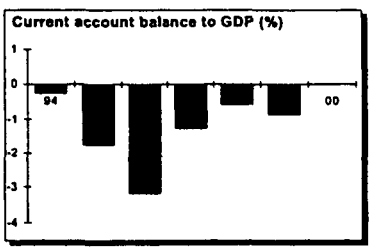
TRADE

	1980	1990	1999	2000
(US$ millions)				
Total exports (fob)	..	1,524	5,324	5,762
Raw jute	.	163	72	71
Leather and leather products	.	178	168	194
Manufactures	..	1,008	4,770	5,137
Total imports (cif)	.	3,791	8,017	8,403
Food	..	343	997	250
Fuel and energy	..	174	388	489
Capital goods	..	1,296	1,684	2,515
Export price index *(1995=100)*	..	67	103	103
Import price index *(1995=100)*	..	96	97	99
Terms of trade *(1995=100)*	.	70	106	103



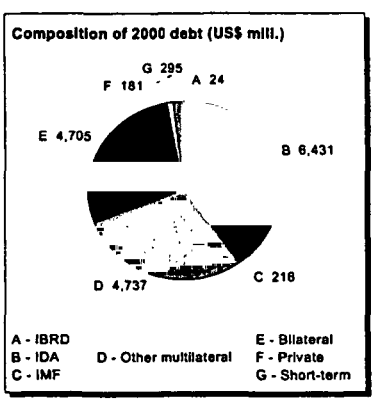
BALANCE of PAYMENTS

	1980	1990	1999	2000
(US$ millions)				
Exports of goods and services	885	1,903	6,031	6,611
Imports of goods and services	2,545	4,156	8,527	9,060
Resource balance	-1,660	-2,253	-2,496	-2,449
Net income	14	-122	-135	-221
Net current transfers	802	802	2,237	2,672
Current account balance	-844	-1,573	-394	2
Financing items (net)	640	1,196	189	77
Changes in net reserves	204	377	205	-79
Memo:				
Reserves including gold *(US$ millions)*		520	1,513	1,596
Conversion rate *(DEC, local/US$)*	15 5	33 3	47.8	50 3



EXTERNAL DEBT and RESOURCE FLOWS

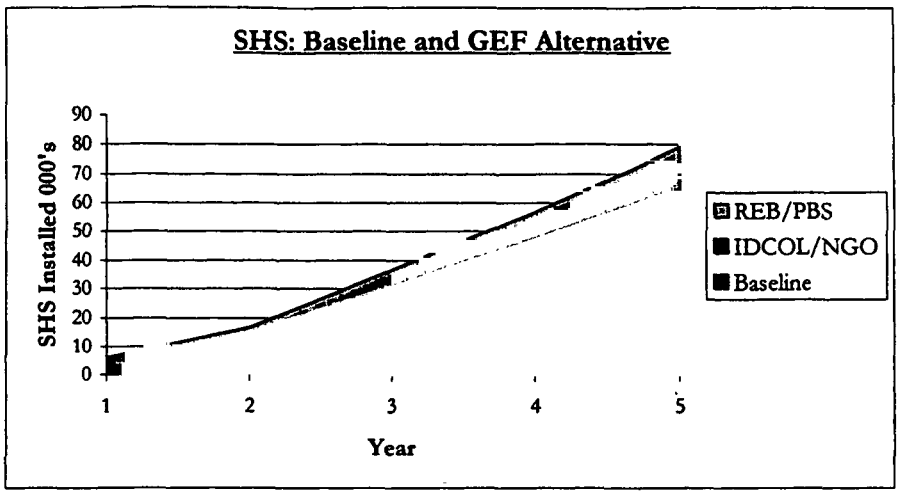
	1980	1990	1999	2000
(US$ millions)				
Total debt outstanding and disbursed	4,230	12,768	17,422	16,589
IBRD	55	64	31	24
IDA	926	4,095	6,428	6,431
Total debt service	278	791	746	762
IBRD	3	5	7	7
IDA	6	41	119	129
Composition of net resource flows				
Official grants	0	766	345	283
Official creditors	667	878	377	355
Private creditors	11	67	-12	16
Foreign direct investment	0	3	198	194
Portfolio equity	0	-194	-6	0
World Bank program				
Commitments	331	572	595	198
Disbursements	158	484	413	357
Principal repayments	0	14	78	87
Net flows	158	470	335	270
Interest payments	9	32	48	49
Net transfers	147	438	286	221



Additional Annex 11: Incremental Cost Matrix and STAP Review Comments and Response
BANGLADESH: Rural Electrification and Renewable Energy Development

The approach for solar home systems considers the replacement of kerosene lamps by solar lighting. For a detailed project description, see main body of the text as well as Annex 2, where the project components are discussed in detail. Below the incremental cost matrix based on this information.

	Baseline	Alternative	Increment
Domestic Benefits	Slow Solar market development. At best SHS installations by NGOs/MFIs without support may reach 15000 in the next 5 years.	Accelerate market development through support to NGOs, MFIs and Dealers. Estimated SHS installations in the next 5 years will be 50,000 systems through this approach.	Barriers (Information, first cost etc.) to commercial development removed. Strengthen PV capabilities within businesses and NGOs, increase consumer awareness and confidence, and provide a grant to buy-down first cost.
	Limited grid-extension by the PBSs/REB to provide access in rural areas. Demonstration of SHS applications in some areas.	PBSs implement a "fee for service" SHS Program for about 14,000 households in 5 separate PBSs in addition to the 50,000 SHS above. Total SHS 64,000 in 5 years. (see chart below)	In addition to measures described above, build capacity within PBSs to design, implement and evaluate SHS Programs.
	Limited development of PV business models; Service delivery through large NGOs such as BRAC only. Pay for service, dealer sales model only available in pilot areas.	Project promotes multiple approaches- feefor service through PBSs, sales through several NGOs, and direct sales by dealers.	Successful demonstration of a range of business approaches and incremental social awareness and acceptance for SHS.
	Slow development of other renewables including micro and hydro and micro wind	Support for hydro and wind market development and building an enabling policy/regulatory framework	Policy barriers to wind, mini hydro removed.
Global Environmental Benefits	Power development and rural energy service provision relies on batteries, diesel and kerosene.	Offset of GHG emissions through application of SHS	Nearly 250,000 tons of carbon dioxide avoided



	Baseline	*Alternative*	*GEF Increment*
Cost by Component	(million US$)	(million US$)	(million US$)
1a. Solar home system – investments (including implementation support and credit line management)	5.30	26.40	6.34
1b. Solar home system – technical assistance	0.0	3.90	1.56
2. Other Renewables – Technical Assistance	0.0	0.30	0.30
GEF Incremental Costs			8.20

Notes: (1)The Baseline scenario is a 'no project' scenario, because without GEF participation for barrier removal, IDA credit support and TA alone would not result in any significant change to SHS promotion. Therefore, baseline achievements are those expected from current initiatives by few institutions.
(2) The GEF Alternative scenario is based on IDA, GEF, GOB participation in barrier removal, credit and grant support.

STAP Review

September 27, 2001

(by J. P. Painuly, Senior Energy Planner, UNEP Collaborating Centre on Energy and Environment (UCCEE)
RISØ National Laboratory, Post Bag 26, Roskilde, DK- 4000, Denmark)

Review of the document "Project Brief: Bangladesh Rural Electrification and Renewable Energy Development Project"

Overall Comments: The proposal is well developed and comprehensive in nature. It seeks to accelerate penetration of solar home systems (SHS) in rural areas of Bangladesh building on the strengths of existing institutions and employing innovative measures to remove the barriers. Since the project targets the poor rural households with limited paying capacity, it may need to ensure that calculations of repayment requirements for the SHS and paying capacity are reliable. The project can benefit from the experiences in Africa and Asia where rural consumers have been targeted for solar energy usage. The project also explores potential for mini hydro and wind energy in the Bangladesh.

Project Relevance : Rural electrification is one of the important measure to improve quality of life and most of the target population is not expected to have access to electricity in near future in absence of the project. It is also in line with the Bangladesh Government strategy to promote off-grid options in such areas. The project meets the GEF funding criteria under its operational program and also meets FCCC objectives of mitigating greenhouse gas emissions.

Background Information: It is presented fairly well in the document.

Other Features: The project takes a participatory approach in which various stakeholders are involved. This is very useful for resolving the problems and future extension of the concept. Solar industry is not explicitly mentioned as an active partner. Their participation can be useful for training and confidence building about the product through maintenance contracts. Such maintenance can be done by local technicians trained by them. Capacity building is an important component of the project, which is useful for its large-scale application to realize the potential. Project is replicable and hence can contribute to climate change mitigation in other regions also.

The project should refer to the successful experiences in countries in South Asia and benefit from that.

Scientific and Technical Assessment

(i) System selection: It is very important that appropriate system is selected. A 20 Wp system appears to be on lower side considering following factors:

(a) The peak watt capacity normally refers to a radiation level of 1000 w/m2 and 250 C. Performance falls at higher temperatures. Therefore, it is to be derated for available radiation level (which may be low during monsoon) and temperature; and

(b) Factors such as energy losses in the system, efficiency of the battery may result system performance upto 75 percent (Alsema, 2000). When you take various other effects also into consideration, actual output of a typical system may be less than half of rated value (Stamenic, 1995).

Therefore, a 20 Wp system may hardly be able to support two bulbs of 7 W. Is it enough for the lower level identified in the project? It is possible if they were using only two kerosene lamps/lanterns. But in that case, they may be consuming four to six litres kerosene per month only. How much they will spend on this? Anywhere between US$ 1 (if subsidized) to US$ 2.5 (if no subsidy) per month. If they are spending US$ 3.11 (as mentioned on page 11), they have more than 2 light points. In that case, 20 Wp is not adequate. Similarly, 40 Wp may be a poor substitute for those spending monthly US$ 5.84 on kerosene for lighting.

Also, if the system is designed to meet minimum electricity demand, it may turn out to be insufficient to meet the expanding demand (with income growth) long before end of its working life. Currently, it is quite expensive to upgrade the system. In a recent study Lee (2001) assumes a 50 Wp system suitable for a household consuming kerosene about 10 litres / month. This may be too high but indicates that 20 Wp may be low.

(ii) Financial assessment: It is important that program is financially viable for all the stakeholders; SHS users, suppliers, IDCOL, MFIs etc.

On page 11: Expenditure of US$ 3.11 per month over a period of 15 years yields US$ 259 for level 1 and 487 for level 2 (it appears a discount rate of 12 percent was used). Cost of solar home systems is taken as US$ 344 and 544 for 20 and 40 Wp systems.

Since break-up is not given, it is not clear whether all the costs have been factored in or not. These include system costs, installation costs, maintenance costs and financing costs. Financing costs can be quite high; IDA costs, IDCOL costs and MFI costs. MFIs typically lend at rates 18 percent and above unless special arrangement exists for SHS financing. Some of these are barrier removal costs but need to be accounted for.

Three- to five-year loans from MFIs are planned (page 8). Even if SHS level consumer were to be financed 100 percent (US$ 259 loan + US$ 85 subsidy), their monthly outgo to repay the loan will be many times their monthly expenditure on kerosene. This is because, they spend this amount over 15 years, but need to pay over five years. How is this problem sorted out ?

More detailed calculations on financial assessment for each stakeholder may throw light on all these issues.

(iii) Funding requirements for wind and mini hydro assessment, and pilot project have not been included in the proposal; and

(iv) Data on diesel use for battery charging and how this will be substituted by SHS is not available in the proposal.

Global Benefits:

In the calculations of direct benefit, it is mentioned that 5.76 million litres of kerosene will be avoided. This works out to 8 litre per household per month. (divide by 60000*12). This is not consistent with expenditure on kerosene (US$ 3.11 and US$ 5.84). The kerosene saved should be much higher.

Cost of carbon is given as US$ 32.8/ton CO2 (or US$ 120/ t C). No calculations have been provided.

Incremental cost and carbon cost calculations should be given.

The calculations on lumen equivalence basis may not be relevant considering the implicit assumption in this about triple kerosene consumption.

Editorial Comments:

1. Add a list of acronyms or expanded form when first used (for example for CAS on page 4 and PRSP on page 27).

2. Page 6, 2.2 Baseline: Baseline is also used for cost calculations. For clarity, please mention that in the baseline, these incremental households not covered by solar home systems will continue to use kerosene (45-48000).

3. Page 10: What happens to SHS if grid comes in 5 years (to 10 years?). What is payment period for consumers? What about buyback of 5-10 year old? What about result of this on GHG savings calculated ? These could be explored, if necessary.

4. Page 10: 2.4.2: Figures and headings on costs on page 10 and 29 are not consistent. Following discrepancy exists.

   (a) In (i) ; SHS through NGO and MFIs: Figures are 11.16 and 4.5 against 12.16 and 5.5 on page 29. Also "finance 60000 SHS" should be changed to 50000 as on page 11 (2.4.3 (b)).
   (b) In (ii) SHS through PBS: figures are 3.29 and .7 against 3.43 and 84 on page 29.
   (c) In (ii) SHS through PBS: TA amount of US$ 1 million each mentioned is not reflected on page 29 in the component SHS program implemented by PBS. This appears to have been added to the wrong component. See (A) above. Logically, this should have been added to last component on page 29 (technical assistance for capacity building and demo projects).
   (d) For (iii); Development of framework for other renewable: No funding allocation is shown.

5. Page 12, last para: "The estimated cost of the TA component is a total of 4.2 million". But from page 10, total TA adds upto 1.56+1.56+2= 5.12 (from i and ii).

6. Page 19, last Para: "In the case of PBSs, under the current grid program, even households using less than 40 kWh per month are regular in paying bills and the cost of SHS fee-for-service is not likely to be much higher."

MFIs do have excellent record of recovery. But comparison with 40 kWh consuming household is not relevant. This is because this (40 kWh) represents almost 16 times output provided by SHS (of 20 W, 4 hours daily), allowing consumer to use TV and other appliances with the same amount.

7. Page 21, Economic assessment: Calculation details should be included (as Annex).

8. Page 21, Financial assessment: Calculation details should be included (as Annex).

9. Page 25, last para: "market assessments indicate a significant potential of over 1.7 million households for the 20 W systems and over 430,000 households for 40 W systems."

The above data indicates a total of about 2.13 million for 20 and 40 W systems. Total market estimate is given as 4 million elsewhere (page 6). How is it arrived at?

References:

Alsema, E.A., E. Nieuwlaar, 2000. Energy Viability of Photovoltaic Systems. Energy Policy 28 (14): 999-1010.

Lee, Robert F., Ian Simm and Bruce Jenkyn-Jones, 2001. "Could carbon financing appreciably accelerate the diffusion of Solar Home Systems?", PCF Plus, Washington DC.

Staminic L and G. Ingham, 1995: Solar Photovoltaic Revolution. A Canadian Handbook for Electricians, Engineers, Inspectors and Builders. Sunology International Inc. Vancouver B.C. Canada.

Response to the STAP Review

The STAP review generally endorses the project and commends some of its key features, such as participatory approach and replicability.

In response to the comment about referring to South Asia experience on renewables, the Project Brief describes a broad range of lessons learnt from various projects, including those from South Asia. The principal experience in this regard is from India and Sri Lanka. In most projects in India, solar home systems (and small hydro and wind projects) have been developed in the non-government and private sectors, similar to the approach being proposed for Bangladesh. However, the general reluctance of the commercial sector and suppliers in India to take rural credit risk has limited the penetration of solar systems. Hence, the preference in Bangladesh to follow a time-tested rural micro-credit model that has fared well in other areas of community-driven development initiatives. Support for the micro-credit model comes from Sri Lanka, where the sale of solar home systems has risen dramatically since the leading rural micro-finance institution there – SEEDS – took an active role. Several of the project's proposed initiatives on barrier removal and capacity development are directly modeled on lessons learnt from Sri Lanka and India.

Regarding the comment on the positive role of the solar industry, the project intends to engage the solar industry as an active partner in developing and serving the solar market in Bangladesh. The current state of the solar industry in Bangladesh consists of a few dealers, but several major players have shown interest in entering the market through this project window. The project provides for TA to develop private sector partnership and introduce both quality standards and competitive provision of equipment and services. Based on experience in other countries in South Asia, this would help to develop strategic plans for greater coverage, better service, and possibly lower costs.

The following responses broadly follow the ordering of the comments in the review note (Annex 3a)

(i) System selection: We completely agree with the comments. Intuitively one would believe that low income rural families in Bangladesh would be able to afford only 20 Wp systems. However a growing body of implementation experience and feedback from NGOs and micro-finance institutions (MFIs) is producing a different picture. 36 Wp and 40 Wp systems appear to be preferred over the 20 Wp systems. This is also the experience from Sri Lanka where consumers like to upgrade 20 Wp systems within a few weeks of installation and the market share of 20 Wp systems is declining. This latent preference for higher watt systems explains to some extent the ambiguity reflected in the report. The analysis conducted during preparation is based on 20 and 40 watt peak systems; however the delivery systems and business planning is likely to stress 36-50 Wp sizes and higher; both for fee-for service schemes and MFI credit programs. Eventually, as the implementing agencies finalize their business plans and the PDF B is mobilized to enable NGOs to prepare marketing programs, a more appropriate selection of system sizes would emerge.

From an analytical standpoint, it is to be noted that the US$ 3.11 value for households stems from costs of both kerosene and battery maintenance and charging costs. Batteries are extensively used in rural Bangladesh. The cost of charging a battery approximately every 15 days, along with associated transport and time costs (often boat journeys involving several hours) is in the range of 250-400 Takas per month (about US$ 4-6). The US$ 3.11 and US$ 5.84 values are average estimates of a range of lighting and battery use options. Clearly, households used to employing batteries would not be satisfied with a 20 Wp system, which is consistent with earlier statements regarding preference for larger systems.

(ii) Financial assessment: Attachment A illustrates cash flows for a household purchasing a 40 Wp system with 3 year credit from MFI with a grant element of US$ 90. The calculations take into account all the costs, including taka 800 per year for maintenance, and taka 7000 every five years for battery replacement and other spares. The life of the panel and controller is taken to be conservative 15 years (it can be upto 20 years) and a 20 percent equity contribution by the consumer is factored. The net cash flow for the household is positive, with an FIRR of 13 percent. In the first three years, besides the equity contribution of 4000 takas, the household has to pay out nearly 165 takas per month over and above the savings realized on kerosene and battery charging. From the fourth year onwards there is a net saving. The pattern of financing is not different from practice being followed by MFIs for other activities, where loans range from one to three years. In order to account for the fact that the solar system does not generate additional incomes, the project will try to encourage MFIs to lend for five years in order to make systems more affordable. Detailed business planning work is currently underway to determine the financial viability of each enterprise (NGO and/or MFI) and PBS in providing systems, credit and services to consumers. The reviewers advice of taking account of all costs to the household are duly noted. The outcomes of the detailed business planning will determine the nature and extent of financing criteria under IDA credit lines to the implementing institutions and the financing terms to consumers.

(iii) Funding requirements for wind and mini hydro assessment, and pilot projects have been included. These are shown as 'Other TA' in the Project Financing Plan in Annex 2. The GEF provision is US$ 300,000, and if assessments indicate positive potential, IDA funds would also be available to develop and implement pilots and establish commercial framework.

(iv) Data on diesel use for battery charging is difficult to ascertain with a reasonable degree of confidence in Bangladesh. The reasons are several, the main ones being: (i) battery charging stations are largely operating in the informal sector; (ii) in many places these are operated through grid connections, and grid power uses a mix of natural gas, diesel and hydro for generation; and (iii) seasonal variations in availability and cost of battery charging facilities is very high, e.g. in the flood season, many centers would be inaccessible and households would also move to flood and cyclone shelters. Hence, the estimates worked out for carbon savings are probably on the low side as savings from diesel use for battery charging has been ignored. The number of battery charges vary from 20-27 per annum, and the levelized monthly costs therefore range from US$ 2.1 p.m. to US$ 3.3. The incremental cost calculation takes an average for 23 charges leading to a levelized cost of US$ 2.85 per month* for the equivalence of a 40 Wp system. Please see details in Attachment B. (* this has resulted in a slight correction in valuing benefits for determining incremental costs – the 40 Wp equivalence is now valued at US$ 5.51 instead of US$ 5.84 previously. This results from taking an average view on the number of battery charging by household annually)

Global Benefits

As mentioned earlier, the cost savings of US$ 3.11 and US$ 5.51 are worked out on the basis of kerosene usage and actual costs of battery charging. Incremental cost calculations and carbon benefits are shown in Attachment B. The point about calculations on lumen equivalence basis not being relevant is well taken, these are furnished for illustrative purposes only. Text in the project brief has been amended to reflect this.

Editorial Comments

The comments are gratefully acknowledged and the inconsistencies have been addressed in the report. Some specific responses on substantive issues raised follow:

3. **Page 10:** *What happens to SHS if grid comes in five years (to 10 years?). What is payment period for consumers? What about buyback of 5-10 year old ? What about result of this on GHG savings calculated ? These could be explored, if necessary.*

This is clearly one of the crucial design issues, and the project team discussed this issue in detail with the Rural Electrification Board during the pre-appraisal mission. Selected areas under PBSs are not likely to receive grid connections in the next 10 years. Under the fee-for-service scheme though, the PBSs can recover the systems in an electrified village and move them to other remote villages. The NGOs before targeting households for SHS also ensure that grid will not be available in the area as per the current PBS program for next 10 years. However, the project will explore the necessity and viability of providing buy-back programs.

6. **Page 19:** Last Para: The comment is: *"In the case of PBSs, under the current grid program, even households using less than 40 kWh per month are regular in paying bills and the cost of SHS fee-for-service is not likely to be much higher." MFIs do have excellent record of recovery. But comparison with 40 kWh consuming household is not relevant. This is because this (40 kWh) represents almost 16 times output provided by SHS (of 20 W, 4 hours daily), allowing consumer to use TV and other appliances with the same amount.*

The 40 kWh per month example is used for comparison with PBS fee-for-service scheme only. This consumption at current tariffs represents a cost of about 150 taka per month, and the PBS fee for service tariffs per month are in the range of 250 Takas. A willingness to pay in this range in unelectrified villages has been clearly established through surveys. The MFIs on the other hand are using the savings from kerosene as the basis for the viability of financing the SHS and no equivalence with 40 kWh consumption is imputed. The text has been reworded to remove this impression.

7. and 8. Calculation details in respect of economic and financial assessment are not included in the interest of keeping the report to a reasonable length, but are available for review. These are being provided to the STAP reviewer.

9. Estimations of solar market demand: The demand numbers are based on two field studies carried out in Bangladesh over the last three years. The various inconsistencies on assessed demand in the report have been addressed. The overall picture is as follows: Nearly 4.8 million households earn more than US$ 50 per month. Of these, households that spend more than US$ 3.11 per month and US$ 5.51 per month on battery charging and kerosene costs are 36 percent and 9 percent respectively. This provides about 1.70 million household that can potentially purchase a 20 Wp system, and 0.43 million households that can potentially purchase a 40 Wp system, with some grant support. The market for 20 Wp and 40 Wp systems is therefore assessed as 2.13 million. The figure of 4 million systems is an approximation of households earning more than US$ 50 per month and not connected to the grid, without considering current expenditures on kerosene and battery charging. In order to reduce confusion with different estimates, the report now uses only the 2.13 million households number consistently.

Attachments available in project files: (a) Attachment 1: Financial Assessment for household adopting SHS; (b) Attachment 2: Incremental Cost Analysis and Global Carbon Benefits.

Additional Annex 12: Operating Guidelines
BANGLADESH: Rural Electrification and Renewable Energy Development

Measure	Arrangement/Entity
1. Project Life	Five and a half (5 1/2) years [October 2002-June 2008].
2. Loan Amount and Financing Sources	Total: US$ 24.90 million IDA: US$ 11.44 million and GEF: US$6.67 million Households: US$ 3.20 million and POs: US$3.59 million
3. Borrower	Government of Bangladesh (GOB).
4. Executing Agency	Infrastructure Development Company Limited (IDCOL).
5. Estimated Commitment Period	Five years after Credit Effectiveness.
Solar Program	
	Interest Rates
6. Service Charge to GOB	Standard IDA service charge, 0.75 percent p.a.
7. Interest Rate to Participating Organizations (POs)	6 percent p.a., calculated on the outstanding balance.
8. Interest Rate from POs to Household	To be determined by POs in consultation with IDCOL, rendering installment payments affordable to households.
	Maturity
9. IDA to GOB	Standard IDA terms with 40 years maturity including 10 years grace.
10. GOB/IDCOL to POs	Ten years, including two years grace.
11. POs to Household	Two-five years, with or without any grace period to be agreed with their clients.
	Repayment Frequency
12. GOB to IDA	Semi-annual
13. POs to IDCOL/GOB	Semi-annual.
14. Households to POs	Monthly.
15. POs Eligibility Criteria	Private Companies, NGOs, MFIs, commercial banks and cooperatives validly operating under Government of Bangladesh laws and rules are potentially eligible, subject to satisfactory creditworthiness assessment, and meeting eligibility criteria (See Annex 5 – Financial Summary for examples).
16. Eligible Subprojects (Investment Projects)	Investment proposals for solar home systems. Funds cannot be used for financing or acquisition of existing assets (including land) or refinancing of existing debts.

Measure	Arrangement/Entity
17. Maximum amount of refinancing	Maximum US$ 500 for any individual solar system loan
18. Portion of subloan refinancing	Maximum eighty (80) percent of the amount POs have extended as loans to beneficiaries; provided such loan amount to household is less than or equal to the market price of approved equipment less household equity and less GEF Grant A as defined below. Remainder twenty (20) percent of the debt portion shall be provided by POs.
19. Responsibility of IDCOL	IDCOL will administer the GEF grant funds and IDA Credit, and will be responsible for: • Processing requests for disbursement of GEF grant funding; • Channeling GEF subsidy directly to SHS dealers or through the POs; • Maintaining the GEF grants related statistical records, incorporating, among other things approval of grants and disbursement made in respect thereof; • Preparing/submitting quarterly statistical reports on the GEF grant disbursement as required by GOB and GEF; • Processing disbursement requests for loans approved by POs; • Maintaining the IDA Credit related statistical records, incorporating, among other things approval of subloans and disbursement made in respect thereof; • Informing IDA from time to time, provide regular reports, and assist IDA and GEF supervision and/or evaluation mission regarding the progress of the Project; • Preparing/submitting quarterly statistical reports on the Credit component as required by GOB and IDA; and • Monitoring timely preparation and submission of subloan completion reports.
20. Environmental/Social Requirements	In accordance with national standards and procedures.
21. Procurement Procedures	Commercial practice.
22. Audit Requirements	Annual external audit required of Project Account and Special Account, and separate opinion on Statement of Expenditures (SOEs). IDCOL will be responsible for maintaining disbursement documentation for POs, and carrying out spot checks of solar installations (see 29 below) Annual external audit required of POs' financial statements and its compliance with the eligibility criteria.
23. Exchange Risk	GOB would bear all foreign exchange risk.

Measure	Arrangement/Entity
24. Assessment of Compliance with Prudential Regulations by POs	IDCOL would monitor that POs are organized under appropriate laws and conform with prudential regulations, taking into account eligibility criteria.
GEF Grant Arrangements	**Household based SHS**
25. Basis and Amount of GEF Grant Cofinancing	US$ 90 per system for first 20,000 SHSs. US$ 90 is split between (a) US$ 70 **"GEF Grant-A"** (intended to buy down SHS investments); and (b) US$20 **"GEF Grant-B"** (to support POs' operational costs).
26. Schedule of GEF Grant	US$ 90 for first 20,000 SHS US$ 70 for next 20,000 SHS US$ 50 for next 10,000 SHS
27. Grant Cofinancing Reservation Period after Commitment	One year, beginning on the date of subloan approval (and annually thereafter).
28. Consumer Education and Protection Facility	IDCOL will prepare TOR for Consumer Education and Promotion Facility (in consultation with IDA). GEF grant provided to IDCOL to cover costs of maintaining and publicizing the facility, which will investigate, unresolved consumer complaints against dealers and to seek appropriate solutions.
29. Verification	IDCOL will prepare TORs (in consultation with IDA) for sample verification of solar systems installed and their compliance with eligibility/quality standards. IDCOL will select suitable consultants for this activity in consultation with IDA. IDCOL will carry out inspections and supervisions of solar systems periodically, and include results in the six-monthly supervision reports.

Other Off-grid sub-projects (wind, hydro and biomass and RAPSS)		
		Interest Rates
1.	Service Charge to GOB	Standard IDA service charge, 0.75 percent p.a.
2.	Interest Rate from IDCOL/GOB to Sub-borrowers	To be determined on a case by case basis, but not to be less than Average Weighted Deposit Rate (AWDR) of Scheduled Banks plus a spread of 100 basis points p.a., calculated on the outstanding balance.
		Maturity
3.	IDA to GOB	Standard IDA terms with 40 years maturity including 10 years grace.
4.	GOB/IDCOL to Sub-borrowers	Up to 12 years, including maximum construction period + 6months grace.
		Repayment Frequency
5.	GOB to IDA	Semi-annual.
6.	Sub-borrowers to IDCOL/GOB	Semi-annual.
7.	Sub-borrowers Eligibility Criteria	Private Companies, NGOs or other legally registered entity, validly operating under Government of Bangladesh laws and rules and subject to satisfactory creditworthiness assessment.
8.	Eligible Subprojects	Investment proposals for establishing electricity generation projects based on wind, hydro or biomass resources, either selling electricity to a utility under a power purchase agreement or directly to consumers under a concession agreement and RAPSS (generation and distribution mini-grids) based on any type of fuel. Maximum size eligible 10 MW.
9.	Maximum amount of IDCOL financing	50 percent of debt requirement of project calculated on the basis of a minimum 25 percent of total project cost as equity participation by sub-borrower.
10.	Maximum Amount of Grant Funding	To be determined on a case-by-case basis based on an incremental cost analysis acceptable to IDA and GEF. RAPSS sub-projects using non-renewable energy resources are not eligible for any grant funding.
11.	Responsibility of IDCOL	IDCOL will administer the GEF grant funds and IDA Credit, and will be responsible for: • Processing requests for disbursement of GEF grant funding; • Channeling GEF subsidy appropriately to the sub-project; • Maintaining the GEF grants related statistical records, incorporating, among other things approval of grants and disbursement made in respect thereof; • Preparing/submitting quarterly statistical reports on the GEF grant disbursement as required by GOB and GEF; • Processing disbursement requests for loans approved by POs; • Maintaining the IDA Credit related statistical records, incorporating, among other things approval of subloans and disbursement made in respect thereof; • Informing IDA from time to time, provide regular reports, and assisting IDA and GEF supervision and/or evaluation mission regarding the progress of the Project; • Preparing/submitting quarterly statistical reports on the Credit component as required by GOB and IDA; and

Other. Off-grid sub-projects (wind, hydro and biomass and RAPSS)	
12. Environmental/Social Requirements	In accordance with agreed standards and procedures as laid down in national standards and the Project's ESF. EAs for each sub-project would have to be prepared by sub-borrower and furnished by IDCOL to IDA for review. IDCOL is responsible for obtaining IDA's prior clearance before starting appraisal of the sub-project.
13. Procurement Procedures	As per Bank guidelines and commercial practice.
14. Audit Requirements	Annual external audit required of Project Account and Special Account, and separate opinion on Statement of Expenditures (SOEs). IDCOL will be responsible for maintaining disbursement documentation for each subproject, and verification and valuations of assets (see 19 below). Annual external audit required of sub-borrower's financial statements and its compliance with the eligibility criteria.
15. Exchange Risk	GOB would bear all foreign exchange risk.
16. Project Preparation Grant Amount	Up to 95 percent of preparation cost up to a maximum of US$ 10,000. IDCOL will explore and implement maximum potential for cost sharing by developer. IDA review and approval will be required in each case.
17. Preparation Grant Eligible Expense	Fees of an independent consultant directly attributable to the subproject preparation. Only expenses incurred after October 1, 2002 would be eligible. Each subproject developer would be eligible for only one grant.
18. Trigger for Project Preparation Grant Release	On presentation of eligible expenses and submission of grant disbursement request, (a) 50 percent of grant amount released on approval of draft business plan report by IDCOL; and (b) the balance 50 percent of grant amount released after approval of final business plan report by IDCOL.
19. Verification	IDCOL will prepare TORs (in consultation with IDA) for design verification, installation verification and spot checks of installation compliance. IDCOL will select suitable consultant in consultation with IDA. IDCOL will carry out diligent inspections and supervision of sub-project periodically and file six-monthly supervision reports with IDA in respect of each sub-project. IDCOL will follow-up on design and installation irregularities and seek remedial action. If the remedial action is unsuccessful, then IDCOL will seek remedies under the sub-loan agreement.

Eligibility Criteria for Participating Organizations (POs)
For All Participating Organizations

(a) Satisfactory business plan approved by the PO's Board of Directors as to the overall planning in relation to the use of the IDCOL Refinancing Facility under the Project, and containing *inter-alia*; proposed internal organization to implement the business plan, details of responsible business team, capacity to originate, evaluate and approve lending proposals, manage subsequent follow-up monitoring and loan recoveries and the details related to similar financing schemes that the PO operates.

(b) Particulars of the operational and financial results of the PO for at least the previous two (2) years based on an acceptable audited report. The PO's operations should be profitable for at least the past two years. However, in reaching an assessment about potential profitability, IDCOL will also consider (i) forward looking business prospects and potential for profitable operations; and (ii) if the PO is operating a solar program, the performance of their solar business.

(c) The PO should furnish proof to IDA that the financial performance of the PO concerned is in conformity with the applicable financial criteria outlined below.

(d) After fulfilling the eligibility criteria by PO for program entry, the PO shall continue to meet the eligibility criteria aforementioned, satisfactory to IDCOL and IDA, which shall monitor PO's compliance therewith annually. If the PO fails at any time to satisfy the above specified criteria IDCOL and IDA reserve the right to suspend "Sub Loan" authorizations under the Project until the PO has taken specific steps to address its problems in a manner satisfactory to IDCOL and IDA.

(e) PO has established and maintained sound and transparent accounting, MIS and internal audit system.

(f) Accounts are audited by a reputable external auditor on an annual basis.

Eligibility Criteria For MFIs

General Criteria

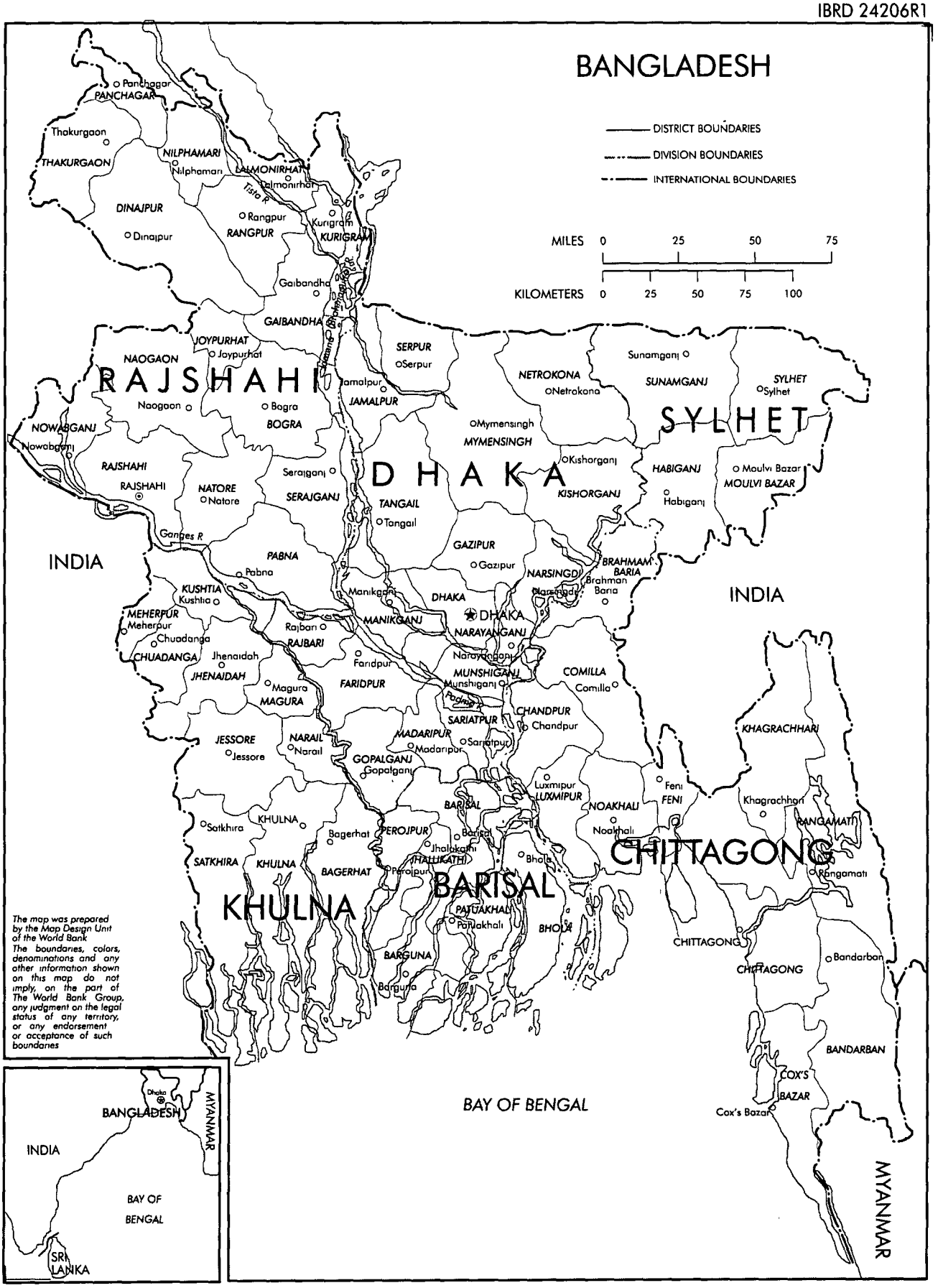
- Must be registered with appropriate registration authority to conduct microfinance services;
- Currently conducting microfinance services with soft loan funds from:
  - PKSF as a PO,
  - Bank of Small Industries and Commerce ("BASIC") Limited, and
  - Any other similar national or international funding source;
- Have microfinance operations in Project areas identified in the priority list for the SHS program;
- Number of beneficiaries is not less than 10,000; and
- Capable of managing rural renewable energy program.

Specific Financial Criteria

- Minimum Tk. 1,000,000 of equity;
- Debt to equity ratio of the MFI not in excess of 3.0;
- Minimum total cash collection ratio of principal and interest on current loan portfolio calculated on a rolling twelve month basis of 95 percent;
- In case of an existing SHS loan portfolio, minimum total cash collection ratio of principal and interest calculated on a rolling twelve month basis of 95 percent;
- Minimum after tax profit equivalent to 4 percent p.a. on revolving loan fund (RLF);
- In cases where prospective business profitability is considered to be positive, the PO should be at least breaking even after meeting operational expenses and debt service. However, in such cases, continued eligibility will be conditional on being able to meet the 4 percent p.a. after tax profit criterion the following year; and
- Minimum debt service cover ratio of 1.25 times.

Selection Criteria for Other Private Entities (PEs) – for grant only

- A lawful private entity organized under the laws of Bangladesh, complying with pertinent laws and regulations regarding capital adequacy, classification of assets, non-accrual of interest and provisioning, exposure limits, etc.;
- A verification that PE meets satisfactory financial criteria, ratio requirements and exposure limits; and
- Capable of managing rural renewable energy program, as evidenced by satisfactory business plan and operating results.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