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Report No: 49266 - BD

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT PAPER

ON A

PROPOSED ADDITIONAL FINANCING CREDIT

**IN THE AMOUNT OF SDR 83.8 MILLION
(US\$130 MILLION EQUIVALENT)**

TO

THE PEOPLE'S REPUBLIC OF BANGLADESH

FOR THE

**RURAL ELECTRIFICATION AND RENEWABLE ENERGY
DEVELOPMENT PROJECT**

July 6, 2009

**Sustainable Development Unit
South Asia Region**

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BANGLADESH – GOVERNMENT FISCAL YEAR
July 1 – June 30

CURRENCY EQUIVALENTS
(Exchange Rate Effective as of June 30, 2009)

Currency Unit = Bangladesh Taka (Tk)
SDR 1 = US\$ 1.55223
US\$1 = Tk 68.875

Weights and Measures
Metric System

ABBREVIATION AND ACRONYMS

ADB	Asian Development Bank	IL	Incandescent Lamp
BPDB	Bangladesh Power Development Board	ISO	International Standards Organization
CAS	Country Assistance Strategy	JICA	Japan International Cooperation Agency
CDM	Clean Development Mechanism	KfW	Kreditanstalt für Wiederaufbau
CER	Certified Emission Reductions	KWH	Kilowatt-hour
CFL	Compact Fluorescent Lamp	MW	Megawatt
DESCO	Dhaka Electric Supply Company	NGO	Non-Government Organization
DPDC	Dhaka Power Distribution Company	NSC	National Steering Committee
DSM	Demand Side Management	OHSAS	Occupational Health and Safety Management Systems
EIRR	Economic Internal Rate of Return	PBS	Palli Bidyut Samities (rural cooperatives)
EMF	Environment Management Framework	PDO	Project Development Objective
ERPA	Emission Reductions Purchase Agreement	PO	Participating Organizations
FIRR	Financial Internal Rate of Return	PRMP	Procurement Risk Mitigation Plan
FM	Financial Management	PSU	Project Support Unit
GEF	Global Environment Facility	RE	Rural Electrification
GHG	Green-house Gases	REB	Rural Electrification Board
GOB	Government of Bangladesh	RERED	Rural Electrification and Renewable Energy Development
GPOBA	Global Partnership on Output-Based Aid	SHS	Solar Home System
GTZ	Gesellschaft für Technische Zusammenarbeit	TA	Technical Assistance
IDA	International Development Association	VAT	Value Added Tax
IDCOL	Infrastructure Development Company Limited	WP	Watt Peak

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**Additional Financing for Rural Electrification
And Renewable Energy Development Project**

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PROJECT PAPER DATA SHEET

Date: July 6, 2009 Country: Bangladesh Project Name: Additional Financing for Rural Electrification and Renewable Energy Development Project Project ID: P112963		Team Leader: Raihan Elahi Sector Manager: Salman Zaheer Acting Country Director: Robert L. Floyd Environmental Category: B			
Borrower: Peoples Republic of Bangladesh Responsible agency: Infrastructure Development Company Ltd. (IDCOL) and Rural Electrification Board (REB)					
Revised estimated disbursements (Bank FY/US\$m)					
FY	FY 2010	FY 2011	FY 2012	FY 2013	
Annual	30.0	35.0	35.0	30.0	
Cumulative	30.0	65.0	100.0	130.0	
Current closing date: December 31, 2009 Revised closing date: December 31, 2012					
Does the restructured or scaled-up project require any exceptions from Bank policies? Have these been approved by Bank management? Is approval for any policy exception sought from the Board?					<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Yes <input checked="" type="radio"/> No
Revised project development objectives/outcomes <i>[If applicable]</i>					
The development objective of the additional financing project remains same as the main project. 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.					
Does the scaled-up or restructured project trigger any new safeguard policies? No					
For Additional Financing					
[] Loan [X] Credit [] Grant For Loans/Credits/Grants: Total Bank financing (US\$m.): US\$130 million Proposed terms: IDA Standard Credit					
Financing Plan (US\$m.)					
	Source	Local	Foreign	Total	
	Borrower	4.0	0.0	4.0	
	IDA	30.0	100.0	130.0	
	Local Communities	87.3	0.0	87.3	
	Development Partners	66.7	82.0	148.7	
	Total	188.0	182.0	370.0	

The Rural Electrification and Renewable Energy Development Project Additional Financing

I. Introduction

This Project Paper seeks the approval of the Executive Directors to provide an additional credit in an amount of US\$130 million to Bangladesh Rural Electrification and Renewable Energy Development Project, Credit No. 3679-BD.

1. The proposed additional financing Credit would help finance the costs associated with: (i) scaling up the project's renewable energy components which are improving off-grid electricity supply in rural areas through the installation of Solar Home Systems (SHSs) for affordable lighting, and also supporting electricity generation and supply from other renewable energy sources; (US\$100 million); (ii) introducing energy efficient Compact Fluorescent Lamps (CFLs) as part of a electricity demand side management program to help address the severe energy shortages in the country, which is particularly affecting the rural areas of Bangladesh (US\$15 million); and (iii) rehabilitating additional electricity distribution networks in rural areas as part of the System Loss Reduction component of the project (US\$15 million)¹. The first component will be managed and implemented by the Infrastructure Development Company Limited (IDCOL) using eligible Participating Organizations (POs) while the second and third components will be managed and implemented by the Rural Electrification Board (REB).

2. The proposal meets all three criteria of the Additional Financing Policy. It proposes to **scale up** the renewable energy component by supporting installation of more SHS and other renewable energy projects (e.g. generating electricity from biogas and biomass fuels, solar water pumps, etc.); **restructure** the original project by adding a component on energy efficiency and demand side management to address the present electricity demand-supply gap in the rural areas through introducing energy efficient lighting; and **meet an unanticipated financing gap** of the distribution line renovation component due to the sharp exchange rate fluctuations between SDR and US\$ over the past year.

3. **Partnership arrangements:** Given the successful implementation track record of the renewable energy component by IDCOL, several development partners became interested in supporting the program. The GEF grant fund provided under the Bank financed project was used for training, awareness and communication campaign, and to subsidize initial SHS costs to consumers. The grant fund successfully reduced various implementation barriers. Following the same project design, KfW and GTZ of Germany started to support the project by providing grant funds for the technical assistance part of the project and to further reduce SHS costs to consumers. Recently, the Asian Development Bank approved a credit of US\$33 million to install 100,000 SHS. IDCOL

¹ The scale-up in rehabilitation was conducted under the original project due to an increase in funds caused by currency fluctuations. The additional financing is required to fill the financing gap created when the SDR value sharply decreased in FY09.

signed an Emission Reduction Purchase Agreement (ERPA) with the Bank for developing a Clean Development Mechanism (CDM) project, acting as the bundling agent for 14 Participating Organizations (PO) which borrow from IDCOL, to expand their SHS program. Another large PO which borrows from IDCOL, Grameen Shakti, has also signed a separate ERPA with the Bank. IDCOL's overall program has a target of installing a total of 1,000,000 SHS units by the year 2012, which will require installation of 650,000 additional SHS units and cost about US\$305 million. This proposed Additional Financing will support IDCOL in meeting this target.

II. Background and Rationale for Additional Financing

Sector Issues and Relevance to Additional Financing

4. Over the last decade, Bangladesh has experienced a net energy demand growth in the order of 8% to 10% per annum. Per capita electricity generation is among the lowest in the world, at about 165 kWh per year. Peak electricity demand is around 5,200 MW and available generation capacity of 3,600 to 4,300 MW is insufficient to satisfy current demand². At the same time, the demand for electricity continues to grow at the rate of over 500 MW a year due to population growth, increased industrialization, additional connections and rise in the use of modern, electrical appliances. The generation capacity deficits results in frequent power failures during peak load hours (usually 6 to 11 pm in summer season), which hurts economic growth and industrial development and affects the quality of life³. Frequent outages have also prompted industries, shops and households to install their own generators, pushing up the cost of living. This situation could also lead to indirect negative impacts, such as in 2009, when the Government had to temporarily close down several fertilizer plants to divert the natural gas they use to generate more electricity. For a variety of reasons, Bangladesh also failed to award new contracts to increase generation capacity although some agreements have recently been signed with development partners to finance several power plants to increase generation capacity by about 900 MW. If demand is not managed properly, load shedding will continue to increase until new power plants come into operation, which is not expected soon.

5. The Government's Vision and Policy Statement (2002) on Power Sector Reforms has, inter alia, the following objectives to overcome the enormous challenges facing the power sector:

- bring the entire country under electricity service by the year 2020 with improved reliability and quality of the electricity supply
- increase the sector's efficiency and make the power sector financially viable
- make the sector commercial and increase private sector participation

² The higher loads are prevalent in the urban areas, with the largest electricity load centers being Dhaka and Chittagong. However, load shedding regime is implemented throughout the country during the specific periods of power shortages, with rural customers being affected more disproportionately.

³ Estimates indicate a reduction in gross domestic product by around \$1 billion annually due to power shortages.

- use natural gas as a primary fuel for generation and explore the possibility for power export
- ensure a reasonable and affordable price for electricity

6. The policies outlined above, if implemented well, could very well underpin a well managed, financial and economically viable power sector, ready to meet the rapidly growing energy needs of the country. However, implementation of the above referenced policies and reforms have been much slower than expected due to weak sector institutions with limited managerial and technical capacity. The Bank is assisting the Government to overcome some of these issues through various lending and TA activities. Though Government is to provide electricity to all by 2020, there has not been any significant addition to its electricity generation capacity after Meghnaghat-1 (450 MW) IPP was commissioned in 2002. This shortcoming has particular relevance for the rural population since many rural areas are distant from the national electricity grid and, even where these are connected to the grid, the lack of sufficient generation capacity invariably leads disproportionate load shedding in rural areas. The original Rural Electrification and Renewable Energy Development (RERED) project had helped bring electricity to remote areas away from the grid through several renewable energy options, i.e. Solar Home Systems (SHS). The proposed additional financing will augment those efforts and also make more electricity available by introducing energy saving Demand Side Management (DSM) measures through large scale programmatic deployment of CFLs.

Background on RERED project

7. IDA financing for the Rural Electrification and Renewable Energy Development Project (RERED) was approved on June 25, 2002 and became effective on December 31, 2002. The project's development objective is to support Bangladesh's efforts to raise levels of social and economic growth by increasing access to electricity in rural areas. The project was designed to increase access of rural people to electricity through conventional and renewable energy options.

8. The Rural Electrification Board (REB), whose mandate is to support the rural electric cooperatives, known as Pally Bidyut Samities (PBSs), implemented the grid electrification component of the project. A total 70 PBSs are responsible for the entire rural area of Bangladesh, out of which 45 PBSs constructed new distribution lines to expand and intensify their existing networks and connect new consumers under this project. These 45 PBSs also took over pockets of the Bangladesh Power Development Board (BPDB) operated networks within their coverage area to renovate and integrate them with the PBS network. This reduced system losses significantly and also optimized the rural distribution network. Under this project, REB has so far connected about 600,000 consumers, constructed about 8,500 km of new distribution lines and taken over about 12,000 km of distribution lines from BPDB, which are now being renovated.

9. To implement the renewable energy component, the project adopted a two-pronged approach to reach the remote areas of Bangladesh, far away from the grid network. REB was tasked with extending a *fee-for-service* SHS program, whereby the systems would be installed and owned by REB and consumers would pay a monthly

fixed fee for using the systems. The approach of the other SHS implementing agency, IDCOL, was to *sell* the systems to consumers using a micro-finance scheme through the POs (NGOs, micro-finance institutions, cooperatives, and private organizations) who have greater reach and acceptability at the community level as well as practical experience in providing micro-finance. The POs extend micro-credits for consumers to buy the systems and, in turn, obtain re-financing from IDCOL for up to 80% of the loans extended to consumers.

10. The REB's fee-for-service approach was able to achieve about 75 percent of the project target for SHS installation in rural areas. Against a target of providing 16,000 households with SHS, REB provided SHS to about 12,000 households. As REB's primary function is to provide grid electricity, it found itself organizationally challenged to provide SHS services. REB's institutional constraints and its inability to contract the manpower to support the SHS program was one of the main reasons behind meeting less than the target output.

11. The IDCOL SHS program, in contrast, has been highly successful. Against the original project target of installing 50,000 systems, by May 2009 the POs had installed about 320,000 systems, a remarkable achievement within a period of 6 years. On average, the POs are installing about 12,000 SHS per month. The success of the IDCOL approach can be attributed to: (i) SHS ownership by consumers resulting in proper care in systems usage; (ii) customer training imparted by the POs, enabling customers to carry out repairs and regular maintenance by themselves; (iii) credibility of the POs at the community level resulting in customer readiness to try the systems; and (iv) institutional set-up of the POs enabling them to reach remote customers in a cost-effective and efficient manner. The implementation mechanism of the IDCOL approach has proved sustainable, with POs having an average loan collection efficiency of about 98% while fully servicing their debts owed to IDCOL on a timely basis.

12. As a result of successful implementation, mainly by IDCOL, the initial financing of US\$18 million to provide about 50,000 households with SHS was expanded in stages, achieving disbursements of about US\$52 million and electrification of about 320,000 households through SHS. This component targets households far from the grid who are unlikely to get grid electricity in the foreseeable future. As the installed generation capacity of the country has been unable to meet the entire electricity demand, IDA has supported the Government's requests to divert more funds to this renewable energy component, including now through the additional financing. The project has also financed the piloting of the first biomass power plant in Bangladesh which is providing electricity through its mini-grid to about 300 consumers.

13. Having realized the importance of energy efficiency improvements and the need to utilize the large energy savings potential across various sectors, in 2008, Government of Bangladesh (GOB) drafted the Energy Conservation Act, which is expected to be endorsed by the Parliament in the near future. The Government had also introduced some electricity load management measures in 2008 (e.g., time of use pricing for industrial and large commercial consumers, closing of shopping malls at 8.00 pm). More recently,

starting June 19, 2009 a new system of Daylight Savings Time has been introduced and the Government estimates that 200-250 MW per day can be saved by having more daylight hours in the evening so that people can avoid using electric lights. The Government has also decided to waive VAT and other duties on imported solar panels and CFLs to help reduce prices in the market and encourage increased use.

14. Table 1 summarizes the key data of the RERED project to date, including relevant project dates, credit amounts, and performance ratings.

Table 1: Summary of RERED project data

Project Data		Project Performance Ratings		
<i>Board Approval Date:</i>	<i>06/25/2002</i>	Summary Ratings:	Last	Now
<i>Effectiveness Date:</i>	<i>12/31/2002</i>	<i>Achievement of PDO</i>	<i>S</i>	<i>S</i>
<i>Scheduled Closing Date:</i>	<i>06/30/2008</i>	<i>Achievement of Global Obj.</i>	<i>HS</i>	<i>S</i>
<i>Revised Closing Date:</i>	<i>12/31/2009</i>	<i>Implementation Progress</i>	<i>S</i>	<i>S</i>
<i>Credit Amount:</i>	<i>SDR153 million</i>	<i>Other Ratings:</i>		
<i>Credit Amount (June 30,09)</i>	<i>US\$236 million</i>	<i>Financial Management</i>	<i>MS</i>	<i>S</i>
<i>Amount Disbursed:</i>	<i>US\$236 million</i>	<i>Financial Performance</i>	<i>S</i>	<i>S</i>
<i>Disbursement %</i>	<i>99.9%</i>	<i>Project Management</i>	<i>S</i>	<i>S</i>
Global Supplement		<i>Procurement</i>	<i>MS</i>	<i>S</i>
<i>Board Approval :</i>	<i>06/05/2002</i>	<i>Notes: HS=Highly Satisfactory;</i>		
<i>Effectiveness Date :</i>	<i>12/31/2002</i>	<i>S=Satisfactory; MS= Moderately Satisfactory,</i>		
<i>Original grant Amount :</i>	<i>US\$8.2 million</i>	<i>U=Unsatisfactory; HU=Highly Unsatisfactory</i>		
<i>Disbursement %</i>	<i>98%</i>			

15. While the project maintained its overall performance rating as “satisfactory” throughout its implementation period, the Financial Management and Procurement ratings were downgraded to “Moderately Satisfactory” in the December 2008 Implementation Status Report as REB could not submit its audit report on time and took a long time to resolve several representations on its Procurement Bid Evaluation Report. REB has already taken corrective measures to improve its Financial Management and Procurement ratings. It has also shared an action plan with IDA to ensure satisfactory financial and procurement management rating. Based on these initiatives, project performance ratings of these two indicators have been upgraded in the recent (June 2009) Implementation Status Report. All legal covenants of the project are in compliance.

Rationale for additional financing

16. The primary rationale for additional financing is for IDA to maintain its support for the Project which continues to be an important and effective contributor to enable the Government in meeting its vision of providing universal access to electricity by 2020.

17. Access to electricity in Bangladesh is low, currently about 40%. Even those with access to grid electricity do not get an uninterrupted supply as the country is facing serious power shortages and load shedding in the rural areas is disproportionately severe (see Box A). Apart from some small power plants, no new reliable power generation capacity has been added to the grid since 2002. GOB is making efforts to increase electricity generation capacity and improve efficiency of the supply system. Despite

these efforts, reliance on grid electricity alone will not allow GOB to realize its vision of universal access to electricity by the year 2020. Furthermore, the dispersed nature of rural settlements and the numerous rivers that crisscross the country make grid electrification in many areas difficult and expensive. In this context, off-grid electrification, based on renewable energy is the only long-term option available for cost-effective electricity access for millions of people in remote areas.

Box A: Load Shedding in Urban and Rural Areas

In March 2009, the average generation was about 3,600 MW. The average demand in DESCO area (the utility serving the northern Dhaka areas) was 420 MW while the average demand in the rural areas served by PBSs was 2,200 MW. During the month, the average supply to DESCO area was 312 MW (74% of DESCO demand) while PBSs received 1,281 MW (58% PBS electricity demand).

18. While the grid-based supply component had been effective in the Project's early years, the off-grid electrification component has become more effective in recent times, in view of the mounting power generation shortages in the country, increasing availability and gradual decrease in costs of modern renewable energy-based measures like SHSs. Therefore, the bulk of the additional financing is proposed for the renewable energy based, off-grid component.

19. As mentioned before, the impact of the power shortages have been particularly severe in the rural areas where electricity is sometimes available only for a few hours a day. While efforts are underway to increase generation capacity, it is realized that it will take several years before additional capacity comes on stream, and electricity deficits may continue to grow as the Bangladesh economy grows further. In order to address some of the current and expected power shortages in the future, which particularly affects rural areas more disproportionately, GOB has requested additional financing to initiate a program of electricity demand-side management activities through the introduction of energy efficient compact fluorescent lamps (CFLs) on a large scale. Limited variety of CFLs are available in Bangladesh but the consumer uptake, especially for household consumers, has been low due to high cost (Taka 250 to 300 per CFL) and poor quality of these available products. The project aims to deploy high quality CFLs, procured in bulk (and therefore at a cheaper price) in the densely populated electrified areas, both in urban and rural distribution utilities, and use mostly traditional incandescent lamps (ILs) which are five times inefficient. The reduction in electricity demand in these areas due to the replacement of ILs with CFLs, will make more electricity available to be distributed in the rural areas of Bangladesh. The plan is to help increase the penetration of CFLs to the entire country, within a relatively short time to maximize the benefits from DSM activities. The CFL deployment program proposed under this project is the first step towards national coverage.

20. The borrower has requested the additional financing for the following three components:

21. **Component 1 - Scale up the renewable energy component (US\$100 million).** Additional financing would be used to provide electricity to an additional 300,000 households through SHS and to finance other renewable energy projects in rural Bangladesh. This will help IDCOL continue with the successful program and complement the funding from other donors. Under this component renewable energy initiatives like solar home systems, biomass power plants, biogas power plants, solar water pump for irrigation, solar thermal plants, solar mini grids, etc will be supported. About US\$ 92 million for SHS and about US\$ 5.8 million for other renewable energy projects will be allocated as subloan to implement this component. About US\$ 2.2 million has been allocated for goods, technical assistance to support training, inspection, monitoring & evaluation, feasibility studies, etc.

22. **Component 2 - Introduce a new component on energy efficiency and demand side management to mitigate supply shortages and improve the availability of electricity in the rural areas (US\$15 million).** A part of the additional financing will be used to purchase and install about 10 million high quality CFLs, to replace an equivalent number of incandescent lamps in the households of the most densely populated areas of Bangladesh where the electricity demand is high – both in urban and rural areas. Residential consumers will be provided with a limited number of CFLs, free of cost, and in exchange for the ILs currently under use in their households. As lighting coincides with the peak load hours and contributes over 20% of the demand as per a recent comprehensive survey in Bangladesh, this initiative is expected to reduce peak power demand and reduce load shedding significantly, particularly in the rural areas. Assuming that the CFLs of equivalent light output (measured in lumens) will reduce electricity demand/consumption by 80% over that of ILs (for instance, a 100W incandescent may be replaced by a 20W CFL, and 40W incandescent may be replaced by a 8W CFL), deploying 10 million CFLs in areas of high demand is expected to reduce the peak demand by about 360 MW. Due to the “release” of 360 MW grid based generation capacity, the reliability of power supply is expected to increase considerably, particularly in adversely affected rural areas.

23. **Component 3 - Meet the financing gap of the REB component to renovate distribution lines taken over from BPDB (US\$15 million).** Additional financing will be used to fund the financing gap which has emerged while implementing this successful component. As part of a distribution rationalization program, REB took over rural electricity distribution networks from the national power utility (BPDB), renovated them to reduce losses, and improve services that resulted in positive financial returns to REB. The financing gap has arisen due to exchange rate fluctuations. The original IDA Credit funding for the project was SDR153 million, which was equivalent to US\$190 million in June 2002. Due to exchange rate fluctuations, the total credit amount increased to about US\$250 million in mid-2008. Against a target of 9,400 km of lines, REB has actually taken over 12,000 km of lines from BPDB and IDA agreed to finance the renovation of these additional lines from the funds generated by SDR appreciation. Unfortunately,

after all the contracts to finish this renovation had been awarded, the SDR started to depreciate sharply against the US Dollar from early FY 2009; as of June 2009, the credit amount is equivalent to US\$236 million. Given this sharp reduction in available credit funds in US\$ equivalent and as most of the contracts awarded are in US\$, REB would need about US\$15 million to meet the financing gap and complete the renovation of all the distribution lines taken over from BPDB.

24. A summarized indicative Cost Table for the additional financing project is provided below.

Table 2: Project Costs and Financing by Components (US\$ million)

Components	Total	Govt.	PO	Cons	IDA	GPOBA	Other DPs
1. IDCOL Renewable Energy	328.9	0.0	51.1	35.8	97.8	8.0	136.2
Solar Program	311.8		48.5	35.8	92.0	7.0	128.5
Biogas Based Electricity	5.4		1.0		1.0	0.3	3.1
Biomass Based Electricity	4.9		0.9		1.2	0.3	2.5
Solar Mini Grid	2.9		0.1		1.0	0.1	1.7
Solar Thermal Plant	2.2				2.2		
Solar Water Pump for Irrigation	1.7		0.6		0.4	0.3	0.4
1.1 IDCOL Technical Assistance	7.1	0.0	0.4		2.2	0.3	4.2
Operating Costs and Fees	3.4				0.0		3.4
Staff and Customer Training	2.1		0.4		0.8	0.1	0.8
Inspection Related Expenses	1.1				1.0	0.1	
Feasibility and Market Study	0.5				0.4	0.1	
2. REB CFL Program	15.0	0.0			15.0		
3. REB Grid Electrification Component	19.0	4.0			15.0		
Total	370.0	4.0	51.5	35.8	130.0	8.3	140.4

Note:

Govt. Government contribution is for the REB Grid Electrification Component only. GOB fund will be used for paying Tax, CD, VAT, staff cost, and other operating expenditure against this component. These costs can be easily identified and separated.

PO: Includes contribution from Partner Organizations against 20% of the loan extended to consumers for SHS and equity participation of Sponsors for other renewable energy pilot projects.

Cons: Includes down payment required from consumers before receiving SHS.

GPOBA: Includes subsidy allocated for each household receiving SHS and subsidy to reduce capital cost on other renewable energy projects.

Other DPs: Includes commitment from Development Partners: Asian Development Bank, Islamic Development Bank, GTZ, KfW, JICA, etc.

Funding received from PO, Cons, GPOBA and other DPs will be parallel financing.

25. The bulk of the additional financing will continue with the on-going activities of the parent project. Hence it will start to disburse immediately after the credit is effective. The renewable energy component of IDCOL is expected to be completed within a period of three years. The energy efficiency component is expected to be completed by the end of 2010. REB's line rehabilitation component will be used to meet the financing gap for contracts that have already been awarded and would require retroactive financing. Total expected amount required for retroactive financing is expected to be about US\$ 10

million paid after January 1, 2009. This component is expected to be disbursed within 3 to 4 months of effectiveness of the additional financing credit.

III. Proposed Changes

26. The primary activity of the project under the Additional Financing Credit remains essentially the same. The project will follow the same implementation design to support installation of SHS and other renewable energy projects. The proposed changes to the project are:

- (i) ***SHS program expansion*** with the target of installing additional 300,000 SHS during FY10-12. Under the proposed additional financing credit, IDCOL will allow its POs to support SHS smaller than 30 Wp in addition to their current range of products. This will ensure rural households with relatively lower income to receive SHS under this project. A funding application has been submitted to the Trust Fund for Global Partnership on Output-Based Aid (GPOBA) to support this project and GPOBA Panel of Experts has accepted the application for eligibility. An additional US\$7 million is expected from GPOBA to support the SHS component of the project. Fund from GPOBA will be used as parallel financing to this project.
- (ii) ***Support several renewable energy technologies.*** Under the original credit IDCOL has successfully supported a pilot biomass base power plant of 250kW. Another biogas based power plant of 50 kW is under construction. Based on the experience of these plants and lessons learned, IDCOL plans to support more subprojects based on similar technologies. IDCOL further plans to support other subprojects like i) solar water pumping for irrigation, ii) solar mini grid, iii) solar thermal plants, etc. IDCOL has received proposals for a 400 kW biomass plant and a 20kW solar water pump for irrigation. These and other sub-projects will be considered under the additional financing that will help achieve the Project Development Objective of increasing access to electricity in the rural areas of Bangladesh in a sustainable manner. Funding from GPOBA to buy down the capital costs of these pilot projects has been requested and about US\$1 million is expected. Fund from GPOBA will be used as parallel financing to this project.
- (iii) ***Financing and installation of CFLs.*** Given the severe electricity supply shortage prevailing in Bangladesh, GOB requested IDA to support in electricity demand side management. Hence a new component has been included in this proposed additional financing credit to help alleviate the serious energy shortage in the country. The GOB has requested \$15 million of additional financing to deploy about 10 million CFLs amongst residential consumers of high density load centers in Bangladesh. The funds will be used to procure better quality CFLs, support a systematic distribution system, as well as conduct a comprehensive consumer awareness scheme, and monitoring and evaluation plan. The first phase

can be launched relatively quickly, with CFL deployment starting in early 2010 and contributing to reduce load-shedding by the next peak season (summer 2010). The availability of additional electricity is expected to particularly benefit the rural areas which have borne the major brunt of the load shedding. REB will be the key implementing agency responsible for overall management of this component, including implementing consumer awareness and monitoring and evaluation plans at national level. REB will be procuring the high quality CFLs in bulk, and distributing them in the service territory of their selected PBSs for installation in place of ILs within the households. In addition, a portion of the CFLs will be distributed by other utilities (BPDB, DESCO, DPDC, etc.) amongst the residential consumers in their respective service territories, using the same broad approach being followed by REB. Quick deployment of a large number of CFLs may allow GOB to capture the benefits of carbon financing, by seeking payments for the resulting carbon emission reductions which will substantially offset the cost of deploying the CFLs, in the long-term. IDCOL will act as the coordinating entity (bundling agent) for the CDM transaction associated with the CFL project.

- (iv) ***Implementation arrangement of the CFL component.*** Though REB will act as the implementing agency to implement the CFL component, GOB is considering it as a national level component, which will help the country to reduce its electricity peak demand and help alleviate load shedding. Due to the complex nature of the CFL component which involves multiple stakeholders, a Project National Steering Committee (NSC), under the chairmanship of Joint Secretary-Power Division, will be set up to oversee project activities. The NSC and Power Division will be supported by a Project Support Unit (PSU) funded from an existing technical assistance grant (Sustainable Energy Development) from the GTZ. The NSC will ensure coordination between the stakeholders to support implementation of this component.

IV. Consistency with Country Assistance Strategy (CAS)

27. The RERED project's objective is to extend electricity access to a greater portion of the population. Increasing access to electricity is an important component of poverty reduction and is consistent with the Country Assistance Strategy of Bangladesh. The persistent shortage in electricity is particularly affecting the rural population, which is suffering a disproportionate share of the load shedding. The CFL component will help mitigate this imbalance and contribute to poverty reduction and improve the quality of life in the rural areas.

V. Appraisal of Project Activities

Economic and Financial Analysis of the SHS Program

28. The direct benefits accruing to households from the use of SHS result from savings in kerosene consumption due to replacement of kerosene lamps for lighting. Prior to the deployment of solar home systems, many households operated televisions on batteries which were typically of low-quality and required frequent re-charging. Switching to SHS (of 40W and above) saves the households from this significant cost and inconvenience of recharging batteries. Among the costs of owning an SHS, households make a down payment for the system (usually 10% of the system price), pay the remaining amount in monthly installments, and bear the costs of replacing the batteries and other accessories. Taking these costs and benefits into account, the net benefits to households, calculated in terms of financial rate of return (FIRR) and economic rate of return (EIRR), are summarized in the following table⁴. The assumptions used in the calculations are summarized in Annex 1.

Size of SHS (WP)	FIRR		EIRR	
	Without Carbon Benefits	With Carbon Benefits	Without Carbon Benefits	With Carbon Benefits
20	3.1%	4.0%	-0.6%	0.4%
40	41.1%	41.9%	33.0%	33.7%
50	32.8%	33.7%	26.9%	27.8%
65	30.4%	31.2%	25.1%	25.9%
85	25.5%	26.5%	21.4%	22.4%

29. The benefit of using a 20 WP system derives mostly from replacement of kerosene lamps, and does not add up to significant benefit to the consumers at the current prices of kerosene. These systems are used by poorer households, and continued subsidies are needed to make these systems affordable. The prices of bigger systems (85 WP) are proportionately higher than the medium range (40-50 WP), contributing to reduced rate of return for the bigger systems.

30. Under the existing RERED project, more than 320,000 SHSs have been installed through the Participating Organizations (POs). Of the number of systems installed so far, about half (45%) are of 50 WP size, 20% of 40 WP size, 20% are in the range of 60-65WP, and only 9% in the 85 WP range. Less than 2% of the systems were in 20-30WP size. The POs do their own due diligence on the affordability of the households to pay for the systems. The overall collection efficiency of the existing program is 96%.

31. The economic and financial analysis took into account only the direct benefits of owning SHS. There are other benefits of using SHS (improved quality of lighting contributing to improved productivity and better quality of life, reduction in indoor

⁴ The Financial Rate of Return (FIRR) takes into account direct benefits of using the system (cost savings from kerosene and battery recharging) and directs costs of owning the system. The economic rate of return (EIRR) is calculated based on the same benefits and costs but net of taxes and subsidies.

pollution, longer study time for students, etc.) that have not been quantified but nonetheless are making positive contribution to the lives of the rural households.

32. The SHS component of the project is expected to receive carbon benefits. Two Emission Reductions Purchase Agreements (ERPA) have been signed between CDM and (1) IDCOL, (2) Grameen Shakti. CDM validation is currently on-going. The proposed additional financing will continue in the same way, allowing IDCOL to lower costs for consumers and enhance project returns.

Economic and Financial Analysis of the CFL Component

33. The additional financing will fund the deployment of 10 million CFLs in areas with the highest electricity demand. Although the Government's goal is to replace all ILs nationwide with 30 million CFLs in the long term, 10 million CFLs will be distributed in the first phase in high priority areas that have been identified through surveys carried out with the assistance of GTZ. The GTZ funded survey shows that of the 12 million households having access to grid power each use 2 to 3 on an average, and on a weighted average basis 2.3 incandescent lamps, of mostly 40W rating.

34. The cost of the proposed CFL deployment program will be the cost of procurement of the energy efficient and high quality CFLs and the cost of distributing them to the households to replace inefficient incandescent lamps. In addition, there will be costs associated with designing and implementing consumer awareness programs and M&E plans. CFLs are more expensive than ILs. However bulk procurement of CFLs will ensure the cheapest price. The higher cost of CFL is offset by the fact that CFLs last about 5-6 times longer than incandescent lamps (10,000 hours compared to 1,000 hours typically) and consumes 80% less energy for the same light (lumens) output.

35. The Government intends to distribute the first replacement CFL free (limit of four per family) and therefore there will be no cost to the consumer other than the remaining value of incandescent lamp which they will bring to the office of the electric utility. The benefit to the consumer will be the reduction of electricity consumption and hence the monthly electricity bill, which they accrue for the life of the CFLs and also the avoidance of the replacement cost of incandescent lamps which would have been there during this life of the CFLs, had the consumer continued to use incandescent lamps.

36. Detail discussion on assumptions used to calculate the Economic and Financial rate of return for this component is provided in Annex 1. The summary result shows that 10 million CFLs will result in 312 GWh/year in energy savings (at the bus bar) equivalent to US\$ 11.5 million per year. Taking into the cost of the program of US\$15 million, the FIRR and EIRR of the program turns out to be 44% and 52% respectively. Including the CDM benefits, the FIRR and EIRR of the program will turn out to be 52% and 60% respectively.

Operational Policy 8.3 Compliance

37. IDCOL performs a financial intermediary role, which requires them to comply with World Bank's OP 8.30 eligibility criteria. A full OP 8.30 compliance review has been carried out and IDCOL was found to be in compliance. Financial performance of IDCOL as found during the review is provided below. The detailed OP 8.30 compliance review is provided in Annex 2.

(i) Capitalization: IDCOL has a sound capital structure. As of June 30, 2008 its share capital is BDT 400 million and its total equity is BDT 548.09 million, which is approximately 41% and 56% respectively of the loans and advances outstanding.

(ii) Recovery Performance: The implementation of the IDCOL approach has proven to be sustainable without compromising the loan recovery rate. The recovery rate is 96%, on average, at the PO-beneficiary level and 100% at the IDCOL-PO level.

(iii) Loan Loss Provisioning: IDCOL abides by the provisioning guidelines of the Bangladesh Central Bank. This financial intermediary has been provisioning 1% for unclassified loans and 5% for the classified part of the portfolio.

(iv) Accounts Keeping: Accounting documents and financial statements of the Company have been audited by established audit firms over the last three fiscal/accounting years. It appears that adequate numbers of disclosure have been made in company annual reports and those were approved by the auditors.

(v) Profitability: As per its audited financial statements, IDCOL has been earning profits, which are sufficient to support sustainability.

Fiduciary

38. The financial management (FM) arrangements used in the original project, which are satisfactory to IDA, will be used under the Additional Financing Credit with add-on arrangements corresponding to the expected changes in the financing arrangements in respect of SHSs and CFL distribution. In implementing the CFL component, REB will use the PBSs, BPDB, DPDC, DESCO, etc. by signing Participation Agreements with them. IDCOL's Financial Management Organization and systems have been adequate to manage its operation and to undertake the project financial management. The Financial Management organization of the REB is robust and its entity financial management systems are also acceptable, although the implementation of its computerized accounting system is moving slowly. During implementation to date, IDCOL and REB financial management teams have acquired significant experience in IDA procedures and requirements. A detailed Financial Management assessment of the implementing agencies under the project and a table showing amount of fund allocated to different disbursement categories is provided in Annex 3.

Procurement

39. The only change in procurement arrangements is in component 2 for the procurement of about 10 million compact fluorescent lamps (CFLs) to replace incandescent lamps. This component is estimated to cost about \$15 million and REB will implement this component. It was decided by the Power Division that all the CFLs will be procured through one or two procurement packages following International Competitive Bidding (ICB) procedures. REB will procure the CFLs and will be responsible for the distribution, consumer awareness, M&E and other administrative activities related to ensuring distribution of CFLs by other participating power distribution utilities (DESCO, DPDC, BPDB) and the use of CFLs by end users. Therefore, the project foresees some consulting and advisory services along with incremental operating costs. REB will procure and distribute the CFLs to respective Power Distribution utilities. REB will be supported by the Project National Steering Committee in both upstream and downstream activities of the CFL program and, in particular, the monitoring and evaluation activities required to claim carbon emission reduction benefits, the latter to be managed by IDCOL.

40. The procurement under the proposed additional financing would be carried out in accordance with the Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004 revised October 2006 and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004 revised October 2006, as well as the provisions stipulated in the Legal Agreement. As mentioned in Annex 4, the project is considered a high risk operation from the procurement perspective. This assessment was based on the prevailing conditions for public procurement in the country as well as the previous experience under this project. A number of special measures are underway in the country, and as part of the ongoing procurement reform, a second follow-on reform project under implementation is expected to make the reform efforts sustainable. Concurrently, a number of measures including: a system of handling complaints, disclosure of information and the introduction of a procurement risk mitigation plan (PRMP) with a set of performance indicators will be specifically introduced during project implementation to minimize procurement risks. Steps that have reduced project specific procurement risks are discussed in the "Governance and Anticorruption" Section below. The detailed arrangements specific to this project are described in Annex 4.

Technical

41. The project uses well established renewable energy and energy efficient lighting technologies. The solar home system component will continue to use internationally sourced photovoltaic panels and local batteries and electronics, all of which are compliant with detailed specifications. The additional financing for renewable energy mini-grids will explore all potential options, with proven technologies tested elsewhere in the world, with a specific focus on biomass gasification and biogas electrification. Such plants are

currently under development and are well matched to the fuel resources found in rural Bangladesh.

42. The procurement of CFLs under Component 2 will be guided by Efficient Lighting Initiative (ELI) set criteria. Experience and lessons learned from deploying similar projects in other countries and supported by the Bank will help finalize the bidding documents and CFL technical specifications. The CFL will have specifications based on ELI as the benchmark, but adjusted for higher requirements required for Bangladesh (eg., voltage tolerances, power factor, THD, etc), along with a 1 to 2 year warranty and branded with the Power Division logo on the body of the CFL. Power Division has formed a CFL Technical Specification Committee to ensure CFL specification complies with the technical requirements for Bangladesh.

43. Power Division will provide leadership and guidance to REB and other distribution utilities through the Project National Steering Committee. They will coordinate the communication and awareness campaign activities at the National level to support effective replacement of the ILs with CFLs. The distribution utilities are considering a common mechanism for efficient deployment of the lamps, where on selected days, consumers will bring specified number of incandescent lamps in a predetermined place to exchange for the CFLs. REB will use the project funds to procure the CFLs, finance the cost against communication and awareness campaign and meet the incremental operating cost to deploy the CFLs in exchange of ILs. REB is preparing its Development Project Proposal based on the above project implementation design. The Development Project Proposal will be finalized based on input received from all participating electricity distribution companies. REB will share with IDA the draft final Development Project Proposal before submitting it to the Planning Commission to ensure that it is consistent with this Project Paper.

44. The technical risk of the SHS and other renewable energy program has been mitigated by the creation of a technical advisory committee working in collaboration with the Bangladesh University of Engineering Technology and the Bangladesh Standards and Testing Institute.⁵ In the current phase, there have been some issues with the photovoltaic panels procured not meeting the technical specifications. In future, the task team may seek grant funding for additional testing capacity within Bangladesh.

⁵ GTZ has provided funds to Bangladesh Standards and Testing Institute to procure an advanced CFL testing facility, which could be used for random sample tests after the procurement, to ensure products indeed meet the technical criteria specified under the procurement. However, the REB procurement under the Component 2 will include a standard provision for third party independent testing as per the technical specifications.

Institutional

45. Infrastructure Development Company Ltd. (IDCOL) has been successfully facilitating private sector participation in developing infrastructure projects in Bangladesh since its inception in 1997. This is a Government owned financial intermediary and governed by an independent Board of Directors represented by representatives from the Government of Bangladesh and the representatives from the Private Sector Stakeholders. Being independent from the Civil Service Regulations, IDCOL had been able to offer market based incentive package to its staff and attract qualified professionals from the market. This has helped IDCOL to work at similar level of efficiency compared to the private sector Financial Intermediaries. To meet short term special needs to carry out a feasibility study or to supervise construction of projects, IDCOL had appointed qualified consultants to manage the process.

46. Rural Electrification Board started its operation in 1977 with the mandate to electrify rural Bangladesh. According to its enabling Ordinance, REB is to act as the Financier, Quasi Regulator, and Technical Assistance Provider of the PBSs. The Rural Electrification (RE) program was created based on the Rural Electric Cooperative Model of USA and the first phase included development of 13 PBSs. For many years REB performed as a successful rural electrification model, arguably one of the most effective models in the developing world. However, over the years the Bangladesh electricity sector has gone through several changes presenting numerous challenges for the RE program. The total number of PBSs increased to 70; total number of rural consumers increased from several thousands to more than 7.5 million; rural customers now account for the highest share of electricity (about 40% of total electricity consumption); etc. Furthermore, with the creation of Bangladesh Energy Regulatory Commission (BERC), some overlaps have been created between REB's role vis-à-vis the PBSs and BERC's role as a whole.

47. Given the above development in the REB and PBS system, REB has found it challenging to maintain its once high level of operational and managerial performance. With the increasing demand of rural electrification, there had been instances where selection of new lines had not fully followed REB's practice of economic and area coverage principles. This has shaken the consumer confidence on REB management. The situation was further aggravated as rural consumers suffered more from load shedding to provide better electricity supply to the urban consumers despite rural consumers' better track record of paying bills on time compared to the urban consumers. The relationship between the PBS management and the consumers worsened so much that the consumers carried out processions protesting against PBS management and physically attacked some PBS offices. To resolve the issue, the government agreed to take actions to improve electricity services quality in rural areas and equitably load shed between urban and rural consumers. The CFL component included in the Additional Financing proposal is expected to assist in this regard by reducing electricity demand overall and therefore making more electricity available for the rural areas. The Government has also recognized the need to improve REB's overall governance and effectiveness, and is carrying out a study to assess the effectiveness of REB's current organizational and

management structure. Recommendations of this study will help the government to take corrective measures to restore effectiveness of REB. IDA is supporting GOB to finalize this study and would support in implementing the recommendations.

48. Power Division of the Ministry of Power Energy and Mineral Resources will play a pivotal role in guiding REB to implement the CFL component of the project. The Power Division will be supported by a Project Support Unit funded from an existing GTZ grant facility and will ensure overall coordination among different stakeholders taking part in implementing this component.

Safeguards

49. The safeguard category of the project is B since there are no significant and/or irreversible adverse environmental and social issues in sub-projects financed under the project. The major concerns under the Additional Financing Credit are improper discharge of lead sulphate into the local environment and occupation health and safety issues during recycling of used SHS batteries. IDCOL will promote the adoption of ISO 14001-2004 (Environmental Management Standard) and OHSAS 18001:1999 (Occupational Health and Safety Management Systems) by battery manufacturers and will make it mandatory to have these certifications within two years of implementation of the Additional Financing Credit. During implementation of the original RERED project, IDCOL developed a policy guideline for “Disposal of Warranty Expired Batteries” and to ensure its effectiveness developed standard agreements to be entered into between Battery Manufacturers and POs to buy back warranty-expired batteries as per the guideline. Similarly, the project will now facilitate developing a national guideline for collection and recycling of used CFLs using good practices in the developed and other regional countries. REB has updated its Environment Management Framework (EMF) of the project by incorporating the above changes.

Governance and Anti-corruption

50. Bangladesh has a challenging environment with regard to governance and anti-corruption issues. There is significant risk of corruption, particularly where large scale procurement is involved. However, government has put efforts to improve procurement framework to better mitigate the related risks.

51. The parent RERED project has two implementing agencies – REB and IDCOL. REB operates under the civil service rules and IDCOL operates under the Companies Act governed by an independent Board of Directors. During the implementation period of the RERED project, there had been several newspaper articles indicating political interferences in REB’s decision making process. The news media questioned procurement award decisions made by REB management under GOB funded projects. Given this news media perception, the RERED Task Team maintained very close supervision of the RERED project. Almost all procurement packages of REB under the RERED project were prior reviewed by the Procurement Specialist of the Task Team. REB had to obtain no objection from IDA on its final bidding documents and bid

evaluation reports. This reduced the risk of political or other interference under the Bank financed procurement of REB under the RERED project.

52. Implementation of the renewable energy component by IDCOL followed a financial intermediary model, where the consumers borrowed funds from POs and followed commercial practices to purchase their SHS and IDCOL refinanced POs 80% of the their loans to households. To ensure that POs are claiming refinancing for actual installation of SHS, IDCOL initially inspected 100% of SHS installations physically before making any disbursements. When IDCOL found any discrepancy between the claimed SHS and actual verification, which could be difference in size of the SHS, model number of the PV panel, etc. IDCOL disallowed those claims and asked the POs to explain the reasons behind the discrepancy. To ensure a proper database of all the SHS installed with name of the households and their address, IDCOL developed a software database and required all POs to maintain that database. This helped IDCOL to monitor the program and ensure that no system has claimed refinancing or the subsidy twice. As the program expanded, (POs are installing about 12,000 SHS per month) IDCOL reduced its physical inspection ratio to about 50%-60%. However, IDCOL carried technical audit of SHS performance based on random sampling of consumers from the database it maintains. These stringent procedures have helped IDCOL to mitigate governance and corruption risks under the project. IDCOL Board has now decided that this technical audit will now be carried out annually through an independent firm.

53. Under the Additional Financing Credit IDCOL will continue to implement its renewable energy project under the same principles established in the parent project. This implementation model has already been tested, under which about 320,000 SHS have been installed, and other development partners (ADB, IDB, GTZ, KfW, etc.) have also reviewed this model independently and agreed to finance IDCOL under the same approach. This provides good evidence that this model is robust enough to protect the project from governance related issues and corruption risks.

54. The CFL component is new to the project and would require REB to procure CFLs following IDA Procurement Guidelines. At most there could be two procurement packages. IDA would require the implementing agency to follow ELI (Efficient Lighting Initiative) benchmarks as the minimum basis, particularly in terms of quality parameters of technical specifications, to procure these lamps and the Bid Document and the Bid Evaluation Report will be prior reviewed by IDA to mitigate governance and corruption risks.

55. The REB system loss reduction component financed by the Additional Financing Credit has limited exposure to governance and anti-corruption issues as all the procurement has already been carried out following IDA procurement guidelines and contracts have been awarded. The Task Team will however ensure through its close supervision of the project that the goods procured are actually used to renovate the lines taken over from BPDB and the system losses of those lines comes down to less than 20% after the renovation is complete.

VI. Expected Outcomes

56. This project is expected to meet the development objective of raising social development and economic growth by expanding access to electricity in rural areas. Both the SHS and mini-grid components will expand access to electricity to rural households and businesses. The success of this program is easily measured by the number of systems installed, which is recorded by the POs. The success of the CFL program can also be measured by the number of light bulbs replaced, against the target of 10 million, and the subsequent reduction in overall electricity demand. This reduction in demand will reduce load shedding, which has hurt electricity availability in rural areas. Detailed outcome indicators are provided in Annex 5.

VII. Benefits and Risks

57. Rural electrification is a critical infrastructure element needed for improvements in economic development, provision of social services, and enhancement of quality of life. Already the original RERED project has brought grid electricity to about 600,000 consumers and off-grid lighting to about 320,000 households, businesses and community centers. While the magnitude of these benefits is expected to increase with the additional financing, there are some risks to consider as the program expands.

58. The greatest threats to the sustainability of the project are:

- **Market saturation:** There may be a finite population that is able to afford the SHSs under the current financing schemes.
- **Maintenance and reliability:** As more and more installed SHSs enter the battery replacement phase, and other parts begin to show wear, it is important to keep up with maintenance to retain consumer confidence in the technology.
- **Component quality and cost:** Price fluctuations or technical failures of procured system parts could impact consumers' perceptions of PV and its relative affordability and reliability.

59. Prior to the current RERED project, a market report for Bangladesh estimated the SHS market at 500,000 households. However, over this period the SHS market has developed and several entry barriers have been removed. Now that IDCOL is targeting 1,000,000 households, there is a risk that the market will saturate before reaching that goal. The greatest scale-up constraint appears to be with affordability so POs will need to be creative about how to size and finance the systems to make them affordable to poorer households. There have already been some efforts in this direction and POs have started to target households demanding smaller systems. It is up to the POs to make sure their product lines reflect consumer demand. In addition, IDCOL plans to conduct a new market survey to help direct the project expansion.

60. Most of the growth in SHS installations in Bangladesh has occurred very rapidly and as the program matures there is likely to be a greater number of battery and component failures. There is a risk that with further scale-up the technical problems will become more prominent and reduce customers' favorable impression of solar. Steps have already been taken to mitigate this risk in the creation of a Technical Standards Committee (TSC). Through this project, IDCOL will be able to strengthen the TSC, its activities and its monitoring role.

VIII. Financial Terms and Conditions for the Additional Financing

61. The Additional Financing Credit would be an IDA Credit repayable in 40 years, including a grace period of 10 years. GOB will then transfer the IDA credit to IDCOL and REB under the following terms.

- a. SHS and Renewable Energy Component: GOB will lend the proceeds to IDCOL under a subsidiary loan agreement at an interest rate of (3%) and a repayment period of (20) years including a (5) years grace period. The foreign exchange risk to be borne by the Recipient.
- b. CFL Component: GOB will transfer the proceeds to REB as a grant.
- c. Grid Electrification Component: GOB will lend the proceeds to REB under a subsidiary loan agreement with a repayment period of 25 years after an 8-year grace period, an interest rate of three-fourths of one percent ($\frac{3}{4}$ of 1%) per annum during the grace period, capitalized; an interest rate of two percent (2%) per annum thereafter, and the foreign exchange risk to be borne by the Recipient.

Annex 1
Bangladesh: Rural Electrification and Renewable Energy Development Project
Request for Additional Financing Credit (US\$130 million equivalent)
Financial and Economic Analysis

The SHS Component

Financial and Economic Analysis

The Solar Home Systems (SHSs) range from 20 WP to 120 WP and are used by households for lighting, watching TV, and running small appliances like cell phone chargers. The direct benefits accruing to households from the use of SHS result from savings in the purchase of kerosene due to replacement of kerosene lamps. Prior to the deployment of SHSs, many households ran TVs on batteries which were typically of low-quality and required frequent re-charging. Switching to SHS (of 40 WP and above) saves the households from this significant cost and inconvenience of recharging batteries. Among the costs of owning an SHS, household makes down payment for the system (usually 10% of the system price), pays the remaining amount in monthly installments, and carries out the replacement of system batteries and other accessories (charge controllers and lamps) at the end of their useful lives.

Under the existing RERED project, more than 320,000 SHSs were installed through the Participating Organizations (POs). Of the number of systems installed so far, about half (45%) are of 50 WP size, 20% of 40 WP size, 20% are in the range of 60-65WP, and only 9% in the 85 WP range. Less than 2% of the systems were in 20-30WP size. These small systems cannot run TVs and hence are not popular with rural households. The price of the most popular 50 WP system is currently Tk 27,900 (about US\$400) and the minimum 10% down payment turns out to be \$40 for a 50WP system. The POs have reported that the average monthly income of households buying 30WP or above ranges from Tk 6,000-10,000 (US\$90-150). The POs do their own due diligence on the affordability of the households to pay for the systems. The overall collection efficiency of the existing program is 98%.

Taking the costs and benefits over the life of an SHS (20 years), the net benefits of the additional systems to be installed under the proposed additional financing program were calculated in terms of financial rate of return (FIRR) and economic rate of return (EIRR). The FIRR takes into account direct benefits of using the system (cost savings from kerosene and battery recharging) and direct costs of owning the system (including the replacement cost of batteries and other accessories). The EIRR is calculated based on the same benefits and costs but net of taxes and subsidies. As the existing project is going through the process of getting carbon benefits (the necessary CDM validation is currently on-going), the analysis also looked at the financial/economic returns with and without carbon benefits.

Results Summary

As the following table shows, the net benefits calculated in terms of FIRR and EIRR of systems above 20 WP size are high. The benefit of using a 20 WP system derives mostly from replacement of kerosene lamps, and does not add up to significant benefit to the consumers at the current prices of kerosene (the economic return is actually negative). The smaller systems are used by poorer households, and continued subsidies are needed to make these systems affordable. The prices of bigger systems (85WP) are proportionately higher than the medium range (40-50 WP), contributing to reduced rate of return for the bigger systems. The project is viable without the carbon benefits, while the carbon claims bring slightly higher benefits to households.

Size of SHS (WP)	FIRR		EIRR	
	Without Carbon Benefits	With Carbon Benefits	Without Carbon Benefits	With Carbon Benefits
20	3.1%	4.0%	-0.6%	0.4%
40	41.1%	41.9%	33.0%	33.7%
50	32.8%	33.7%	26.9%	27.8%
65	30.4%	31.2%	25.1%	25.9%
85	25.5%	26.5%	21.4%	22.4%

Assuming that the additional 300,000 SHSs under the proposed additional financing follows roughly the same distribution of WP sizes as of the existing project (2% of 20 WP size, 21% of 40 WP, 45% of 50WP, 23% of 65WP, and 9% of 85WP), the weighted average FIRR and EIRR of the total program would be about 33% and 27% respectively (without carbon benefits). Adding the carbon benefits, the FIRR and EIRR of the additional SHSs would be about 34% and 28% respectively.

Sensitivity Analysis

The financial and economic benefits from using the higher size SHS (above 20WP) are robust. The weighted average returns of the program will still be above 15% even if prices of kerosene dropped by half from the current level. If all the additional SHSs were of small sizes (50% of 20WP and 50% of 40WP), the weighted average FIRR and EIRR will be 22% and 16% respectively without carbon benefits. If the savings from the avoided costs of battery recharging were to reduce to half from the current level, the returns will still be above 15% for systems above 20WP.

Assumptions Used in the Analysis

The following are the key assumptions used for quantifying the benefits and costs of owning SHS:

- The solar panels are assumed to have a life span of 20 years and the system prices range from Tk 13,000 (US\$ 190) to Tk 41,900 (US\$ 612), depending on the size of the system.

- Battery costs are assumed to range from Tk 3,200 to Tk 11,400 depending on the size of the SHS and are assumed to be replaced by the household at its own cost after the end of its estimated useful life of 5 years.
- The associated accessories, charge controllers and lamps, are estimated to have a life-span of 3 years after which the household replaces them at its own cost. Prices of charge controllers are assumed to be Tk 600 each, and lamps at Tk 350 each.
- Household pays 10% of the system price as down payment and the rest is borrowed at 12% interest rate to be repaid in equal monthly installments in 3 years.
- The battery recharging cost savings are assumed to be Tk 240 per month. This cost is based on the price charged by a battery recharging station (Tk 1 per Amp) and the costs of transportation to and from the recharging station. The avoided cost of battery replacement (Tk 5,650 each) after 2 years of useful life was also added as a benefit to the household. These cost savings were assumed for SHS of 40 WP and above only.
- Price of Kerosene was assumed to be Tk 44/liter (equivalent to about US\$ 2.8/ US gallon). This is the current selling price of kerosene at the retail level.
- The following kerosene consumption pattern for different systems is assumed. The figures are taken from a sample survey of 441 households done by Grameen Shakti in early 2009 as part of establishing a baseline for claiming carbon benefits. The sample had only one 20 WP system with a consumption of 3.94 liters/month. To be conservative, an amount of 3.5 liters/month of kerosene consumption savings was assumed for a 20 WP system.

Table: Summary Results of Survey of Grameen Shakti (2009)

Size of SHS (WP)	Kerosene Consumption per Household per Month (Liters)	Average # of Kupis used by Household	Average # of Hurricanes used by Household
20		2	1
40	4.22	1	2
50	6.15	2	2
65	8.63	2	3
85	10.94	3	4

- The Grameen Shakti survey also established the average number of lamps (hurricanes) and small lamps (kupis) used by households (as shown in the table above). The price of each hurricane was assumed to be Tk 120 and kupi Tk 20 each with estimated useful life of one year. By owning an SHS, the household saves on the replacement cost of these lamps.
- Emission factor for kerosene was assumed to be 2.41 tCo_{2e}/kl and the price for carbon benefit was assumed to be 10 US\$/tCo_{2e}.
- For the purpose of calculating the economic rate of return (EIRR), all prices were assumed net of tax and subsidy. Tax rates assumed were: i) 5.5% for solar panels; ii) 25% for batteries; iii) 8% for charge controllers; and iv) 12% for lamps. Total tax on kerosene price was assumed to be Tk 12 per liter. Subsidy in each system was estimated at Euro 30.

- A price contingency of 10% was included in the financial return calculations.
- Exchange rate was assumed to be Tk 68.4/US\$ and US\$1.32/Euro.

The Energy Efficiency – CFL Component

Financial and Economic Analysis

The additional financing will fund the deployment of 10 million CFLs in areas with the highest electricity demand. Although the Government's goal is to replace all incandescent lights (ILs) nationwide with 30 million CFLs in the long term, 10 million CFLs will be distributed in the first phase in high priority areas that have been identified through surveys carried out with the assistance of GTZ. The GTZ funded survey shows that of the 12 million households having access to grid power each use 2 to 3 on an average, and on a weighted average basis 2.3 incandescent lamps, of mostly 40W rating.

The cost of the proposed CFL deployment program will be the cost of procurement of the energy efficient and high quality CFLs and the cost of distributing them to the households to replace inefficient incandescent lamps. In addition, there will be costs associated with designing and implementing consumer awareness programs and M&E plans. CFLs are more expensive than ILs. However bulk procurement of CFLs will ensure the cheapest price. The higher cost of CFL is offset by the fact that CFLs last about 5-6 times longer than incandescent lamps (10,000 hours compared to 1000 hours typically) and consumes 80% less energy for the same light (lumens) output.

The Government intends to distribute the first replacement CFL free (limit of four per family) and therefore there will be no cost to the consumer other than the remaining value of incandescent lamp which they will bring to the office of the electric utility. The benefit to the consumer will be the reduction of electricity consumption and hence the monthly electricity bill, which they accrue for the life of the CFLs and also the avoidance of the replacement cost of incandescent lamps which would have been there during this life of the CFLs, had the consumer continued to use incandescent lamps.

The cost of this Component to the Government will be the cost of CFLs itself, CFL distribution costs (including transportation costs associated with taking CFLs from the head offices to zonal offices/distribution centers), cost of implementing consumer awareness programs, and monitoring and evaluation plans. The benefits of the program for the Government will be the avoided cost of installing power generation capacity equal to the electricity saved by the CFLs compared to incandescent lamps and the O&M cost of running these electricity generation plants.

In addition, a further benefit of the introduction of CFLs is the reduction in Green House Gas (GHG) reductions due to the reduced need for energy from the supply side that is power stations. These GHG emissions reductions can be claimed by the Government under the CDM, with the assistance of the World Bank. The sale of certified emissions

reduction (CERs) through CDM, in the global carbon market will bring additional revenues to the Government.

The following table summarizes some of the assumptions of the financial and economic analysis of the CFL component.

Wattage (average) of CFL (as a replacement of 60W incandescent lamp):	15 W
Usage of lamps per day:	4 hours
CFL Lifetime (as defined by ELI specifications):	6,000 hours
Program Leakage Factor (Losses due breakage, etc.):	5%
Cost of High Quality CFL (assuming high PF CFL):	\$1.10
Program Implementation Cost (Distribution, M&E)	\$1,500,000
Overall Consumer Awareness Program:	\$1,000,000
Recycling/destruction of ILs	\$500,000
Overall Program Contingencies, Other Costs:	\$1,000,000
GHG Emissions Factor:	700 kg/MWh
Avoided Generation Costs (IPP):	4.5c/KWh
Price of CERs in the Carbon Market:	\$10/tCO _{2e}
Exchange rate	Tk 68.4/US\$
Price escalation:	None

The analysis here takes into the energy savings due to replacement of ILs with CFLs. This energy savings is quantified using the Bulk Supply tariff (for financial analysis) and in avoided generation costs (for economic analysis). The lifetime savings of energy from using CFL is the only benefit considered for the purpose of this analysis. The analysis does not take into account the avoided T&D losses, replacement costs of ILs, consumer outage costs, and other positive cross-effects of CFLs. There will be increase in reliability of the supply in the system due to the availability of freed up capacity resulting in lower number of power cuts (load shedding) particular in rural areas resulting in avoidance and/or reduction of consumer outage costs. The cross-effects of CFLs such as reduction in cooling (air conditioning) loads inside the households due to lowered cooling needs because less heat (waste energy) will be dissipated by cooler CFLs compared to inefficient incandescent lamps.

Results Summary

It is estimated that 10 million CFLs will result in 312 GWh/year in energy savings (at the bus bar) equivalent to US\$ 11.5 million per year. Taking into the cost of the program of US\$15 million, the FIRR and EIRR of the program turns out to be 44% and 52% respectively. Including the CDM benefits, the FIRR and EIRR of the program will turn out to be 52% and 60% respectively.

Annex 2
Bangladesh: Rural Electrification and Renewable Energy Development Project
(REREDP)
Request for Additional Financing Credit (US\$130 million equivalent)
Operations Policy 8.30 Compliance Review

I. Introduction

This is a review of the proposed additional financing Credit for Bangladesh: Rural Electrification and Renewable Energy Development Project (REREDP), to ascertain its compliance with World Bank OP 8.30 requirements. This review is based on background documents, a detailed discussion with the Task Team Leader and team members, and review of documents submitted by Infrastructure Development Company Limited (IDCOL), the financial intermediary (FI) for the project.

II. The Project: Financial Sector Context and Objectives

1. The original REREDP, scheduled to close in December 31, 2009, has been under implementation with the objective of spreading affordable lighting in rural areas of Bangladesh through installation of Solar Home Systems (SHSs) and providing reliable electricity generated from other renewable energy sources. This off-grid electricity component of REREDP is being implemented by IDCOL, which on-lends to selected partner organizations (POs) across the country. The additional financing of REREDP aims at scaling up the off-grid renewable energy component (US\$98 million) keeping the project objectives the same while introducing one new component: an energy efficient component for Compact Fluorescent Lamps (CFLs) as part of demand side management to help alleviate energy shortages in the country (US\$15 million).
2. Access to electricity improves the quality of livelihood in rural areas and empowers the poor, as stated in the second pillar of CAS. On the other hand, financing real sector investment in affordable power in environmentally friendly manner and promoting development of participating FIs are real benefits derived from a financial intermediary loan (FIL), which is consistent with the first pillar of CAS. As such, the Additional Financing Credit for the FIL is very much consistent with the country's poverty reduction objectives.

III. Policy Framework for the FIL

1. There is no issue with respect to the macroeconomic environment or the interest rate regime. Bangladesh has a record of consistent and successful macroeconomic management resulting in a steady growth pattern, relatively moderate inflation, and a stable and market-based exchange rate.
2. Despite the ongoing global financial meltdown and the resultant macroeconomic imbalance in a number of developed as well as developing economies, Bangladesh has,

so far, remained one of the least affected countries. Relatively low integration with global financial markets is probably one reason for this. However, the country's economy is well integrated with the global markets through the export of readymade garments and through remittances sent back by the expatriate workers. There is some indication that Bangladesh could be affected by the global recession in these two sectors in three to six months time. The Government of the country is preparing itself for such a shock, as much as possible, and a Government Task Force is actively working on possible measures that need to be taken. It is expected, that with positive steps, the shocks will be absorbed and be managed to a reasonable degree.

3. One important aspect of the compliance review is the likelihood of Government intervention in the market through the project, which might distort the financial intermediation process in the country. As in the ongoing REREDP, the implementation approach would remain the same for the Additional Financing Credit: i.e. IDCOL would provide financing to the POs (NGOs, micro-finance institutions, cooperatives, and private organizations) to sell the SHSs to consumers using a micro finance scheme. The POs have greater access as well as acceptability at the community level. The hands on expertise and experience in implementing micro-finance operations would also be a criterion. The POs would extend micro-finance for consumers to buy the systems and would, in turn, get re-financing from IDCOL for up to 80% of the micro-finance extended to consumers. The POs operation would be at the market determined interest rate, as in other microfinance services they provide. Currently the POs' interest rate varies between 12% -15% (nominal rate) with a repayment period of 2-3 years. The POs receive re-financing from IDCOL at 6% interest rate, with a 10-year repayment period, including a grace period of 2 years. The cost of funds for the POs under the RERED project is comparable with their other sources of financing – such as PKSF (Pally Karma Shahayak Foundation), the apex institution financing micro-finance organizations in Bangladesh. Thus, there would be no significant market distortions arising from implementation of the Additional Financing operation for RERED project.

4. There is, however, some subsidy component in the lending process of SHS to poor households. A small subsidy of US\$50 per SHS per household (initially, it was US\$90) on the selling price is provided to buy down the capital cost of SHS. Grant funding is also provided to overcome the initial market barrier by increasing awareness among the poor households, building up capacity of the POs, and training households on how to operate the systems. It is expected that the need for a subsidy would continue to decrease as the remaining market barriers are overcome, competition is enhanced in the market, and the SHSs become affordable enough to reach even more remote areas and poorer households.

IV. Eligibility of the FI

1. Implementation Progress

As per the background documents, implementation progress of the renewable energy component implemented by IDCOL has been highly satisfactory. Against an initial project target of 50,000 households, over 320,000 households have now been provided with SHS-based electricity access over the 6-year project implementation period. Currently, 12,000 households are getting SHS installed per month. The pace of growth suggests that there is demand for SHS at the household level and IDCOL can utilize the additional resources needed to satisfy the market demand.

2. Financial Performance of IDCOL

(vi) Capitalization: In terms of capitalization, IDCOL has a sound capital structure. As of June 30, 2008 its share capital was BDT 400 million and total equity was BDT 548.09 million, which is approximately 41% and 56% respectively of the loans and advances outstanding.

(vii) Recovery Performance: The implementation of the IDCOL approach has proven to be sustainable without compromising the loan recovery rate. The recovery rate is 98%, on average, at PO-beneficiary level and 100% at IDCOL-PO level.

(viii) Loan Loss Provisioning: IDCOL abides by the provisioning guidelines of Bangladesh Bank, the country's central bank. The financial intermediary has been provisioning 1% for unclassified loans and 5% for the classified part of the portfolio.

(ix) Accounts Keeping: Accounting documents and financial statements of the Company have been audited by established audit firms over the last three fiscal/accounting years. It appears that adequate numbers of disclosure have been made in company annual reports and these were approved by the auditors.

(x) Profitability: As per audited financial statements, IDCOL has been earning profits, which are enough to support sustainability.

3. Exemptions

As per Bangladesh Bank Circular, IDCOL is exempted from compliance of sections 4(d), 6,9,14(1),14(1)(d),14(1)(e),14(1)(f), 16, 17, 18, 19, and 25(3) of the Financial Institutions Act 1993. These exemptions provide Government guarantees and enhance IDCOL's capacity to sustain itself as a viable, non-banking, financial institution in Bangladesh.

4. Under the original REREDP, IDCOL received OP 8.30 clearance during project appraisal.

V. Recommendations

Considering the above points and based on other available information, it can be concluded that IDCOL, the financial intermediary, is compliant to OP 8.30 requirements. However, it is recommended that adequate care and due diligence be carried out as regards the following aspects:

- (a) In order to be compliant with CAS pillars and outcomes, REREDP would remain focused on poor households' demand satisfaction and sufficient emphasis would be given to the newly-introduced component of demand side management to have a greater development impact.
- (b) The project would definitely need to examine closely the impact of the global financial crisis on IDCOL, on the POs, on the rural households dependent on remittances, and on the project's financial management as a whole.
- (c) The standards and criteria used for selecting POs by IDCOL should be maintained and, if necessary, may need to be revised to improve the quality of implementation.
- (d) It is understood that the amount of subsidy component is small and is required for increasing awareness among poor households in the rural areas. IDCOL should take care in regard to the use of the subsidy component to ensure that benefits actually meet project criteria.
- (e) For these kinds of projects, success in project management as well as in financial performance of the FIs/POs depends on close monitoring by the implementing agency. Therefore, as the additional financing component gets going, a more rigorous monitoring system (through frequent field visits) put in place would only help in maintaining the high standards set earlier.

Annex 3
Bangladesh: Rural Electrification and Renewable Energy Development Project
(REREDP)
Request for Additional Financing Credit (US\$130 million equivalent)
Financial Management Assessment Review

Financial Management

1. Brief Project Description: The proposed additional financing would help finance the costs associated with:

- | | |
|---|------------------|
| (i) scale up the project's renewable energy components through the installation of Solar Home Systems (SHSs) and Technical Assistance | US\$ 94 million |
| (ii) scale up pilot projects for generating electricity from fuels like biogas, biomass, solar thermal, and Technical Assistance, etc. | US\$ 6 million |
| (iii) introduce energy efficient Compact Fluorescent Lamps (CFLs) as part of demand side management | US \$ 15 million |
| (iv) rehabilitate additional electricity distribution networks in rural areas as part of the System Loss Reduction component of the project | US\$15 million |

The project under additional financing will be implemented by the two agencies -- Infrastructure Development Company Limited (IDCOL) a Financial Intermediary fully owned by the Government and Rural Electrification Board (REB) an autonomous body under the Power Division of the Ministry of Power Energy and Mineral Resources. These agencies have been implementing the original project. The first two parts will be managed and implemented by IDCOL, using eligible Participating Organizations (POs) and Project Sponsors. The third and the fourth components will be managed and implemented by REB. In implementing the third component – installation of CFLs in exchange of incandescent lamps, REB will use the rural electric cooperatives known as Pally Bidyut Samities (PBSs), Bangladesh Power Development Board (BPDB), Dhaka Power Distribution Company (DPDC), Dhaka Electric Supply Company (DESCO), etc. by signing participation Agreements with them.

2. FM capacities : The financial management (FM) arrangements used in the original project, which are satisfactory to IDA, will be used under the additional Financing with add on arrangement corresponding to the expected changes in the financing arrangements in respect of SHS and distribution of 10 million CFLs, in exchange of incandescent lamps, to the electricity consumers. IDCOL's Financial Management organization and systems have been adequate to manage its operation and to undertake the project financial management activities. Financial Management

Organizations of the REB is a robust one and its entity financial management systems are also acceptable, although the implementation of its computerized accounting system is going a bit slow. Both the agencies have been using their entity FM systems for financial management of the project. During implementation to date, RERED implementing agencies i.e., IDCOL and REB financial management team have acquired significant experience in IDA procedures and requirements.

3. Disbursements and Flow of Funds: The additional financing will use transaction based disbursement currently used under the original project. IDA funds will continue to be channeled through the existing special accounts (CONTASA) operated by IDCOL and REB under the original Credit. For the new energy efficiency component, a separate Designated Account (CONTASA) has to be opened as this fund will be transferred to REB as grant. Authorized Allocation for REB's special account is Tk 670 million which will remain unchanged, the Authorized Allocation for the new Designated Account of REB could be Tk 100 million. IDCOL requested to increase its Authorized Allocation from Tk 100 million to Tk 250 million given increase in pace of implementation of their project.. Additional financing of \$100 million will be accessible to IDCOL through a Subsidiary Loan Agreement with MOF in order to refinance loans to be made to households for purchase of SHS and to refinance loans for installing small generating plants from biogas and biomass. Funds will flow from IDCOL to Participating Organizations (POs) and Project Sponsors through sub-loans under Sub-loan Agreements between IDCOL and the POs and Sponsors. IDA will finance 100% inclusive of taxes in sub-loans and goods and services associated with management of sub-loans. The requested additional financing of US\$ 15 million for REB Grid component will flow to REB to meet the anticipated financing gap on the contracts already awarded. This is the only activity under AF in which Government counterpart funding is involved in financing taxes and duties. For this activity, IDA will finance 100% of works, goods and services net of taxes.

4. Disbursement on CFL: The disbursement under AF will continue under the same disbursement categories except for the new financing to compact fluorescent lamps (CFL). A new disbursement category will be opened to track disbursements on Goods, Services and Incremental Operating Costs (to be defined in the Financing Agreement) up to \$15 million for procurement and installation of about 10 million compact fluorescent lamps (CFL) in exchange of incandescent lamps to households in the urban and rural habitats across the country. REB will procure the CFLs and will distribute these through PBSs and the electricity distribution companies. To avail the economy of scale, the procurement will be done through two packages with IDA's prior review and funds will be disbursed through Special Commitment. A new Designated Account will be used to fund services and incremental operating costs for this component. IDA will finance 100% inclusive of taxes and duties. To meet the fiduciary assurance that the fund is used for the intended purpose, the actual distribution of CFLs to the targeted consumers will be carried out according to the implementation arrangement outlined in the CFL project Development Project Proposal, satisfactory to IDA and approved by GOB. Adequate and accredited documentation will be provided to authenticate implementation progress that would be reported through Project Physical Progress Report.

5. Disbursement Category: IDA financing under the credit through the various disbursement categories would be as follows.

Table 3.1: Disbursement Table

Category	US\$ Million	% of IDA Financing
(1) Works REB Grid	1.50	100% exclusive of taxes
(2) Goods (a) REB Grid	12.00	100% exclusive of taxes
(b) IDCOL	0.20	100% inclusive of taxes
(3) Services (a) REB Grid	1.50	100% exclusive of taxes
(b) IDCOL	2.00	100% inclusive of taxes
(4) Goods, Services and Incremental Operating Costs For REB CFL	15.00	100% inclusive of taxes
(5) Sub-loans IDCOL	97.80	100% inclusive of taxes
Total Amount	130.00	

6. Accounting: Since, IDCOL as a financial intermediary, will be borrowing from the Government, IDA funds on additional financing of SHSs, IDCOL's records and financial statements should reflect the amounts payable to the Government and receivable from the POs. In ensuring accounting and financial control of transactions under additional financing IDCOL agreed to enhance their current accounting system in consultation with IDA. Any inadequacy in the accounting and reporting systems in IDCOL and non-availability of reliable, timely and periodic information from the POs to monitor performance may increase the risk of inefficient use or diversion of funds. IDCOL agreed that its evaluation of POs will encompass an assessment of their FM capacities as well. IDCOL shall also strengthen its field monitoring of loan recoveries at various unit offices of the POs and their accounting controls. IDCOL has agreed to maintain adequate FM systems in IDCOL and in the POs and this will be ensured through insertion of appropriate provisions (stated below) in the Operating Guidelines of the project and Participation Agreement signed between IDCOL and the POs:

"POs shall:

- (i) maintain a financial management system including records and accounts, and prepare, all in accordance with accounting standards acceptable to the

Association, consistently applied, adequate to reflect distinctly the operations, resources and expenditures related to subloans granted under the Project.

- (ii) have their records, accounts and financial statements (balance sheets, statements of income and expenses and related statements distinctly identifying) for each fiscal year audited, in accordance with auditing standards acceptable to the Association, consistently applied, by independent auditors listed under the List of Auditors Grade-A of Bangladesh Bank ;
- (iii) promptly furnish at the request of the Association, as soon as available, but in any case not later than six months after the end of each such year, (A) certified copies of the financial statements referred to in clause (i) of this Section, for such year as so audited, and (B) an opinion on such statements and report of such audit, by said auditors, of such scope and in such detail as the Association shall have reasonably requested including a management letter indicating auditor's findings on state of governance ,internal controls and management practices involved in POs' operations and measures recommended by auditors to overcome weaknesses ; and
- (iv) furnish to the Association such other information concerning such records, accounts and financial statements, and the audit thereof, and concerning said auditors, as the Association may from time to time reasonably request
- (v) furnish to the Association IDCOL's assessment of financial management capacities and practices of the selected POs.

7. Financial Reporting: The format, content and periodicity (within 45 days of the completion of quarters) of the Financial Monitoring Reports (FMR) under AF will continue to be the same as in the original Credit except for project finance and implementation report on CFLs by REB for which contents and formats of reporting was agreed during negotiations. Under the original Credit, FMRs have been received in a reasonably timely manner and with acceptable quality. However, FMRs were produced from a standalone excel spread sheet rather than from the entity accounting system, exposing to risk of inaccuracy and manipulations. It has been agreed with both REB and IDCOL that henceforth FMRs would be produced from the entity accounting system and the accounting process and FMR presentation arrangements will be monitored during FM supervisions.

8. Internal Control: IDCOL through interim operational review meetings has initiated to address fiduciary and internal control weaknesses. IDCOL has agreed to share the minutes of the meetings with IDA at its request. REB's audit findings reflected on lack of reconciliation of transfer of funds and resources from REB to PBSs and repayment by PBSs to REB. REB undertakes to strengthen its internal control arrangement in terms of appropriate documentation, audit trail and regular reconciliation.

9. Audit: IDCOL has been submitting the external audit reports both for the entity and the project within the due dates. However the entity audited financial statements were

not clearly reflecting the project transactions and the auditors did not always provide managements letters. REB also submitted all due audit reports with some exceptions on timeliness for entity audit reports. Absence of management letters was also prevalent in respect of REB audits. To address the above issues, appropriate provisions will be inserted in the Article IV of the Project Agreements or recorded in the minutes of negotiations requiring REB and IDCOL to furnish management letters and to share the audit TORs with IDA. REB audit reports were often qualified but REB has been progressively addressing the audit issues and has always been responsive to Bank's concerns on audit follow ups. There are a number of outstanding audit objections on REB audits for which REB is preparing a dated Action Plan to resolve the audit issues. The audit requirement under the Additional Financing that will be tracked through the Audit Report Compliance System (ARCS) will follow the provisions of the original project as stated in the following table:

Implementing Agencies	Audit	Auditors
REB	Project Financial Statements	C&AG
REB	Entity	Private Auditor
IDCOL	Project Financial Statements	Private Auditor
IDCOL	Entity	Private Auditor

10. FM Risks: From the fiduciary perspective, the overall FM risk for the Additional Financing is assessed as Substantial. This is composed of high inherent risk at country level and substantial to moderate control risks at the project level. The following matrix presents the risks associated with this project and their respective mitigation measures.

Identified FM risks	Rating	Mitigation measures	Rating Post Mitigation
<p><u>Fund Flow</u></p> <p>(i) Fund flow to REB and IDCOL and to IDCOL's POs might be constrained due to delayed (a) financing arrangements between the Government and REB and IDCOL (b) refinancing agreement between IDCOL and POs</p>	S	<p>Subsidiary Loan/Grant Agreements (draft) between GOB and IDCOL and between GOB and REB to be endorsed by MOF during negotiations or signing of such agreement(s) will be effectiveness/ disbursement condition. IDCOL's on lending terms to its POs will be agreed during negotiations.</p>	S
<p><u>Internal Control</u></p> <p>Internal control arrangement and accounting control environment of the POs are unknown. IDCOL's coverage of POs and its unit offices accounting and customer loan recovering systems for tracking the flow and use of fund yet to</p>	S	<p>IDCOL agreed that its assessment of POs will encompass an assessment of their FM capacities as well. The Participation Agreement between IDCOL and POs will contain provisions requiring the POs to maintain adequate FM</p>	S

Identified FM risks	Rating	Mitigation measures	Rating Post Mitigation
be streamlined.		systems.	
<p><u>Financial Reporting</u></p> <p>Timely, reliable and accurate reporting under AF may be constrained due to FMRs not produced from the entity accounting systems and financial statements not reflecting distinctly the project resources and expenditures</p> <p>Contents and format of a report on implementation of CFL distributions at the level of end users.</p>	S	<p>FMR submission shall continue at quarter intervals on total expenses of the project (Own, GOB contribution and IDA fund). Both REB and IDCOL agreed that henceforth FMRs would be produced from the entity accounting system.</p> <p>The accounting process and FMR presentation arrangements will be monitored during FM supervisions. The format, contents of the reporting on CFL distributions will be agreed with REB before starting implementation of this activity</p>	M
<p><u>Audit</u></p> <p>The audit reports may not capture accountability and corruption issues adequately and audit report on POs may not provide the assurance that sub-loans proceeds were used for the intended purpose.</p> <p>Governance and accountability issues might not be captured in absence of Management Letters.</p>	S	<p>Audit reports of both IDCOL and REB and also POs and PBSs will be supplemented by a management letter.</p> <p>Audit TOR on Audit of IDCOL, POs and entities borrowing from IDCOL and REB and PBSs under REB to be shared with IDA.</p> <p>While clearing the Audit TORs, IDA will ensure that auditors are required to issue management letters on weaknesses on financial management practices and report on governance and internal control framework.</p>	S
<u>Overall Project Risk Rating</u>	S		S

Annex 4
Bangladesh: Rural Electrification and Renewable Energy Development Project
Request for Additional Financing Credit (US\$130 million equivalent)
Procurement Assessment

GENERAL

The additional financing proposed is for US\$ 130 million out of which, for component 3 is about US\$ 15 million. Out of this US\$ 15 million consulting services would be for about US\$ 1.5 million and works of US\$1.5 million and goods worth of US\$ 12 million have already been procured and contracts awarded. Portion of this fund will have to retroactively be financed to REB from the credit.

The only change in procurement arrangement is for the new Component (2): the procurement of about 10 million CFLs at an estimated cost of US\$15 million to be deployed in households in areas with high electricity demand; REB will implement this component. For component 3, REB has completed the procurement process and awarded the contracts under the existing RERED project. Due to US\$ appreciation there is a shortage of US\$15 million fund to meet contractual obligation under the existing credit. The US\$ 15 million being provided under the Additional Financing will meet this shortfall.

The procurement under the proposed additional financing would be carried out in accordance with the Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004 revised October 2006 and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004 revised October 2006, as well as the provisions stipulated in the Legal Agreement. Within the overall context of Bank guidelines, the local procurement of goods, works, and services (for which the shortlists are expected to be entirely comprised of national consultants) will follow the Government's Public Procurement Act (PPA) 2006 (applicable to goods: < US\$300,000 per contract, works: < US\$300,000 per contract and consulting services-firms: < US\$100,000 per contract and individual consultant- < US\$50,000 per contract). In case of any conflicts between the Bank and GOB procedures, the Bank guidelines will prevail.

In addition, the project implementation will need to be carried out in compliance with *The Guidelines for Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants (dated October 15, 2006)*.

2. Prior Review Thresholds:

Goods and Works: The Bank will carry out prior reviews for the following contracts: (i) for goods - first contract using NCB, and thereafter contracts estimated to cost US\$ 300,000 equivalent or more, irrespective of the procedures; and (ii) for works - first package/contract using NCB, and thereafter contracts estimated to cost US\$300,000 equivalent or more, irrespective of the procedures.

Consultants Services: The Bank's prior review will be required for consultant's services contracts estimated to cost US\$100,000 equivalent or more for firms and US\$50,000 equivalent or more for individuals. All single-source contracts will be subject to prior agreement by the Bank. All TORs of the consultants are subject to the Bank's prior review.

3. Procurement Components and Responsibility: The project will have three components. Component 1 will be implemented by IDCOL and has no procurement. Components 2 and 3 will be implemented by REB.

4. Procurement Capacity and Risk Assessment: A procurement capacity assessment of REB was carried out to evaluate the capability of the implementing agency and of the adequacy of systems in place to administer Bank-financed procurement and to assess the risks that may negatively affect ability of the agency to carry out the procurement process. REB is the implementing agency of the present RERED project and it has adequate knowledge of Bank guidelines and procedures related to project implementation. However, REB has weaknesses in terms of internal controls, award delays, transparency, management of the procurement process, and in handling complaints. In order to safeguard against this and given the prevailing conditions for public procurement in the country, the project is rated "high risk" from the procurement and contract administration viewpoint. In order to minimize the risk, several measures including a procurement risk mitigation framework have been introduced.

5. Measures for Improving Governance in Procurement: Government has put efforts to improve procurement framework to better mitigate the related risks. Several risk mitigation measures have been agreed with the Government toward improving governance in procurement and minimizing procurement risks under the project. The three main pillars of the risk mitigation framework are: (i) system of handling complaints; (ii) disclosure of information; (iii) introducing a procurement risk mitigation plan (PRMP) with a set of performance indicators as described in paragraph 8 below to monitor procurement performance through reports submitted to IDA on a quarterly basis.

6. System for Handling Complaints: A credible system for handling complaints will be put in place in REB. The salient features of the system will be an oversight of a complaint database, a standard protocol with appropriate triggers for carrying out investigations, and actions taken against involved parties. The system will be developed and managed by REB. For ICB and international selection of consultants the Bank's prescribed complaint redress mechanism will apply.

7. Disclosure of Information: All information relating to bidding and procurement above the specified thresholds, as per PPR will be published in CPTU's website in addition to REB's website. In addition, the following additional steps will be followed as part of procurement and implementation:

- (i) ***Alerting agencies' officials/ staff:*** In accordance with the PPA and the Bank guidelines, REB will issue an alert letter notifying staff about the

possible consequences of corrupt procurement practices and similar behavior and the actions to be taken against the officials/staff found involved in such practices.

- (ii) ***Alert bidders:*** In pre-bid meetings, REB will alert all bidders on the consequences of corrupt practices (fraud and corruption, collusion, coercion, etc.) including the debarring of contractors.
- (iii) ***Multiple dropping:*** The multiple dropping of bids (bids submitted in more than one location and opened in one location) will not be permissible for any procurement under Bank financed projects.
- (iv) ***Timeliness of bid evaluation and contract award:*** In accordance with the PPA, REB will ensure the awarding of contracts within the initial bid validity period, and closely monitor the timing. The Bank may not finance contracts which are not awarded within the period of bid validity.
- (v) ***Action for corrupt practices (bidders and GoB staff):*** In cases where collusion has been established, REB will initiate actions, including the debarring of contractors/suppliers and actions taken against responsible GoB staff (if applicable), as appropriate in accordance with PPA and Bank guidelines.
- (vi) ***Filing and record-keeping:*** REB will preserve records and all documents regarding their public procurement, in accordance with the PPA provisions.
- (vii) ***Publication of award of contract in websites:*** For ICB and large value consultancy contracts including direct contracting and sole source selection of consultants, REB will publish contract award information in dgMarket/ UNDB online within two weeks of contract award; this is in addition to CPTU's and agencies' websites.
- (viii) ***Late payments and liquidated damages:*** REB will ensure the timely payment of bills of the suppliers/contractors/consultants and the imposition of liquidated damages for delayed completion specified in the relevant contracts.
- (ix) ***Oversight by Project Director(PD):*** PD will provide the oversight function for procurement and provide the Bank quarterly reports identifying any procurement deficiencies including measurement of procurement performance using the indicators mentioned below.
- (x) ***NCB conditions to be added:*** Bids should be submitted and opened in public in one location immediately after the deadline for submission.

8. Procurement Performance Indicators: REB will prepare reports on the following procurement performance indicators.

SL	Procurement steps / subjects	Indicators
1	Publication of invitation for bid	Percentage of invitations for bid published in the CPTU website in accordance with the PPA.
2	Receipt and evaluation of bid	<ul style="list-style-type: none"> • Average number of bidders purchased bidding documents. • Average number of bidders submitted bid. • Average number of days between receiving bids and completion of evaluation. • Percentage of contracts required extension of bid validity.
3	Contract awarding	<ul style="list-style-type: none"> • Average number of days taken between submission of bid evaluation report and the approval of contract for different financial delegation as per PPA. • Percentage of contract awards information published in CPTU's website as per PPA.
4	Delivery within the original schedule	<ul style="list-style-type: none"> • Percentage of contracts completed within the original deadline as stated in contract. • Percentage of contracts had liquidated damaged imposed.
5	Payments	<ul style="list-style-type: none"> • Average number of days taken for release payment. • Percentage of contracts where payments were not made as per contract. • Percentage of contracts where interest for delayed payment was made.
6	Procurement Training	<ul style="list-style-type: none"> • Ratio of staff get procurement training and number of staffs planned for procurement training.

Compliance with the above arrangements will ensure that the procurement under this additional financing is likely to be effective and transparent and result in smooth implementation of the project. However, procurement process and implementation of the contracts would be reviewed every six months by the Bank, and adjustments or corrections will be made, as appropriate.

Annex 5
Bangladesh: Rural Electrification and Renewable Energy Development Project
Request for Additional Financing Credit (US\$130 million equivalent)
Results framework and monitoring

The primary objectives of the RERED additional financing are to continue to expand access to electricity in rural areas not served by the grid and to reduce demand on the grid system through the introduction of demand side management measures which will make more electricity available in the rural areas which suffer disproportionately from load shedding. The first objective will be met through sales of solar home systems and installation of renewable energy mini-grids. The second will be met through the exchange of incandescent light bulbs for compact fluorescent lamps (CFL). The third component of the Project will help REB to complete renovation of its distribution lines taken over from BPDB and reduce system loss in Project PBSSs. Under the main project, REB has renovated about 9,000 km of lines and has brought down the system loss of taken over pockets from more than 40% to less than 20%. REB will continue to provide information of its System Loss Reduction Program as carried out under the parent project.

SHS sales will be tracked monthly by the POs and compiled by IDCOL. Sales are expected to continue to grow, or hold steady, for the three years of the Additional Financing operation. If there is a trend of reduced sales (seasonally adjusted), IDCOL will need to take action to identify and address the problem. By monitoring this metric closely, IDCOL is better positioned to respond to potential problems like market saturation and declining quality of service.

While SHS sales show the success of the business side of the project, there should be a corresponding rise in socio-economic status of the households which purchase a system. The quality of life impacts of the project is being monitored through a socio-economic impact assessment to determine the extent of changes to the health, education, and income of the households. There is no specific outcome indicator for socio-economic improvements from the additional financing since the assessment will cover primarily households that were connected under the first phase of RERED. However, it can be assumed that the impacts will be similar for SHS installations going forward. The baseline survey for the socioeconomic impact monitoring was carried out in 2006 and now a panel survey is ongoing. After some delays, the study is expected to complete in May 2010.

A successful result in the development of renewable energy mini-grids is less easily defined. IDCOL will accept proposals for new systems (several are already in the pipeline) based on the strength of design and technical, financial and economic viability. Setting a target for the size or number of systems could create a technology bias and therefore better left to the discretion of IDCOL.

The energy efficiency component will be measured by the number of CFLs that are distributed in exchange for incandescent bulbs. This program will be carried out by REB with the assistance of the PMU that will be created.

The REB' project component to renovate distribution lines taken over from BPDB would be measured by amount of km of line renovation completed and number of consumers connections recorded. REB will also provide monthly system loss data of the Project areas.

PDO	Project outcome indicators	Use of project outcome information
<p>To raise levels of social development and economic growth by increasing access to electricity in rural areas.</p> <p>Three components supporting the PDO will:</p> <p>Expand access to electricity in rural areas of Bangladesh through the use of renewable energy resources.</p> <p>Reduce capacity shortage on the grid through demand side management.</p> <p>Reduce system loss of REB taken over pockets from BPDB through renovation.</p>	<p>Additional 300,000+ households with electricity service. Expanded use of electricity for quality of life improvements and income generation.</p> <p>Capacity demand reduced by about 360 MW.</p> <p>System loss of renovated areas brought down to below 20%.</p>	
Outputs from each component	Output indicators	Use of output monitoring
Expand access to rural households through financing of solar home systems	Number of panels installed Target: 300,000	Number of panels installed per month should keep a consistent, if not growing, pace (seasonally adjusted). If sales begin to slow, IDCOL needs to investigate the causes so that the approach can be adjusted if needed.
Expand renewable energy options for off-grid energy supply in rural areas	Number of successful projects and number of kW installed capacity Target: To be determined by IDCOL	Progress will be monitored to make sure viable projects are being funded and implemented.
Reduce energy shortages through introduction of compact fluorescent lamps as replacements for incandescent bulbs	Number of incandescent bulbs replaced by CFLs Target: 10 million	Conversion to CFLs should be monitored to ensure that all lamps will be deployed by the end of the funding period. If monitoring shows that the lamps are not being distributed, then the strategy can be adjusted mid-project.
Reduce system loss of taken over areas through renovation of distribution lines	Total km of lines renovation Target 12,000 km Reduction in System Loss Target less than 20%	Monitoring of these output indicators will help REB management to find out whether PBS operation and monitoring are effective and whether there is need to change its Supervision strategy.

Outcome Indicators	Baseline			Target Values			Data Collection and Reporting		
	YR0 FY 09	YR1 FY 10	YR2 FY 11	YR3 FY 12	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection		
To expand access to electricity in rural areas of Bangladesh through the use of renewable energy.	300,000 SHS installed through RERED program	380,000 SHS installed ¹	480,000 SHS installed	600,000 SHS installed	See below	See below	IDCOL		
To reduce capacity shortages on the grid through demand side energy efficiency.	One 250 kW biomass gasification mini-grid	TBD	TBD	TBD					
To reduce system loss of distribution lines taken over from BPDB	Shortfall of 200MW+	360 MW reduced demand	Project completed in FY10	Project completed in FY10			System loss reduced to less than 20%		
	More than 40% system loss	System loss reduced to 25%	System loss reduced less than 20%	System loss reduced to less than 20%					

Output indicators by component	YR0 FY 09	YR1 FY 10	YR2 FY 11	YR3 FY 12	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
Component One: Expanded access to electricity through solar home systems	12,000 systems per month	80,000 systems per year ⁶	100,000 systems per year	120,000 systems per year	Sales/installation figures should be collected monthly, with reports published annually	Data collected directly from PO sales records	IDCOL is responsible for collecting and aggregating data from POs and verification agents
Expanded use of renewable energy in rural areas through development of mini-grid power systems	One 250 kW biomass gasification installed, several more in pipeline	TBD by IDCOL ⁷	TBD by IDCOL	TBD by IDCOL	Evaluation report for each system's performance	Site visits and technical/financial review	IDCOL
Component Two: Improved energy efficiency by replacement of incandescent bulbs with compact fluorescent lamps (CFL)	No program initiated	10 million lamps distributed			Monthly reports showing number of CFLs used to replace incandescent bulbs	Data collected by REB from distribution companies	REB

⁶ Note – other donors are supporting this program so the rate of panel installation and cumulative number of SHS installed in Bangladesh will be higher than the figures given here. Although we will coordinate with other donors, the targets listed are for World Bank funded efforts only.

⁷ The projects will be developed based on strength of proposals. Fixing a number or size for these projects will influence the technology options available so this indicator is left open to IDCOL's discretion. Progress will be monitored to make sure viable projects are being funded and implemented.

Output indicators by component	YR0 FY 09	YR1 FY 10	YR2 FY 11	YR3 FY 12	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
Component Three: Reduced system loss through renovation of taken over lines	About 3000 km of lines renovated in one year	3,000 km of lines renovated with total renovation of 12,000 km lines			Quarterly progress report showing amount of renovation completed, and System loss reduced.	Data collected from awarded work orders and PBS MIS report	REB