37. The first phase would have resulted into savings in peak demand of at least 200MW. However, post installation surveys have indicated alarming levels of lamp failure rates (33%) within a few months of installations. Interim test reports of a re-testing at the Bangladesh Standards and Testing Institution (BSTJ) has confirmed the high failure rates of the first phase CFLs. The lamp failure rates have seriously undermined achievement of the program objectives. REB has claimed replacement of the poor quality CFLs from the supplier and Bank is closely following-up on the issue.

38. Procurement of the second phase CFLs was also initiated by REB under the RERED project immediately after first phase distribution (and before the lamp failure issue began to surface). Procurement of 17.5 million CFLs in 8 lots was awarded but contracts could not be signed as the winning bidders either did not submit the performance guarantees acceptable to REB, or submitted fake ones. REB has taken steps against the delinquent bidders including debarring them from future procurement. GOB intended to re-bid but there remained limited time before RERED closing to conclude the re-bid.

39. GOB has expressed its strong commitment to continue with the ELIB program taking into account lessons learned from the poor quality in the first phase and the aborted second-phase procurement. The second phase procurement and distribution of CFLs has been proposed to be included in RERED II project. The technical specifications for the second phase will need to be strengthened to allow for the procured CFLs to withstand wide voltage fluctuations that are common occurrence in Bangladesh systems. Adequate testing needs to be ensured before product shipment and appropriate penalty clauses introduced to ensure procurement of quality CFLs. An international technical consultant will be appointed to provide suggestions for strengthening the technical specification and the bidding documents. In addition, an international procurement consultant will support REB during bid invitation and evaluation.

40. Thanks to the awareness campaigns from the first-phase distribution, many households in the urban areas have already switched to CFLs. However, uptake in the rural/semi-urban areas has been slow because of the high costs of CFLs compared to incandescent lamps. The second phase CFLs will be distributed in the predominantly rural areas. The estimated number to be distributed is about 7.25 million. IDA funding would cover the costs of CFL procurement including pre-award inspections, pre-shipment inspections and testing, post-shipment testing; costs of distribution including training for proper distribution and documentation to comply with CDM requirements; customer awareness; impact evaluation etc. GOB funds will cover the costs of PMU within REB. Because the CFLs to be procured are expected to be screw-types that are technically better than the pin-types that are households typically use, replacement of sockets will be undertaken along with the installation of the CFLs. The costs of sockets will be borne by the utilities distributing them. Finally, IDCOL will be responsible for maintaining database of households receiving the CFLs, and conducting post-installation surveys to claim carbon credits under the CDM.

41. **Component D Technical Assistance to Power Sector (total cost** US$6.5 **million, IDA credit** US$5 **million).** Power Cell was established in 1996 as a technical arm of the Power Division of the Ministry of Power, Energy and Mineral Resources with the objective of

supporting implementation of the power sector reform program. It has been receiving technical assistance support from the Bank-financed Power Sector Development Technical Assistance (PSDTA) project, which is scheduled to close in December 2012. Under the PSDTA project, various technical assistance activities were undertaken by Power Cell, which include: formulation of power sector policies including RAPSS rules and regulations; development and implementation support for power sector reform roadmap; development of strategy and implementation of private sector participation in power generation including transaction advisory support for the Independent Power Producer (IPP) program; formulation and implementation support for the financial restructuring and recovery plan for power sector; installation of power system interface metering; support for feasibility studies including environment and social impact assessments for various projects in power generation, transmission, and distribution; training, workshops, and capacity building etc.

42. In continuation of the above activities beyond PSDTA closing, an amount of US$S million in technical assistance support implemented by Power Cell is proposed in the RERED II Project. The activities to be supported under the Project would include:

1. Support for establishment and operationalizing the Sustainable and Renewable Energy Development Authority (SREDA) through the provision of office equipment and furniture, consultant services, and training.
2. Support to the Bangladesh Energy Regulatory Commission (BERC) for capacity building in power sector regulations including tariff methodologies and regulations.
3. New and On-going activities including implementation of power sector reform roadmap; transaction advisory support for the IPP program; feasibility studies for power plant rehabilitation and re-powering; feasibility studies for Liquified Natural Gas (LNG) import; Environment and Social Impact Assessments for power generation, transmission, and distribution projects in the pipeline; bid process consultant support for high-voltage transmission links; design and implementation support for performance improvements of power plants; support to utilities for cost-based tariff analysis and tariff-filing; project preparation support for public private partnership; development of national guidelines for safe disposal/recycling of CFLs and capacity building support for safe disposal of CFLs procured under ELIB; impact assessment for the CFLs distributed under the Project; consultant support for technical, financial, legal, MIS, HR and management of Power Cell.
4. Training, road shows, workshops, seminars, and study tours for power sector capacity building.
5. Selective monitoring, evaluation, and coordination activities related to the Project.
6. Office equipment support and incremental operating costs for Power Cell. Incremental operating costs will include honoraria, travel and travel allowances, rental of communication equipment and vehicles, operation and maintenance of vehicles and office equipments, office utilities, office supplies and consumables, bank charges, and salaries of contracted Project staff but excluding salaries of GOB civil servants.

Annex 3: Implementation Arrangements

BANGLADESH: Rural Electrification and Renewable Energy Development II

Project Institutional and Implementation Arrangements

1. IDCOL is responsible for overall implementation of the access to electricity and the household energy components. The procedures followed by IDCOL in the ongoing RERED Project will be followed in RERED II. Presently there are 30 POs appointed by IDCOL to support SHS program. Additional POs will be appointed for the access to electricity component as required as per the selection criteria detailed in the Operating Guidelines. A separate Operating Guideline has been prepared for the household energy component.

2. POs obtain grants and loan refinancing from IDCOL upon satisfactory evidence of SHS installation and customer satisfaction. Private firms and NGO seeking financing for other renewable energy investments will be evaluated by IDCOL based on the credit worthiness of the borrower, loan securitization along with the technical and financial viability of the sub-project. IDCOL will ensure that the sub-projects comply with environmental and social safeguards as outlined in the Environment and Social Management Framework (ESMF) adopted for the Project.

3. IDCOL, a government owned infrastructure finance company, is run by professional management under an effective oversight by a competent Board. As a company, IDCOL is able to offer market based incentive package to its management and staff. IDCOL has proven its capacity in managing the renewable energy program of GOB under the on-going RERED project. The growing renewable energy portfolio however is going to put a strain on the capacity of IDCOL. Recognizing this, an institutional development consultant has been engaged by IDCOL to review the current organization structure and to proposed modifications for enhancing its capacity. It is expected that during the implementation of the Project, capacity ofIDCOL will be enhanced with separate unit established to manage the growing renewable energy program.

4. IDCOL has a team of inspectors who would inspect and verify that the systems are installed as per approved technical standards, and financing would be released from the project fund. For the RAPSS sub-component, the sub-project specific due diligence would be done by IDCOL based on project proposals from the POs. Bank will review the appraisal reports of the first *five* sub-projects in each technology (solar PV based mini-grid, biomass gasification based mini-grid, solar irrigation pumps, biogas based captive plant, biomass based captive plant etc).

5. SREDA, once operational, will provide for leadership and overall advisory oversight for the national household energy program. SREDA will be responsible for the formulation of a long term national strategy on household energy access and design mechanisms to coordinate its monitoring, evaluation, and impact assessment. An advisory committee comprising members from SREDA and other relevant Government Agencies (i.e., Power Division, Ministry of Local Government and Rural Development, Ministry of Environment and Forests, and Ministry of Science and Technologies), NGOs and private sector stakeholders will be formed to review components' activities and provide feedback to improve on the implementation.

6. IDCOL will establish a specific PMU for the implementation of the household energy component. The IDCOL PMU will be responsible for day to day management of the component following Bank's fiduciary guidelines and procedures. It will also be responsible for the monitoring of the component's activities and results. IDCOL PMU will engage in activities to support the POs which can be done more efficiently at central level. These will include technological assessments, updating and certifications of clean cooking devices; production of awareness and consumer education materials. A Technical Committee comprising stove experts, technologists and relevant government officials under IDCOL's guidance will be set up to advise on design and certification standards and other relevant technological issues.

7. The energy-efficient lighting component will be implemented by REB, which will procure the CFLs and distribute it to the relevant PBSs and other distribution utilities. PBSs and the distribution utilities will be responsible for distributing the CFLs in exchange of incandescent lamps in the respective service territories. REB will be responsible for overall management of the component. Consultants for impact assessment for the component will be supported under the sector technical assistance component implemented by the Power Cell. As the Coordinating and Managing Entity (CME), IDCOL will be responsible for maintaining database of households receiving the CFLs, conducting post-installation surveys, and taking other steps necessary for CDM.

8. Power Cell will be implementing the technical assistance to the sector following the same implementation arrangement of the PSDTA project. Support in the form of consulting services will be channeled to the SREDA and to the Bangladesh Energy Regulatory Commission (BERC) for creating enabling environment for renewable energy development.

Financial Management, Disbursements and Procurement

Financial Management

9. A financial management (FM) assessment was carried out to evaluate the overall financial management environment prevailing in the country and within the implementing agencies of the Project. More specifically the assessment aimed at assessing the financial management risks underlying the Project, the FM capacity of the implementing agencies, and the FM systems in place. The purpose of the assessment is to identify the financial management arrangements under the Project that would need to be in place to meet the Bank's fiduciary requirements in accordance with its *OP/BP* 10.02. The FM assessment was carried out keeping into perspective the lessons learnt during the implementation of the on-going RERED and the PSDTA projects.

10. The Project will be implemented by three agencies and the financial management capacities of each are summarized below:

a. Infrastructure Development Company Limited (IDCOL), a government owned infrastructure finance company, has been implementing the Bank supported SHS and other renewable energy programs with support of the eligible Participating

Organizations (POs) under the RERED project since 2003. The major investment components - Access to Electricity and Household Energy Components will be implemented by IDCOL that has acquired significant experience in IDA financial management procedures and requirements. IDCOL's FM organization and system are found to be adequate to manage its operation and to undertake project financial management activities.

b. The Rural Electrification Board (REB), an autonomous body under the Power Division of the Ministry of Power Energy and Mineral Resources (MPEMR), has been implementing the CFL component under the RERED project and it will continue to implement the energy-efficient lighting component under the RERED II Project following the same implementation arrangement. Financial Management Organization of the REB is a robust one and its entity financial management systems are also acceptable to IDA. However, there have been outstanding audit issues on the project accounts of REB.

c. Power Cell, a technical arm of the Power Division of MPEMR, provides technical assistance for design and implementation of power sector reform activities and has been receiving technical assistance funding through the ongoing Bank-supported PSDTA project. The PSDTA project is scheduled to close in December 2012 and continued TA support to Power Cell is expected to be provided through the RERED II Project. Power Cell has gained experience in Bank project implementation from their participation in the PSDTA project. There have however been issues with lack of FM staff at the Power Cell.

11. ***Disbursements and Flow of Funds.*** Disbursement of IDA funds will be transaction based. The applicable disbursement methods include: Advance, Reimbursement, Direct Payment, and Special Commitment. Each implementing agency will open a Segregated Designated Account in the form of Convertible Taka Special Account (CONTASA) in a commercial bank acceptable to IDA, except for IDCOL which will manage two Designated Accounts - one for electricity access and the other for household energy component. Each agency will independently operate its designated account(s) including submitting withdrawal applications for advances/replenishments and documentation.

12. IDA funds sub-loans for the Access to Electricity component will be made available to IDCOL under a Subsidiary Loan Agreement (SLA) with the Finance Division of the Ministry of Finance. Funds for Household Energy component and technical assistance for the Access to Electricity component will be made available to IDCOL under a Subsidiary Grant Agreement (SGA) with the Finance Division. Funds for the Energy Efficient Lighting component will be will be made available to REB under an SGA with the Finance Division. No SLA will be required for Power Cell to receive project funds as it is a part of the Power Division of the MPEMR. For the IDCOL implemented Access to Electricity and Household Energy components, funds will flow from IDCOL to the POs through sub-loans under Participation Agreements between IDCOL and the POs.

13. ***Disbursement Table***

Category No	Category Name	US$ Million Equivalent	
1	Sub-Loans for Access to Electricity	110.9	100% (inclusive of Taxes)
2	Goods, Services, training, and incremental operating costs for IDCOL for Access to Electricity	5.1	100% (inclusive of Taxes)
3	Goods, Services, training, incremental operating costs, and Sub-Grants for Household Energy	12.0	100% (inclusive of Taxes)
4	Goods, Services, training, and incremental operating costs for Energy Efficient Lighting	17.0	100% (inclusive of Taxes)
5	Sector Technical Assistance	5.0	100% (inclusive of Taxes)
6	Un-allocated	5.0	
	Total	155.0	

14. ***Book Keeping and Accounting*** arrangements under the RERED Project will continue to apply for IDCOL and REB under the RERED II Project. Power Cell will follow accounting and reporting arrangements prescribed under the on-going PSDTA project. Each agency will continue to maintain the Books of Accounts for its part of the project activities on cash basis using double entry book keeping principles. Cash and Bank Book, General Ledger, Payment Register, Inventory and Fixed Assets Register, and Bank Reconciliation will be maintained on a regular basis. All the implementing agencies will follow GOB's Project Accounting Manual in maintenance of project books and reporting to various monitoring and control agencies of GOB. IDCOL will use its entity computerized accounting system for processing project financial transactions and financial reporting. Power Cell shall procure a reputed and tested off-the-shelf accounting software to ensure timeliness and accuracy of its accounting and financial reporting

15. IDCOL's records and financial statements should continue to reflect the amount payable to the Government and receivable from the POs/sponsors. **In** ensuring accounting and financial control of transactions of the Project, IDCOL shall maintain adequate FM systems within the entity and in the POs. The Participation Agreement between IDCOL and the POs would include provisions requiring the POs/sponsors to maintain appropriate accounting and financial control as outlined in the Operating Guidelines of the Project.

16. ***Financial Reporting.*** All three implementing agencies will submit Interim Unaudited Financial Reports (IFRs) to IDA. The format, contents and periodicity (within 45 days of the completion of quarters) under the on-going RERED project, with customization as appropriate, will apply to IDCOL and REB under the RERED II project. Power Cell will continue to submit IFRs to IDA as provided under PSDTA with customization of formats and contents to be agreed. Under the on-going RERED project, IFRs have been received in a reasonably timely manner and acceptable quality. However, for IDCOL, IFRs are still produced from stand-alone excel spreadsheet rather than from the entity accounting system making them vulnerable to error and manipulations. Although IDCOL has developed a comprehensive software solution to automate

its activities, the system is yet to generate IFRs from the entity accounting system automatically without manual processing. IDCOL has agreed to incorporate necessary modification in its computerized accounting systems so that IFRs can be automatically generated from the entity accounting system itself without manual processes.

17. ***Internal Control.*** The Operating Guidelines of the Project includes provisions requiring the POs/sponsors to maintain adequate FM arrangements, and to submit financial reports and audited financial statements to IDCOL in a timely manner. These provisions would be included in the Participation Agreements between IDCOL and the POs/sponsors. IDCOL would intensify its follow-up measures to ensure that POs comply with the agreed terms of the Agreements. IDCOL has strengthened its field level monitoring by engaging its staff for inspection and auditing POs records and to carry out FM assessment of the POs.

18. REB will ensure adequate control and transparency in its procurement and distribution of CFLs through requisite track records and through inclusion of stock and flow of CFLs in the quarterly IFRs. Power Cell will undertake internal control measures such as having adequate FM staffing to exercise internal check on transactions processing, payments to providers of goods and services through direct bank transfer, regular maintenance of books and records, due diligence on contracts administration, regular preparation of bank reconciliations and submission of claims for documentation of project expenditures through designated account.

19. ***External Audit.*** Audited financial statements of IDCOL do not report project activities undertaken, cost thereof, IDA funding to the cost and unspent IDA fund. Also, the Management Letter does not report adequately on the assessment of internal control measures e.g., accounting issues, governance, risk management etc, which are material to IDA. IDCOL agreed to address these deficiencies in the FY2012 accounts.

20. There are six outstanding audit observations by Foreign Aided Project Audit Directorate (FAPAD) on the project accounts of REB, which are being followed-up for resolution under the on-going RERED project. An action plan for addressing these observations has been developed by REB. Most of these observations are irregularities reported in respect of individual transactions, which are currently in the status of 'Questionable Expenditures'. The nature of these issues as reported include irregularities in awarding contracts, supply of broken and/or defective materials by suppliers, overstating of expenditures and resources in the financial statements, auditors not being provided with supporting documentation. It will take some more time to determine if any or some of these would tum into ineligible expenditures. Taking satisfactory measures to remedy these audit observations have been made a condition for disbursement for the REB implemented efficient lighting component.

21. Power Cell has been submitting annual audit reports within the deadline but there were some delays in following up on the outstanding audit observations. All the agencies agreed to adhere to the deadlines for submission of audited financial statements and be responsive to address the audit findings on a priority basis. A Project Audit Committee with composition and charter of duties acceptable to IDA will be established to monitor the follow up on audit issues of all the implementing agencies.

22. The audit requirements under the proposed project are mentioned below, and these requirements will be tracked through the Audit Report Compliance System (ARCS):

Implementing Agencies	Audit	Auditors
IDCOL	Project Financial Statements	Private Auditor
IDCOL	Entity	Private Auditor
REB	Project Financial Statements	Foreign Aided Project Audit Directorate (FAPAD)
REB	Entity	Private Auditor
Power Cell	Project Financial Statements	Foreign Aided Project Audit Directorate (FAPAD)

23. ***FM*** *Risks.* The overall FM fiduciary risk for the proposed project is assessed ***Moderate*** considering that all the three implementing agencies have previously participated in the implementation of Bank-financed projects and the agreed project financial management arrangements would be adequate to address the weaknesses identified. The following matrix presents the risk associated with this project and their respective mitigation measures.

Identified FM Risk	Rating	Mitigation measures	Rating Post Mitigation
The Interim Financial Report (IFRs) ofIDCOL are produced from stand-alone excel spreadsheet making it vulnerable to inaccuracy and manipulation	M	Further modification to the already developed computerized accounting system is on-going so that IFRs can be automatically generated from the entity accounting system without any scope for outside interference	M
Delay in the submission of audited accounts and Management Letters (ML) and inadequacy of ML might impair the audit assurance	S	Continued follow-up has resulted in timely submission of audited accounts in FY11. Management Letter would be made an integral part of the audit report as per the audit TOR and this will be enforced through recording this agreement in the Minutes of Negotiations	M
Provisions in the Participation Agreement between IDCOL and the POs may not be fully complied with	M	IDCOL has agreed to intensify its follow-up measures to ensure that POs comply with the agreed terms of the Agreement from FY20I2 onward	M

Identified FM Risk	Rating	Mitigation measures	Rating Post Mitigation
Power Cell may not have agreed FM staff on board as was the case in the PSDTA project	S	A Deputy Director (Finance & HR) has recently been appointed. Appointment of an Assistant Director (Accounts) is made a condition for disbursement of the component implemented by Power Cell	M
There are unsettled audit observations by FAPAD on the project accounts of Power Cell	M	Power Cell resolved all outstanding audit observations that were identified as material to IDA. In the event of any audit observations in the future, Power Cell agreed to follow-up with FAPAD on a priority basis to settle those observations	M
There have been outstanding audit observations by FAPAD on the project accounts of REB	M	An action plan was agreed with REB for addressing audit observation of FAPAD on REB project account which has resulted in the settlement of a substantial number of observations. REB agreed to a revised timeline (by October 30,2012) to settle the remaining observations that are within its control.	M
	M		M

24. The agreed financial management arrangement for the Project including the risk mitigation measures provide for a reasonable assurance that the Project funds will be used for the intended purposes.

*25. Supervision **Plan.*** The initial supervision will focus on compliance with all actions, identifying any FM or disbursement issues in project implementation, and agreeing on redress measures. Preparation of first IFRs from computerized accounting systems of IDCOL on time, having in operation a computerized accounting system in Power Cell, and use of internal controls on FM functions of all the implementing agencies will be closely reviewed by IDA's FM unit.

Procurement

26. Procurement for the Project would be carried out in accordance with the World Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated January 2011 (Procurement Guidelines); and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated January 2011 (Consultant Guidelines)) and the provisions stipulated in the Financing Agreement.

27. All expected major procurement of works and consultants' services will be announced in the General Procurement Notice (GPN), published in the Bank external website and United Nations Development Business (UNDB).

28. Procurement Responsibility: The overall responsibility of project implementation would be with IDCOL, REB and Power Cell. The access to electricity component implemented by IDCOL would be under financial intermediary loan and the procurement for this component will be the responsibility of the concerned POs. The POs are expected to follow established commercial practices ensuring economy and efficiency.

29. Particular Methods of Procurement of Goods and Works: Except as otherwise agreed in the procurement plan, works and goods may be procured on the basis of International Competitive Bidding. Procurement of Goods and Works having estimated value less than the ceiling stipulated in the Procurement Plan may follow National Competitive Bidding (NCB) and Shopping. Direct Contracting (Goods/Works) and Single Source Selection (Consultants) may be allowed under special circumstances with prior approval of the Bank. NCB would be carried out under Bank Procurement Guidelines following procedures for Open Tendering Method (OTM) of the People's Republic of Bangladesh (Public Procurement Act 2006 - PPA, 1st amendment to PPA (2009) and The Public Procurement Rules 2008, as amended in August 2009) using standard bidding documents satisfactory to the Bank. The "Request for Quotation" document based on PPA is acceptable to IDA for shopping. For the purpose of NCB the following shall apply:

a. Post bidding negotiations shall not be allowed with the lowest evaluated or any other bidder;
b. Bids should be submitted and opened in public in one location immediately after the deadline for submission;
c. Rebidding shall not be carried out, except with the Association's prior agreement;
d. Lottery in award of contracts shall not be allowed;
e. Bidders' qualification / experience requirement shall be mandatory;
f. Bids shall not be invited on the basis of percentage above or below the estimated cost and contract award shall be based on the lowest evaluated bid price of compliant bid from eligible and qualified bidder; and
g. Single-stage two-envelope procurement system shall not be allowed.

30. Procurement of non-consulting services: Except as otherwise agreed in the procurement plan, non-consulting services may be procured on the basis of International Competitive Bidding. Procurement of non-consulting services having estimated value less than the ceiling stipulated in the Procurement Plan may follow National Competitive Bidding (NCB). The agencies will carry out such procurement using Bank Guidelines.

31. Methods of Procurement of Consultants' Services: Selection of Consultants will follow the Bank Consultant Guidelines. The following methods will apply for selection of consultants: Quality- and Cost-Based Selection (QCBS), Quality-based selection (QBS), Fixed Budget Selection (FBS), Consultants' Qualification (CQ), Least-Cost Selection (LCS), Individual Consultants (IC) and Single-Source Selection (SSS). Shortlist of consultants for services estimated to cost less than US$300,000 equivalent per contract may be composed entirely of national consultants. The Procurement Plan will specify the circumstances and threshold under which specific methods will be applicable.

32. **Methods of Procurement of Consultants'** Services: Single-source selection of consulting firms and individuals (paragraphs 3.8 (b) and 5.6, respectively, of the Consultant Guidelines) may be used only if it presents a clear advantage over competition for the required consulting services.

33. Consultants' Qualification Selection (CQSj may be an appropriate method for small assignments. The selection is carried out in accordance with paragraph 3.7 of the Consultant Guidelines.

34. Country Procurement Regulations and Capacity: Bangladesh has a nodal procurement policy agency and a Public Procurement Act (PPA) 2006 with associated Public Procurement Rules 2008 (PPR) and bidding documents. It created a critical mass of about 63 procurement professionals and, as of now, provided training to over 4,200 staff of about 300 organizations. To sustain the reform, with Bank's assistance, the Government has been implementing a second procurement reform project since late 2007, focusing largely on the implementation and monitoring of PPA including introduction of e-government procurement at key sectoral agencies.

35. Notwithstanding the above progress over the past years, the current Government made a few amendments to the PPA part of which were found to be inconsistent with the Bank's Guidelines, and as such the Bank for its projects allowed for local procurement the use of PPA / PPR with those exceptions.

36. Assessment of the Agency's Capacity to Implement Procurement: The procurement capacity assessment was carried out in all the three implementing agencies, viz. REB, IDCOL and Power Cell with the web-based Procurement Risk Assessment Management System (P-RAMS), findings of which are summarized below.

37. REB has adequate staff with procurement knowledge in its Procurement Directorate. However, delays in awarding contracts and maintaining confidentiality during the bidding process are the key issues in REB. Power Cell has shortage of staff with procurement knowledge causing delays in procurement process. Being a financial intermediary, IDCOL is not involved in major procurement except for small value procurement of goods and consultant services. REB and Power Cell are not immune to systemic issues affecting procurement efficiency and performance. For all the three implementing agencies, in addition to adequate staffing for procurement needs, emphasis also needs to be laid out on areas of internal control, documentation, information dissemination, administration of contract including delivery follow up, payments, handling complaints etc. The Project is rated as "Substantial-Risk" from procurement operation and contract administration viewpoint.

38. In order to minimize the procurement associated risks, the following measures have been agreed upon with the concerned agencies. Parts of these measures are already in place, while the remaining shall be in place during implementation of the Proj ect.

39. Identify procurement focal points (PFP) in REB, Power Cell and IDCOL. Each of the three implementing agencies shall nominate a procurement focal person for their part of the Project. The appointed focal person will take necessary training, both on PPR 2008 and Bank

Procurement Guidelines. The focal persons will help the respective agencies m day-to-day procurement follow-up and preparation of periodic procurement reporting.

40. Services of an individual international technical expert and an individual international procurement expert for REB. The technical expert will be appointed to support REB during bidding document preparation, evaluation, and post-award inspections for its CFL contracts. His/her service will be staggered time based; during specification preparation, bid evaluation, and post-award inspections. The procurement expert will support REB during bid evaluation, and will be a member of the bid evaluation committee for the CFLs.

41. Pre-shipment testing for CFL procurement. A statistically viable sample under each production lot will be tested from renowned international testing lab, and if the result is satisfactory, only then the shipment will be allowed. The list of the internal testing lab needs to be acceptable by the Bank.

42. Service of a national Procurement Consultant (for Power Cell and IDCOL). Power Cell would hire a full time national Procurement Consultant with sound knowledge in the Bank Procurement Guidelines and Recipient's Public Procurement Act / Rules. This consultant would also assist IDCOL as and when needed basis. The consultant should have sound knowledge in the Bank Procurement Guidelines and Recipient's Public Procurement Act / Rules. This consultant will be a member of the bid evaluation committee for all procurements.

43. Bid Evaluation Committee (BEC). The BEC will have at least five members with two experts from outside the procuring entity with proven track record of experience in procurement; depending on the type of procurement, such experts shall be either from public offices and/or from professional bodies/individual of known probity and/or individual consultants. Formation of such BEC shall be in conformity with the Bank's Guidelines and be acceptable to the Bank. REB and Power Cell will prepare thorough terms of reference and a time bound action plan for the bid evaluation committee to ensure strict confidentially of the bidding process, unauthorized access of the confidential document and timely completion of the evaluation.

44. Establish/upgrade a functional webpage (regularly updated) for REB, IDCOL and Power cell with procurement related information accessible to the public. All information pertaining to bidding and procurement above the specified thresholds, as per PPR, will be published in Central Procurement Technical Unit's (CPTU's) website. **In** addition, the implementing agencies will publish procurement information on their own website. This information will include: invitation to bid, bid documents and RFPs (wherever applicable); latest information on procurement plan/contracts; status of evaluations once completed; contract award information; and information covering the poor performance of contractors, suppliers and consultants, including a list of debarred firms. The website would be accessible to all bidders and interested persons equally and free of charge.

45. Establish a system for handling complaints and a database for recording, monitoring and follow up on all the procurement activities under the project in *REB, IDCOL and Power cell*.

46. Adopt a procurement risk mitigation plan (PRMP), individually by REB, IDCOL and Power cell that would have the following features. The agencies will report to IDA on a periodic (semi-annual) basis on the implementation of PRMP. Specific reporting requirements will be finalized during project implementation.

a. *Alert bidders in pre-bid meeting:* Implementing agencies *(REB, IDCOL and Power cell) individually* through a notification will alert bidders during pre-bid meeting on consequences of corrupt practices (fraud and corruption, collusion, coercion, etc.). The alert message, among others, will include that if bidders are found to have adopted such practices, there may be remedial actions including debarment from bidding processes in conformity with the Bank's Guidelines. For national competitive bidding, national bidders debarred, if any, under the PPA will not be able to participate. **In** addition, in the pre-bid meeting, the bidders will be clarified for preparation of bids correctly.

b. *Alert internal officers/staff.* Implementing agencies *(REB, IDCOL and Power cell)* will issue alert letter(s) notifying on the fraud and corruption indicators and the possible consequences of corrupt and similar behavior in procurement practices and action to be taken against the official staff if they are involved in such practices. Moreover, agencies will highlight that, in case of noncompliance or material deviation from IDA's Procurement Guidelines, IDA may take remedial actions (i.e., withdrawal of funds, declaration of mis-procurement) for concerned contracts.

c. *Multiple dropping:* Multiple dropping of bids (bids submitted in more than one location and opened in one location) will not be permissible for any procurement under this project.

d. *Maintain high level oversight throughout the process of CFL procurement by a Government team committed to the integrity of the process.*

e. *Bid opening minutes:* During the same day of bid opening, photocopies of the Bid Opening Minutes (BOM) with readout bid prices of participating bidders will be submitted by BEC for circulation to all concerned. For prior review packages, such BOM will be shared with the IDA.

f. *Low competition among bidders and high price of bids:* The case(s) of low competition (not solely based on number of bidders) in ICB and NCB cases, coupled with high-priced bids will be inquired into and further reviewed by the implementing agency. The review and decision in this regard would be in the context of qualification criteria, the contract size (too small or too large), location and accessibility of the site, capacity of the contractors, etc.

g. *Measures to reduce coercive practices:* Upon receiving allegations of coercive practices resulting in low competition, implementing agency will look into the matter and take appropriate measures. For prior review contracts, observations of implementing agency will be shared with IDA, along with the evaluation reports.

Implementing agency may seek assistance from law enforcing agencies to provide adequate security for bidders during bid submission. For ICB contracts, provision for bid submission through international/national courier services will be allowed and confirmation of the receipt of the bid will be informed to the bidders through e-mail.

h. *Rebidding:* **In** case of re-bidding, implementing agency will inquire into the matter, record and highlight the grounds of re-bidding (i.e. corruption or similar, high bid prices etc.) along with recommended actions to be taken. For prior review of cases, all such detailed reports will be sent to IDA.

1. *Filing and record-keeping:* implementing agency will preserve all records and documents regarding their public procurement in accordance with provisions of the Bank guideline. These records will be made readily available on request for audit/investigation/review by the Development Partners and the Government.

J. *Publication of award of contract:* implementing agency will publish contract award information within two weeks of contract award on its website, dgMarketlUNDB online, and CPTU's websites with the following information: identity of contract package, date of advertisement, number of bids sold, number of submitted bids along with names, bid prices as read out at bid opening, name and evaluated price of each bid, number of responsive bids along with name of bidder, name of bidders whose bids were rejected and brief reasons for rejection of bids, name of the winning bidder and the price it offered, proposed completion of date of contract, as well as a brief description of the contract awarded.

47. ***Procurement Plan:*** A Procurement Plan for the first eighteen months of the Project has been prepared. It will be made available in the Project's database and in IDA's external website for this project. The Procurement Plan will be updated in agreement with REB, IDCOL and Power Cell, at least annually, to reflect the actual project implementation needs and adjustments thereof.

48. ***Review by IDA of Procurement Decisions:*** The review by IDA of procurement decisions and selection of consultants will be governed by Appendix 1 of the Bank's Guidelines. For each contract to be financed by credit, the threshold for prior review requirements and post review contracts will be identified in the Procurement Plan. During the first 18 months of the project, IDA will carry out prior review of the following contracts. This prior review threshold will be updated annually based on the performance of the implementing agency:

a. For Goods. All the ICB Contracts and Direct Contracts irrespective of estimated cost. The NCB Contracts estimated cost equivalent or more than US$600,000.
b. For Works. All the ICB contracts and Direct Contract irrespective of estimated cost. The NCB Contracts estimated cost equivalent or more than US$400,000.
c. For Non-consulting service. The Contracts estimated cost equivalent or more than US$600,000.
d. For Consultant's Services. Prior review will be required for consultants' services contracts estimated to cost USD 300,000 equivalent or more for firms and USD

100,000 equivalent or more for individuals. All single-source contracts will be subject to prior review by and in agreement with IDA. All Terms of References of the consultants are subject to the IDA's prior review.

49. Detailed Procurement Arrangements

Goods

Ref No.	Contract Description	Estimated Cost (US$ 000)	Selection Method	Review By Bank	Expected Bid Opening Date
REB					
G-1	CFL, Output lumen-715 (13~14 Watt) & 1350 (20~23 Watt)	9,075	ICB	Prior	Jan 2013
G-2	CFL, Output lumen-715 (13~14 Watt) & 1350 (20~23 Watt)	1,800	ICB	Prior	Jan 2013

Services

Ref No.	Contract Description	Estimated Cost (US$ 000)	Selection Method	Review By Bank	Expected proposal Opening Date
Power Cell					
S-Ol	IT Consultant for ERP Selection	100	IC	Prior	Nov 2012
S-02	Legal (Technical & Financial) Advisor for IPP Project	300	IC	Prior	Nov 2012
S-03	Feasibility Study on Re-powering of existing power plants ofBPDB	300	QCBS	Prior	Nov 2012
S-04	Study for Performance Improvement ofBPDB's old Power Plant	100	QCBS	Post	Nov 2012
S-07	Cumulative Environment Study on Siddhirgonj-Haripur-Meghnaghat Generation Hub	100	QCBS	Post	Jun 2013
S-08	Business Process Consultant for EGCB	100	SS	Prior	Jun 2013
S-09	Business Process Consultant for GTCL	200	QCBS	Prior	Jun 2013
S-lO	CFL Bid Technical Consultant	125	IC	Prior	Nov 2012
S-ll	Assistance to the Implementation of REB reform programs	261	QCBS	Prior	Feb 2013
S-12	Technical and Financial advisory support to implement RAPSS project in private sector	300	IC	Prior	Feb 2013
S-13	Capacity development of the utilities for cost based tariff analysis and tariff filling before BERC	100	QCBS	Post	Feb 2013

Ref No.	Contract Description	Estimated Cost (US$ 000)	Selection Method	Review By Bank	Expected proposal Opening Date
S-16	Project Preparation consultants for PPP	300	IC	Prior	Feb 2013
S-17	Procurement Consultant to Assist Power Cell	100	IC	Prior	Nov 2012
S-19	CFL Procurement Consultant	125	IC	Prior	Nov 2012
S-20	CFL Disposal Guideline - Int'1	100	IC	Prior	Nov 2012
S-21	CFL Disposal Guideline- Local	14	IC	Post	Oct 2012
IDCOL					
S-04	Lighting Bangladesh Program Design	100	IC	Prior	Sep 2013
S-05	Lighting Bangladesh Program Implementation Support	100	IC	Prior	Dec 2013
S-08	Individual Consultant for SHS Impact Evaluation	150	IC	Prior	lun 2014

Environmental and Social (including safeguards)

50. No public land will be used for the Project, and no land acquisition will be financed under the Project. Land required for the RAPSS sub-projects will be private lands made available by the sub-project sponsors via direct purchase or by leasing. IDCOL requires that the land for the sub-projects is free of disputes and encumbrances. All land for Project use, whether made available via direct purchase or leasing, will be screened to ensure that no physical or economic displacement of communities/persons will take place, and lands which are disputed or have encroachments on them (informal settlers, non-titled entities) will not be used for the Project. It may be mentioned that such encumbrances are very rare in rural areas. The three mini-grid pilots under the RERED project have been using this approach. Bank policy OP 4.12, Involuntary Resettlement was not triggered for the pilot projects under the RERED project; since the same approach will be adopted for the RERED II Project, it will not be triggered in this case either.

51. The project may extend facilities in areas where indigenous people (IPs) live. However, availing the facilities/services/products under the access to electricity and household energy components of the Project is purely on a voluntary basis for all paying customers (including IPs). No negative impacts are anticipated towards IPs. In cases of project activities in the IP areas like Chittagong Hill Tracts, the POs are well-versed in IP languages to offer adequate consultation on maintenance of products. proper usage of facilities offered, awareness raising, and training. Bank policy OP4.10 related to IP was not triggered under the RERED project. Since the same approach will be followed for the RERED II project, OP4.10 is also not triggered under RERED II project.

52. A Gender Assessment and Plan has been prepared that specifically identifies the opportunities for gender responsive activities in the access to electricity and the household energy components (Annex 10).

53. Applicable Environmental Category and Safeguard Polices: The Project is designated as Environmental Category B as there is no significant and/or irreversible adverse environmental and social issues in the sub-projects financed under the project and which is consistent with the provisions of *OP/BP* 4.01. Under the RERED project, an Environmental and Social Management Framework (ESMF) was adopted which provides general policies, guidelines, and procedures to be integrated into the implementation of development intervention. The original ESMF was updated twice during two additional financings of the RERED project. The RERED II adopts an updated ESMF to comply with World Bank Policies and environmental legislation of the Government of Bangladesh (GOB). This updated ESMF defines the environmental requirements needed for processing the financing of each sub-component and includes consequence impacts due to the proposed new activities (RAPSS and household energy).

54. Approach to Address Environmental Safeguard Issues: The Environmental and Social Management Framework (ESMF) of the RERED project has been updated for the RERED II Project to include consequence impacts due to the proposed new activities (RAPSS and household energy). The updated ESMF includes an assessment on the compliance of the activities undertaken in the ESMF under the on-going RERED project.

55. The SHS component has environmental impacts due to improper disposal! recycling of lead-acid storage battery. Under the on-going RERED project, several measures have been undertaken by IDCOL to strengthen the battery recycling that includes refinancing for battery replacement and enhanced incentives for POs and manufacturers for collection of expired batteries. IDCOL has required the compliance ofISO 14001:2004 and OHSAS 18001:2007 by all battery recyclers and battery suppliers. Already 12 battery manufacturers out of the 13 are ISO 14001 and OHSAS 18001:2007 compliant, while the rest is expected to be compliant soon. Also out of three battery recyclers in the country, one is already ISO 14001:2004 and OHSAS 18001:2007 compliant. IDCOL will make sure that remaining two battery recyclers are compliant before the implementation of the RERED II Project begins. IDCOL agreed to continue awareness raising campaign for the POs and the users about the adverse impact of improper management of expired battery.

56. For the CFLs under the efficient lighting component, risk of exposure to mercury from improper disposal of CFLs is the main environmental concern. REB is committed to minimize the risk of mercury contamination by adopting technical specifications that require minimum mercury in each CFL (less than 5 milligrams). REB will also require that each CFL packet contains instructions, both in Bengali and in English, about the precautions to be taken by customers in case the CFLs are accidentally broken. Although it was agreed to prepare a national guideline for safe disposal of CFLs under the on-going RERED project, it has been delayed due to several reasons. Proper guidelines are made a condition before the distribution of CFLs financed under RERED II can commence. Capacity building support is provisioned for in

sector technical assistance component to ensure safe disposal of CFLs financed under the Project.

57. ***Recipient's capacity on environmental safeguard:*** IDCOL has gained experience in implementing environmental management framework under the on-going RERED project. IDCOL has made progress in institutionalizing environmental and social management by having a full-time environment staff in the Environment and Social Safeguards Management Unit (ESMMU). The environment staff is working with the POs and battery manufacturers/suppliers to raise awareness about the importance of environmental and social safeguards and to discuss the environmental impacts of improper disposal or recycle of lead-acid batteries. The environmental staff visits all battery recycling plants on half-yearly basis for ensuring environment compliance. To strengthen the ESMMU, IDCOL is in the process of appointing an additional environmental consultant to guide the client in preparing and reviewing the environmental assessment/screening for subprojects.

58. ***Environmental Safeguard Supervision and Monitoring:*** IDCOL will monitor the environmental and social safeguard compliance with the support of the POs. An annual environment audit will be undertaken by an independent third party to assess the adequacy of the current mechanism for ensuring proper recycling of batteries and to monitor implementation of the ESMF.

59. ***Consultation and Disclosure:*** IDCOL has carried out consultation with battery manufacturers/recyclers, POs and beneficiary of the Project. Their comments and concerns have been included in the ESMF. The updated ESMF along with a BangIa version has been disclosed in IDCOL website (http://www.idcol.org) on July 18,2012 and in World Bank Info shop on July 20,2012.

Monitoring & Evaluation

60. Monitoring and evaluation are fundamental to assess implementation progress and to provide necessary corrective measures during implementation. IDCOL has a well-established monitoring system in place for its SHS program that will be further strengthened for the growing SHS program and will be replicated for use in the other activities (RAPSS and household energy). The Operations Committee of IDCOL having representation of IDCOL management and PO representatives have monthly meetings to discuss the results and issues involved in the SHS program. The refinancing applications by the POs include details of the SHS installations (address of households, systems size, price etc), which are then integrated into IDCOL database for selecting random samples for inspections and verifications by IDCOL field inspectors. Several new indicators like household size (including number of females), household income would be included in the refinancing application of the POs during the implementation of the Project that would provide for data measuring the outcome indicators (number of households, number of people including number of females) benefiting from access to electricity. An impact evaluation study for the SHS program is currently on-going and the final report (expected towards end 2012) would be used for strengthening the monitoring mechanisms for SHS and also to develop a baseline for subsequent impact evaluation.

61. For the RAPSS sub-component, sub-project specific appraisal reports would include information related to number of connections, beneficiaries (including female) to provide for the data measuring the outcome and results indicators. Periodic sub-project status reports will inform on the progress on the number of connections and beneficiaries.

62. For the household energy component, IDCOL will design a monitoring and evaluation system to track performance of beneficiary POs based on its successful experience with the SHS program. IDCOL will support the POs to strengthen their own monitoring and evaluation systems to facilitate reporting and quality control.

63. To better assess customer feedback from connections (through SHS and RAPSS) and from clean cooking solutions (ICS and biogas plants), several IT based options for enhanced reporting and feedback are being explored for implementation during the Project. Some of the POs already have a mobile text messaging system in place to track daily installation data of various field offices of the POs. The option of introducing this system for the whole program would be explored which would allow for automatic update of the installation data in the database maintained at IDCOL to avoid false claims. Using the technology, the staff of a PO could record a geo tagged, time and date stamped picture of the SHS or RAPSS connections, which could be automatically updated in the database of IDCOL and the concerned PO. Similarly, customer satisfaction feedback via text messaging would be introduced that would allow for an easy and cost-effective method for collecting customer feedback, thus ensuring enhanced accountability of the POs for proper service delivery.

64. For the energy-efficient lighting component, REB will collect data on the number of CFLs distributed by the PBSs/utilities and report through a progress report on a quarterly basis. Data on loads before and after the distribution in selected feeders will be collated to measure the impact of distribution of CFLs in terms of MW saved. Funding for this impact assessment is provisioned for in the sector technical assistance component implemented by Power Cell. As part of CDM validation, independent third party audits will be carried out annually to verify that the CFLs are working at households.

65. Power Cell will report on a semi-annual basis on the activities undertaken and track progress in creating an enabling policy for power sector development particularly renewable energy development.

Role of Partners

66. USAID is expected to provide matching grant funds to the access to electricity component through a trust fund to be established with the Bank as the administrator. Grant financing for the solar irrigation pumps under the RAPSS sub-component is expected to be provided from the multi-donor trust fund Bangladesh Climate Change Resilience Fund (BCCRF) for which on-principal approval has been obtained. These funds will be provided to IDCOL under separate grant agreements. KfW will be providing matching grant for the RAPSS sub-component on a parallel co-financing.

Annex 4: Operational Risk Assessment Framework (ORAF)

BANGLADESH: Rural Electrification and Renewable Energy Development II
Stage: Board

Pro.iect Stakeholder Risks	Rating I Substantial
Description: Despite the softer credit terms and the capital buy down grants, the tariff to be charged by the mini-grid operators under the RAPSS component would be higher than the subsidized tariff paid by the grid consumers, which is likely to create resentment among consumers in the RAPSS areas. This may act as a deterrent for potential investors to invest in the schemes.	Risk Management: Awareness campaigns would be needed to inform consumers that the RAPSS schemes are the least cost options for them. In many of the rural markets in the potential RAPSS areas, there are diesel genset operators who charge a fixed amount per lamp that translates into a tariff as high as Tk 60-70kWh (USc 70-85/kWh). After the softer credit terms and capital buy down grants, the tariff would be lower than the tariff charged by the diesel genset operators. A gradual approach will be taken with market being tested with a few mini-grids rust. IDCOL already has a few mini-grid proposals on which due diligence is being carried out. Market response from the implementation of these initial sub-projects will help guide the way for the remaining mini-grids. In the event that the mini-grids or captive plants under the RAPSS component does not get materialized, the funding allocation can be used for SHS program in achievement of the project objective of increasing access to electricity.
There is a risk that the PBS grid would reach the RAPSS areas and customers would migrate to PBS service (as the PBS charges are significantly lower albeit at lower level of service). This will leave the mini-grid investor with a stranded asset.	The stranded asset risk would be mitigated by designating the mini-grid area as "RAPSS Area" under the RAPSS guidelines of2007 that would give the mini-grid operator the exclusive right to generate and distribute electricity in the area for the specified number of years. In the event that the PBS grid does reach the area, compensation rules will be promulgated and issued by BERC that would compensate the mini-grid investor for the stranded asset.
	Resp: Client Stage: Implementation Due Date: Status: Not yet Due

Implementing Agency Risks (including fiduciary)				
Capacity	Rating: I Substantial			
Description: IDeOL has good institutional capacity but there is a risk that the growing renewable energy program may put a strain on its institutional capacity.	Risk Management: An institutional development consultant has been appointed by IDCOL to assess the organizational structure and to propose modifications to meet the growing needs of the renewable energy portfolio ofIDCOL. The consultant report is expected soon and the implementation of the report will be followed-up by the Bank team during implementation ofthe Project.			
The different sub-projects under the RAPSS component would require careful due diligence by IDCOL to ascertain the proper level of grant support. Given the potentially large number of sub-projects with different technologies involved, there is a risk that the quality of due diligence process is compromised due to over-stretched institutional capacity of IDCOL	Bank no-objection will be required on the appraisal reports of the first five sub-projects in each technology. If necessary, Bank will require no-objection for sub-projects beyond the first five.			
	Resp: Client	Stage: Implementation	Due Date: Early in project implementation	Status: Not yet due
SREDA, the coordinating agency for the household energy component, is yet to be established.	Risk Management: Necessary legislation for SREDA has been drafted and Cabinet approval obtained. It will be placed in the Parliament for approval. The Project will finance technical assistance support for operationalization of SREDA. A SREDA cell has been created in the ministry to carry out the preliminary activities of establishment of SREDA. While SREDA is envisaged to be providing			

	leadership and overall oversight of the household energy program, the component would be implemented by IDCOL that has experience of implementing a similar domestic biogas program and the successful SHS program. Delays in opreationalization of SREDA would therefore have minimal impact on the implementation of the household energy component.
	Resp: Client | Stage: Implementation | Due Date: | Status: Not yet due
Weak institutional capacity at REB stemming from inadequate human resources increases the risk of implementation delays for the energy-efficient lighting component.	Risk Management: The component is a high priority project of the GOB resulting in MPEMR keeping a close watch and providing guidance for timely implementation of the component. REB will have the responsibility of doing the one-time procurement (that too is a re-bidding under close guidance of MPEMR), and as such excessive delays are not expected. The distribution utilities have gained experience from the fust phase in distributing the CFLs. A separate dialogue is on-going with all the stakeholders of REB for improving institutional capacity of REB, and a time-bound and credible action plan is being formulated by GOB for strengthening REB.
	Resp: Client | Stage: Implementation | Due Date: | Status: Not yet due
Power Cell has experience in implementing Bank project but it has vacancies at critical staff positions. All the Assistant Director level positions are currently vacant leaving little support for mid-level functionaries.	Risk Management: Recruitment process for the vacant positions has been initiated. The key positions are expected to be filled in by credit effectiveness.
	Resp: Bank | Stage: Preparation | Due Date: Credit effectiveness | Status: **In** Progress
Financial Management: Some delays in the submission of audited accounts have been observed in case of all the implementing agencies. The audited accounts are issued without any management letter.	Risk Management: Continued follow-up with the implementing agencies have reduced delays in submission of audited accounts. FYII audited accounts of IDCOL included a management letter.
The Financial Monitoring Reports (FMRs) of IDCOL are produced from stand-alone spreadsheet with scope for manipulation and errors.	A computerization of accounting system at IDCOL is on-going that would allow for automatic generation of FMRs from the system without manual processes.
There have been outstanding audit observations by the Foreign Aided Project Audit Directorate (FAPAD) on the project accounts of REB.	An action plan was agreed with REB for addressing the audit observations of FAPAD on REB project accounts and substantial progress has been made on addressing the observations. Taking satisfactory measures to remedy these observations is made a condition for disbursement of the efficient lighting component implemented by REB.
There were outstanding audit observations by FAPAD on project accounts of Power Cell. Power Cell remained non-compliant throughout the PSDTA project period in having the required FM staff on board.	Power Cell has resolved all outstanding audit observations that were identified as material to IDA. In the event of any audit observations in the future, Power Cell agreed to follow-up on a priority bases to settle those observations. A Deputy Director (Finance and HR) has recently been appointed. Appointment of an Assistant Director (Accounts) is made a condition for disbursement of the sector TA component implemented by Power Cell.
	Resp: Client | Stage: Preparation | Due Date: Credit Effectiveness | Status: In Progress
Procurement: Being a financial intermediary, IDCOL does not have adequate procurement experience.	Risk Management: An IDCOL staff will be designated to act as procurement focal point with adequate training provided to manage the small-value procurement under the Project. A procurement

	consultant appointed by Power Cell will support IDCOL as and when needed basis.			
	Resp: Client	Stage: Implementation	Due Date: Implementation	Status: Not Yet Due
Delays in concluding procurement and breach of confidentiality are common in REB. REB has adequate staff with procurement knowledge, but disagreement over issues (e.g., seeking clarifications from bidders during bid evaluation) is common.	Risk Management: Due to close follow-up by the Bank, the second phase CFL procurement experience was much better compared to the first phase in terms of complaints received (only one complaint in the second phase compared to 19 complaints in the first phase). Although the second phase CFL procurement could not be concluded (due mostly to issues related to the bidders), REB recognizes the need to have a clean and fair re-bidding for the second phase. The risk mitigation measures would include: (i) a time bound action plan with close monitoring; (ii) a thorough terms of reference for the bid evaluation committee; (iii) appointment of a technical specialist for providing support during bid invitation, evaluation, and post-award inspections; iv) appointment of a procurement consultant for providing support during bid invitation and evaluation; v) selection of competent bid evaluation committee members with inclusion of the procurement specialist; and (vi) establish strict confidentiality arrangements for bid evaluation.			
	Resp: Client	Stage: Implementation	Due Date: Before procurement begins	Status: Not Yet Due
Power Cell has shortage of staff with procurement knowledge causing delays in procurement process under the on-going PSDTA project.	Risk Management: Proposed risk mitigation measures would include: (i) service of a full time procurement consultant throughout the project period; (ii) designate one staff as procurement focal person with sound knowledge in GOB and Bank procurement.			
	Resp: Client	Stage: Implementation	Due Date: Early in project implementation	Status: Not Yet Due
Governance	Rating: Moderate			
Description: REB has weak governance structure in place. There is no separate policy making Board for REB and no formal accountability mechanism for REB top management.	Risk Management: Strengthening the governance structure of REB has been a major focus of the REB action plan. A credible and time-bound action plan for strengthening the REB and the PBSs is a condition for further investment support of the Bank to REB beyond the energy-efficient lighting component supported under the Project. Some changes have already been made in REB top management as a first step towards introducing professionalism at REB.			
	Resp: Client	Stage: Implementation	Due Date:	Status: In progress
Description: Selection of non-qualified operators for the RAPSS areas may lead to inferior quality services at higher tariff. There is a potential of misuse of subsidy in the RAPSS schemes.	Risk Management: IDCOL has been managing the SHS program transparently and effectively, mobilizing about 30 POs and supervising them well. It is expected that the same due diligence will be applied in mini-grid awards and supervision under RAPSS. Surveys and consultations as part of the sup-project specific feasibility studies will assess the ability and willingness to pay in the RAPSS areas. There will be a gradual approach with a few sub-projects implemented fust, which will provide for the lessons learned for the subsequent areas. Subsidy needs in the form of capital buy-down grant will be assessed after sub-project specific feasibility studies and appraisal by IDCOL.			
	Resp: Client	Stage: Implementation	Due Date:	Status: Not Yet Due
Pro.iect Risks				
Design	Rating: Moderate			
Description: Numerous implementing agencies with diverse components may cause delays in project preparation.	Risk Management: A co-ordination committee is set up at the Ministry headed by the Additional Secretary, Power Division with representation from the implementing agencies to ensure effective			

	coordination during project preparation. Coordination during the implementation phase would be less of an issue as the different components are independent of each other, such that delay in implementation of one component would not impact on the implementation of the other components. Resp: Client | Stage: Preparation | Due Date: Appraisal | Status: Done
Social & Environmental	Rating: | Moderate
Description:. The safeguard category of the project is B since there are no significant and/or irreversible adverse social and environmental issues in the project. Discharge of lead sulphate in the local environment during recycling of used SHS batteries is a concern. CFLs contain mercury and safe disposal of CFLs is also a concern.	Risk Management: The 2009 additional financing of the RERED project required the battery manufacturers to adopt ISO 14001-2004 (Environmental Management Standard) and OHSAS 18001:1999 (Occupational Health & Safety Management Systems) certifications by June 2011 for proper handling of recycled batteries. Out of the 13 battery manufacturers supplying batteries to the SHS program, 12 have already complied with the requirements and the remaining one is expected to comply soon. Out of the three battery recycling facilities, one is compliant with the certification requirements and the rest are expected to comply soon. Several incentives have been introduced by IDCOL to ensure that the expired batteries are sent to the approved recycling centers and not by backyard smelters. To further strengthen the monitoring of battery recycling and to strengthen the overall monitoring social and environmental monitoring of the renewable energy program of IDCOL, the capacity of the Environmental and Social Safeguards Monitoring Cell (ESSMU) is being strengthened with inclusion of a second environment consultant. An Environment and Social Management Framework (ESMF) was adopted under the RERED project. The ESMF has been updated to include the activities related to RAPSS and household energy. An annual environmental audit would be undertaken to check compliance with the environmental safeguards measures outlined in the ESMF and the report will be submitted to IDA by June 30 of every year. The technical specifications for the CFLs will require minimum mercury content (less than 5 milligrams per unit) as was done in the first phase CFLs fmanced under the RERED project. CFL packets will contain instructions for precautions in case the CFLs are accidentally broken. National guidelines for safe disposal/recycling of the CFLs will be in place before distribution of CFLs fmanced the Project can commence. Capacity building support is provisioned for in the sector TA component to ensure safe disposal of CFLs fmanced under the Project. Resp: Client | Stage: Implementation | Due Date: | Status: **In** progress
Program & Donor	Rating: | Low
Description: A number of successful but small scale improved cookstoves (ICS) program are currently being implemented by various NGOs. Bank's involvement in the household cook stove sector may cause resentment amongst the existing players.	Risk Management: The household energy component has been designed after thorough consultation with the key stakeholders. The oversight by SREDA will ensure effective coordination with other cookstoves program implemented in the country. The team will closely coordinate with the USAID financed project on Catalyzing Clean Energy in Bangladesh. Project implementation will also pay particular attention to initiatives to be developed through the Global Alliance for Clean Cookstoves in the country. Collaborative avenues will also be created with on-going Bank fmanced projects such as the Local Governance Support Project (LGSP-II) to allow for reaching the bottom of the pyramid. Resp: Bank | Stage: Implementation | Due Date: | Status: Not yet due

Co-financing from donors (USAID, BCCRF, and KfW) may be delayed or unavailable creating uncertainties in project implementation.	Firm commitment has been received from USAID for channeling the grant funds through a trust fund administered by the Bank. Necessary formalities are expected to be completed soon to establish the trust fund. On-principal commitment has been received from BCCRF and final approval is contingent upon approval of IDA funds for the Project. KfW fund is approved by the Government of Germany and necessary formalities for agreement signing will soon be initiated by KfW. Resp: Bank | Stage: Appraisal | Due Date: Appraisal | Status: Done
Delivery **Monitoring** & Sustainability	**Rating:** | Moderate
Description: Fast growth of the SHS program and introduction of RAPSS and household energy components to be implemented by IDCOL may outstrip its capability of oversight and monitoring. Sustainability of the SHS program is an issue after IDCOL discontinues financing the SHS program.	Risk Management: IDCOL has strengthened its inspection and monitoring capacity by establishing four new regional offices and hiring additional inspectors in addition to the existing six regional offices. An independent third party monitoring will be introduced to improve the monitoring of quality of service delivery. IT based customer feedback options are being explored for the program to ensure effective and real-time feedback from customers that will be used to strengthen service delivery. To assess the market potential and to allow for a smooth transition of the SHS program towards commercial financing, a study is being undertaken by IDCOL that will assess the sources of commercial financing available, constraints to raising commercial financing, and provide recommendations for the transition to commercial financing for the SHS program. Resp: Client | Stage: Implementation | Due Date: | Status: Not yet due

\| Implementation Risk Rating

The implementation risk is rated Moderate considering the track record of the main implementing agency IDCOL in successfully implementing the renewable energy program of the on-going RERED project.

Annex 5: Implementation Support Plan

BANGLADESH: Rural Electrification and Renewable Energy Development II

1. The Implementation Support Plan (ISP) provides the support required for implementation of all the mitigation measures identified in the ORAF and the GAAP in order to ensure that all the major risks are addressed. The design of the Project contains safeguards against each of these risks. The ISP is designed to review and ensure that those safeguards are effective and to reinforce them where necessary. The ISP will be undertaken by World Bank staff and is based on three major principles: (i) frequent field-based supervision of project activities including consultation with the Project beneficiaries, (iii) consistent review of fiduciary procedures and controls within the implementing agencies; and iii) continual high-level policy dialogue on improving institutional capacity of the implementing agencies.

2. IDCOL, the implementing agency of the access to electricity and household energy components, has a proven track record of managing the renewable energy program of GOB. The components will be implemented by IDCOL with partnership of the POs (which are mostly NGOs for the SHS and household energy, and NGOs/private sponsors for the RAPSS). IDCOL has developed a well-functioning inspection, monitoring, and oversight mechanism to ensure proper service delivery. However, the growing the renewable energy program and introduction of new components (RAPSS sub-component and the household energy) are expected to put a strain on the institutional capacity of IDCOL. IDCOL has already initiated an organizational review by institutional consultant and is in the process of establishing a separate unit for renewable energy with additional capacity. The Bank team will be closely following-up for early signs of organizational stretch, and provide advice and support as necessary. The third-party monitoring and IT-based customer feedback mechanisms that are envisaged under the Project will strengthen the implementation support of the renewable energy program. Enhanced technical support will be ensured in the Bank team to provide for the necessary technical guidance and due diligence required for the new and varied technologies introduced under the RAPSS sub-component.

3. The institutional and governance issues of REB are expected to have a limited impact on the efficient lighting component because of the ring-fencing of the one-time CFL procurement supported under the Project (international technical and procurement consultants supporting REB in bid invitation and bid evaluation etc). The implementation support team will however continue to engage in a policy dialogue with GOB, REB, and other stakeholders to help improve on the institutional capacity and governance issues at the REB and the PBSs, which are critical institutions for the country's rural grid electrification program. The team will closely follow-up progress in development of the action plan for REB/PBS strengthening.

4. Taking lessons learned from the PSDTA project implemented by Power Cell, several up-front measures are already introduced for strengthening capacity in areas of financial management and procurement. The implementation support team will continue to monitor and intervene as necessary for improving the capacity of Power Cell for effective implementation of the sector TA component.

5. Given the number of components and implementing agencies, the implementation of the Project would be challenging. Based on the experience of the RERED and PSDTA projects, several actions have been agreed that will facilitate implementation support:

- Third party monitoring by independent third parties will be introduced to monitor quality of customer service delivery, response time in case of customer complaints, compliance with the environment and social safeguards standards and framework etc.
- IT based customer feedback options and will be explored in addition to the customer hotline in place to ensure effective and real-time feedback from customers that will be used to strengthen the program delivery
- An annual technical audit by independent third parties will be undertaken every year to test if the quality of installations conform to the technical standards
- A procurement audit by an independent third parties of the PO procurement practices will be undertaken every alternate year during project implementation
- An annual environment audit by independent third parties will be undertaken to check compliance with the environmental safeguards measures outlined in the ESMF
- A separate PMU will be established at IDeOL with adequate capacity to implement the household energy component

6. The Bank team will undertake field visits on a regular basis and have focus group discussions with Project beneficiaries about service quality and responsiveness of the POs. This information will be used to continually improve project practice.

7. The Bank team will undertake regular and comprehensive fiduciary review. This will include thorough reviews including the assessment of interim financial management reports. Particular attention will also be given to the findings of the annual procurement post review of contracts, technical audit, procurement audit, environmental audit, and financial audit and implementation of the audit recommendations/observations.

A. Implementation Support Plan

8. The Bank's supervision team will include a Task Team Leader based in Dhaka supported by Washington based Lead Specialist to ensure close follow-up on implementation issues supported by international/regional technical specialists. The fiduciary and environment safeguards staff providing support will be all Dhaka based.

9. ***Technical Support:*** The following technical specialists will be part of the Bank team in support of implementation review of the Project:

a. An international/regional renewable energy specialist having vast knowledge on renewable energy technologies and international best practices to support due diligence of the sub-projects under the RAPSS sub-component, follow-up on the transition of the SHS towards commercialization, and to provide guidance and support on strengthening technical standards and compliance of the access to electricity component.

b. An irrigation specialist (field-based) to review the feasibility studies and site-specific appraisal reports of IDCOL on the irrigation schemes to be supported under the access to electricity component. This will require on average 10 staff weeks per year through the life of the Project.
c. An international/regional technical specialist supported by a field-based technical specialist to review implementation of the household energy component in line with international best practices tailored to local conditions. This will require on average two missions and an input of four staff-weeks by the international/regional specialist and ten staff-weeks by the field-based specialist.
d. An international/regional technical specialist for due diligence on technical specifications and bidding documents and procedures for the procurement of CFLs under the efficient lighting component.
e. A sector technical specialist (field-based) to monitor and follow-up on implementation issues of the sector TA component by Power Cell
f. A gender specialist to assess progress in implementation of the gender-responsive activities proposed under the social assessment of the Project. The specialist will monitor the adequacy and effectiveness of PO consultations during installations of SHS and RAPSS connections, and provide support in effective implementation of the gender-responsive household energy component. The specialist will carry out field visits for consultations with women beneficiaries of the Project. This input will require on average 8 staff weeks per year through the life of the project.

10. Financial Management (FM): A financial management specialist based in the Bank's office in Dhaka will conduct two or more FM supervision missions every year throughout the life of the project. The initial supervision will focus on compliance with FM actions, identifying any FM or disbursement issues in project implementation, and agreeing on redress measures. Preparation of the first Interim Financial Reports (IFRs) from computerized accounting systems of IDCOL on time, having in operation a computerized accounting system in Power Cell, and use of internal controls on FM functions of all the implementing agencies will be closely reviewed by the FM specialist.

11. *Procurement supervision:* A procurement specialist based in the Bank's office in Dhaka will be a member of the project team throughout the Project period. The procurement specialist will provide due diligence services for procurement documents and will join the implementation support missions. The frequency of missions is expected to be twice per year. The specialist will review the red flags required to be checked for all procurement under the project; implementation of the procurement risk mitigation framework; and implementation of recommendations provided in the various audit reports.

12. Environmental Safeguards supervision: An environmental specialist based in the Bank's office in Dhaka will be a member of the project team throughout the Project period. Besides supervision of compliance with environmental safeguards, the specialist will provide support to IDCOL in strengthening the Environment and Social Safeguards Management Unit (ESMMU) for effective implementation of the ESMF. The specialist will assess performance of the unit and monitor implementation of recommendations of the annual environment audit and third party monitoring reports.

13. Social Safeguards superVISIOn: A social development specialist based in the Bank's office in Dhaka will be a member of the project team throughout the project period. Besides supervision of compliance with social safeguards, the specialist will provide support to IDeOL on implementation of the ESMF. The specialist will monitor implementation of recommendations of the third party monitoring reports.

14. Implementation of GAAP: A Governance specialist based in the Bank's Dhaka office will be a member of the project team throughout the Project period to support implementation of the GAAP and the risk mitigation measures related to governance and corruption.

B. Skills **Mix Required**

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Task management Dhaka-based	25	10	Field-based
Co-Task management International	5	4	International Trip
Renewable energy specialist	10	4	International Trip
Irrigation specialist	10	10	Field-based
Household energy specialist - International	4	2	International Trip
Household energy specialist - Local	10	5	Field-based
CFL specialist	5	2	International Trip
Sector technical specialist	5		Field based
Gender specialist	8	5	
Procurement specialist	4		Field-based
Financial management Specialist	5		Field-based
Environment specialist	5	2	Field-based
Social development specialist	5	2	Field-based
Governance Specialist	3	1	Field-based

Annex 6: Governance and Accountability Action Plan (GAAP)

BANGLADESH: Rural Electrification and Renewable Energy Development II

Introduction

1. Improving governance and fighting corruption are central to the Government of Bangladesh's development agenda set forth in the 6th Five Year Plan and the Bank's mission of promoting sustainable growth and reducing poverty. This Governance and Accountability Action Plan (GAAP) for the Rural Electrification and Renewable Energy Development II (RERED **II)** Project contributes to these efforts by outlining a framework for actions, institutional arrangements, and additional specific measures to minimize governance and corruption risks in the project. The project is largely a repeater of an on-going project. The experience from the on-going project has been incorporated in the assessment of the critical governance and corruption risks and in designing the action plan for mitigating the risks. This GAAP has also been consulted with the implementing agencies to take into account their concerns and perspectives. Consultations with the POs will be done to ensure that they are fully aware of the principles and requirements set forth in the GAAP.

Country Context and Background

2. Bangladesh is a high risk environment for governance. The judiciary system is hampered by weak conflicts-of-interest regulations. The implementation of Bangladesh's Right to Information Act 2009 has been slow, partly because of poor records, lack of public awareness, and weak capacity. Despite some attempts to enhance accountability in the legal framework for corporate governance and public sector regulation, there is still a perception of poor performance and abuse of office in the public sector including state-owned enterprises. The Bank's Country Assistance Strategy (FYll-14) for Bangladesh has also defined weak governance as a binding constraint to inclusive growth and committed the Bank to embedding more systematic approaches to governance challenges across the portfolio.

3. Governance in the energy sector has had particular challenges. There is a perception of corruption in large value procurements. The sector remains affected by political considerations, short-term planning horizons of successive governments, poor incentive structure for managers and regulators, and a not-yet-mature regulatory body. However, these problems in the sector overall have had limited effect on the renewable energy program of the government. This program is implemented by the Infrastructure Development Company Limited (IDCOL), a government-owned company with a performance-oriented corporate culture. Besides, IDCOL as a financial intermediary is not involved in large value procurement minimizing the risk of outside interference.

4. The proposed project involves three implementing agencies. The major components of the project (access to electricity through renewable energy and access to modem energy for cooking) would be implemented by the *Infrastructure Development Company Limited (IDCOL)* through a number of Non-government Organizations (NGOs) and private sponsors. The *Rural Electrification Board (REB)* would be responsible for procurement and deployment of Compact Fluorescent Lamps (CFLs) through the rural cooperatives (PBSs) and other distribution utilities.

Power Cell, a technical arm of the Ministry of Power, Energy and Mineral Resources (MPEMR) would be responsible for supporting sector reform activities through a sector technical assistance component. All the three agencies have gained experience in implementing Bank projects through their involvement with the on-going Rural Electrification and Renewable Energy Development (RERED) and Power Sector Development Technical Assistance (PSDTA) projects. Because of this ongoing engagement, institutional weaknesses and major governance and corruption risks for the proposed project are mostly known which has contributed to the detailed risk assessment and design of the mitigation measures in this GAAP.

Governance and Corruption Risks

5. The governance and corruption risks in the proposed project fall into two major categories: i) Service Delivery Risk; and ii) Capacity Risk.

6. **Service Delivery Risks:** The major allocation of the Project is for solar home systems (SHS), which is implemented under a market-based public-private partnership model where NGOs (called Partner Organizations or POs) sell the systems to rural households/businesses under a micro-credit scheme. The NGOs later get refinancing of the micro-credit part from project fund after IDCOL verifies that the systems installed by the POs conform to the technical standards of IDCOL. Because of the growing size of the program, 100% verification of installation by IDCOL's inspectors is not possible. Inspection and verification of a certain percentage of systems on a random selection basis are done before funding is released by IDCOL. The program is based on the assumption that because the POs operate in a competitive market of selling SHS, each has an incentive to perform and deliver on quality supply, installation, and maintenance of the SHS. This market mechanism is also the principle means to counter rent-seeking and other types of corruption, since such behavior would undermine competitiveness and quickly lead to failure of the business. For this market based incentive to work, there would have to be options for consumers to buy systems from competing POs. IDCOL is gradually introducing more POs to the program (that meet the eligibility criteria) to ensure adequate competition in the market. Starting with just 5 POs when the program started in 2003, IDCOL currently has 30 POs, and more are planned to be added. Still, the market is dominated by only a few players with the largest PO (Grameen Shakti) having 40% market share with the second largest PO (Rural Services Foundation) having **11%** share. This high concentration of a limited number of players increases the risk of market imperfections including potential collusion in certain areas.

7. **Capacity Risks:** The renewable energy program of IDCOL is growing at a fast rate overstretching IDCOL's capacity for inspection and monitoring. **In** addition to further supporting the scale-up of the SHS program, the Project would support renewable-energy based mini-grids and captive plants, and solar irrigation pumps under the Remote Area Power Supply Systems (RAPSS) sub-component. Approval of these sub-projects would require location-specific due diligence by IDCOL. The Project would also support introducing clean energy for cooking to be implemented by IDCOL with the help of POs. All these activities are going to put additional burden on IDCOL's already overstretched institutional capacity for due diligence, inspection, and monitoring thus aggravating the risks that the refinancing and grant facilities are abused (POs submitting false claims of systems/connections to avail project funds), that sub-

standard equipment are used resulting in poor service quality, and that the after-sales services are not provided in a satisfactory manner.

8. The procurement of first phase CFLs by REB under the on-going RERED project had difficulties (numerous complaints from bidders, disagreement with the Bank on the bid evaluation reports etc). The second phase procurement experience under the RERED project was much better (relatively clean bid evaluation report and only one complaint from bidders). However, the procurement could not be concluded due to issues related to performance guarantee by the winning bidders. Delays in awarding contracts and maintaining confidentiality during the bidding process are issues in REB.

9. The Power Cell, the technical arm of the Power Division under MPEMR, has shortage of staff in procurement and financial management to ensure proper utilization of project fund.

Actions to Mitigate Governance and Corruption Risks

10. To mitigate the service delivery and capacity risks in the implementing agencies of the Project, the following measures are proposed.

11. To mitigate the service delivery risk, an assessment of the market competitiveness of the SHS program will be carried out early in project implementation and appropriate interventions would be taken to ensure proper functioning of the market based model. The assessment will look at the number of field offices of different POs in different geographic areas as an indicator of market competitiveness. An impact evaluation study of the SHS program is currently on-going that includes, among others, an assessment of the performance of a selected POs in terms of service delivery. This report is expected by project effectiveness. Appropriate interventions based on these assessments will ensure a smooth transition towards the goal of a full commercialization of the SHS program during the implementation of the Project.

12. Transparency measures will feature prominently in the project. All three implementing agencies will have duly appointed designated officers to fulfill obligations for proactive and reactive disclosure under Bangladesh's Right to Information Act. These persons will be ensured adequate training and capacity to carry out their duties. A program for proactive provision of information about the agencies' services, performance, and financing will be designed and executed. Project management and the designated officer will monitor feedback through helpline calls, the SMS system, and other complaints mechanisms listed below and accordingly adjust proactive disclosure of information to meet more closely what interests the public.

13. A third party monitoring is being introduced under the on-going RERED project to supplement IDCOL's efforts of appropriate feedback and monitoring of PO activities for ensuring effective service delivery by the POs. This third party monitoring mechanism will be continued under the RERED II Project focusing on collecting feedback from the beneficiaries on service quality. A technical audit by an independent third party will be undertaken every year to test if the quality of the installations conforms to the technical standards set by IDCOL. IDCOL has a hotline for customers to call directly and report any problems, which are then followed up by IDCOL with the concerned POs.

14. Several IT based options for enhanced reporting and feedback are being explored that will be implemented in the proposed project. Some of the POs already have an SMS based system in place to track daily installation data of various field offices of the POs. The option of introducing this system for the whole program would be explored which would allow for automatic update of the installation data in the database maintained at IDCOL to avoid false claims. Using the technology, the staff of a PO could record a geo tagged, time and date stamped picture of the SHS, which could be automatically updated in the database ofIDCOL and the concerned PO. Similarly, customer satisfaction feedback via SMS would be introduced that would allow for an easy and cost-effective method for collecting customer feedback, thus ensuring enhanced accountability of the POs for proper service delivery.

15. To address the capacity risks, an institutional development consultant has been appointed by IDCOL to assess the organizational structure of IDCOL and to propose modifications to meet the needs of the growing renewable energy portfolio. It is expected that IDCOL will establish a separate unit with adequate staff to ensure effective implementation of the access to electricity component of the Project. Support for the Project Management Unit (PMU) for the household energy component has been provisioned for in the Project.

16. Procurement of goods and services for the access to electricity component is the responsibility of the concerned POs. POs are required to conform to commercial practices and ensure economy and efficiency in procurement of the systems components. It is important to ensure that the POs are procuring the equipments at a competitive price, which in tum would ensure that the end-user prices are reasonable and fair. For this, a procurement audit by an independent auditor will be undertaken every alternate year during Project implementation to assess the procurement practices of the POs. All procurement information as required by Bangladesh's procurement framework, including the procurement plans and information about awards, will promptly be made publicly available.

17. To address the institutional and governance issues at REB, a Bank-supported study was initiated in 2009 that identified the problems/issues and provided recommendations for addressing them. After extensive consultations with various stakeholders (including staff and management of REB and the PBSs), GOB is at the final stage of developing a credible and time-bound action plan for strengthening the REB and the PBSs. GOB has already made some positive changes in the top management of REB in its efforts towards introducing professional management at REB.

18. For the second phase CFL procurement proposed under the project, the following 'ring fencing' measures were discussed and agreed: i) a time bound action plan with close monitoring by REB and the Power Division; (ii) a thorough terms of reference for the bid evaluation committee; (iii) appointment of a competent international technical specialist (with adequate knowledge on commercial and technical issues on CFLs) to support REB during bid invitation, evaluation, and post-award inspections; iv) appointment of a competent international procurement consultant to support REB during bid invitation and evaluation; v) selection of competent bid evaluation committee members with inclusion of the international procurement specialist; and (vi) establishing strict confidentiality arrangements for bid evaluation.

19. The Power Cell has initiated recruitment to fill-in the vacant positions and to strengthen its procurement and financial management capacity. Appointment of the Assistant Director (Accounts) has been made a condition for disbursement for the sector TA component implemented by Power Cell. A procurement consultant would support Power Cell throughout the implementation period of the proposed project, and a staff of Power Cell would be designated as procurement focal person with adequate training provided.

20. The Bank will apply sanctions as per its guidelines if it determines incidences of fraud, corruption, collusion and coercive practices. These sanctions may include fines, blacklisting, suspension of disbursements, or ultimately cancellation with respect to that contract. The Bank will seek first to remedy cases of corruption through cooperation with the implementing agencies. Any entity that is found to have misused funds may be excluded from subsequent funding. Information regarding such cases, where lessons are learnt and funds are retrieved, will be widely disseminated.

21. The GAAP matrix proposes actions for each of these issues, timeline for each action, and responsible agency for implementation. There are also some "early warning indicators" which, if monitored properly, would enable timely actions for course correction.

Monitoring arrangements

22. GAAP will be monitored regularly through indicators and reflected in progress reports by the implementing agencies, as well as in World Bank implementation supervision reports and aide memoires for supervision missions. The GAAP matrix will be used widely for monitoring purposes. Any 'early warning' indicators of governance and accountability risks will be monitored regularly so that corrective measures could be carried out promptly. A Governance Specialist will also be included in the Bank supervision team to strengthen the dialogue on the governance and accountability issues with the respective implementing agencies.

Bank Supervision and Surveillance

23. The project will require intensive supervision by Bank staff. Supervision arrangements for this project, particularly for procurement and financial management, are extensive. Bank supervision missions will be more frequent at the start of the project and would involve qualified staff in all disciplines, including procurement and financial management. The Bank will also conduct regular monitoring between supervision missions.

24. The GAAP will be adjusted as necessary during implementation to reflect governance issues which may emerge and/or to add actions. Considering the track record of the main implementing agency, fund flow and oversight arrangements and subject to meeting the agreed GAAP, the implementing agencies will have adequate systems to account and report for the project resources and expenditures accurately, and ensure that the project funds are utilized for the intended purpose.

Matrix of Actions
RERED II Project Governance and Accountability Action Plan

Issues/Risks/ Objective	**Actions**	**Agency responsible**	**Timeline**	**Early Warning Indicators to Trigger Additional Action**
		Service Delivery Risks		
Ensure adequately competitive market for effective service delivery	Carry out a market assessment to gauge the extent to which customers have options in choosing the service provider	IDCOL	Early in project implementation	Delays in initiating the assessment
	Complete impact evaluation study that includes an assessment of PO performance	Study consultant	Early in project implementation	Delays in report submission
	Based on the assessments, take appropriate interventions for ensunng an adequately competitive market	IDCOL	Early in project implementation	Delays in implementing appropriate interventions
	Conduct Technical audit by an independent auditor on installation quality	IDCOL appointed auditor	Every year during project implementation	Delays in appointing auditor, non-cooperation by the POs
Ensure enhanced reporting and feedback	Undertake regular reporting by the implementing agencies on implementation	IDCOL/REB/Power Cell	Quarterly	Lack of focal point or frequent replacement
	Ensure RTI Designated Officer in place and proactive information dissemination conducted	IDCOL/REB/Power Cell	Within three months of effectiveness	No designated officers in place; check of websites reveals lack of information

Issues/Risks/ Objective	Actions	Agency responsible	Timeline	Early Warning Indicators to Trigger Additional Action
	Introduce third party monitoring system	IDCOL	Within the first year of project implementation	No initiative by the implementing agency
	Introduce IT based systems for reporting installation data and for collecting customer feedback	IDCOL/POs	Within the first year of project implementation	No initiative by the implementing agency, non-cooperation by the POs
Capacity Risks				
Strengthen institutional capacity for effective implementation	Complete reView of the organization structure ofIDCOL	Institutional Development Consultant	Early in project implementation	Delays in implementation of the study recommendations
	Develop a credible and time-bound action plan for strengthening REB/PBS program	REB	Within the first year of project implementation	Delays in finalizing the action plan
	Appointment of Assistant Director (Accounts)	Power Cell	Before disbursement of the component	Delays in initiating selection process
Reduce risk of corruption in procurement.	Conduct procurement audit by an independent auditor on PO procurement practices	IDCOL appointed auditor	Every alternate year during implementation	Delays in appointing auditor, non-cooperation by the POs
	For the energy-efficient lighting component, develop i) a time bound action plan with	REB	Before initiating CFL procurement	Delays in developing the

Issues/Risks/ Objective	Actions	Agency responsible	Timeline	Early Warning Indicators to Trigger Additional Action
	close monitoring by REB and the Power Division; (ii) a thorough terms of reference for the bid evaluation committee; (iii) appointment of a competent international technical specialist to support REB during bid invitation, evaluation, and post-award inspections; iv) appointment of a competent international procurement consultant to support REB during bid invitation and evaluation; v) selection of competent bid evaluation committee members with inclusion of the international procurement specialist; and (vi) establishing strict confidentiality arrangements for bid evaluation.			action plan and terms of reference, delays in appointment of the international technical specialist, complaints received
	Appointment of a procurement consultant and training for procurement focal point	Power Cell	Early in project implementation	Delays in initiating selection process

Annex 7: Impact Evaluation Methodology

BANGLADESH: Rural Electrification and Renewable Energy Development II

1. An Impact Evaluation will be designed to attribute causality to project interventions. The proposed Impact Evaluation (IE) aims to determine whether the project has had a significant impact on income, employment, access to social services and socio-economic welfare of the beneficiaries. Results will be disaggregated by gender to measure the impact on female beneficiaries. A baseline survey will be carried out at the project start and the follow-up survey at the project completion. The study will implement a difference-in-difference approach for comparison between treatment (beneficiaries of the project) and control (non-beneficiaries) groups. The impact evaluation would be based on a diverse set of data sources: primary data collection through baseline surveys, participatory focus group discussions, consumer satisfaction surveys, and selected secondary data sources (household surveys, census, and other types of secondary information).

2. **Research Questions for the Impact Evaluation.** The proposed IE aims to determine whether the project has had a significant impact on the earnings and socio-economic welfare of beneficiaries. The evaluation seeks to answer the questions of whether the intervention impacted households': i) Mid-term earnings 18 months after being intervened (in particular, by farm and non-farm sector to identify transition between sectors); ii) consumption, iii) behavioral changes due to the availability of electricity (e.g time use); iv) gender differential in the outcomes; v) health outcomes (in particular for women and children who are the most exposed groups to indoor air pollution); vi) educational outcomes such as study hours, school attendance and grade completion (by gender).

3. **Control Group and Identification Strategy.** Ideally, one would have two groups to be compared that would be as identical as possible before the intervention (ex-ante) in both observable and unobservable characteristics and factors. In order to secure the similarities between these groups, the IE will be designed as a randomized controlled trial (ReT). This design constitutes the best strategy to ensure that the impact analysis is conducted in rigorous fashion and enables causal inference. If this is achieved, the single difference between the two groups after the intervention could be attributed to the impact of the program's implementation. For doing this, eligible beneficiaries that will be willing to participate in early stages of the program will be randomly assigned to intervention and control groups. Randomization ensures that any source of bias is properly isolated. The expected demand for the project will determine the final design of the IE. Information on this demand is expected to be refined before the program becomes effective. In the most likely scenario of excess demand for the program, a lottery would be used as a fair and transparent option for giving every woman the same chances to be first (or last) in the program. This, as well as other alternatives, will be agreed with the GoB upon project approval and the concept of the evaluation will further reviewed as a stand alone analytical piece following the standard quality enhancement procedures.

4. **Data.** The baseline survey will be conducted in the first six months of project implementation. The surveys will be implemented at household and village level. The follow-up survey will take place 18 months after the first batch of households are implemented and be

applied to the same sample used for the baseline. Qualitative data, at household and community levels (focus groups), will be included as part of the baseline survey data collection. The gathering of qualitative information can provide information to refine the analysis of the diffusion mechanisms of the impact identified in the evaluation as well as potentially capture additional spillovers effects.

5. **Methodology of analysis. In** case the randomized intervention is difficult to implement (for practical reasons), alternate cross-sectional estimation techniques can be explored such as Propensity Score Matching (PSM) and Instrumental Variable (IV) technique. Furthermore, the study can implement a difference-in-difference (DiD) approach for comparisons between treatment and control groups, drawing on data from both the baseline and the follow-up surveys. The DiD methodology consists of measuring the average change in a given indicator between two periods (before and after the intervention, for both treatment and control groups) and then comparing the changes for the two groups. The differences between two groups reflect the isolated effect of the program. The DiD econometric analysis will allow for verification of the effectiveness of the randomization strategy in creating comparable groups. It will also facilitate correction of some potential "contamination" of the data, as the before-and-after difference for each group corrects for any remaining fixed differences between treatment and control while the difference between groups deals with external factors that affect the target population during the interval of analysis. Moreover, controlling for initial conditions in the DiD implementation can correct for biases due to pre-existing differences between the treatment and control group.

Annex 8: Operations Policy 8.30 Compliance Review

BANGLADESH: Rural Electrification and Renewable Energy Development II

I. Introduction

1. This is a review of the Rural Electrification and Renewable Energy Development II (RERED II) Project, to ascertain its compliance with WB OP 8.30 requirements. This review is based on study of the available background documents, discussions with the Project task team and the client, and examination of documents submitted by Infrastructure Development Company Limited (IDCOL), the financial intermediary (FI) for the project.

II. The Project: Financial Sector Context and Objectives

2. The ongoing RERED Project, scheduled to close in December 31, 2012, has been under implementation with the objective of increasing access to electricity in rural areas of Bangladesh through installation of Solar Home Systems (SHSs), a renewable energy solution. The experience of the RERED Project has been encouraging, as it is making real impact in off-grid remote areas in the country. The RERED II Project will expand the outreach of the SHS and also introduce new component of private sector led mini-grid schemes, solar irrigation pumps, and captive plants for rural areas. The renewable energy components of RERED II will be implemented by IDCOL, which on-lends to selected partner organizations (Pas) across the country. The RERED II Project aims at increasing access to clean energy in rural areas through renewable energy sources to in rural areas through renewable energy and promote more efficient energy consumption.

3. Availability of electricity not only improves quality of livelihood but enhances delivery of social services like education and health in rural areas. As such, it promotes inclusive growth as stated in the third pillar of the CAS 2010 - 2013. On the other hand, financing real sector investment in affordable power in environmentally friendly manner and promoting development of participating organizations are real benefits derived from a financial intermediary loan (FIL), which is consistent with the first pillar of CAS 2010 - 2013. Thus, the proposed new FIL, RERED II Project is consistent with the country's poverty reduction objectives.

III. Policy Framework for the FIL

4. The macroeconomic pressures intensified in Bangladesh over the past 18 months, resulting in a marked deterioration in the country's external position. These pressures stem mainly from large oil and capital imports associated with new fuel intensive power stations, oil price-driven terms-of-trade shock, and expansionary fiscal and monetary policies.[21] The near term, and possibly the medium term, outlook continues to remain challenging, with risk posed by external, fiscal, and inflation pressures.

21 Different background papers prepared by IMF in 2011 - 12 while processing extended credit facility (ECF) for Bangladesh

5. The overall situation in the financial market remains volatile. While financial soundness indicators (FSIs) have improved in recent years, banking system stability could be undermined by systemic risks emanating from rising liquidity pressures, limited prudential oversight, and weak bank governance and risk management controls, most notably at the state owned commercial banks. Rapid growth in the banking sector and equity markets has strained supervisory capacity of the regulators and heightened systemic risks. Instability looms large in the capital market with aversion to long term equity investment by the institutional investors, whose capacity to invest is partly constrained by the current liquidity crunch.

6. The ongoing global economic/financial crisis appears far from being over; a number of economies in the European Union are going through severe fiscal and monetary turmoil. Private sector confidence in the market is yet to be restored in the USA and in other leading economies. Amidst all these, Bangladesh continues to be one of the least affected countries and remains on the path of6% growth in GDP. Small size of the economy, relatively low integration with global financial markets, and entrepreneurial zeal in the domestic private sector continue to be the primary reasons for this apparent insulation and resilience. However, remittance flow and export of readymade garments - Bangladesh's two main channels of integration to the global economy - have been challenged by the consumer behavior and investment activities in the western economies. Especially, the export earnings through the trade channel appears more vulnerable in the short to medium term. On the domestic real economy front, lack of new investments due to infrastructure bottleneck accumulated over the years remains a source of concern. Together with relatively high probability of double digit inflation (mainly non-food), the financial sector activities and parameters such as interest rates will continue to be restrictive for financial market players and the business of financial intermediation is going to be affected in the near to medium term.

7. One important aspect of compliance review is likelihood of Government intervention in the market through the Project, leading to distortion in the process of financial intermediation. As in the ongoing RERED Project, approach of implementation would remain the same for the new financing through RERED II; 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. 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 SHSs and would, in tum, get re-financing from IDCOL for 60-80% 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% - 9% interest rate with a repayment period of 5 - 6 years including the grace period. The cost of funds for the POs under the RERED II Project is comparable to other sources of financing - such as PKSF (Pally Karma Shahayak Foundation, the microfinance apex). Thus there would be no significant market distortions arising from implementation of the RERED II Project.

8. There is, however, some subsidies to make the services affordable to the poor. A small subsidy ofUS$ 20 per SHS per household (initially the subsidy was US$ 90) on the selling price is provided to buy down the capital cost of SHS. The RAPSS component has the provision to

have upto 50% of the project cost as subsidy to make the tariff affordable to the rural community. The household energy component likewise has a subsidy element for the biogas installations. For the SHS program, it is expected that the need for subsidy would continue to decrease as the remaining market barriers are overcome, competition is enhanced in the market, and the rapid decline in the PV prices in the international market continues. The ultimate target is to withdraw the subsidy component and make SHS a fully market based commercial solution.

IV. Eligibility of the FI

1. Implementation Progress

9. Implementation progress of the renewable energy component implemented by IDCOL is rated satisfactory consistently. Against initial project target of 50,000 households, over 236,000 households were provided with SHS-based electricity under the original credit. Under the first additional financing, over 300,000 SHS were supported. Under the second additional financing approved in 2011, another 630,000 systems are targeted to be supported by the credit closing in December 2012. Currently over 50,000 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 additional resources needed for satisfying the market demand.

2. Financial Performance of IDCOL

(i) Capitalization: In terms of capitalization, IDCOL stands well. As of January 2012 its share capital was raised to BDT 1,200 million and total equity is BDT 1,656 million, which is around 82% and 73% higher than what these were during the last OP8.30 review in 2011. **In** terms of Paid-up Capital, IDCOL is over the top of the BASEL II requirement of 1,000 million. The share capital and total equity is around 10.6% and 14.63% respectively of the loans and advances outstanding (these were 9% and 14% respectively during the last OP8.30 review in 2011). The recent drop in the historically high capitalization to loans and advances ratio is due to significant increase in long term loans extended to power sector, especially to the renewable energy sector.

(ii) Recovery Performance: IDCOL's overall loan recovery rate has improved to 98.69% from previous 96% (June 2010). This signifies that implementation of the IDCOL approach has proven to be sustainable and without compromising with the loan recovery rate.

(iii)Loan Loss Provisioning: IDCOL does abide by provisioning guidelines of Bangladesh Bank - the central bank of the country. The financial intermediary has been provisioning 1% for unclassified loans and 20% for the classified part of the portfolio, as per the regulation.

(iv) Accounts Keeping: Accounting documents and financial statements of the Company have been audited by renowned audit firms over the last three fiscaVaccounting years. It

appears that adequate numbers of disclosures (mandatory and voluntary) have been made in the company annual reports and those were approved by the auditors.

(v) Profitability: As per the audited financial statements, IDCOL has been earning profits, which is adequate to support sustainability and business continuity of the FI. In FY 11, net profit of the company was 44.85% of its operating income.

(vi)Management: The policy affairs ofIDCOL are set and overseen by an independent Board, represented by personnel from both government and the private sector. The day-to-day business of the FI is run by trained professionals hired from the market. As far as the Project is concerned, a technical standards committee approves the standards and an operations committee monitors the POs' technical and financial performance.

3. Exemptions

10. As per Bangladesh Bank Circular IDCOL is exempted from compliance of sections 4(d), 6,9,14(1)(b), 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 as a viable non-banking financial institution in Bangladesh.

11. Under the original RERED and during the two additional financing, IDCOL received OP8.30 clearance at the appraisal stage.

V. Key Risks and Challenges

12. IDCOL's investment portfolio has major concentration risk in terms of single sector/product exposure. At present about 69% of its portfolio holds lending/assets in renewable energy sector. This indicates inability of the FI to diversify its portfolio into different sectors/products; IDCOL official reported that the organization's mandate has been a limiting factor in product diversification. However, this assessment stresses that IDCOL immediately embarks on devising strategic plan for diversification and balancing its portfolio.

13. Given the cautious outlook for investment, at least in the near term, IDCOL is facing a big challenge of reinvesting its proceeds from the existing investments outside renewable energy and of maintaining the growth required for sustainability. Once again, a strategic plan for short, medium, and long term investment is imperative to address this challenge.

VI. Recommendations

14. Considering the issues covered in the previous sections and based on other available information, it appears that IDCOL, the financial intermediary for the RERED II Project, is compliant with the Bank's 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 to CAS pillars and outcomes, RERED II Project would remain focused on poor households' demand satisfaction and adequate importance would be given to the newly introduced components to have a greater development impact.
(b) The project team would need to keep a close eye on the overall financial sector parameters and monitor impact of the same on the FI as well as domestic capital and on the POs.
(c) The standards and criteria used for selecting POs by IDCOL should be maintained and, if necessary, be revised for improving quality of implementation.
(d) It is understood that the amount of subsidy component is less than significant and is required for increasing awareness among the poor households in the rural areas. IDCOL should continue to have guard on use of the subsidy component in terms of benefit going to those meeting the project criteria.
(e) As far as the mini-grid component is concerned, market based private sector principles will be maintained.
(f) It is imperative that IDCOL initiates formulating a strategic plan for investment, with a clear objective of diversifying and balancing its portfolio of assets. After all, sustainability and growth of IDCOL should not be made too much dependent on donor supported renewable energy products.

Annex 9: Economic and Financial Analysis

BANGLADESH: Rural Electrification and Renewable Energy Development II

Solar Home Systems Component

Summary SHS Program Performance Indicators

SHS Households Benefitted	550,000	
PV modules used	28	MWp
National Benefits		
Economic NPV (w/o consumer surplus)		
@1O%	16,489	Millions of BOT
Economic NPV (w/ consumer surplus)		
@1O%	225,031	Millions of BOT
Economic IRR (w/o consumer surplus)	43%	
Financial NPV @12%	9,765	Millions of BOT
FinancialIRR	26%	
Annual Kerosene Saved	40	million liters/year
Value of kerosene saved to nation	2,713	millions BOT per year
NPV Kerosene subsidies offset	2,560	millions BOT
NPVTaxes Earned (from hardware sales)	1,879	millions BOT
SHS grants provided	740	millions BOT
NPV net fiscal impact	3,699	millions BOT
Household Benefits		
PV electricity delivered	45,568	MWh/year
NPV net financial benefits for households	4,405	Millions BOT
FinancialIRR for Households	25%	
Value of Kerosene Saved for households	2,413	millions BOT per year
Benefits to Partner Organizations		
NPV@ 10%	2,656	Millions BOT
Financial rate of return	16%	
Global Benefits		
C02 emissions offset	95,325	tons C02/year

1. **Proposed SHS Investment and Alternative.** The Solar Home System (SHS) comprises of a solar panel of varying sizes from 10 to more than 100 Wp each, with appropriately sized controller and batteries, wiring, and efficient CFL or LED lamps and outlet(s) for supplying power to small appliances such as a radio or TV. The amount of electricity produced is directly proportional to the size of the solar panel. The SHS replaces fuel based lighting, most often kerosene lighting, and disposable or rechargeable batteries for operating small appliances. The light quality from CFL or LED lamps is far superior to lighting from kerosene lamps so users gain considerable benefits from superior lighting, especially for reading, general illumination and removing a fire hazard posed by kerosene lamps.

2. **Project Economic and Financial Viability.** The economic and financial analysis is based on the supply and installation of 550,000 solar home systems of varying capacities for a period of about 15 months beginning January 2013. The pace of installation is conservatively assumed to be the same as it is today, about 38-40,000 a month, with about 25,000 SHS a month directly funded from RERED II and the balance using other sources of funds available to IDCOL and the Partner Organizations. For analysis purposes, the product mix is assumed to be similar to that from January 2010 to December 2011, though the share of systems up to 20 Wp is assumed to increase slightly to 23 percent from 21.5 percent as subsidy for SHS larger than 30 Wp will no longer be available.

3. Economic internal rates of return were used to assess the viability of SHS where it displaced kerosene lighting and rechargeable batteries. The economic analysis took into account the economic cost of the SHS, the replacement costs of key components and O&M services. Analyses are done in constant 2012 BDT. The benefits are accrued due to avoided cost of kerosene for lighting and charging batteries. Kerosene consumption data was based on a survey undertaken by IDCOL as part of establishing baseline for the CDM. Kerosene retail price used was 61 BDT/liter and the economic price was 69 BDT/liter. Fuel price escalation was based on US Energy Information Administration's medium term forecast. The SHS is expected to deliver 4.5 Wh/Wp of electricity daily.

4. Consumer surplus valued only the additional benefits accrued due to greater quantity of electric lighting available from the SHS (measured in lumen-hours) compared to kerosene lamps. The local environmental and safety benefits of switching from kerosene to electric lighting or the improved quality of lighting were not taken into account. The consumer surplus calculation is done using financial costs (since these are the costs actually seen by the consumer).22 The consumer surplus benefit, though calculated, was not used in computing EIRR as its inclusion resulted in no negative cash flow values. C02 emissions reduction value was taken into account, but it is low compared to economic cost savings.

5. From both an economic and financial viewpoint the project has high and robust internal rates of return (IRR). Even without considering consumer surplus benefits, the economic IRR is 43%. The financial IRR is 26%. Average kerosene fuel consumption per household needs to drop to 1 liter per month before the economic NPV reduces to zero at a 10% discount rate. Such low levels of consumptions have not been observed in Bangladesh among households considering purchasing SHS.

6. **PO Viewpoint.** From the viewpoint of the POs[23], the SHS business is financially attractive, with Modified Financial IRR[24] for the POs of 16% (assuming a finance rate of 9

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22 The consumer surplus estimation approach used was from Peter Meier, *An Economic Analysis of Solar Homes Systems: A Case Study for the Philippines*, February 3, 2003, The World Bank. See http://go.worldbank.org/8SFC140Zl0.

23 POs obtain 60 percent of loan amount from IDCOL at 9 percent and on-lend to SHS customers while retaining a margin of about 13-15 percent.

24 Modified IRR (MIRR) avoids the problem associated with the standard IRR calculation formula, which assumes that interim positive cash flows are reinvested at the same rate of return as that of the project that generated them. This is usually an unrealistic scenario. The Modified IRR calculation assumes that that the funds are reinvested at a rate closer to the fum's cost of capital and negative cash flows are financed at the firms cost of borrowing. This

percent and reinvestment rate of 15 percent). It assumes IDCOL financing of 60% of debt at 9 percent with loan tenor of 6 years with a 2 year grace period. The PO extends loans to the households at 15 percent.

7. Household viewpoint. The market response, in this demand driven project in itself provides a high degree of confidence that the individual households find that the SHS are attractive investments. The 20 Wp SHS offers 6 hours of lighting from two 7 Wp SHS (12 light-hours). The larger systems offer 12 to 20 light-hours per day. The larger systems also offer an additional 20-30 hours of TV viewing or other equivalent services.

8. A detailed financial analysis for individual systems finds that SHS are financially attractive with positive IRR and highly positive NPV for all systems (Table 1).

Table 1 Financial Viability of Individual SHS

SHS Financial Viability for Households				
	20 Wp	40 Wp	50 Wp	85 Wp
Levelized Electricity Cost (BDT/Wh)	0.100	0.084	0.085	0.079
Financial NPV @ 10% (BDT)	13,151	8,728	14,036	13,206
FIRR	47%	22%	25%	20%

9. The costs to households include the initial cost of supply and installation, O&M and replacement of battery, and controller over time. The benefits to a household comprise of avoided purchase of kerosene lanterns, batteries, kerosene fuel, and battery recharging costs.

10. Global Benefits. The reduction in emissions from kerosene use is 95 thousand tons of C02 annually. Additional C02 emissions reductions also occur as recharging batteries using fossil fuel generators are avoided. The economic value of global benefits if assumed to accrue only for ten years is BDT 243 million on a NPV basis (at USD 5/ton C02 avoided).25

11. National Benefits. The SHS offsets the use of 40 million liters of kerosene. The kerosene subsidy saved (estimated as the difference between the economic cost of kerosene and its financial cost), is BDT 2,560 million on a net present value basis over 20 years, assuming that the real price of kerosene does not increase and retail price remains unchanged. The Government will earn BDT 1,879 million in taxes on SHS components on a NPV basis. The grants for SHS sales are valued at BDT 740 million. The Government consequently has positive fiscal returns of BDT 3,699 million on a NPV basis. Income and other taxes that POs and IDCOL have to pay will further increase fiscal revenues.

RAPSS Component

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avoids the problem with the IRR giving an unduly optimistic picture of the project. MIRR also avoids the problem with the standard IRR method where more than one IRR can be found in projects with alternating positive and negative cash flows. MIRR finds only one value.

25 C02 emissions avoidance value from World Bank Carbon Finance Unit.

12. The RAPSS portfolio to be financed by IDCOL is expected to include solar photovoltaic (PV) powered mini-grids, irrigation pumping, and biomass gasification power plants. If demand exists and projects are viable, IDCOL may consider other applications such as solar cold storage; solar dryers; biogas power plants; and hybrid Hoffman brick kilns (see Table 2). As this is a demand driven program, specifying precisely the types and quantities of projects to be financed is not possible. For planning purposes, the RERED II Project is expected to finance 42 solar PV minigrids, 1,500 solar PV irrigation pumps, 450 biogas power plants and 28 biomass gasification power plants. Other sources of financing that IDCOL is mobilizing will finance the other investments.

Table 2 Indicative Portfolio of RAPSS to be Financed under RERED II

RAPPS Renewable Energy Investments (2013-2016)							
Mini-grid Type	Average Capacity	Number	Cost per unit (USD)	Total	Equity (USD million)	Grant (USD million)	Loan (USD million)
Solar Mini Grid	150 kWp	42	600,000	25.2	5.0	12.6	7.6
Solar Water Pump - Irrigation	500m3/day	1,500	40,000	60.0	12.0	24.0	24.0
Solar PV based cold storage	1000 m3	-	230,000	-	-	-	-
Solar dryer	80 kg	-	370	-	-	-	-
Biogas based Power Plant	20 KW	450	32,000	14.4	2.9	2.9	8.6
Biomass Gasification Plant	200 KW	28	285,000	8.0	1.6	1.6	4.8
Hybrid Hoffman Brick Kiln		-	1,000,000	-	-	-	-
Total		2,020		107.6	21.5	41.1	45.0

13. Economic cost effectiveness analysis was conducted for RAPSS applications - solar mini-grid, solar irrigation pumping and for biomass gasification captive power supply - against diesel generation as the alternative providing the same levels of service. Grid extension was not considered as an alternative as these will be installed in areas unlikely to be served by the REB grid in the near to medium term. Cost effectiveness analysis, rather than EIRR computation was undertaken as the type of service (electricity or water delivery), and the service levels (kWh or cubic meters of water supplied) from the renewable energy options and the diesel alternative are identical - thus the benefits are identical.

Solar Mini-grids

14. A solar photovoltaic mini-grid comprises of a large, typically ground-mounted solar PV array, batteries, a back-up diesel generator and a distribution network connecting customers. An example of such a mini-grid is the 100 kWp Sandwip Island solar PV system to serve up to 400 consumers (but presently serving 165 customers) that include the small shops, school, health center and 4-5 residences surrounding Enam Nahar Market.[26]

15. Average consumption per customer from a solar mini-grid is significantly greater than from a SHS. For example, average consumption per customer in the Sandwip Island scheme currently could be about 1000 kWh per year (when all 400 customers are connected, the average would be up to 400 kWh/year). This level of consumption would be suitable for small enterprises and industry. In contrast a 50 Wp SHS delivers only 80-90 kWh per year suitable for providing

[26] Sandwip 100 kW Solar Mini Grid, http://www.lged-rein.org/archive_file/brieCon_Sandwip_100kW_solar.pdf

basic lighting and electricity services. However, a solar mini-grid, or even a biomass gasifier or diesel mini-grid require certain pre-requisites to be fulfilled - there should be a significant number of customers located in a relatively compact area which can be connected by a grid network at low cost. The electricity demand per customer should be high including daytime loads, which implies significant business or industry demand, rather than only household demand. The mini-grid location should also be far from the grid, if not, it would be more economic to meet the demand through an REB grid extension.[27]

16. Since the quality and level of electricity service from a solar mini-grid would be the same as from an appropriately sized diesel mini-grid, an economic cost-effectiveness analysis was undertaken to verify that electricity from a solar mini-grid is less costly than from a diesel mini-grid providing the same level of service. The financial analysis of the solar mini-grid estimated the financial internal rate of return for the investment and the levelized financial cost of electricity from each mini-grid alternative.

17. An analysis was conducted for a representative mini-grid serving 500 customers using 0.77 kWh/day/customer based on expected maximum demand at the Manikgonj project. Required PV system size is 103 kWp with a 5 kW diesel serving as a backup to recharge the batteries for exceptionally cloudy/rainy periods. The alternative diesel generators are 2 x 80 kW assuming peak coincident load per customer of 130 Wand diesels operate at 80% of their rated capacity. Two diesels are used to ensure adequate availability and reliability comparable to a solar mini-grid. Specific fuel consumption is 0.35 liters/kWh and 2% real fuel cost escalation[28] is assumed. Solar PV installed economic cost of $3.72/Wp inclusive of distribution cost and BDT 0.66/Wp for taxes. Battery accounts for $0.8l/Wp (exclusive of taxes). Distribution network adds $0.59/Wp to the cost. A back-up diesel is included to provide greater reliability. It is assumed that the back-up supplies 2.5 percent of the electricity. Life of electronic components, batteries is 5 years and diesel generator is 10 years. For financial analysis a 50% grant and tariff of 32 BDT/kWh is assumed based on Sandwip experience, with tariff escalation equal to half the diesel fuel escalation, plus a fixed monthly charge of BDT 100/customer. The diesel-only generators installed cost is 20,000 BDT per kW plus cost of distribution which is the same as for the solar mini-grid.

18. The analysis demonstrated that the solar PV minigrids can supply electricity cheaper than with diesels (economic levelized costs: 38 BDT/kWh for solar vs. 48 BDT/kWh for diesel). The financiallevelized cost of electricity from the solar mini-grid is 30.8 BDT/kWh due to the 50% subsidy which partly offsets the taxes and duties paid on all components, except PV modules; compared to 42 for the diesel mini-grid that uses subsidies fuel. The switching value at which diesel electricity economic cost equals that of solar electricity is 30% less than the current cost of about $1/liter. With a capital grant of 50 percent and a tariff of 32 BDT/kWh, the project has a Modified FIRR of 13.7 percent. The results are summarized in Table 3.

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[27] For a discussion of the options and trade-offs between grid, mini-grid and stand-alone electricity systems, see, Chapter 3 in: The Wodd Bank, "Addressing the Electricity Access Gap", Background Paper for the Wodd Bank Group Energy Sector Strategy, June 2010 at
http://siteresources.woddbank.orgIEXTESClResources/Addressing_the_Electricity_Access_Gap.pdf

[28] US EIA medium term forecast for diesel cost escalation.

Table 3 Solar PV Mini-grid Economic and Financial Results

Criteria	Condition	Diesel	Solar	Units
Levelized economic cost of electricity	Base case	47.7	38.4	BDTjkWh
Project FIRR			13.7%	
Financial Levelized Cost		42.7	30.8	BDTjkWh
Levelized economic cost of electricity	Real fuel escalation 0%	44	38	BDTjkWh
Project FIRR			13.7%	
Breakeven PV system cost			4.95	USDjWp
			33%	higher
Breakeven diesel fuel domestic economic cost when economic cost of diesel and solar electricity are same.			30%	Less than current economic cost of US$ Ijliter

19. A tariff of 32 BDT/kWh is significantly greater than the tariff charged by a BPS, however, in the Sandwip Island solar PV mini-grid, consumers are paying a tariff of 32 BDT/kWh. A significant risk in these projects is that customers may not want to pay such high tariffs if nearby PBS customers are paying a much lower tariff. This risk may limit the demand for solar mini-grids. Willingness to pay assessments are crucial.

20. It is also important to locate the solar mini-grid (or any other mini-grid) in areas where the likelihood of REB extending its grid in the near future is low. In the case of a solar mini-grid, a key decision point is in about the sixth year where significant investment is needed for battery replacement. By the end of the seventh year the project should begin to have positive cumulative cash flow and after the 8th year the financial IRR should be more than 12 percent. See Figure 1.

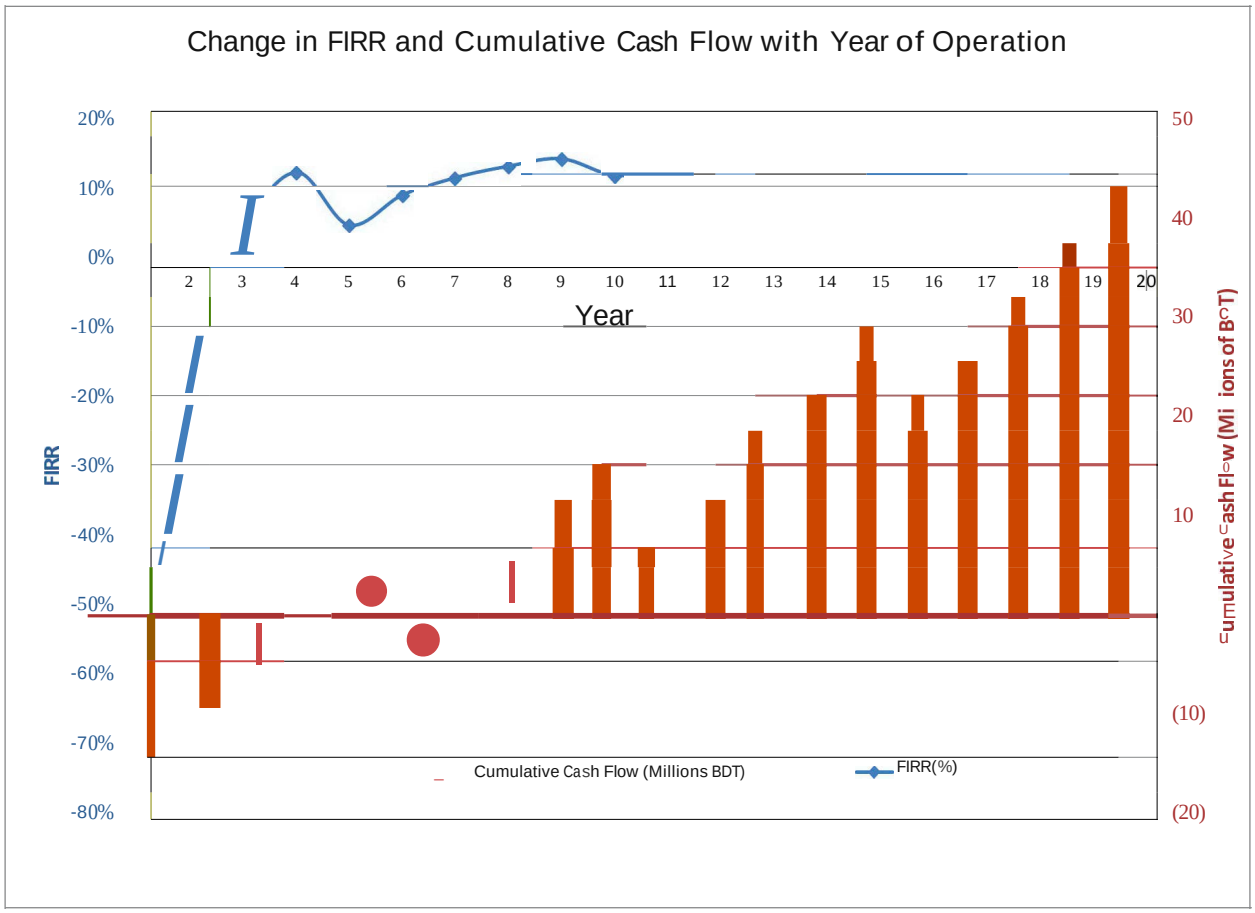

Figure 1 FIRR and Cumulative Undiscounted Cash Flow with Years of Operation

Solar PV Irrigation Pumping SUb-Component

21. Solar PV irrigation pumping scheme comprises of a PV array on fixed or tracking supports powering a deep well irrigation pump through a variable frequency inverter. Located centrally among the fields to be irrigated, water is distributed through PVC pipes and open channels to the fields. Owned and operated by a PO, the farmers are charged an annual fee based on the area of land to be irrigated. These PV pumps displace diesel pumps. IDCOL has financed a number of such schemes and the response from pas and from farmers are said to be positive. An example of such a pumping scheme is the 3.5 million BDT, 8.4 kWp solar PV array powering a 7.5 kW submersible pump located in Thamrai Upazila in Village Rehatet, Post Shreapur, Dhaka District. It provides irrigation water to 100 bighas (33 acres) and charges farmers 5,000 BDT/bigha/year.

22. The alternative to a solar rrngation system is a diesel generator powered deep well irrigation pump in the same location delivering water to the same fields. There are millions of diesel irrigation pumps operating in Bangladesh.

23. An economic cost effectiveness analysis verified that solar PV irrigation pumping was lower cost compared to diesel pumping when delivering the minimum quantity of water required

by the farmers. As the solar PV array has greater capacity than the requirements of the farmers, given their current irrigation practices, the cost of water, should the full capacity of the solar pumping system be usefully utilized, was also computed. The results are summarized below in Table 4. The 6.5 kWp solar pump can potentially deliver 184 thousand cubic meters of water though the cost effectiveness analysis is based on using 147 thousand cubic meters of water as this is the quantity of water required by the farmers.

Table 4 Solar PV Irrigation Pumping Summary Results

	Units	Diesel Irrigation	Solar Irrigation
Economic capital cost	Thous. BDT	20	2,139
Quantity of Water Delivered	m3/year	147,168	147,168
Economic Cost of Water	BDT/m3	2.36	2.11
Financial Cost of Water	BDT/m3	1.89	1.20
Breakeven diesel fuel cost			
- Economic	BDT/liter	49.5	
-Financial	BDT/liter	30.5	

24. The financial results shown below are from actual projects that IDCOL appraised and approved for financing. The projects irrigated 9-41 acres each, had project costs ranging from 1-3.5 million BDT. Their FIRR ranged from 10-13 percent range after accounting for 40 percent capital cost buy-down (Table 5).

Table 5 Solar PV Pumping Financial Analysis Results

Irrigation Project	Rice Acres Irrigated	Vegetable Irrigation (Hours/Year)	Total Cost (BDT)	Revenue/Bigha (rice/year, veg per hour) BDT	FIRR	DSCR Minimum
RCSNI	9	513	1,025,000	1700-2000,32	10.60%	1.14
RSF	31	414	3,379,500	2600,80	13.36%	1.82
NUSRA					Representive: 1 cusec solar pump cost BDT 3.38 m	
Dhamrai	30	Multi-crops: rice, jute, maize, heat, vegetables included in acres	3,500,000			
Shailkupa	41		3,500,000			
Kumarkhali	26		3,500,000	1000-3000, 90	13.36%	1.82
Chirirbandar	36		2,413,010			
Bogra Sadar	35		2,593,170			
All projects received 40% grant, 30% IDCOl loan. loan terms were 6% interest, 8 year tenor and 9-12 month grace. Source: IDCOl Appraisal Reports						

Biomass Gasification Power

25. Producer gas from a biomass gasifier, after cleaning can be fed into an internal combustion engine to generate electricity. IDCOL has financed two projects to-date. Sustainable Energy & Agro-Resource Limited (SEAL) invested in a 64.25 million BDT, 400-kW rice husk gasification based power generation facility along with a precipitated silica plant at Chilarong, Thakurgaon sadar, Thakurgaon. The plant uses rice husk as fuel for power generation. The plant

at present is supplying electricity to the adjacent silica production plant with a captive consumption of 75kW. The project is expected to also supply power to a nearby poultry hatchery (minimum requirement 300kW), thirty irrigation pumps (lOkW each) and/or numerous rice mills in the area. The second project, a rice husk-fueled 250 kW developed by Green Power Private Ltd., in 2007 was designed to supply up to 300 household and small business customers in Kapasia, Gazipur. The 25 million BDT project stopped operation in December 2011. It is not functional for a variety of reasons from failed distribution lines due to inadequately treated poles, higher than expected rice husk costs, inability to meet customers' price expectations as the REB grid is relatively close.

26. An economic and financial cost effectiveness analysis was conducted for a representative 200 kW biomass gasifier plant. The economic analysis demonstrated that the gasifier is cost effective compared to a diesel generator supplying the same quantity of electricity. The economic levelized cost of electricity from the gasifier is estimated at 11.4 BDT/kWh compared to 33.7 BDT/kWh from a diesel generator where the specific fuel consumption of the diesel is 0.35 liters/kWh. See Table 6.

27. On a financial basis, as diesel fuel is subsidized, the avoided cost is also less. The levelized financial electricity cost for the gasifier is 12.0 BDT/kWh compared to 25.34 BDT/kWh from a diesel generator. The breakeven economic cost of diesel, when the electricity cost from diesel is equal to that from the gasifier is 26.4 BDT per liter of diesel (compared to the economic cost of diesel fuel of 82.5 BDT per liter. On a financial basis the breakeven diesel fuel cost is 27.6 compared to financial cost of diesel of 61 BDT per liter.

Table 6 Summary results for Biomass Gasification Power

	Units	Diesel Electricity	Biomass Gasification Electricity
Economic capital cost	Thous. BDT	4,000	18,105
Quantity of Electricity Delivered	kWh/year	1,168,000	1,168,000
Economic Cost of Electricity	BDT/kWh	33.68	11.44
Financial Cost of Electricity	BDT/kWh	25.34	12.03
Breakeven diesel fuel cost			
- Economic	BDT/liter	26.4 compared to 82.5	
- Financial	BDT/liter	27.6 compared to 61	
Breakeven biomass fuel cost	BDT/kg	13.3	

28. To obtain the attractive returns for biomass gasifier generated power requires the plant to operate reliably over the long term, with access to predictably priced biomass fuel, and to be well managed. Internationally, small biomass gasifier power plants have had a spotty record, therefore careful design, well trained operators/managers and fuel that is dry and properly managed is essential to its reliable operation. Biomass financial fuel cost needs to be four times higher for its electricity cost to equal that of diesel electricity (in India, for example, biomass fuel

price increased six-fold over a ten year period m areas with significant biomass power generation).[29]

29. The biomass gasifier would not be a net emitter of C02. However, as they are mainly expected to use agricultural residues, a sustainable source of biomass fuels, they may not qualify for full carbon credits. Common available biomass gasifiers do require some amount of water consumption for cleaning the gas prior to sending it to the engine-generator. The effluent has to be carefully treated and safely disposed.

Household Energy Component

30. Improved cookstoves and biogas stoves that displace traditional stoves save considerable amount of biomass cooking fuels. Importantly, they have very significant environmental and health benefits, especially for women and children. Improved cookstoves and biogas stoves result in significant reduction of indoor air pollutants such as small particulates, and toxic pollutants. The WHO estimates that as much as 3.6 percent of the total burden of disease in Bangladesh is attributable to exposure to indoor air pollution; 32,000 children below 5 years of age die annually due to acute lower respiratory infections, and 14,000 adults die due to chronic obstructive pulmonary disease.[30]

31. An IDE survey3l conducted for IDCOL identified very significant benefits for biogas plants in terms of improved health, socio-economic status, reduced workload for women, and enhanced agriculture and environment. The users have reported significant health benefits resulting from reduced air pollution and the associated eye and respiratory infections. One notable benefit is the reduction of fire-induced accidents resulting from non-use of firewood and other traditional fuels. There were significant benefits from time savings. Though acknowledged, the economic analysis did not quantify the health and environmental benefits due to using improved cookstoves or biogas stoves.

Improved Cook Stoves

32. The analysis is conducted at the national and household level for a program that would support the replacement of traditional wood burning stoves with improved cook stoves (ICS). The economic analysis uses project TA costs and household investment and maintenance as costs and the value of fuel savings and health expenditure savings as benefits. The financial analysis from the household perspective takes into account only the direct investment and maintenance cost to the household and fuel savings. The ICS program has positive economic and financial benefits as shown below in Table 7.

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29 Krishna Mohan, "Rising fuel costs make biomass energy unattractive", Business Standard, October 20,2009. http://www.business-standard.com/india/news/rising-fuel-costs-make-biomass-energy-unattractive/373664/

30 ESMAP, "Improved Cookstoves and Better Health in Bangladesh: Lessons from Household Energy and Sanitation Programs, The World Bank, Final Report June 2010.

31 IDE, "Annual Biogas Users Survey 2010" prepared for IDCOL, November 2011.

Table 7 Economic and Financial Analysis Results for Improved Cook Stoves

Millions BOT	Project (Economic)	Households (Financial)
Cost	2,319	2,140
Net Benefit	740	1,459
NPV	419	820
EIRR and MIRR	36.4%	39.7%

33. A modified IRR is computed in the financial analysis as the traditional IRR would overstate the project attractiveness. The economic and financial results are robust though sensitive to avoided fuel costs. Rural biomass expenses have to decline to BDT 2.43/kg (compared to assumed cost of BDT 3/kg) for the financial net present value (at 10%) to be zero.

Biogas Plant with Biogas Stove

34. The analysis is conducted at the national and household level for a program that would support the replacement of traditional wood burning stoves with 20,000 biogas plants and biogas stoves. The analysis is based on households acquiring a biogas plant with a daily gas production of 2.8 m3 required to cook three meals a day. It would require daily feeding rate of 60 kg of dung per day.[32] Households with 5 or more head of cattle would have sufficient dung to support a gasifier producing 2.8 m3/day of biogas. The number of such households is about one million.

35. The economic analysis uses project capital and TA investments and household investment as costs and the value of fuel savings, along with value of nutrients (displacing purchased fertilizer), domestic labor savings, value of C02 emission reductions, and health expenditure savings due to reduced indoor air pollution as benefits. The biogas displaces purchased fuelwood burned in a traditional cook stove. The financial analysis done from a household perspective uses only the direct cost to households as costs, and the fuel savings as benefits. The project is economically and financially viable. The results are summarized in Table 8:

Table 8 Biogas Economic and Financial Results

Millions BOT	Project (Economic)	Households (Financial)
Cost	265	540
Net Benefit	1,254	1,519
NPV	356	535
IRR	27.3%	15.1%

36. The project is economically viable with an EIRR 27.3 percent. The EIRR drops to 26 percent if C02 emissions reduction benefits are not available. This analysis may be conservative; a biogas user survey conducted in 2010 for IDCOL found that the cost of biomass fuels displaced by a biogas unit was significantly greater than HIES2010 fuel consumption data indicated -

[32] SNV, "Feasibility of a national programme on domestic biogas in Bangladesh," August 2005.

average of BDT 1400/month, compared to HIES2010 estimate of cooking fuel costs of BDT 418/month for rural households.

37. The project is financially viable with an FIRR of 15 percent. The cost of purchased biomass fuels prior to acquiring a biogas plant would have to drop to 252 BDT/month (compared to HIES2010 estimate of 418 BDT/month) for the financial NPV to become zero (10 percent FIRR).

Energy Efficient Lighting Component

38. The CFL Program Goal is to supply 7.25 million CFLs through REB to reduce electricity use and peak demand. As these CFLs will be displacing thermal generation, it will reduce the carbon footprint and be eligible to obtain CDM credits. The REB will distribute the first replacement CFL free (limit of four per family) and therefore there will be no cost to the consumers.

39. The national benefits are due to the avoided electricity consumption and peak demand reduction as well as the global benefits of avoided C02 emissions. The benefit to the consumer will be the reduction of electricity expenses and also avoiding more frequent replacement of incandescent lamps, had the consumer continued to use incandescent lamps.

40. The analysis focuses on the original CFLs distributed by the program and not on any CFLs that the consumer will purchase to either replace burnt CFLs or to add more light points in the home.[33] The analysis is therefore conservative, as a successful demonstration of CFL use is expected to create more demand for CFLs thus further reducing electricity consumption and costs.

41. The cost of the CFL Program is 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. The benefits of the Program for the nation are reduction in electricity demand, reduction in peak demand, and contributing to the global goal of C02 emissions reduction. The sale of certified emissions reduction (CERs) through CDM, in the global carbon market will bring additional revenues to the Government.

42. The Program has very robust and significant benefits with Economic NPV exceeding BDT 3 billion and Financial NPV about BDT 4 billion with and without CDM credits. The EIRR is 182 and 211 percent and FIRR is 45 and 43 percent with and without CDM credits, respectively. The direct benefits to a household is BDT 2,033 and for all households, BDT 3.3 billion, on a net present value basis. Financial benefit to a household per year ranges from 339 to 535 BDT per complete year of operation of the CFLs supplied by the program. Electricity savings range from 312 (year 2 - the first full year) to 198 (Year 7) GWh per year. The decline in savings is due to CFLs burning out over time. The results are summarized in Table 9.

33 UNFCCC CDM methodology for CFLs provides a schedule for lamp burnouts. This is taken into consideration in estimating the electricity avoided. The burnout schedule is Year 1 -6.39%, Year 2 - 12.78%, Year 3 - 19.16%, Year 4 - 25.55%, Year 5 - 31.94%, Year 6 - 38.33% and Year 7 - 44.71%.

Table 9 Summary Economic and Financial Analysis Results for CFL Program

	Economic		Financial	
	NPV@10%	**EIRR**	**NPV** @10%	**FIRR**
Category	Million BOT	Percent	Million BOT	Percent
With Carbon Benefits	3,482	211%	4,263	45%
Without Carbon Benefits	3,190	182%	3,970	43%
NPV Financial Benefits to all Households			3,316	Million BDT
NPV Financial Benefit to individual Household			2,033	BDT
Electricity Saved at 33 kV (GWh/year) range from	312 in Year 2 to 198 in Year 7, if CFLs are not replaced			

43. There will be increase in reliability of the supply 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 CFLs will also reduce cooling loads as CFLs are more efficient than incandescent lamps. The reduction in peak demand (MW), is also valued, especially as Bangladesh electricity system is demand constrained.

44. The analysis takes into account the energy savings due to replacement of incandescent lamps with CFLs. This energy savings is valued using the Bulk Supply tariff for financial analysis and the avoided economic 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 transmission losses, replacement costs of burnt CFLs, consumer outage costs.

Annex 10: Social Assessment

BANGLADESH: Rural Electrification and Renewable Energy Development II

1. A Gender Responsive Social Assessment for Bangladesh Rural Electrification and Renewable Energy Development II (RERED II) Project has been carried out by the BRAC University. The detailed assessment design is based on the experience of the RERED I project, and learning and feedback from the project beneficiaries. Using a gender lens of analysis, the assessment report explores the impacts, problems and opportunities in the Solar Home Systems (SHS), improved cookstoves (ICS) and biogas plants for cooking in the lives of women living in remote rural areas. The main objectives of the assessment are to help make the project design more gender responsive in its focus by analyzing and determining the measure to be adopted for meeting the needs of the potential beneficiaries in general and female beneficiaries in particular. The assessment included focus group discussions, key informant interviews, and household observations in five different sites over a period of a month by a team of 20 researchers.

2. The key findings and recommendations of the report are summarized below.

Solar Home Systems (SHS)

3. The Solar Home System (SHS) has vastly increased mobility and entrepreneurial ambitions among women. It enables women to send their children to school and ensure that their children can study properly at night. It has increased women's safety out of the household in remote areas and within the household (by reducing bum related injuries out of kerosene lamps that the SHS replace). There are greater awareness and interest among women regarding renewable energy. In many households, it is the women and children who are creating the need among the men to avail the SHS.

4. However, the assessment team identified that the POs follow a male-oriented approach to marketing and coverage of SHS. The specific findings are:

- In order to expand the use of the SHS, Partner Organizations (POs) arrange meetings at local markets to reach out to the male members. Females of the community are not considered a part of such inception meetings. Women usually came to know about SHS from neighbors' houses when they saw them installed.
- Many poor households, including female-headed households, are finding it difficult to afford the SHS and/or keep up with the monthly installments.
- Though women are the key to securing the micro-loans to buy the SHS, their opinion is rarely sought regarding its usage.
- Training for operation and maintenance of SHS are provided at locations which are inconvenient for women to travel to.
- Many rural women have some misinformed notions such as SHS takes away energy and power from the sun's rays, and as a result the crops do not get enough sunlight and the yields from the fields suffer. Moreover, many women also believe that solar panels attract thunderbolts.

5. **Recommendations:**

- Explore options for easing the system of one-time down payment for the female-headed households and the female-run enterprises. Ensure continuation of subsidies for the smaller systems to make it affordable to the poorer households.
- Women should be consulted about their preferred usage at the time of installation of the SHS so that women can benefit from the light locations for specific activities like sewing, knitting, or cooking.
- Organize women-friendly training sessions-place, time, and content of the training-should be designed in a way that considers the special needs of a woman in households.
- Adequate and appropriate awareness raising is needed to dispel misconceptions about solar power and its harmful effects on crops.

Biogas Plants for Cooking

6. Biogas plants provide an alternative source of fuel, primarily for cooking stoves in rural areas where government-subsidized natural gas is not available. The main beneficiaries of biogas plants are rural women who spend a huge portion of the day cooking for the household. The assessment found that the biogas plants financed by IDCOL under a separate program improved the lives of women as well as have opened up several entrepreneurial avenues for women. These plants have given rural women access to clean energy. Women, who use biogas, are feeling healthier and have more time to spend on activities other than cooking. It has increased their safety, as they do not suffer from bums and health hazards from clay-stoves any longer. On a larger scale, biogas plants has decreased the dependence of wood and dry leaves for fuel and reduced carbon emissions within the community level. At the same time, these biogas plants have opened up multiple entrepreneurial opportunities for women as they can rent out extra stoves, sell the by-product compost as fertilizer or fish-food. However, very few women in the communities studied have experienced the benefits of biogas plants. Hence, the assessment team has focused on some recommendations that would ensure that a larger community of women could avail biogas.

7. Specific finding regarding biogas plants are

- Insufficient supply of cow-dung and poultry litter may restrict usage, though the benefits to women are many.
- Different social protection programs (e.g. BRAC's TUP, CARE's Shouhardo, CLP etc) are training and helping women set up cattle or poultry farms. These farms may be able to resolve the supply of raw materials problems for biogas plants.
- Many women reported that at times even after having a bio-gas plant is set up, the men of the household would sell of the cows in the house, which is the primary ingredient for biogas.
- The POs do not have adequate male and female employees to access rural women, publicize and advocate about biogas plants. A good mix of male and female employees is highly likely to significantly increase the usage ofbiogas plants.

8. **Recommendations:**

- Introduce cooperative bio-gas plants with women leading and managing them. Encourage those who own larger cattle or poultry farms and if required provide them with financial

support in order to assist them in building up larger biogas plants and supply the rest of the village with biogas from these plants.

- POs need to employ educated female employees who will have the access to the women in the rural community and advice them properly for installing biogas plants.
- Biogas can enhance the quality of life for women in the household and that should be acknowledged by the male counterpart in the family, so raising awareness among men is also important.

Improved Cookstoves (lCS)

9. There are several advantages of improved cooking stoves (ICS). Traditional cooking stoves produce a huge amount of smoke which is harmful for women, as most women are involved in taking care of the cooking purposes within the household. The smoke from the traditional stoves also harms the corrugated iron sheets' (popularly known as tin) roof of the house, cooking utensils, and cause several kinds of skin or eye irritations in women and children. ICS is a welcome change, as it does not produce a huge amount of smoke within the house. Though the ICS are supposed to perform better than that of the traditional stove, the assessment found that many of the ICS are not working properly due to technical problems and in some cases are not proving to be fuel efficient.

10. The specific findings are

- The space between the two stoves is not sufficient and as a result, one cannot place two cooking pots at the same time or use large cooking pots.
- One cannot cook in these stoves during the monsoon season as the pipes attached to the stoves are usually installed on the roof of the house. When it rains, the water drains into the stove, making it non-usable.
- The POs especially Grameen Shakti has almost no female employees, as a result, the consumers, most of whom are women, face uneasiness in dealing with the PO officials.
- In many houses, these stoves are installed a feet above the ground, many women who squat on the floor to cook find it difficult to maintain their balance and suffer from back pam.

11. Recommendations:

- POs would need to improve the technical aspects of ICS and ensure that it does indeed use less fuel than that of traditional clay-stoves. Otherwise, fuel costs would offset the benefits of ICS. A wider assessment is needed to improve the capacity of these stoves and address the technical shortfalls.
- Women should be consulted before installation is done regarding location and height of the stove placement.

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