BANGLADESH: RURAL ELECTRIFICATION AND RENEWABLE ENERGY DEVELOPMENT PROJECT: II (RERED II)

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

Prepared by

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&

Rural Electrification Board

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ABBREVIATIONS AND ACRONYMS

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<th>Abbreviation</th>
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<tr>
<td>BERC</td>
<td>Bangladesh Energy Regulatory Commission</td>
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<td>CFL</td>
<td>Compact Fluorescent Lamp</td>
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<td>EA</td>
<td>Environmental Assessment</td>
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<td>ECA</td>
<td>Environmental Conservation Act</td>
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<td>ELIB</td>
<td>Efficient Lighting Initiatives of Bangladesh</td>
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<td>EMP</td>
<td>Environmental Management Plan</td>
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<td>EMS</td>
<td>Environmental Management system</td>
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<td>ESMF</td>
<td>Environmental And Social Management Framework</td>
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<td>GOB</td>
<td>Government of Bangladesh</td>
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<td>IAF</td>
<td>International Accreditation Forum</td>
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<td>ICS</td>
<td>Improved Cook Stoves</td>
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<td>IDA</td>
<td>International Development Association</td>
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<td>IDA</td>
<td>International Development Association</td>
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<td>IDCOL</td>
<td>Infrastructure Development Company Limited</td>
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<td>IFC</td>
<td>International Finance Corporation</td>
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<td>ISO</td>
<td>International Organization for Standardization</td>
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<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<tr>
<td>kW</td>
<td>Kilowatt</td>
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<tr>
<td>MW</td>
<td>Mega-watt</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
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<tr>
<td>OHSAS</td>
<td>Occupational Health and Safety Standard</td>
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<td>PBS</td>
<td>Palli Bidyyut Samity</td>
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<td>PO</td>
<td>Participating Organization</td>
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<td>PSDTA</td>
<td>Power Sector Development Technical Assistance Project</td>
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<td>RAP</td>
<td>Resettlement Action Plan</td>
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<td>RAPSS</td>
<td>Remote Area Power Supply Systems</td>
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<td>REB</td>
<td>Rural Electrification Board</td>
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<td>RERED II</td>
<td>Rural electrification And Renewable Energy development Project: II</td>
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<td>SHS</td>
<td>Solar Home Systems</td>
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<td>SREDA</td>
<td>Sustainable Renewable Energy Development Authority</td>
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<td>MOEF</td>
<td>Ministry of Environment and Forest (MOEF)</td>
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EXECUTIVE SUMMARY

The Project development objectives are to increase access to clean energy in rural areas through renewable energy, promote more efficient energy consumption, and improve the response capacity of the borrower in case of an emergency. The project will support: (i) increased access to electricity in rural areas through renewable energy; (ii) large-scale dissemination of more efficient cook stoves and fuels for cooking; (iii) more efficient energy consumption; and (iv) improved technical and institutional efficiency in the power sector.

The Solar Home Systems (SHS) program of Bangladesh supported by the Bank is emerging as a viable electrification option for lighting and other basic services in areas without grid access. Solar Home Systems (SHS) are being installed under the ongoing renewable energy project and the proposed RERED II will continue this support. Further the commercial needs of the rural markets and small enterprises would be served by mini grid renewable energy sources under the Remote Area Power Supply Systems (RAPSS) Guidelines of 2007. At the same time, RERED II Project will continue its support replacement of incandescent lamps with energy efficient Compact Fluorescent Lamps (CFLs) to reduce the peak electricity demand under the Efficient Lighting Initiatives of Bangladesh (ELIB) program. The RERED II will also support clean cooking options for households through improved cook stoves (ICS), advanced combustion stoves, and biogas.

The renewable energy program is being implemented by the Infrastructure Development Company Limited (IDCOL), while the distribution of CFLs to the households in exchange for incandescent lamps is being executed by the Rural Electrification Board (REB).

An amount of US$155 million in International Development Association (IDA) funding is proposed for the project. This will mainly include (A) Solar Home Systems (SHS) Component (B) Remote Area Power Supply Systems (RAPSS) (C) Technical Assistance to IDCOL Component (D) Household Energy Component (E) Compact Fluorescent Lamp (CFL). The solar home system, min-grid (solar system) or CFL bulbs will not generate any air pollution during operation. However, the primary concerns are related to environmental, health, and safety issues due to improper manufacturing, and disposing process of battery and CFL bulbs. The project components mainly deal with the solar panels, batteries and CFLs that have some environmental impact. So the Environmental and Social Management Framework (ESMF) is required for the RERED II to identify the required environmental management measures that need to be taken. The original ESMF was updated twice during two additional financings of the RERED project. The RERED II will adopt this updated ESMF, which defines the environmental requirements needed for processing the financing of each sub-component to comply with World Bank Policies and environmental legislation of the Government of Bangladesh (GOB).

No land acquisition will be financed under the credit. No public lands will be used for the project. Land, 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. Private lands which are disputed or have encroachments on them (informal settlers, non-titled entities) will not be used for the project. Encumbrances are rare in rural areas. Since there is no public land acquisition involved, Bank policy OP 4.12, Involuntary Resettlement will not be triggered by the project. The project may extend facilities in areas where indigenous people (IPs) live. However, availing the facilities/services/products is purely on a voluntary basis for all paying customers (including IPs). No negative impacts are anticipated towards IPs. Bank policy OP 4.10 Indigenous People will not be triggered by the project. SHSs are also being installed in IP areas like Chittagong Hill Tracts through Partner Organizations (POs), which are well-versed in IP languages to offer adequate consultation on maintenance of products and proper usage of facilities offered. Future sub-projects will also follow this approach in IP areas, in order to tailor the awareness raising, mobilization and training campaigns to the needs of IPs in the relevant locations.
Legislative bases for Environmental Impact Assessment (EIA) in Bangladesh are the Environmental Conservation Act 1995 (ECA’95) and the Environmental Conservation Rules 1997 (ECR’97). Department of Environment (DOE), under the Ministry of Environment and Forest (MOEF), is the regulatory body responsible for enforcing the ECA’95 and ECR’97. Other law of Bangladesh like Renewable Energy Policy of Bangladesh, 2008, Bangladesh Labor Law, 2006 etc will be obliged for the project. The ESMF also be guided by the World Bank’s Safeguards (Relevant Policies) mainly OP 4.01 Environmental Assessment will be triggered for this project.

The main negative environmental impacts of this project are

- Improper disposal and recycling of lead acid storage batteries, as causes for lead sulfate contamination in the surrounding lands and water bodies. Lead sulfate is a water soluble substance that could contaminate groundwater. Lead Sulfide dust or lead concentrate enter the body through the nose and/or mouth through breathing. Very fine dust particles go into the lungs and affect the human body.

- Improper disposal of CFL bulbs regarding health impact of mercury. The technical specifications of the CFLs supported under the project required the mercury content to be no more than 5 milligrams per unit. Given the large number of CFLs supported under the project (about 7 million that will be procured under the Project in addition to the 10.5 million procured and distributed under the RERED project) can have a collective significant impact on the environment, if not disposed of properly, has potential of causing damage to the public health.

The following are the major progress achieved under the ongoing RERED project

- Out of 13 battery suppliers in IDCOL in SHS program, 12 have fully completed the ISO 14001:2004 (Environmental Management Standard) and OHSAS 18001:2007 (Occupational Health Safety Standard) certification process. The remaining one supplier is expected to complete the certification process by July, 2012.

- There are three battery recyclers in IDCOL SHS program. Rahimafrooz has already completed the ISO 14001:2004 and OHSAS 18001:2007 compliances for their recycling unit. Others, the HAMKO Battery Company and the Panna Battery have made substantial progress for obtaining the ISO 14001:2004 and OHSAS 18001:2007.

- For the CFL component, an international consultant together with a local consultant is being hired to develop a national guideline for the proper disposal of lamps and ensure safe collection of waste CFL bulbs as part of the ELIB program.

- Audit Consultants (Environment Audit specialist and Mechanical Engineering Specialist) are being hired for undertaking an environment audit to assess the adequacy of the current mechanism for ensuring proper recycling of batteries.

The purpose of this Framework is to identify the likely environmental impacts, propose suitable mitigation measures and implementation of these measures. Sub-projects under the RAPSS (mini-grids, biogas and biomass based captive plants, and solar irrigation pumps) need an environmental and social screening/assessment with management plan. No site specific environmental assessment will be required for household system (solar home system, biomass, CFL etc.). The measures under the ESMF include:

- Prepare guidelines for selecting new battery supplier.

- Provide technical guidance to Environmental Improvement on Battery recycling and CFL Recycling Support.

- Arrange training and awareness raising session for Pos
- Assign the IDCOL’s Solar Inspectors to monitor the distribution of new battery as well as collection of expired battery.
- Strengthen IDCOL’s capacity for environmental and social safeguard management.
- Ensure half-yearly monitoring of battery recycling plants.
- Engage an independent third party monitoring firm to review half-yearly the environmental and social compliance during implementation.
- REB is committed to minimize the risk of health hazards associated with CFL bulbs and will raise enough awareness among stakeholders. In addition, REB will take measure to ensure well written instruction at the outside of the packet of CFL bulb of the second phase of ELIB in both Bengali and English.
- Both REB and IDCOL will disclose this updated ESMF (both English and Bangla) in their website for comments with newspaper advertisement. This ESMF will also be disclosed in the World Bank InfoShop.

IDCOL has gained experience in implementing environmental management framework under Bank financed RERED project. IDCOL is strengthening the Environment and Social Safeguards Management Unit (ESMMU) to institutionalize the environmental and social management in its operation.
1. INTRODUCTION

1. The Solar Home Systems (SHS) program of Bangladesh supported by the Bank is emerging as a viable electrification option for lighting and other basic services in areas without grid access. Solar Home Systems (SHS) are being installed under the ongoing renewable energy project and the proposed RERED II will continue this support. Further the commercial needs of the rural markets and small enterprises would be served by mini grid renewable energy sources under the Remote Area Power Supply Systems (RAPSS) Guidelines of 2007. At the same time, RERED II is continuing its support to replacement of incandescent lamps with energy efficient Compact Fluorescent Lamps (CFLs) to reduce the peak electricity demand under the Efficient Lighting Initiatives of Bangladesh (ELIB) program. The RERED II will also support clean cooking options for households through improved cook stoves (ICS), advanced combustion stoves, and biogas.

2. The renewable energy program is being implemented by the Infrastructure Development Company Limited (IDCOL), while the distribution of CFLs to the households in exchange for incandescent lamps is being executed by the Rural Electrification Board (REB). It is expected that these interventions yield net positive environmental impacts. No significant and/or irreversible adverse environmental and social issues are expected but obviously these interventions bear some environmental risk. The primary environmental, health, and safety issues involve how they are manufactured, installed, and ultimately disposed of. So, proper consideration of all environmental and social factors during design and implementation is of utmost concern. An environmental management and social management framework (ESMF) was adopted under the original RERED project, which was updated during the two additional financings of the RERED project. The ESMF has been further reviewed and revised for the RERED II Project. This updated ESMF will include consequence impacts due to the proposed new components (RAPSS and household energy) in the RERED II and findings on assessment report of the existing ESMF implementation.

3. This ESMF is required for the RERED II to identify the required environmental management measures that need to be taken, in order to ensure compliance with the Government of Bangladesh own requirements and those of the World Bank. All the major environmental impacts along with mitigation and management measures have been compiled in the form of ESMF.
2. BRIEF PROJECT DESCRIPTION

4. In support of Government of Bangladesh (GOB)'s vision of providing universal access to electricity by the year 2020, the proposed project would support the provision of renewable energy based electricity services, clean fuels, and modern cooking methods using the capabilities of NGOs and the private sector. It will help reduce peak electricity demand by supporting a more effective CFL dissemination program. The proposed project will support institutional development in the public sector so that the GOB can play a more effective role in increasing access to modern energy services without further burdening overstretched public sector organizations.

5. The Project builds on the achievements of the RERED project, which has delivered gender responsive results by supporting the provision of energy services to facilitate social and productive activities undertaken by men and women in rural areas of Bangladesh. The RERED II Project would support the provision of renewable energy based electricity services and clean cooking solutions using social mobilization approaches of the NGOs and marketing techniques of the private sector. By leveraging the capacities of NGOs and the private sector, the Project would contribute to strengthening the on-going development of a commercial market for SHS and other renewable energy technologies, thus contributing to job creation in green technologies.

2.1 Components of the Project

2.1.1 Component A Solar Home Systems (SHS) Component:

6. The Project would further scale up support to the successful Solar Home Systems (SHS) program of Bangladesh for providing access to electricity to households and shops in rural areas where grid electricity has not yet reached. The target is to support 550,000 systems following the same implementation arrangement under the RERED project. Customers are expected to provide 10%-15% of the SHS prices as down payment. IDA funds (and IDCOL own funds) will refinance 60%-70% of the micro-finance extended by the POs to the households.

2.1.2 Component B Remote Area Power Supply Systems (RAPSS) Component

7. The Project would support mini-grid schemes under the RAPSS guidelines to meet the electricity needs of rural household, enterprises, and businesses that could not otherwise be met with SHS. The implementation activities, including selecting the sponsors for establishing, operating, and maintaining the mini-grids, would be undertaken by IDCOL1. Sponsor equity will be a minimum of 20% with IDCOL providing the balance funds (including credit and capital buy-down grant to keep the end-user tariff affordable) to the mini-grid schemes building on the lessons learned from the pilots under the on-going RERED project. The least cost technology options (solar PV, biomass gasification etc.) will be used depending on the resource availability in the specific locations of the mini-grids. The component would also support biogas based captive plants to supply electricity in rural areas. Depending on demand and viability of the sub-projects, the component can support financing other applications such as solar cooling and drying or advanced hybrid brick kilns.

8. The component will also support solar irrigation pumps that would replace diesel-operated pumps thus contributing to increased access to clean energy by farmers. Similar to the mini-grid schemes, private sponsors would identify locations and reach agreements with groups of farmers on the selling rate for water and on the duration and quantity of water supply. Sponsors will be putting in an equity of at least 20%, while the rest of the project cost will be financed through a combination of credit and grant to keep the tariff affordable to farmers. IDCOL will do site specific due diligence before approving the sub-projects.

1 The private operators would apply to BERC for licenses. BERC would also have to approve the tariff applications of the mini-grid operators.
2.1.3 Component C Technical Assistance to IDCOL

9. This component would support IDCOL and the POs/sponsors in implementation, monitoring and evaluation of SHS and renewable energy investments to ensure effective implementation of Components A and B. The monitoring is to ensure that: (a) funds are being used for the intended purpose; (b) the POs/sponsors comply with established technical, after-sales service, and consumer protection standards; (c) customers are satisfied with the services; and (d) hazardous wastes such as used batteries are safely recycled. TA-supported activities would include IDCOL inspections and monitoring activities, technical performance audits of PV systems and components, procurement audit, third party monitoring, piloting of new and improved solar products including LED lamps etc.

2.1.4 Component D. Household Energy Component

10. The proposed household energy component supports the efforts of various NGOs in providing rural households with clean cooking solutions. The strategic approach of this component includes: (i) awareness raising through social mobilization to ensure potential users are aware of the fuel saving and health benefits associated with clean cooking; (ii) research and development to enhance product quality, performance, safety and durability; (iii) setting up of performance standards, labels and testing facilities; and (iv) support to selected partner organizations to generate demand and to facilitate enterprise creation. The target is to commercially disseminate about 1 million improved cookstoves and 20,000 biogas units within the implementation period of the Project. Implemented by IDCOL, the component will build on the success of Bangladeshi NGOs in the areas of community outreach in total sanitation programs. It will also build on the earlier work undertaken by local institutions in the areas of stove design and reduction of emission of toxic pollutants from incomplete combustion of wood fuels. The implementation of this component will be in close collaboration with on-going activities in the sector by NGOs, GIZ, USAID and upcoming activities that will be undertaken through the Global Alliance of Clean Cookstoves.

2.1.5 Component E. Compact Fluorescent Lamp (CFL)

11. In 2010, under the ELIB program supported by the RERED project, about 10 million CFLs were distributed to households in exchange for incandescent lamps in 2010. However, post-installation surveys have indicated alarming levels of lamp failures. REB, the implementing agency, has claimed replacement of the poor quality bulbs from the supplier. The second-phase procurement of 17.5 million CFLs was initiated in late 2010 under the RERED project (before the post-installation survey results of the first phase was available), but due to various issues (including issues related to submission of fraudulent performance guarantees by the winning bidder) the procurement could not be completed.

12. GOB has expressed its strong commitment to continue with the second phase and intends to initiate a re-bidding, taking into account lessons learned from the poor quality in the first phase and the aborted second-phase procurement. REB will revise the bidding documents with the help of an international consultant to strengthen the clauses for quality assurances. Recognizing that many in the urban households have already switched to CFLs, the second phase distribution will be restricted to rural areas only where people cannot afford to pay for the high costs of CFLs. The estimated number to be distributed is 7.25 million CFLs. 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.

2.1.6 Component F. Technical Assistance Support to Power Cell

13. The Project would provide continued technical assistance support to Power Cell beyond December 2012 when the on-going PSDTA project will close. This would include, among others,
support for implementation of power sector reform, feasibility studies and environment and social impact assessments for various power sector projects in the pipeline, and capacity building of the sector etc. This would also include support for establishment and operationalization of SREDa through the provision of office equipment and furniture, consultant services, and training, and capacity building support for BERC.

2.1.7 Component G. Contingent Emergency Response (US$0)

14. Given the country’s vulnerability to natural disasters, a contingent component with zero allocation is proposed to allow for the flexibility of a rapid response in the event of an emergency (OP/BP 8.00). Should an emergency occur, the proposed project would finance public and private sector expenditures on a positive list of goods, both domestic and imported, required for the Borrower’s emergency recovery program. In case of an emergency, funds would be re-allocated to this component from other project components under a Level 2 restructuring.

2.2 Description of Activities

15. Although the project will support 7 components, 2 components (technical assistance to IDCOL and technical assistance to power cell) are not expected to create any environmental and social impacts. No fund has been allocated now for the component G i.e., contingent emergency response and if the project requires Level 2 restructuring, environmental screening will be included there. In general, the major activities under the project are given below:

(i) Installation of about 5,50,000 SHS

(ii) Installation about 1500 nos solar irrigation pumps, 42 mini-grids, and 450 biogas based captive plants, and 28 biomass gasification captive plants.

(iii) Provide about 1 million improved cookstoves and 20,000 biogas units

(iv) Introducing about 7.25 million energy savings CFLs

16. The environmental impact from the project interventions are explained in the Chapter 4.
3. RELEVANT POLICY, ACT AND RULE

3.1 General

17. Legislative bases for Environmental Impact Assessment (EIA) in Bangladesh are the Environmental Conservation Act 1995 (ECA’95) and the Environmental Conservation Rules 1997 (ECR’97). Department of Environment (DOE), under the Ministry of Environment and Forest (MOEF), is the regulatory body responsible for enforcing the ECA’95 and ECR’97. It is the responsibility of the proponent to conduct an Environmental Assessment (EA) of development proposal and the responsibility to review EIAs for the purpose of issuing Environmental Clearance Certificate (ECC) rests on DOE.

3.2 Bangladesh Environmental Conservation Act (ECA), 1995

18. The Environmental Conservation Act (ECA) of 1995 is the main legislative framework document relating to environmental protection in Bangladesh. This umbrella Act includes laws for conservation of the environment, improvement of environmental standards, and control and mitigation of environmental pollution. This Act established the Department of Environment (DOE), and empowers its Director General to take measures as he considers necessary which includes conducting inquiries, preventing probable accidents, advising the Government, coordinating with other authorities or agencies, and collecting & publishing information about environmental pollution. According to this act (Section 12), no industrial unit or project shall be established or undertaken without obtaining, in a manner prescribed by the accompanying Rules, an Environmental Clearance Certificate (ECC) from the Director General of DOE.

19. The Act was amended in 2006 (SRO No. 175-Act/2006 dated August 29, 2006) on collection and recycling of used/non-functional batteries for conservation of environment, improving environmental standard and control and prevention of environmental pollution. According to this amendment, no recycling of battery will be permitted without environmental clearance of DOE. This also restricted the improper disposal of used batteries or any parts of used battery in open place, water bodies, waste bins etc. All used batteries must be sent to the DOE approved battery recycling industry at earliest convenience. No financial transaction was allowed for used/non-functional batteries. However, the act was amended on same issue again in 2008 (SRO No. 29-Act/2008 dated February 11, 2008) to allow financial transaction on mutually agreed fixed cost.

3.3 Bangladesh Environmental Conservation Rules (ECR), 1997

20. The Environment Conservation Rules, 1997 were issued by the Government of Bangladesh in exercise of the power conferred under the Environment Conservation Act (Section 20), 1995. Under these Rules, the following aspects, among others, are covered:

- Declaration of ecologically critical areas
- Classification of industries and projects into 4 categories
- Procedures for issuing the Environmental Clearance Certificate
- Determination of environmental standards

21. The Rule 3 defines the factors to be considered in declaring an area ‘ecologically critical area’ (ECA) as per Section 5 of ECA’95. It empowers the Government to declare an area ‘ECA’, if it is satisfied that the ecosystem of the area has reached or is threatened to reach a critical state or condition due to environmental degradation. The Government is also empowered to specify which of the operations or processes shall be carried out or shall not be initiated in the ecologically critical area. Under this mandate, MOEF has declared Sundarban, Cox’s Bazar-Tekhnaf Sea Shore, Saint Martin Island, Sonadia Island, Hakaluki Haor, Tanguar Haor, Marzat
Baor and Gulshan-Baridhara Lake as ecologically critical areas and prohibited certain activities in those areas.

22. ECR'97 (Rule 7) classifies industrial units and projects into four categories depending on environmental impact and location for the purpose of issuance of ECC. These categories are:
   - Green
   - Orange A
   - Orange B, and
   - Red

23. All existing industrial units and projects and proposed industrial units and projects, that are considered to be low polluting are categorized under "Green" and shall be granted Environmental Clearance. For proposed industrial units and projects falling in the Orange- A, Orange- B and Red Categories, firstly a site clearance certificate and thereafter an environmental clearance certificate will be issued. A detailed description of those four categories of industries has been given in Schedule-1 of ECR’97.

24. A part from general requirement, for every Orange-B and Red category proposed industrial unit or project; the application must be accompanied with feasibility report on Initial Environmental Examination (IEE), Environmental Impact Assessment (EIA) based on approved TOR by DOE, Environmental Management Plan (EMP) along with lay-out plan (showing location of ETP), time schedule of ETP etc.

25. The ECR’97 also contains the procedures for obtaining Environmental Clearance Certificates (ECC) from the Department of Environment for different types of proposed units or projects. Any person or organization wishing to establish an industrial unit or project must obtain ECC from the Director General. The application for such certificate must be in the prescribed form together with the prescribed fees laid down in Schedule 13, through the deposit of a Treasury Chalan in favor of the Director General. Rule 8 prescribes the duration of validity of such certificate (3 years from green category and 1 year for other categories) and compulsory requirement renewal of certificate at least 30 days before expiry of its validity.

26. There is no clear guidance about application of renewable energy technologies and energy efficient CFL bulb project in both ECA’95 and ECR’97.

3.4 Environmental Conservation Act (Amendment 2010)

27. This amendment of the act introduces new rules & restriction on:
   - ensure proper management of hazardous wastes to prevent environmental pollution and Health Risk
   - No remarked water body cannot be filled up/changed; in case of national interest; it can be done after getting clearance from the respective department; and
   - Emitter of any activities/incident will be bound to control emission of environmental pollutants that exceeds the existing emission standards

3.5 Renewable Energy Policy of Bangladesh, 2008

28. The renewable energy policy of Bangladesh has been approved on December 18, 2008 with the target of developing renewable energy resources. This Policy laid out the target of meeting 5% of total power demand from renewable energy sources by 2015 and 10% by 2020. The policy provides an overall guidance of
   - institutional arrangements
- resource, technology and program development
- investment and fiscal incentives
- regulatory policy

29. The policy promotes appropriate, efficient and environment friendly use of renewable energy. It also suggest that for large biomass electricity projects (i.e., greater than 1 MW) the project developer must demonstrate that the biomass is being sustainably harvested and that no adverse social impact will result from that development. It also restricted the larger scale production and use of bio-fuels which may jeopardize the existing crops.


30. The Remote Area Power Supply Systems (RAPSS) guideline of 2007 allows for private sector participation in development, operation, and maintenance of electricity generation system and distribution networks in remote rural areas including isolated islands to supplement GOB efforts at achieving universal access by 2020. However, there has not been much progress in implementing the RAPSS schemes. GOB is preparing the legislation to establish a Sustainable and Renewable Energy Development Agency (SREDA) as an autonomous body to lead its efforts in promoting renewable energy and energy efficiency in the country.

3.7 Bangladesh Labor Law, 2006

31. This Act pertains to the occupational rights and safety of factory workers and the provision of a comfortable work environment and reasonable working conditions. In the chapter VI of this law safety precaution regarding explosive or inflammable dust/gas, protection of eyes, protection against fire, works with cranes and other lifting machinery, lifting of excessive weights are described. And in the chapter VIII provision safety measure like as appliances of first-aid, maintenance of safety record book, rooms for children, housing facilities, medical care, group insurance etc are illustrated.

3.7 World Bank’s Safeguards (Relevant Policies)

**OP 4.01 Environmental Assessment**

32. The Bank requires environmental assessment (EA) of projects proposed for Bank support to ensure that they are environmentally sound and sustainable, and thus to improve decision making. EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. EA takes into account the natural environment (air, water and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples and physical cultural resources); and transboundary and global environmental aspects. The borrower is responsible for carrying out the EA and the Bank advises the bower on the Bank’s EA requirements.

33. The Bank classifies the proposed project into three major categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

**Category A:** The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.
**Category B:** The proposed project’s potential adverse environmental impacts on human population or environmentally important areas—including wetlands, forests, grasslands, or other natural habitats—are less adverse than those of Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than Category A projects.

**Category C:** The proposed project is likely to have minimal or no adverse environmental impacts.

**OP 4.04 on Natural Habitats**

34. The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank promotes and supports natural habitat conservation and improved land use by financing projects designed to integrate into national and regional development the conservation of natural habitats and the maintenance of ecological functions. Furthermore, the Bank promotes the rehabilitation of degraded natural habitats. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

35. Of the two environmental safeguard policies that are relevant to this project, only OP 4.01 on Environmental Assessment is triggered in case of RERED additional financing.

**OP 4.10 - Indigenous Peoples**

36. This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. For all projects that are proposed for Bank financing and affect Indigenous Peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation. The Bank provides project financing only where free, prior, and informed consultation results in broad community support to the project by the affected Indigenous Peoples. Such Bank-financed projects include measures to (a) avoid potentially adverse effects on the Indigenous Peoples’ communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive.

37. The Bank recognizes that the identities and cultures of Indigenous Peoples are inextricably linked to the lands on which they live and the natural resources on which they depend. These distinct circumstances expose Indigenous Peoples to different types of risks and levels of impacts from development projects, including loss of identity, culture, and customary livelihoods, as well as exposure to disease. Gender and intergenerational issues among Indigenous Peoples also are complex. As social groups with identities that are often distinct from dominant groups in their national societies, Indigenous Peoples are frequently among the most marginalized and vulnerable segments of the population. As a result, their economic, social, and legal status often limits their capacity to defend their interests in and rights to lands, territories, and other productive resources, and/or restricts their ability to participate in and benefit from development. At the same time, the Bank recognizes that Indigenous Peoples play a vital role in sustainable development and that their rights are increasingly being addressed under both domestic and international law.
OP 4.12 - Involuntary Resettlement

38. Bank’s experience indicates that involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks: production systems are dismantled; people face impoverishment when their productive assets or income sources are lost; people are relocated to environments where their productive skills may be less applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished or lost. This policy includes safeguards to address and mitigate these impoverishment risks.
4. ENVIRONMENTAL AND SOCIAL MANAGEMENT

4.1 Possible Environmental Impacts

39. The project will support: (i) increase access to electricity in rural areas through renewable energy; (ii) support large-scale dissemination of more efficient cook stoves and fuels for cooking; (iii) promote more efficient energy consumption; (iv) improve technical and institutional efficiency in the power sector. The solar home system, mini-grid (solar system) or CFL bulbs will not generate any air pollution during operation. However, the primary environmental, health, and safety issues involve with manufacturing, and mainly disposing process of battery and CFL bulbs. Since the project components generate no air pollution during operation, but the primary concerns are related to environmental, health, and safety issues due to improper manufacturing, and disposing process. The project components mainly deal with the solar panels, batteries and CFLs with some environmental impacts. This ESMF identifies some of the key environmental impacts associated with these technologies and these are stipulated below.

- The chemicals typically used in PV module manufacturing are aluminum, hydrochloric acid, silicon, phosphine etc. Materials used in some solar systems can create health and safety hazards for workers and anyone else coming into contact with them. Workers involved in manufacturing photovoltaic modules and components must consequently be protected from exposure to these materials, as well as proper disposal is required after expired the efficiency of these panels.

- Part of the project financing will be dedicated for the expansion of the solar home system (SHS). The SHS or mini-grid mainly comprise of: (a) a Solar Modules and (b) storage battery (various capacity). Improper disposal and recycling of lead acid storage batteries can cause lead sulphate contamination in the surrounding lands and water bodies. Lead sulfate is a water soluble substance that could contaminate groundwater and can be transferred up the food chain. Lead can enter body in two ways: by breathing or by swallowing it. Lead Sulfide dust or lead concentrate enter the body through the nose and/or mouth through breathing. Very fine dust particles go into the lungs and the lead is absorbed into the bloodstream. When products that are contaminated with lead sulphide are heated, the workers might inhale lead fumes. If lead dust settles on lips, moustache, or beard, the workers might swallow it. They also swallow lead if food or cigarettes are handled with lead-contaminated hands. The lead fumes the workers inhale and the lead they swallow also get absorbed into the bloodstream. Once lead is in the bloodstream, it is circulated through all parts of the body. Lead can be stored in bones, liver, and kidneys. When lead no longer enters the body (that is, when exposure stops) the body gets rid of the storage deposits. The amount of time it takes to get rid of deposits depends on a person's length of exposure, the amount of stored lead, and the efficiency of a person's kidney function. Not everyone is able to excrete lead at the same rate. Too much lead can affect the nervous system and cause headaches, dizziness, irritability, memory problems, and disturbance in sleep. It can affect the digestive system and cause nausea, vomiting, constipation, appetite loss, and abdominal pain. Lead also affects formation of blood and can result in anemia. Over time, the nervous and muscle systems can be damaged; this causes muscle weakness, decreased feeling in hands and feet, and a metallic taste in the mouth. Damage to the kidneys may lead to high blood pressure. Too much lead can also cause miscarriages and stillbirths when pregnant women are exposed to lead. In men, the sperm can be affected and this may result in infertility. Although there are many possible symptoms, you may have too much lead in your body without noticing any change in your health. Some of these changes take a long time to develop. The best thing you can do is to protect yourself before your health is affected.
- Biomass power i.e., combustion of biomass and biomass-derived fuels may produce air pollution if not properly designed, constructed and operated. Advanced technologies with proper operation should generate much lower emissions.

- Improper disposal of CFL bulbs regarding health impact of mercury. The technical specifications of the CFLs supported under the project required the mercury content to be no more than 5 milligrams per unit. Given the large number of CFLs supported under the project (about 7 million to be procured in addition to the 10.5 million procured under the RERED project) can have a collective significant impact on the environment if not disposed of properly. Elemental (metallic) mercury and all of its compounds are toxic, exposure to excessive levels can permanently damage or fatally injure the brain and kidneys. Elemental mercury can also be absorbed through the skin and cause allergic reactions. Ingestion of inorganic mercury compounds can cause severe renal and gastrointestinal damage. Organic compounds of mercury such as methyl mercury are considered the most toxic forms of the element. Exposures to very small amounts of these compounds can result in devastating neurological damage and death. When mercury enters bodies of water, biological processes transform it to methyl mercury, a highly toxic and bio-accumulative form. For fetuses, infants and children, the primary health effects of mercury are on neurological development. Even low levels of mercury exposure such as result from mother's consumption methyl-mercury in dietary sources can adversely affect the brain and nervous system. Impacts on memory, attention, language and other skills have been found in children exposed to moderate levels in the womb. Also breakage of a single CFL bulb in a room can result mercury vapor levels much higher than any international standard for prolonged exposure. However, one of the advantages is recycling of a CFL bulb. Virtually all the component can be recycled - the metal end caps, glass tubing, mercury and phosphor power can all be separated and reused. The metallic portion can be sold as scrap metal, recycled glass can be remanufactured into other glass products and mercury can be recycled into new CFL bulb and other mercury containing devices.

4.2 Principles for Safeguard Management

40. Considering the extent and nature of the project and magnitude of potential environmental impacts, additional financing to RERED project has been assigned as Environmental Category of "B" according to safeguard policy of the Bank and only one environmental safeguard policy OP/BP 4.01 is triggered. 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. The RERED II will adopt this updated ESMF, which defines the environmental requirements needed for processing the financing of each sub-component to comply with World Bank Policies and environmental legislation of the Government of Bangladesh (GOB). This ESMF also included consequence impacts due to the proposed new components (RAPSS and household energy) in the RERED II and findings on assessment report (Annex-1) of the existing ESMF implementation. The objective of the ESMF is to ensure that activities under the proposed operations will address the following issues:

- If possible avoid, or minimize potential negative environmental and social impacts as a result of either individual subprojects or their cumulative effects;
- Enhance positive environmental and social outcomes;
- Protect environmentally sensitive areas from additional disturbance from project interventions;
- Protect human health; and
- Ensure compliance with World Bank safeguard policies
41. In view of the ESMF objectives and assessment of the nature, the project will be based on the following principles:

- No land acquisition will be financed under the credit. No public lands will be used for the project. Land, 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. Private 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. Bank policy OP 4.12, Involuntary Resettlement will not be triggered by the project. For screening involuntary resettlement and indigenous people aspects, a well-structured questionnaire for social compliance (Annex-2) will be followed. The three previous pilot sub-projects under the project have been using this approach. In most of the cases, the private sponsors (NGOs or other partner organizations) have put up the value of purchased land as their equity. The same approach will be used for all components of the current project, including the purchase of land (approximately 2 bighas) for the mini-grids.

- The project may extend facilities in areas where indigenous people (IPs) live. However, availing the facilities/services/products is purely on a voluntary basis for all paying customers (including IPs). In case of the mini-grids too, the connections will be made on a purely commercial basis, same as in the previous pilot sub-projects. In case of the cook-stoves component, the customers (whether IPs or not) will have to buy the product on a voluntary basis. No negative impacts are anticipated towards IPs. Bank policy OP 4.10 will not be triggered by the project. SHSs are also being installed in IP areas like Chittagong Hill Tracts through Partner Organizations (POs), which are well-versed in IP languages to offer adequate consultation on maintenance of products and proper usage of facilities offered. Future sub-projects will also follow this approach in IP areas, in order to tailor the awareness raising, mobilization and training campaigns to the needs of IPs in the relevant locations.

- IDCOL will be responsible for monitoring of environmental and social safeguard compliance with the support of the POs. An annual environment audit will be undertaken to ensure compliance with environmental safeguards compliance. IDCOL will regularly monitor the land purchase processes and application of screening mechanism to rule out any displacement. The quarterly sub-project status reporting by IDCOL on RAPSS component will include status on land issue. The third party monitoring mechanism that will be engaged will include an annual evaluation regarding social safeguard compliance and effectiveness of screening mechanism and consultation strategy with IPs. The environmental and social safeguard will be integral part of the Participation agreement between IDCOL and POs.

- The equipment and accessories manufacturers/suppliers of the project will follow the Section VII (special provisions related to health, hygiene and safety) of Bangladesh Labor Act 2006 to ensure occupational health and safety related to the project activities. In addition, they will follow the prevailing country environmental act and rules to ensure sound environmental management of recycling of used lead-acid batteries.

- IDCOL will prepare guidelines for selecting new battery supplier (A sample guideline is attached in this EMF in annex-3) to ensure that the new manufacturers have sound battery manufacturing and recycling facilities.

- IDCOL will provide technical support to the manufacturers/suppliers for Environmental Improvement of Battery recycling and CFL Recycling:

- As the POs require adequate awareness about environmental pollution and its impact on air, water and soil, IDCOL will arrange training and awareness raising session for POs. Besides including the adverse impact of improper management of expired battery, the
session will include current important issues like environmental pollution, health and safety problem, fire and electric accidents.

- Where the sub-projects operate in IP areas, IDCOL will ensure that consultations are inclusive, carried out in local languages and adhere to local cultural norms and practices.

- IDCOL will strengthen monitoring on distribution of new battery as well as collection of expired battery. IDCOL will assign its Solar Inspectors to monitor the distribution of new battery as well as collection of expired battery. With the monthly inspection report, they have to submit report about distribution of new battery and collection of expired battery scenario. IDCOL will quarterly submit the collection of expired battery and distribution of new battery status report to World Bank

- IDCOL will adopt required measures to strengthen its capacity for environmental and social safeguard management.

- Ensure half-yearly monitoring of battery recycling plants.

- Engage an independent third party monitoring firm to review half-yearly the environmental and social compliance during implementation.

- REB is committed to minimize the risk of pollution associates with CFL bulbs and will raise enough awareness among stakeholders. In addition, REB will take measure to ensure well written instruction at the outside of the packet of CFL bulb of the second phase of ELIB in both Bengali and English.

- Both REB and IDCOL will disclose this updated ESMF (both English and Bangla) in their website for comments with newspaper advertisement. This ESMF will also be disclosed in the World Bank InfoShop.
5. ENVIRONMENTAL ASSESSMENT AND MITIGATION MEASURES

42. This ESMF has been developed by IDCOL and REB specifically for the proposed operation to ensure due diligence, to avoid any environmental degradation issues for the project SHS component, RAPSS component, Household Energy Component.

5.1 Assessment of First Phase Project

The following major action has been undertaken under the existing ESMF of ongoing RERED.

- IDCOL is going to appoint Consultants (Environment Audit specialist and Mechanical Engineering Specialist) soon for undertaking an environment audit to assess the adequacy of the current mechanism for ensuring proper recycling of batteries.

- Out of 13 battery suppliers in IDCOL in SHS program, 12 have fully completed the ISO 14001:2004 (Environmental Management Standard) and OHSAS 18001:2007 (Occupational Health Safety Standard) certification process. The remaining one supplier is expected to complete the certification process by July, 2012.

- There are three battery recyclers in IDCOL SHS program. Rahimafrooz has already completed the ISO 14001:2004 and OHSAS 18001:2007 compliances for their recycling unit. Others, the HAMKO Battery Company and the Panna Battery have made substantial progress for obtaining the ISO 14001:2004 and OHSAS 18001:2007.

- For the CFL component, an international consultant together with a local consultant is being hired to develop a national guideline for the proper disposal of lamps and ensure safe collection of waste CFL bulbs as part of the ELIB program.

- IDCOL has developed the ‘Policy Guidelines on Disposal of Warranty Expired Batteries’ on June 14, 2005 for RERED project. Based on the guidelines, IDCOL facilitated an agreement between battery manufacturers and POs. According to the agreement, POs are responsible to notify the customers before 3 months of the warranty expiration date and advice customers to replace the battery. PO representatives are accountable to collect batteries from customers and to safely transportation of regional locations of battery manufacturer. The manufacturer is responsible for collecting batteries from regional centers and to transport it to the site where the batteries will be recycled or disposed in an environment-friendly manner. The battery disposal issue has been discussed with POs in monthly operational meeting. An agreement copy is attached in Annex-4. For ensuring proper collection of expired battery IDCOL has introduced a format as is shown in Annex-5. Moreover, it has introduced a new clause in the Buy-back Agreement to be signed between PO and household. According to this clause, household shall not sell expired battery to any second party and such battery shall be returned to any of the IDCOL’s POs or supplier of the battery

5.2 Mitigation Measures

43. The purpose of this Framework is to identify the likely environmental impacts, propose suitable mitigation measures and implementation of these measures. For subprojects of mini-grids and solar irrigation pumps under RAPSS need an environmental and social screening/assessment with management plan, during project implementation prior to approval for any sub-project as have been provided as Annex 6. No site specific environmental assessment will be required for household system (solar home system, biomass, CFL etc.). The requirement to carry out an environmental analysis as part of project preparation can be waived. However following measures in the various components of RERED II will be undertaken under the ESMF.
5.2.1 Solar Home Systems (SHS) Component

44. Environment and occupational health & safety are a major issue to the battery recycling and manufacturing under the program. IFC guideline for Environmental, Health, and Safety (EHS) Guidelines will be followed. As mentioned earlier, the existing and new battery manufacturers will be ISO 14001:2004 and OHSAS: 18001:2007 certified for their battery manufacturing and recycling plants. In addition to the above certification, IDCOL has to make sure the following measures in the battery industry for proper implementation EMS and OHS through regular monitoring.

   i. The industry will ensure appropriate work clothes and musk to the workers:
      o use coveralls, work boots, and a washable or disposable cap
      o use full protection mask (not simple cotton nose musk) to avoid inhalation lead-containing furnace emissions
      o remove work clothes before eating or smoking and before leaving work
      o use a change area separate from the work area
      o provide separate work and street clothes
      o regular wash of working clothes

   ii. The industry will promote personal hygiene practices of workers
      o keep hands away from your lips and mouth
      o avoid eating or smoking in the work area
      o avoid rubbing sleeves on face
      o always wash hands and face thoroughly with soap and water before breaks
      o rinse mouth before eating or smoking

   iii. The industry will adopt the following mitigation measures to improve environmental practices
      o proper storage facilities of used batteries and its components at recycling factories
      o use of mechanized process to dismantling the battery and its components
      o neutralization of disposed acid by using sodium hydroxide (NaOH)/calcium carbonate (CaCO3)
      o use of cleaner fuel (natural gas, LPG etc.) instead of low-grade coal as fuel for smelting
      o safe disposal of waste water from recycling plant

45. All battery manufacturers and recyclers need to be oriented with the advanced effluent treatment facility for proper disposal of sludge (sulphuric acid and lead).

46. Under the ESMF, the battery manufacturers will submit quarterly report on environmental and occupational health & Safety to IDCOL.

5.2.2 RAPSS Component

47. The proposed additional financing will support other renewable energy technologies. Other renewable energy technologies are not expected to cause significant environmental impacts. Similar to SHS, the other renewable energy technologies will contribute to reducing environmental impacts associated with fossil fuel use and inefficient use of biomass. Mini grids would be on existing rights of way, which are largely rural roadways and the planning will be
carried out jointly with the local community. Therefore, this mini-grid comprising small rural area will not create any potential adverse environmental impacts. Care will be taken to minimize deforestation in securing rights of way. Mini grids based on solar PV require battery storage room and proper maintenance of these batteries. The project will promote the capacity development of local operator to maintain the system. An environmental impact assessment will be carried out and proper mitigation measures will be undertaken by the project proponent.

48. Mini-hydro power is considered as one of the clean electricity generation technologies since the process causes little impacts to environment during generation when compared to the other modes of electricity generations using conventional fuels. However, planning and designing of mini-hydro project requires ‘educated tradeoffs’, which means that stakeholders are able to engage in technically, economically and environmentally (including socially) informed (educated) decision-making between the critical resource uses/issues (tradeoffs) in a river basin. A mini-hydro power plant includes-

- Machineries (turbine, gearbox or drive belts, generator, water inlet control valve etc.),
- Civil works (intake, fore bay tank and screen, pipeline or channel to carry out the water to the turbine, turbine house and machinery foundations, tailrace channel to return water to the river), and
- Electrical works (control panel, control system, wiring within the turbine house, transformer (if required).

49. The mini hydro may result in some minor environmental impacts, particularly with regard to the partial dewatering of a section of the riverbed from the intake until the water is returned to the river downstream of the powerhouse and consequent impacts on aquatic life in the dewatered section, potential soil erosion caused by flushing flows discharged from sedimentation basins and by overflows at the fore bays, potential ground instability caused by canal/pipe construction, cutting of trees for use as power poles in micro hydro projects. The construction of mini-hydro will require environmental assessment to identify the impacts to i) natural protection areas (any flooding due to project), ii) plants and wildlife (including fisheries), iii) river sediments and pollution, and iv) landscape and pollution.

50. The concerns related to the small-scale wind energy projects results from noise impact and potential interference with bird migration pattern. Windmills make some noise, and the amount of noise increases with the speed of the sails/blades. Since the environmental impacts of small-scale windmills are not significant, environmental assessment will be included in the feasibility and design study of the windmills.

51. The biomass and biogas based electricity projects will be of small to medium scale (below 1 MW). These projects will be mostly captive type and if required, micro grid may need to be established. The following are the key environmental risks if the system is not properly designed, constructed, operated and maintained.

**Effluent emission, On-site contamination, Hazardous materials issues**

- Methane emissions from waste storage facility
- Emission of raw (unscrubbed) biogas from leaks in the gas collection system
- Contamination of surface and groundwater due to disposal of anaerobic digestion effluents- pathogens, particulate matter, COD/BOD
- Emission of nitrogen oxides, sulfur oxides, particulates, trace amounts of toxic materials, including dioxins due to biogas combustion
- Impacts due to waste storage: odor, visual intrusion, windblown litter, attraction of flies and rodents
Occupational Health and Safety issues

- Occupational accidents due to methane emissions during waste storage and gas collection

52. For small-scale household level biomass and biogas project, no environmental assessment will be carried out. Only for commercial plants, detailed environmental assessment will be carried out and site specific environmental management plan will be prepared. In general, the following are the mitigation and enhancement measures to be taken for biomass and biogas based electricity project.

- Appropriate location of waste storage facilities (considering proximity to populated areas, human quarters, working areas etc.)
- Proper design, operation and maintenance of waste storage facilities and gas collection facilities
- Regular monitoring to ensure compliance of operation and maintenance agreed practices
- Frequent monitoring to prevent/minimize biogas leakage during normal operation conditions
- Consider treatment of raw biogas on site to eliminate hydrogen sulfide and ammonia content in order to prevent the formation of corrosive sulfurous, sulfuric and nitrogen oxides
- Planning and carrying out proper waste disposal practices (avoiding discharge of untreated effluents in nearby agricultural land or waterways)
- Provision of fire prevention measures in case of large plant

53. The EAs for solar based mini-grid, wind power, mini-hydro, biomass or biogas based electricity will follow the government procedure for environmental clearance. The reports will be submitted to the World Bank for review and clearance prior to clearance of construction. A summary process to be followed is explained in Annex-7. An EA report format is also attached in Annex-8. In addition, IDCOL will follow preliminary assessment on the environmental and social impacts.

54. 1500 solar irrigation pumps are proposed in this project by replacing diesel pumps. Environmental screening with environmental management plan will be carried out. IDCOL will monitor and ensure the environmental compliance as per management plan.

5.2.3 Household Energy Component

55. IDCOL will ensure that improved cook stove (ICS) are being prepared in an environment friendly atmosphere. Households currently use traditional fuels such as wood, twigs, leaves, agricultural and plant residues, paddy husk, jute sticks and dried animal dung for cooking. Under this project, the combustion process of these fuels will be improved by raising the stove efficiency that will reduce the smoke containing large amount of particulate matter and gaseous pollutants. IDCOL will engage an independent consultant to monitor the compliance and efficiency of the certain percentage of ICS manufacturing plant.

5.2.4 CFL Component

56. A national guideline for collection of waste CFL bulbs will be developed incorporating good practices in the developed and regional countries. There should be also awareness raising initiatives including safety instruction at CFL packets, proper collection and disposal of expired CFL bulbs in a safe manner. The project will also explore options for recycling the glass materials from the destroyed incandescent light bulbs.
6. CAPACITY-BUILDING AND MONITORING OF ESMF IMPLEMENTATION

57. IDCOL has gained experience in implementing environmental management framework under Bank financed first phase RERED project and additional financing. IDCOL is in progress in establishing the Environment and Social Safeguards Management Unit (ESMMU) to institutionalize the environmental and social management in its operation. Earlier the environmental specialist was working with project supports and now a full-time environment staff has been hired and included in the proposed organogram of IDCOL. The Environment Specialist is working with 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. Environmental staff of IDCOL visits all battery recycling plants on half-yearly basis for ensuring environment compliance. To assist the existing Environmental staff as well as strengthen the ESMMU, IDCOL is also in the process of appointing an additional environmental consultant to guide the client in preparing and reviewing the environmental assessment/screening for subprojects. IDCOL is in the process of updating organogram, which will include appropriate safeguard staffing to ensure the proper implementation of this ESMF and other regular activities. The organogram is expected to be available by end of September, 2012. The technical assistance component will help further capacity building of the IDCOL environmental and social unit.

58. IDCOL will monitor the environmental and social safeguard compliance with the support of the POs as well as IDCOL will ensure half-yearly visit at battery recycling plants. Under ESMF of phase I and additional financing of RERED, several measures have been undertaken by IDCOL to strengthen the battery recycling under the SHS component of the on-going project that includes, refinancing for battery replacement and enhanced incentives for POs and manufacturers for collection of expired batteries. IDCOL has required the compliance of ISO 14001:2004 and OHSAS 18001:2007 by all battery recyclers and battery suppliers.

59. IDCOL will hire an independent third party form to monitor the environmental and social compliance in field level implementation as well as compliance monitoring of the battery recycling process.
7. CONSULTATION AND DISCLOSURE

60. The original ESMF has been prepared by IDCOL and REB in consultation with the relevant project stakeholders including POs (NGOs), battery manufacturers, existing and potential users of renewable energy technologies, other government agencies. The ESMF will be made available for public review in both English and Bengali. It will be disclosed in English and Bangla by IDCOL and REB and it will also be made available at the World Bank’s InfoShop. If the sub-project requires updating of the generalized EMP, it will be available to IIDFC website and to be sent to the World Bank. On this ESMF, IDCOL will conduct consultation with all stakeholders during the project implementation of RERED II project.

61. The screening report along with the management plan of all sub-projects (RAPSS) also will be available for all stakeholders in both English and Bengali. The relevant information prior to these consultations in a timely manner and in a form that is meaningful for, and accessible to, the groups being consulted, has been disseminated.

62. A detailed assessment was conducted in Kapasia Gajipur, Manikgonj, Thakurgaon, Prigacha (Rangpur remote Char area), and Swandip. The consultation design has been based on the RERED I project’s experience, learning and feedback from the project beneficiaries. Using a gender lens of analysis, the assessment worked on the effect of access to electricity in the lives of women belonging poor and vulnerable households in general and the impacts of the World Bank supported program on Solar Home Systems (SHS), Biogas electricity and gas, and Improved Cooking Stove (ICS) in particular. Findings of the Focus Group Discussions (FGD) are shown in the Annex-9.
ANNEX-1: ASSESSMENT REPORT OF IMPLEMENTATION OF EXISTING ESMF

1) According to the ESMF, the project did not entertain land acquisition and involuntary resettlement by any sub-project. For SHS there is no issue of land acquisition. In case of solar mini-grid and solar irrigation projects the required land is provided by the project sponsor. IDCOL’s mini-grid project site of Sandwip, the landowner is the project sponsor. Another mini-grid project located at Mankiganj is also purchased land of the project sponsor. In case of solar irrigation project, most of the land is purchased or personal land of the project sponsors. In some cases, there are some leased land having no issue of land acquisition or involuntary resettlement.

2) Adequate Consultations with indigenous people (IP) was held to ensure inclusion and awareness of IPs while selling SHS at the IP areas, if it is in IP majority area according to the strategy of this project. Through REREDP project three mini-grid projects have been financed – one at Manikganj (250 KW), one at the island of Sandwip (100KW), another one at Thakurgaon (400 KW) in north-west Bangladesh There is no recorded habitat of indigenous people at Sandwip and Manikganj.

3) Through REREDproject, one solar irrigation project has been financed. The project is located at Sapahar, Naogaon. There are 21 solar irrigation projects, which are at an advanced stage of consideration with financing from the project. But none of the location of solar-irrigation project has fallen into IP majority area requiring no IP consultation.

4) IDCOL has initiated the process of monitoring environmental and social safeguards compliance with the support of the POs. To ensure the active participation of POs, it has recently revised the participation agreement signed between IDCOL and PO by inserting a new section under Article II. By revising Section 6.01(k) Environmental Compliance of the POs, in section 2.16 of Article II has been written as:

5) “(k) Environmental Compliance: it has been in compliance with all Bangladesh environmental laws and regulations relevant for the operation of the Subproject as well as the Environmental and Social Management Framework as adopted by IDCOL.”

6) Through the project, initiative has been taken to educate the communities on proper use and maintenance of SHS and other renewable energy technologies through POs. For the staff of POs, IDCOL gives 4-day long Training of Trainers (ToT). The main contents of the training are:

   - Introduction to Renewable energy, Electricity, PV technology and Components of Solar Home System,
   - Discussion on battery,
   - Maintenance,
   - Rural marketing of PV modules,
   - Mechanism for loan disbursement and collection
   - Hands on training about SHS installation and battery management

7) The 8th ToT training was arranged 12-14, 16 July 2011 and 9th ToT training was arranged on 10-13 June, 2012. There were about 30 participants in each ToT training. After having the ToT training, the trained PO staff will give training to their field level officials through a 2-day long staff training. Thereafter, the field level officials of PO will provide 1-day long customer raining.

8) IDCOL is in the process of raising awareness about complying with Bangladesh Labor Act, 2006 by all accessories suppliers.
9) IDCOL has posted the English and Bengali version of ESMF in their official website, which are available in the following web links:
   - http://www.idcol.org/Download/ESMF%20July%202011_final.pdf (English)
   - http://www.idcol.org/Download/Bangla-EMF-06.05.12.pdf (Bengali)

10) Several meetings with POs and battery manufacturers/suppliers were held to discuss the environmental impacts of improper disposal of lead-acid batteries, to raise awareness about the importance of environmental and social safeguards. IDCOL has already introduced a reporting mechanism for POs to track the record of expired battery as well as new battery. But as the submitted report is yet to found satisfactory, IDCOL is planning to strengthen the monitoring on distribution of new battery as well as collection of expired battery by involving its Solar Inspector.

11) For ensuring the compliance with required environmental, social and occupational safeguards, IDCOL has already deployed an experienced Environmental Consultant. IDCOL is in the process of revising their organogram, where a structured set-up is expected for Environmental and Social Safeguards Management Unit (ESSMU).

12) IDCOL has ensured the half-yearly monitoring of battery recycling plant. The half-yearly monitoring report is regularly submitted to World Bank. The main objective of this half yearly monitoring is to assess the status of complying with ISO 14001:2004 and OHSAS 18001:2007.

13) The engagement of an independent third party Auditor to conduct an annual environmental audit, is under processing. The main responsibilities of the auditor will include checking that the warranty expired/used batteries in the SHS program are returned to compliant recycling centers and are not sold to backyard smelters. The audit will cover an assessment of the adequacy of the relevant clauses in the participation agreement with the POs in ensuring appropriate recycling of batteries.

14) Out of 13 battery suppliers in IDCOL SHS Program, 12 have already completed the required ISO 14001:2004 and OHSAS 18001:2007 compliances. The remaining supplier SunTec Battery has already completed the required infrastructure and facility. It is now waiting for the final audit by their respective ISO and OHSAS certification agencies, which is expected to complete by July, 2012. The battery suppliers submit quarterly ISO and OHSAS compliance report to IDCOL.

15) There are three battery recyclers in IDCOL SHS program. Rahimafrooz has already completed the ISO 14001:2004 and OHSAS 18001:2007 compliances for their recycling unit. Others, the HAMKO Battery Company and the Panna Battery have made substantial progress for obtaining the ISO 14001:2004 and OHSAS 18001:2007.

16) In case of solar-mini grid project (in the island of Sandwip) an environmental and social impact screening process is followed to assess the possible environmental and social impacts.

17) From 1 June, 2011 to 30 June, 2012, no biomass based power project has been financed from the project.

18) To develop a national guideline for collection of waste CFL bulbs and a recycling method using the other good practices in the developed and other regional countries, the engagement of a Consultant is at an advanced stage.
ANNEX-2: SCREENING FOR SOCIAL COMPLIANCE

A. Involuntary Resettlement Aspect

- Is any land acquisition required for the project?
- Type of land (public, private or lease)
- Is there any settlement present in the site?
- Is there any recorded litigation issue associate with the site?
- Is there any close relationship between the general livelihood pattern and the site in the project area?
- Does the project require physical or economic displacement of any person/household/community?

B. Indigenous People Aspect

- Is the project site located in indigenous people prone area?
- Is there any impact of the project on religious and cultural practice and belief of indigenous people?
- Is there any impact of the project on livelihood pattern of indigenous people?
- Is there any settlement recorded (present and near past) in the site?
- Is there necessity of displacing (physically or economically) any person/household/community?
- What local language(s) is (are) used by the IP population?
- Are the PO staffs conversant in these languages and is the information material relevant to the terms and conditions of purchasing the services and operation and maintenance of equipment available in local languages?
ANNEX-3: GUIDELINES FOR SELECTING NEW BATTERY SUPPLIER

A. LOCAL BATTERY SUPPLIER

The battery supplier, who will supply battery made in Bangladesh, has to comply the following procedure to supply battery in IDCOL’s SHS program:

1. ISO 14001:2004 and OHSAS 18001:2007 compliances: The battery supplier has to be ISO 14001:2004 and OHSAS 18001:2007 certified from a certification body as is approved by International Accreditation Forum (IAF) or American International Accreditation Organization (AIAO).

2. Practicing Experience: The supplier has to prove the record of practicing the aforesaid two compliances at least six months individually. In this case of the two compliance certificates, six (6) months will be counted from the date of issuing of latter one.

3. Basic Infrastructure: All basic infrastructures including effluent treatment plant and air treatment plant (ATP) have to be fully operational. During application in IDCOL, the design detail of ETP and ATP are to be submitted. No exhaust fan will be considered as an alternative of ATP. In addition, the formation will be completely closed. No fume will be allowed to move freely in the unit. They must be properly neutralized.

4. Recycling Facility: The supplier has to make an arrangement of proper recycling facility complying ISO 14001:2004 and OHSAS 18001:2007 compliances. In this regard, he has to ensure individual recycling plant or can do an arrangement with battery recyclers whose plant has the aforesaid two compliances.

5. Technical Standard: The battery has to meet the compliances and standards required by Technical Standard Committee of IDCOL.

6. Health and Safety:
   - The industry will ensure appropriate work safety shoes, protection musk, washable/disposable cloths, cap, hand gloves etc
   - Adequate medical facility for the worker and his family
   - The industry will promote personal hygiene practices of workers
   - Avoid eating or smoking in the work area

B. IMPORTED BATTERY SUPPLIER

If a battery supplier supplies imported battery in IDCOL SHS program, he has to comply the following requirements:

1. Clearance:
   - In case of imported battery supplier, clause 1-5 will be remained same as above.
   - For initial audit, Environmental Consultant, IDCOL will visit the factory.
   - If the initial audit report seems to be satisfactory to senior official of IDCOL and IDCOL Audit Team, they can award clearance in favor of the supplier.
   - For any questionable finding, the battery supplier has to submit adequate evidence about resolving the findings. Thereafter, he can be considered as eligible for clearance.
ANNEX-4: AGREEMENT FOR BUYING BACK EXPIRED BATTERIES

Agreement for Buying Back of Warranty Expired Batteries

This Agreement (the “Agreement”) for Buying back of warranty expired/non-functional (not eligible for replacement under warranty policy) solar battery for safe disposal is executed on...[Date]...among...[Name of a Battery manufacturer]...having its registered office at ...[Office Address]...and Participating Organizations of Infrastructure Development Company Limited (IDCOL), as listed below (hereafter “POs”):

...[Name of the PO, Office Address]...
...[Name of the PO, Office Address]...

Whereas:

(a) IDCOL requires the POs to make necessary contractual arrangements with battery manufacturers for environment friendly recycling of all batteries used under IDCOL Solar Energy Program under Section 9.14 of the Participation Agreements between IDCOL and POs;

(b) The Government of Bangladesh has issued SRO No. 175-Act/2006 dated 29 August 2006 on collection and recycling of used/non-functional batteries for conservation of environment, improving environmental standard and control and prevention of environmental pollution;

(c) The Government of Bangladesh has issued SRO No. 29-Act/2008 dated 11 February 2008 that allows payment of consideration during the return of used/non-functional batteries; and

(d) All parties realize the need for safe and environment friendly recycling/disposal of warranty expired/non-functional (not eligible for replacement under warranty policy) batteries under IDCOL Solar Energy Program as per provisions in this agreement.

Now therefore, ...[Name of a Battery manufacturer]...& POs do hereby agree as follows:

1. Customer Notification:

PO shall notify the customers before 3 months of the warranty expiration date and advise him/her to replace the battery. The customer is free to continue using the existing battery after warranty period if s/he wants to do so. However, the customer will be required to inform the PO’s representative when s/he would stop using the battery after the expiration of warranty period. The PO will incorporate relevant provisions in the SHS sell/lease agreement requiring the customer (a) to furnish the warranty-expired or non-functional (not eligible for replacement under warranty policy) battery to the PO (b) not to keep it with them; and (c) not to sell it to any second party.

2. Collection of Batteries by PO:

PO representatives will collect the batteries from the customers and store it in the local offices. PO will take necessary measures to ensure safe storage of the batteries. The batteries must be collected within 30 days after the customer stops using it. The PO representative will ensure that no component/part of the battery is left behind and the acid does not spill out of the battery during transportation. POs will not sell any battery to the customers of IDCOL Solar Energy Program without provisions for buying back of the warranty expired/non-functional (not eligible for replacement under warranty policy) battery.
PO will send the warranty expired batteries within 30 days to any of the ten regional locations, designated by Battery Manufacturer, at Dhaka, Chittagong, Khulna, Faridpur, Bogra, Sylhet, Barisal, Borguna, Rangpur, Brahmanbaria.

3. **Collection of Batteries by …[Name of a Battery manufacturer]…:**

…[Name of a Battery manufacturer]…will collect the batteries from the regional locations and ensure safe transportation of the batteries to the site where the batteries will be recycled/disposed of in an environment-friendly manner.

### Price & payment: (there are some new aspects in clause 4)

4. **4.1.** The battery manufacturers will pay 24% of the current market price (including VAT) of new batteries to the POs for exchange of warranty expired batteries of similar size at their regional collection points. The salvage value is subject to review for every six months. Salvage value would be retained by the POs as down-payment and remaining price of new battery would be loan from POs to customers. IDCOL will refinance this loan amount which shall not exceed USD 100 equivalent BDT for each battery.

4.2. IDCOL will provide USD 5 equivalent o BDT as grant to the PO for collection of each warranty expired from the household subject to the availability of fund.

4.3. The customer’s portion of buying back price shall be given during the collection time.

4.4. …[Name of a Battery manufacturer]… will make full payment for bought back batteries through A/C payee cheque in favor of the POs within 45 days of receipt of the batteries in the regional locations.

4.5. Subject to the availability of Fund, IDCOL will provided USD 5 equivalent BDT to the battery recyclers for proper recycling of each battery.

5. **Review of price**

Both the parties will sit in every six months to review the buy-back price.

This Agreement is signed, sealed and delivered by authorized representatives of …[Name of a Battery manufacturer]… and POs on the date first mentioned above

…[Name of a Battery manufacturer]…

By___________________

Name:
Title:
Address:

**PARTICIPATING ORGANIZATIONS (POs):**

[...Name of a PO...]  
[...Name of a PO...]

By___________________  
By___________________

Name:  
Name:
Title:  
Title:
Address:  
Address:
ANNEX-5: INFORMATION OF EXPIRED BATTERIES

PO will have to collect data regarding expired batteries and IDCOL will check and store in their database.

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>ID</th>
<th>Customer name</th>
<th>Unit office</th>
<th>District</th>
<th>Panel serial no.</th>
<th>Panel capacity (wp)</th>
<th>Battery model and size</th>
<th>Manufacturer</th>
<th>Date of return</th>
<th>Sent to (manufacturer)</th>
</tr>
</thead>
</table>

2 The format is followed for ensuring proper collection of expired battery. The collection system is
- POs are responsible notify the customers before 3 months of the warranty expiration date and to collect expired batteries from customers and to safely transportation of regional locations of battery manufacturer/recycler.
- The manufacturer/recycler is responsible for collecting batteries from regional centers and to transport it to the site where the batteries will be recycled or disposed in an environment-friendly manner.
## ANNEX-6: SAFEGUARD SCREENING FORMAT FOR RAPSS

<table>
<thead>
<tr>
<th>Type of Impact</th>
<th>Activity</th>
<th>Social Impact Parameter</th>
<th>Level of adverse impact</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water pumping</td>
<td>• Land Acquisition</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Indigenous People</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Involuntary resettlement</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Occupational</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Landuse pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reserving pumped water</td>
<td>• Land Acquisition</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Indigenous People</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Involuntary resettlement</td>
<td>E</td>
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<td></td>
<td></td>
<td>• Gender</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Occupational</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Landuse pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water Supply</td>
<td>• Land Acquisition</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Indigenous People</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Involuntary resettlement</td>
<td>E</td>
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<td></td>
<td></td>
<td>• Gender</td>
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<tr>
<td></td>
<td></td>
<td>• Occupational</td>
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<tr>
<td></td>
<td></td>
<td>• Landuse pattern</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Water pumping</td>
<td>• Noise</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Dust emission</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mobil, lube oil spills</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Electromagnetic field</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visual Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Habitat alteration</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Water pollution</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Watertable depletion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reserving pumped water</td>
<td>• Air emission</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Noise</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visual impact</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mobil, lube oil</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Water pollution</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water Supply</td>
<td>• Air emission</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Noise</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visual impact</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water pollution</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*I=Insignificant, M=Moderate, E=Extreme*

Note: Proponent will primarily fill-up this screening format and IDCOL will review through field visit.
## ANNEX-7: ENVIRONMENTAL CLEARANCE PROCESS

<table>
<thead>
<tr>
<th>STEP</th>
<th>ENVIRONMENTAL CLEARANCE PROCEDURE FOR THE PROJECT FOR MAJOR SUBPROJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feasibility Report submitted to Department of Environment (DOE) and IDCOL</td>
</tr>
<tr>
<td>2</td>
<td>IEE Report Preparation and submission to IDCOL</td>
</tr>
<tr>
<td>3</td>
<td>Upon satisfactory adequacy check IEE submitted to DOE and IDA</td>
</tr>
<tr>
<td>4</td>
<td>DOE makes decision whether EIA is required or if IEE is adequate</td>
</tr>
<tr>
<td>5</td>
<td>If IEE is adequate (no significant environmental issues), DOE provides Environmental Clearance</td>
</tr>
<tr>
<td>6</td>
<td>Developer obtains &quot;no objection&quot; letter from Local Authority for site clearance</td>
</tr>
<tr>
<td>7</td>
<td>If IEE is not adequate (environmental issues requiring detailed analysis), DOE comments on draft TOR for EIA study</td>
</tr>
<tr>
<td>8</td>
<td>Public Consultation on the EIA</td>
</tr>
<tr>
<td>9</td>
<td>EIA review by DOE and IDA</td>
</tr>
<tr>
<td>10</td>
<td>Finalization of Environmental Management Plan, based on comments/conditions by DOE and IDA</td>
</tr>
<tr>
<td>11</td>
<td>Environmental Clearance by DOE and no objection from IDA</td>
</tr>
</tbody>
</table>
ANNEX-8: STRUCTURE OF ENVIRONMENT ASSESSMENT REPORT

The Environment Assessment (EA) Report would cover the following issues:

**Policy, Legal and Administrative Framework:**
A brief description of the policy, legal and administrative setting under which the proposed project is to be implemented.

**Project Description:**
A brief description of the nature and objectives of the proposed project and how it functions or operates, including the proposed location and why it was chosen.

**Baseline Data:**
This section would include a brief description and evaluation of the current environmental situation in the project area. This would include a qualitative description of the existing environmental conditions in the project area including atmospheric, aquatic and terrestrial systems.

**Environmental Impacts:**
This section would identify potential environmental impacts that may arise as a result of the proposed project. All cumulative effects will be considered – positive and negative, direct and indirect, long term and short term.

**Analysis of Alternatives:**
This section would address alternatives for the proposed action, which would include the "no project" alternative as well as other alternatives considered before selecting the proposed action.

**Social Impacts:**
A brief description of the social conditions in the project area including an estimate or the number of people to be relocated, distribution of population in the project area, a brief discussion of the local economy and primary sources of income, the presence of significant cultural and infrastructure facilities that will be affected and a list of issues to be discussed in the EA relative to the social conditions.

Preliminary plans for relocating affected people and a preliminary assessment of land acquisition requirements and a determination of whether the land required for the project falls into conservation areas or tribal lands or other special areas.

**Mitigation Measures:**
This section would include a detailed explanation of how the potential environmental impacts identified above could be mitigated.

**Monitoring Plan:**
This section should include a long term plan for monitoring to ensure that there no adverse impacts due to the project.

**Environmental Management Plan:**
Considering the nature and complexity of the sub-projects and technical assistance to be financed under the Credit, it is unlikely that any major or irreversible environmental impacts will be encountered. Therefore, the most important section of the EA would be the section on Environmental Management Plans (EMPs). EMPs should be prepared after taking into account comments from DOE and IDA as well as any clearance conditions. In view of this, a more detailed explanation of EMPs is given below. Prediction of potential adverse environmental and.
social impacts arising from project activities will be at the core of the environmental impact assessment process. By following the procedure described above, the environmental assessments to be conducted under the Project will be able to identify environmental and social impacts as a result of implementing the sub-projects. While impact identification is important, an equally essential element of this process is to develop measures to eliminate, offset or reduce impacts to acceptable levels during implementation and operation of the projects.

The integration of such measures into project implementation and operation is supported by clearly defining the environmental requirements within a EMP. EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EIA and implementation and operation activities. The plan outlines the anticipated environmental impacts, the mitigation measures to minimize these impacts, responsibilities for mitigation, timescales, costs of mitigation and sources of funding.

World Bank guidelines state that detailed EMP’s are essential elements for Category A projects, but for many Category B projects, a simple EMP alone will suffice. While there are no standard formats for EMPs, it is recognized that the format needs to fit the circumstances in which the EMP is being developed and the requirements which it is designed to meet. The EMP will address the following aspects:

- Summary of impacts
- Description of Mitigation Measures
- Description of Monitoring Programs
- Institutional Arrangements
- Implementation Schedule and Reporting Procedures
- Cost estimates and sources of funds
ANNEX 9: FIELD LEVEL ASSESSMENT FINDINGS

The assessments were conducted in five different sites to understand the people’s perception about the solar home system and cookstoves. These are kapasia Gajipur, Manikgonj, Thakurgaon, Prigacha (Rangpur remote Char area), and Swandip. FGDs findings with the household dwellers are:

- Females in the households have to maintain their household work properly for replacing of kerosene lamp by SHS. Kerosene lamps provide insufficient support to move out in a stormy and rainy night. Further Kerosene contains bad smell that creates health problem for the users and spoils food items due to mixing with food items while carrying these things together from shopping center.
- Children cannot read properly using the kerosene lamp. Demand for SHS is increasing.
- Old persons in the family are moving smoothly at night for better lighting and help to improve their vision.

Traditional cook stove has some health hazards. Participants of different FGDs described the following problems in using traditional cook stoves:

- Carbon spread all over the house. and Roofs are destroyed in a short time.
- Bed sheet/cloths get dirty in a short time.
- They face eye problem because of the heat and smoke.
- Accident occurs several times by the fire coming from the open space of traditional stoves.
- Traditional stoves consume more fuel than that of improved stove. However, in Gagipur, ICS users argued that the improved stove needs more fuel than that of the traditional stove.

Benefits from ICS

- They do not face smoke problem now.
- They are doing another work/agricultural at a time when they are cooking.
- They are saving their time by using this improved stove.
- Now they do not have to sit beside the stove all the time.
- Sometimes children are cooking in this stove as this has less risk.