People's Republic of Bangladesh
Sustainable and Renewable Energy Development Authority (SREDA)
Power Division, Ministry of Power, Energy and Mineral Resources (MPEMR)
Infrastructure Development Company Limited (IDCOL)
Bangladesh Infrastructure Finance Fund Limited (BIFFL)

People's Republic of Bangladesh

Preparatory Survey for Energy Efficiency and Conservation Promotion Financing Project

Final Report

February 2016

Japan International Cooperation Agency

Mitsubishi Research Institute, Inc.

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MITSUBISHI RESEARCH INSTITUTE, INC.

“PREPARATORY SURVEY FOR ENERGY EFFICIENCY AND CONSERVATION PROMOTION FINANCING PROJECT”

<Final Report>

Prepared for:
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
SUSTAINABLE AND RENEWABLE ENERGY DEVELOPMENT AUTHORITY (SREDA)
POWER DIVISION, MINISTRY OF POWER, ENERGY AND MINERAL RESOURCES (MPEMR)
INFRASTRUCTURE DEVELOPMENT COMPANY LIMITED (IDCOL)
BANGLADESH INFRASTRUCTURE FINANCE FUND LIMITED (BIFFL)

Prepared by:
MITSUBISHI RESEARH INSTITUTE, INC.

February 2016

Executive Summary

1. Overview of the Preparatory Survey

This Survey aims to elaborate on the specifications of the ODA loan project (the Project) for promotion of EE&C measures to be conducted through concessional loan scheme. Overview of the Project to be formulated through the Survey is as follows:

● Project Name

"Energy Efficiency and Conservation Promotion Financing Project" in Bangladesh
(Thereafter referred to as the "Project" or "JICA-EEF Project")

● Objective of the Project

The objective of the Project is to promote EE&C measures, and to facilitate installation of EE&C equipment in Bangladesh as well as to assist the GoB's policy to realize Renewable Energy and EE&C promotion by extending concessional loans and other support for implementing the Project, thereby inducing the stability of the energy supply and demand and contributing to the mitigation of climate change.

● Scope of the Project

The subject of the concessional loans will be three components, which are (i) industry / commercial sector component (Component I); (ii) building sector component (Component II); and (iii) home appliances component (Component III). These components were identified as the priority areas as the subject of low interest loan in the EE&C Master Plan (M/P), from the viewpoints of effectiveness and feasibility.

Table 1 Three Project Components

Component	User	Subject of loan	Supporting mechanism
(Component I) Industry / commercial sector component	Companies and other organizations	Energy efficient "listed" equipment at factory, office, commercial facility, etc.	Energy management and auditing
(Component II) Building sector component	Companies and other organizations	Energy efficient "listed" equipment in buildings	Green building rating programme
(Component III) Home appliances component	Households and small businesses	Energy efficient "listed" home appliances	Energy efficiency labelling programme

Source: Survey Team

● Executing Agencies for the Project

Sustainable and Renewable Energy Development Authority (SREDA) is one of the three executing agencies, being the administrative authority for the Project. Ministry of Power, Energy and Mineral Resources (MPEMR) will be supporting SREDA to execute the Project. Further, Two Non-bank Financial Institutions (NBFIs), Infrastructure Development Company Limited (IDCOL) and Bangladesh Infrastructure Financing Fund Limited (BIFFL) are the two more executing agencies functioning as the implementing financial institutions (IFIs) for the Project.

- Project Structure

There will be two types of loan, one being A-type loan: where IFIs directly extends the money to the borrower (industry / commercial businesses) as the end users, while another being B-type loan: which will be extended to PDs who is the intermediate between IFIs and the end user (households and small businesses) who purchases energy efficient home appliances. A-type loan will be utilized for (i) industry / commercial sector component (Component I) and (ii) building component (Component II), while B-type loan will be utilized for (iii) home appliances component (Component III).

Table 2 Two Types of Concessional Loan Provision Channels

	A-type loan (for industrial and commercial equipment)	B-type loan (for home appliances)
Purpose	To promote relatively larger scale EE&C equipment introduction at factories and commercial facilities.	To promote small scale EE&C home appliances purchase at residential and small businesses.
Borrower	Companies of other organizations owning factories and commercial facilities who acquire the EE&C equipment.	PDs that provide EE&C home appliances. PDs will offer the home appliances under installment payment to the end users.
Fund flowing channel	Fund will be paid from IFIs' account into the borrower's account.	Fund will be paid from IFIs' account into the PDs' account. The fund will be utilized by the PDs when laying-in the stocks of the EE&C home appliances.
Payback	Borrower companies / organizations will pay back to the IFIs.	End users will pay back to the PDs. PDs will then pay back to IFIs.
Approval procedure	IFIs will conduct appraisal for each application against A-type loan appraisal manual.	PDs will conduct screening of each end user against B-type loan re-financing manual.

Source: Survey Team

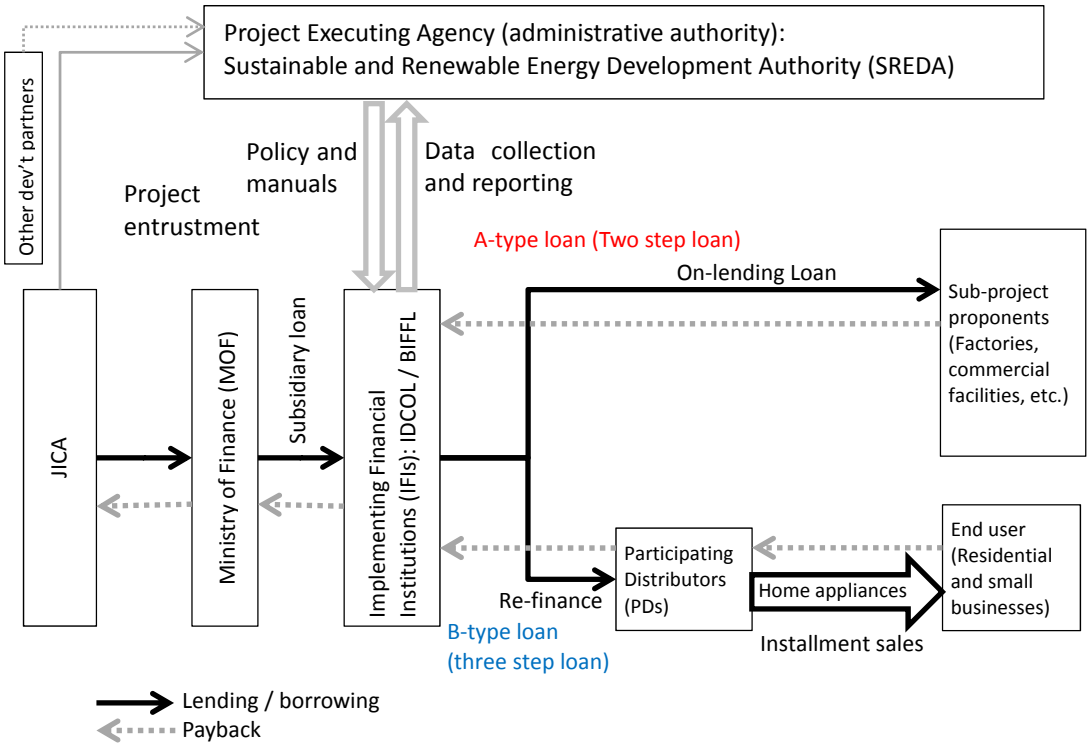


Figure 1 Project Structure

2. Positioning of the Project in the Contexts of Development Policies and Superordinate Plans

● EE&C Promotion Policy

SREDA has presented the "Energy Efficiency and Conservation Master Plan (EE&C M/P) up to 2030" on its website in April 2015, which is the M/P developed with the support of JICA project. SREDA gave a presentation of the M/P to the concerned GOB officials at Joint Coordination Committee meeting in February 2015. The Project, by utilizing ODA loan to promote EE&C measures, is expected to be an essential tool for SREDA to achieve its goal. Further, the energy auditing, energy efficiency labelling, and green building rating programmes will strongly support the Project.

As for the energy auditing programme, there are approximately 100 companies that are expected to be designated as the Designated Large Energy Consumers (DCs), which will be the principal candidates for the Project. Estimation of numbers of sector-wise candidates of the DCs will be made through analysis of the companies' investment plans and through analysis of energy sales data and questionnaire survey data by the Survey Team. Nomination of the DCs will be made by SREDA according to EE&C Rules and regulations.

● Legal Instruments for EE&C Promotion

SREDA Act specifies the establishment, responsibility and function of SREDA including SREDA Fund. Under the SREDA Act, there is the EE&C Rules, which is still under consultation between SREDA and the Ministry of Law to be approved by the Prime Minister Office by early 2016. The EE&C Rules contain regulations on energy audit and energy efficiency labelling.

Contribution for Appropriate Power System Development

SREDA drafted an energy efficiency and conservation master plan (EE&C M/P) which sets out a target to reduce the primary energy consumption per GDP by 15% in 2021 (or Bangladesh FY 2020, as compared with that of FY 2013 as the baseline). Under certain assumption, this implies that 7,482 GWh of electricity, which is equivalent to the power generated annually by 2,000 MW power station, will be saved as the result of energy efficiency measures. The Power System Master Plan (PSMP) is currently being revised anticipating that this energy saving will be realized.

If Bangladesh fails to follow the energy saving path remaining on the BAU case, the energy saving of 7,482 GWh will not be realized and GOB would have to additionally invest on the construction of power station(s), possibly with the capacity of 2,000 MW. The Energy Efficiency and Conservation Promotion Financing Project (JICA-EEF) is probably the only available effective option for Bangladesh to trigger its practical energy saving programme in parallel with pursuing an appropriately planned investment on power sector.

Necessity of Low Interest Rate for End-Users

The Energy Efficiency and Conservation Promotion Financing Project (JICA-EEF) promotes the penetration of energy efficient equipment, contributing to saving energy without affecting the production. To encourage the industry, businesses and households to choose energy efficient equipment which, in many of the cases, is more expensive compared with the conventional ones, there is a need for compensating the cost difference.

3. Current Status of Energy Efficiency and Conservation (EE&C) Measures Promotion in Bangladesh

Technologies Applied

The JICA EE&C Master Plan (M/P) development project reviewed the technologies applied in Bangladesh through on-site surveys. The energy efficiency, in terms of energy intensity unit figures for major energy consuming industry sub-sectors were also collected during the on-site survey.

The main implication points from the on-site surveys are as follows:

- Lack of Information for effective EE&C measures (Required for eligible energy auditing);
- Lack of suitable maintenance for equipment (Required for efforts to maintain energy consuming equipment with appropriate conditions);
- Lack of operation standards in governmental buildings, such as control of room temperature and lighting in lunch time, and;
- Cement, Steel making and re-rolling, and Fertilizer are operated in good energy intensity, therefore there is a desperate need for installation of high efficiency equipment.

Funding

The intervention of the public sector is still very critical to disseminate the technologies and enhance the effective investment. However, the access to financing for EE&C cost is still limited in Bangladesh. GoB is yet to allocate specific budget for the promotion of EE&C. The implementation of EE&C measures should therefore resort to private or international development partners' funding sources.

Commonly Available Funds

Recent statistics from Bangladesh Bank (BB: the central bank of Bangladesh) shows that the currently available loan interest rate for industry is within the range 11% ~ 18%, while consumer credit is around 12% ~ 18.5%.

Need for EE&C Finance Facility

The bottlenecks of EE&C promotion in Bangladesh are considered below:

- Lack of urgency of energy saving among individuals and companies: The Government highly subsidizes energy and power sector to lower the costs of fuel and electricity for the household and industries
- Tight budget constrains: The Government does not have enough budget to implement subsidies or tax incentive measures.

Taking into considerations the above circumstances, the JICA-EEF Project is expected to contribute to the penetration of EE&C equipment through low interest loan. This measure, under low financial burden for the government, enables low interest long-term financial support for end users for the equipment. The main goal of the Project is to promote the dissemination of the EE&C equipment, thus contributing to saving energy.

4. Demand for EE&C Promotion Financing

To promote EE&C in industry and commercial sectors, the DCs should improve energy intensity by means of introducing energy efficient equipment. DCs will be nominated and their energy use will be monitored by SREDA. The survey has identified 114 DC candidates. These DC candidates are expected to be the main end-users of the financing facility for energy efficiency promotion in the Project. This is due to the fact that the energy consumption of the DCs candidates adds up to 28% of that of the industrial entire sector. Energy consumption of the DC candidates is as follows:

- Energy consumption of DC candidates: 3,586,031 toe;
- Energy consumption in industrial sector in 2013: 12,482,000 toe
- Share of energy consumption of the DC candidates: 28.7%

5. Executing Agencies and Other Major Stakeholders

Administrative Authority

SREDA is the nodal institution for identification, promotion, facilitation and overall coordination of all national renewable energy and EE&C policies and programmes in Bangladesh. SREDA, based on such function, will act as the administrative authority for the Project.

Implementing Financial Institutions

There are three candidate governmental financial institutions that may collaborate with SREDA in managing its fund, which are: Bangladesh Bank, Infrastructure Development Company Limited (IDCOL), and Bangladesh Infrastructure Financing Fund Limited (BIFFL). All of them are governmental organizations, which has the experience of receiving JICA ODA loans via MOF. As BB, is unable to extend loan directly to the end users, the IFIs for the Project will be narrowed down to two financial institutions, IDCOL and BIFFL.

PD Candidates

The role of PDs is to disseminate EE&C appliances to their customers like residential and small business who cannot afford these appliances by cash or credit card in one time. As PDs provide installment sales with low interest rate under this scheme of the Project, their customers will be able to obtain the EE&C appliances.

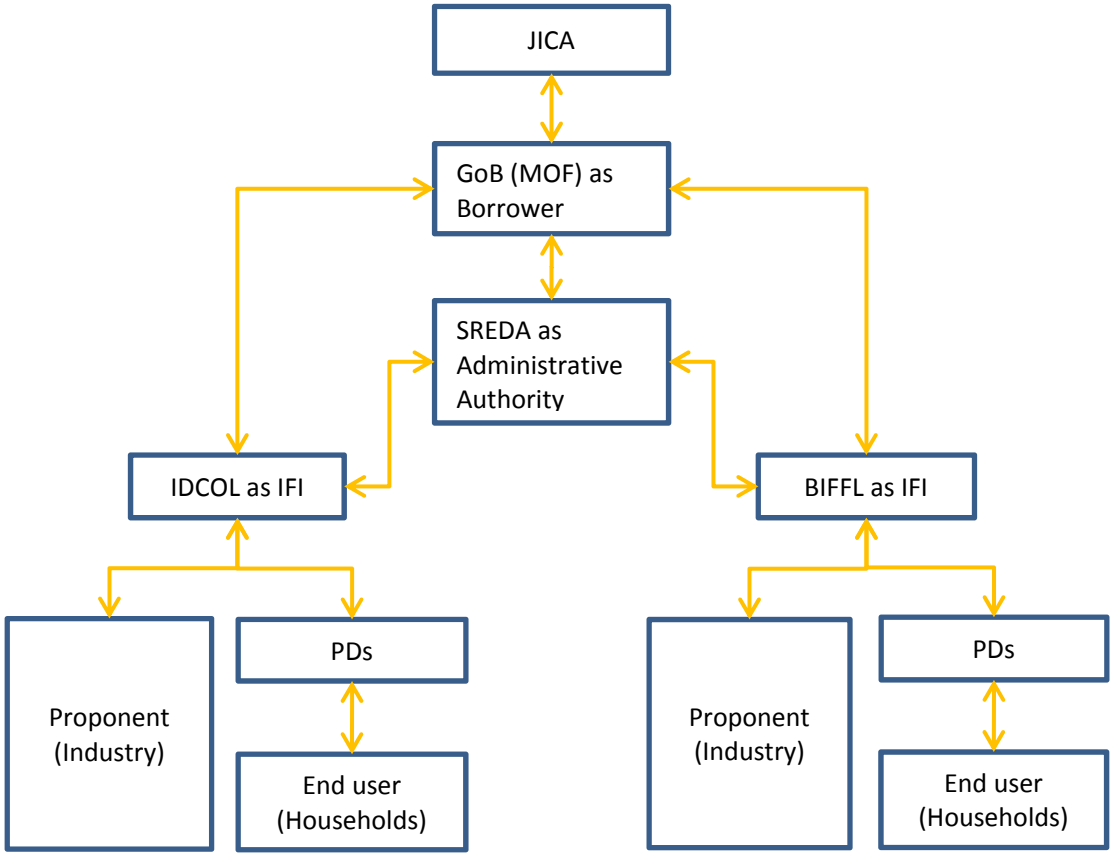


Figure 2 Executing Agencies and Other Major Stakeholders

6. Project Implementation Plan

EE&C Promotion Components

Three components that were identified and suggested in the M/P which was prepared preceding this Survey, were found to be well reflecting the priority in terms of urgency, effectiveness and demand for funding. The Project will therefore be formulated with the following three components as the subject for concessional loan:

Component I	Industry / commercial sector component
Component II	Building sector component
Component III	Home appliances component

Components I and II will be implemented only through A-type loan while Component III will be through B-type only.

Table 3 Type of loan applicable to the Project Components

	A-type loan	B-type loan
Component I Industry / commercial sector component	Yes	No
Component II Building sector component	Yes	No
Component III Home appliances component	No	Yes

Source: Survey Team

- Eligible Technologies and Equipment for Sub-projects

With respect to the need to prioritize industry, residential and buildings sectors, the target fields of technologies and equipment as the sub-projects in JICA Energy Efficiency and Conservation Promotion Financing Project are defined as follows:

- Industry (50% of national primary energy): addressing to Component I
- Residence (30%): addressing to Component III
- Building (5%, increasing rapidly): addressing to Component II and partially Component I

Table 4 Eligible Technologies and Equipment in Component I

No	Sub-sector and items	Specification/ Production Capacity	Energy source
I	Industry / Commercial Sector		
1	Chemical fertilizer		
1.1	Heat exchanger replacement of urea fertilizer plant	Heat exchanger (waste heat recovery system), whose capacity is equal to 10,000 kJ/h or more	Gas
2	Paper & pulp		
2.1	Black liquor boiler	Boiler which burns black liquor and recovers agents such as soda	Gas
2.2	De-inking plant	50 TPD or more	Gas
3	Textile and garment		
3.1	Spinning machine	Roving frames with pneuma-less waste collection system Ring spinning frames with permanent magnet motor Automatic winder with balloon controller Air jet spinning	Electricity
3	Textile and garment		
3.2	Loom (weaving machine) and warper & sizer	Air-jet loom with technology for reducing both air consumption and air pressure. Warper & sizer with inverter control (motor should meet the standard which is stipulated in item 9.7.1).	Electricity

No	Sub-sector and items	Specification/ Production Capacity	Energy source
3.3	Sewing machine	Sewing machine driven by directly connected motor. Main driving motor type is to be a servomotor (motor should meet the standard which is stipulated in item 9.7.1)	Electricity
3.4	Stenter	Stenter controlled by inverter, whose air volume and width of nozzle are adjustable.	Gas & Electricity
3.5	Heat exchanger	Heat exchanger (waste heat recovery system), whose capacity is equal to 10,000 kJ/h or more.	Gas
4	Glass		
4.1	Combustion control of glass melting furnace	Combustion control unit controlled by air ratio in exhaust gas.	Gas
5	Cement & Clinker grinding		
5.1	Vertical roller grinding mill for cement clinker and slag	A mill is to be equipped with main rollers for grinding materials and sub-rollers for stabilizing materials. Having delivery record of mill with power consumption of less than 29 kWh/ton (mill + separator + fan) at 3,300 cm2/g OPC basis.	Electricity
5.2	Vertical roller grinding mill for pre-grinding	Having delivery record of mill facility with power consumption of less than 33kWh/ton (pre-grinding mill + ball mill + separator + fan) at 3,300 cm2/g OPC basis.	Electricity
6	Iron & steel (rerolling mills)		
6.1	Induction furnace	Induction furnace	Gas
6.2	Combustion control unit of reheating furnace	Combustion control unit controlled by air ratio in exhaust gas	Gas
7	Foods and beverages (cold storage)		
7.1	Screw compressor refrigeration unit	Screw compressor with motor whose capacity is equal to 10 kW or more, including chiller, condensing unit, and cold storage capital machineries (Insulation panel, cooling tower, control panel, pumps, and pressure vessels) COP>=4.0 @ +3°C (e.g. potato cold storage) COP>=1.9 @ -25°C (e.g. cold storage in general) COP>=1.4 @ -35°C (e.g. cold storage in general) COP>=1.1 @ -40°C (e.g. ice cream factory)	Electricity
8	Telecommunication		
8.1	Lithium ion battery	When replacing lead/acid battery + captive power generation combination to lithium ion battery	Electricity
9	Common technology		

No	Sub-sector and items	Specification/ Production Capacity	Energy source
9.1	Power receiving and distribution		
9.1.1	Transformer	Transformer with amorphous metal core	Electricity
9.2	Water pump		
9.2.1	Pump with inverter	Pump with inverter control, whose motor output is 10 kW or more (motor should meet the standard which is stipulated in item 9.7.1).	Electricity
9.3	Fan and blower		
9.3.1	Fan and blower with Inverter	Fan and blower with inverter control, whose motor output is 10 kW or more (motor should meet the standard which is stipulated in item 9.7.1)	Electricity
9.4	Air compressor		
9.4.1	Air compressor	Screw compressor with inverter control, or centrifugal compressor, whose motor output is 10 kW or more.	Electricity
9.4.2	Multi air compressor control unit	Numbers of air compressor is 2 sets or more, equipped with an optimum control system.	Electricity
9.5	Inverter		
9.5.1	Inverter	Inverter whose connected motor output is 10 kW or more.	Electricity
9.6	Boiler and steam system		
9.6.1	Once-through steam boiler	Steam generation capacity is between 1 ton/h to 4 ton/h. Boiler efficiency is to be 90% or more at rated load.	Gas
9.6.2	Multiple installation system of once-through steam boilers	Steam generating capacity of a single boiler is from 1 ton/h to 4 ton/h. Efficiency of a single boiler is to be 90% or more at rated load and the efficiency of total system is to be 80 % or more at 50% load. Total steam generating capacity is 2 ton /h or more by multiple numbers of boilers.	Gas
9.6.3	Economizer for boiler	Exhaust gas economizer	Gas
9.7	Motor		
9.7.1	Motor	Efficiency is IE2 or IE3 specified in IEC 60034	Electricity
9.8	Air conditioner		
9.8.1	Air conditioner	1) Centrifugal chiller; 2) Absorption chiller; 3) Variable Refrigerant Flow (VRF) air conditioner whose COP is 4.2 or more; 4) Air cooled chiller, whose COP is 3.0 or more, without using R22 or R123; 5) Water cooled chiller, whose COP is 4.0 or more, without using R22 or R123.	Electricity

No	Sub-sector and items	Specification/ Production Capacity	Energy source
9.9	Heat pump		
9.9.1	CO2 Heat pump	Motor Capacity is 10 kW or more COP>= 3.5 (Hot water supply : heat source=air) COP>= 5.0 (Cooling + Heating supply)	Electricity
9.10	Lighting		
9.10.1	LED lamp	LED lamp with 100 lm/W or more, life time: 40,000 hours or more, number of lamps is 500 or more, and with LED patent license certificate.	Electricity
9.11	Co-generation, tri-generation		
9.11.1	Gas engine	Conversion from existing gas engine power generation to gas engine co-generation / tri-generation by utilizing waste heat, whose total rated thermal efficiency is more than 60%. Maximum capacity per sub-project is 10 MW.	Gas
9.11.2	Gas turbine	Gas turbine co-generation / tri-generation, whose total rated thermal efficiency is more than 80%. Maximum capacity per sub-project is 10 MW.	Gas
9.12	Waste heat recovery		
9.12.1	Once-through steam boiler	Once-through boiler with automatic gas bypass device	Gas
9.12.2	Waste heat recovery system	Exhausted heat recovery system, whose capacity is equal to 10,000 kJ/h or more.	Gas

Note:
COP: Coefficient of Performance
IEC: International Electrotechnical Commission
LED: Light Emitting Diode
OPC: Ordinary Portland Cement
Note: Fuel oils may apply as the energy source in lieu of gas in some of the cases.

Table 5 Eligible technologies and equipment in Component II

No	Items	Specification	Energy source
II	Building sector (Priority will be given to green buildings)		
1	Heat reflective glass	Low-e pair glass and solar reflective glass (solar heat reflective ratio is 50% or more)	Electricity
2	Elevator	Elevator with PM motor and LED lighting	Electricity
3	BEMS	BEMS, which visualizes a real time energy consumption of the building and controls energy consumption for air conditioning and lighting	Electricity
4	Others	Equipment listed in Component I and III are also eligible	-

Table 6 Eligible technologies and equipment (home appliances) in Component III

No	Home Appliance	Specification	Energy source
III	Residential sector (Following equipment to be provided by Participating Distributors (PDs))		
1	Refrigerator	Inverter controlled (energy efficiency label: 3 stars or more, when the programme is established)	Electricity
2	Air conditioner	Inverter controlled (energy efficiency label: 3 stars or more, when the programme is established)	Electricity
3	Others	Further additions are expected in accordance with the establishment of energy efficiency labelling programme	-

● Implementation Support for the Project

The implementation support for the Project is comprised from three components: (i) assistance by JICA advisors during the initial stage of Project implementation, (ii) consulting service for SREDA to oversee the Project, and (iii) consulting service for the IFIs to support the project implementation. The three components have specific features such as main target for support, funding source, procurement arrangement, consultants to be employed and duration/timing. The overview of the three components is as summarized in the following table:

Table 7 Mapping of Terms of Reference for Technical Support on Project Implementation

TOR Item	Assistance by JICA Advisor for Initial Stage of Project Implementation	Consulting Services for SREDA	Consulting Services for IDCOL and BIFFL
	2016 - 2017 (2 year2)	2018 - 2020 (4 years)	2016 - 2022 (6 years)
1. Facilitating Implementation	Assistance for PIU (e.g. operation guidelines)	Assistance for PIU	Assistance for PIU (e.g. operation guidelines)
	Planning project implementation	Planning project implementation	Planning project implementation
		Public relations and awareness	Marketing

TOR Item	Assistance by JICA Advisor for Initial Stage of Project Implementation	Consulting Services for SREDA	Consulting Services for IDCOL and BIFFL
	2016 - 2017 (2 year2)	2018 - 2020 (4 years)	2016 - 2022 (6 years)
2. Capacity Development	Capacity development for implementing agencies	Exposure facilitation Seminars to introduce technology and equipment	
3. Monitoring	Development of tools for data and information analysis	Analysis and processing of EE data	Assistance in monitoring activities by IDCOL and BIFFL
4. Reviewing and Improvement	Support for Technical Advisory Committee	Support for Technical Advisory Committee Support for revision of manuals	
Main Target for Support	SREDA plus IDCOL/BIFFL	SREDA	IDCOL/BIFFL
Funding Source	(Grant Finance) from JICA to implementing agencies (outside of project costs)	(Lending from GoJ to GoB) Japanese ODA loan (Grant from MOF to IFIs)	(Lending from GoJ to GoB) Japanese ODA loan (Grant from MOF to IFIs)
Procurement Arrangement	JICA in charge (JICA procurement rule)	SREDA in charge	IFIs in charge
Consultants to be employed	International and National Consultants		

Source: Survey Team

- Appraisal Procedure for A-type Loan

Appraisal Procedure for A-type loan is as follows:

1. A proponent for A-type loan sub-project submits a loan application to an IFI for installing EE&C equipment;
2. The IFI conducts preliminary financial screening;
3. The IFI forwards the application to SREDA to check the technical eligibility;
4. SREDA checks the eligibility;
5. SREDA issues No Objection Certificate (NOC) and submits it to IFIs;
6. The IFI forwards the NOC to the Proponent;
7. The IFI conducts appraisal based on financial appraisal manual;
8. The IFI institutionally approves the application (Board (or CEO));
9. The IFI notifies the result to SREDA monthly;
10. IFIs to disburse to the proponent (JICA's concurrence is required for the first 5 to 10 sub-projects before the disbursement).

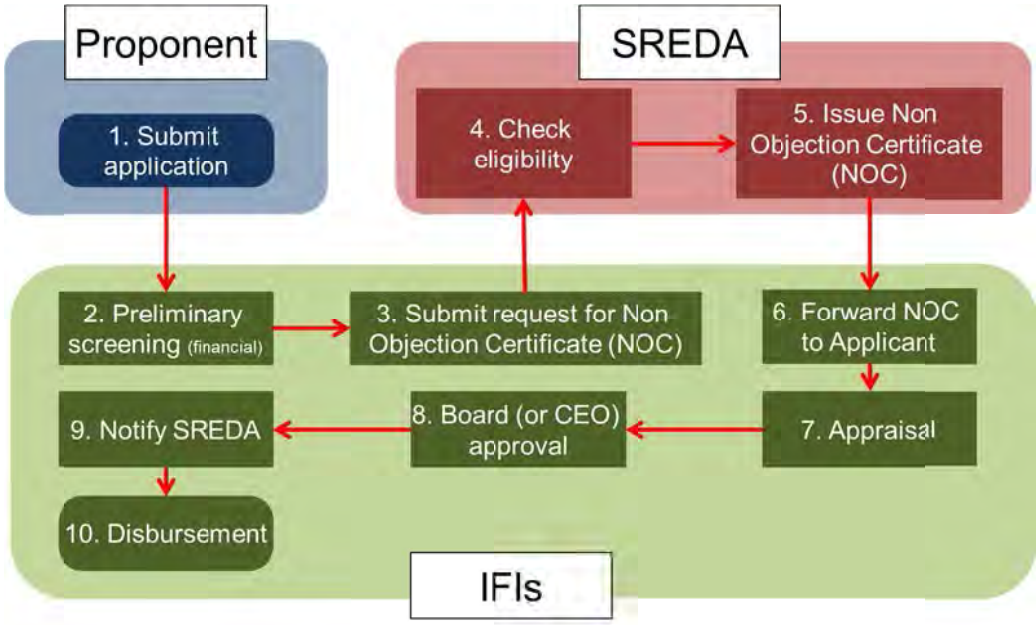


Figure 3 Borrowing Procedure for A-type Loan

- Appraisal Procedure for B-type Loan

1. An IFI conducts public invitation for PDs;
2. An organization which desires to become a PD submits the application;
3. The IFI checks the applications based on the eligibility criteria and select proper candidate as PDs;
4. The IFI signs the participating agreements with the selected PDs;

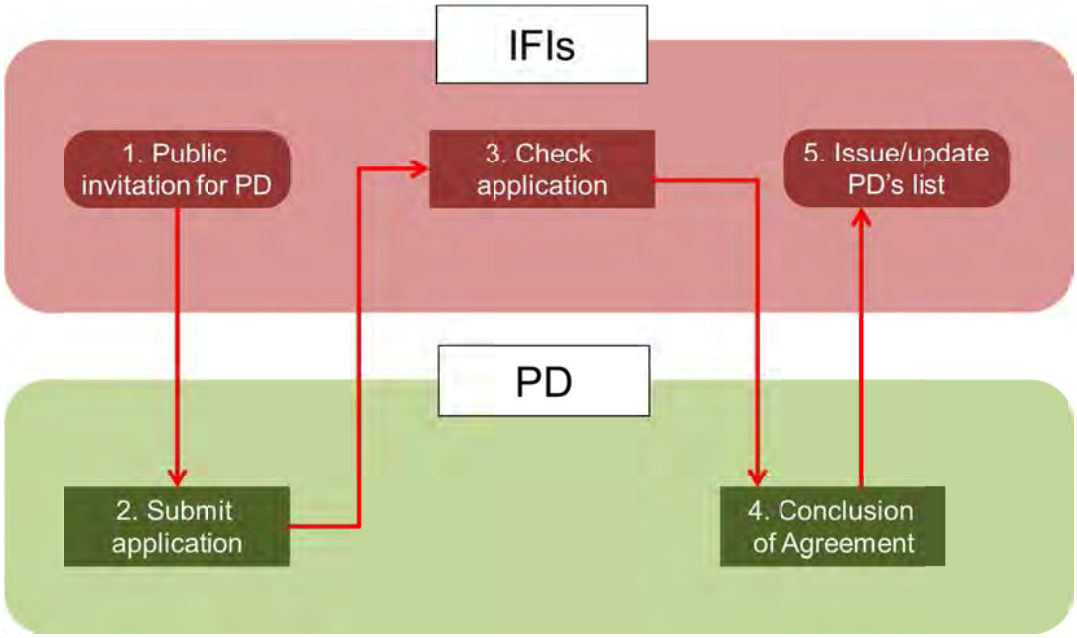


Figure 4 Steps for PD selection in B-type loan

Lending Conditions

For competing with the EE&C equipment in terms of price as well as in terms of other conditions such as payment modes (cash or credit card), the interest rate to the end user should be 4% in case of A-type loan and 8% in case of B-type loan in accordance with the result of interview with some major proponents. Considering that there are financing facility for EE&C products already available at 8%, and that private loan is commonly available from 10%, the policy driven loan of this Project will have to be more attractive compared with the readily available facility.

Table 8 Proposed Lending Conditions for A-type Loan

	Interest Rate Currency	Repayment Period including Grace Period
JICA – MOF	0.01% JPY	40 years (Grace period: 10 years)
MOF – IFIs **Subsidiary loan**	1% BDT	20 years (Grace period: 5 years)
IFIs – Proponents **On-lending loan**	4% (standard) BDT	Varies

Source: Survey Team Proposal

Table 9 Proposed Lending Conditions for B-type Loan

	Interest Rate Currency	Repayment Period including Grace Period
JICA – MOF	0.01% JPY	40 years (Grace period: 10 years)
MOF – IFIs **Subsidiary Loan**	1% BDT	20 years (Grace period: 5 years)
IFIs –PDs **Participating Agreement**	4% (standard) BDT	Varies
PDs – Residential/Small Business	8% (4 points plus standard) BDT	Varies

Source: Survey Team Proposal

7. Project Management

Steering Committee (SC)

Steering Committee will be formulated by Power Division, MPEMR who is the head executing ministerial body for the Project. The formulation timing is on the commencement of the Project, which is within 2 months from Loan Agreement. SREDA will provide secretarial service for the Committee. The Steering Committee is responsible for the following tasks:

- Convene Project review meetings annually inviting all the stakeholders to discuss on the status of the implementation and possible improvement in the Project;
- Find out the problem and bottlenecks and recommend necessary collection in policy level such as rules and regulations, taxes, etc.

Technical Advisory Committee (TAC)

Technical Advisory Committee will be formulated by SREDA upon the commencement of the Project which is within 1 month after formulation of SC. SREDA will provide secretarial service for the Committee. Technical Advisory Committee is responsible for the following tasks:

- To discuss the neceisty of revising the exsiting EE&C equipemnt list and submit the proposed revision SREDA;
- To advise SREDA on the preparation and revision of EE&C equipemnt list;
- To give advice to the Executing Agencies, when requested, on the eligibility of the applications for sub-projects;
- To evaluate energy audit report relating to the sub-projects as needed in such cases as the regulation on energy audit is in place;
- To advise the Executing Agencies concerning any technical issues;
- To give advice to SREDA for improvement in technical aspect of the Project;

Project Effect and Monitoring

With respect to the quantitative effects, the indicators as output of the activities and energy efficiency will be selected (operating indicators). The baseline value, if available and the target value for the two-year after the project completion will also be set. Output indicators are: amount of sub-project approved and extended, rate of receivables in arrears counts and amount basis. Energy efficiency indicators are: total energy saved and emissions reduction.

Table 10 Project Monitoring Indicators

Indicator		Baseline (actual figure in CY 2016)	Target (CY 2023) [Two years after the Project completion]
Output			
Amount of sub-project approval and lending	JPY	-	Entire loan amount extended
Rate of receivables in arrear (amount basis)	%		To be set upon Project commencement
Rate of receivables in arrear (count basis)	%		To be set upon Project commencement
Energy Efficiency			
Total energy saved	toe		To be set upon completion of disbursement
Emissions reduction	t-CO2		To be set upon completion of disbursement

The qualitative effect can also be assessed by such factors as (i) stability of demand and supply situation, (ii) awareness of energy efficiency improvement in industry and residences, and (iii) improved capacity of SREDA and IFIs in appraising the loans.

8. Environmental and Social Considerations

● Consistency with JICA Guidelines for Environmental and Social Considerations

There are no significant gaps between Bangladesh EIA system and "Guidelines for Environmental and Social Considerations, April 2010" (Thereafter referred to as JICA guidelines) in terms of the objectives of the EIA. Governmental legislation, however, pays scant attention to transparency, predictability and accountability. One of the reasons for this is that the EIA is conducted within the framework of the Environmental Clearance Certificate (ECC), which makes the EIA more acceptable than otherwise. The procedure of the EIA has recently been clarified, considerably narrowing the gaps between JICA's recommended procedure and that of Bangladesh. It is also important to note that domestic acts and ordinances pay little attention to social impacts and public participation.

The sub-projects under this Project are required to be selected with reference to the JICA guidelines. When revising the eligible technology and equipment list, there should be no inclusion of technology or equipment which will be under category A.

● Reinforcing Environmental Management Framework

IDCOL's ESSF and ESMF, and BIFFL's ESMF mention necessary requirements for environmental management in various projects such as relevant policies and regulations, environmental checklist, potential impacts, mitigation measures and monitoring items. Because these frameworks will essentially cover required environmental management in the proposed EE&C sub-projects, it will not be necessary to prepare new frameworks for EE&C sub-projects.

However, because JICA-EEF Project is a new component, the following additional text to cover JICA-EEF Project will be added to the existing ESMFs' annex.

- Outline of JICA-EEF Project
- Outline of JICA Guidelines
- Check items

9. Training in Japan

Training in Japan was implemented with the aim to share the same knowledge and notion of EE&C technology, equipment, environment and measures. Trainees were exposed to various EE&C technologies, equipment, measures and policies (through lectures, site visits and discussions). Number of participants was 12, and was held during 22-29 July 2015, right after the Eid ul Fitr holiday.

10. Orientation & Networking Workshop

With the aim to kick start the Project smoothly and effectively, SREDA, with the support of the Survey Team, held an orientation and networking workshop in Dhaka. Invitees were the stakeholders including government officials, business people, the energy consuming industries, the academics and other participants to the JICA EE&C M/P Project participants. The number of the participants was more than 250 in total. Active discussions took place in the morning

presentations, followed by the networking among the potential borrowers, equipment suppliers and the IFIs. More than 50 companies and organizations participated in the networking session.

11. Publicity Activities

● Short-term Action Plan (2015-2016)

In the short-term, the Video Clips will be the main material to raise awareness of the people and to disseminate information on the JICA-EEF Project among the target groups.

● Mid-term Action Plan (2017-)

In the mid-term, SREDA will be acting as an information hub on EE&C. Mechanisms that allow SREDA to collect relevant information (such as successful case studies on EE&C, data showing evidence in achieving EE&C, or development of energy efficient technologies) will be introduced. Any company or organization who has an interest in and seeks more information on EE&C (policies, regulations, technologies, and other solutions) will consult with SREDA. IDCOL/BIFFL will effectively assist companies who introduce energy efficient equipment and provide them with updated information.

Table of Contents

Note: Annexes 1 to 22 are available on a separate document.

List of Tables

List of Figures

Acronyms

2SL	Two Step Loan
3SL	Three Step Loan
AC	Air Conditioner
A/C	Account
ACEM	Accredited Energy Manager
ADB	Asian Development Bank
AMC	Asset Management Company
AVP	Assistant Vice President
BAU	Business As Usual
BB	Bangladesh Bank
BBS	Bangladesh Board of Statistics
BCIC	Bangladesh Chemical Industries Corporation
BERC	Bangladesh Energy Regulatory Commission
BGMEA	Bangladesh Garment Manufacturers and Exporters Association
BIFFL	Bangladesh Infrastructure Finance Fund Limited
BIS	Bank for International Settlement
BKMEA	Bangladesh Knitting Manufacturing & Export Association
BRESL	Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling
BSTI	Bangladesh Standards and Testing Institution
BTMA	Bangladesh Textile Mills Association
BUET	Bangladesh University of Engineering and Technology
CAMS	Continuous Air Monitoring Station
CCEB	Catalyzing Clean Energy in Bangladesh
CEO	Chief Executive Officer
CFL	Compact Fluorescent Light
CIB	Credit Information Bureau
CIC	Credit Information Company
CO2	Carbon Dioxide
COP	Coefficient of Performance
CRAB	Credit Rating Agency of Bangladesh Ltd
CRD	Credit Risk Database
CRG	Credit Rating Grade
CRM	Credit Risk Management
	Carbon Reduction Manager
CSE	Chittagong Stock Exchange
DB	Deutsche Bank
DC	Designated Large Energy Consumers
DEG	Deutsche Investitions- und Entwicklungsgesellschaft
DFID	Department for International Development
DF/R	Draft Final Report
DPHE	Department of Public Health Engineering
DSE	Dhaka Stock Exchange
DSRA	Debt Service Reserve Account
DTCB	Dhaka Transport Coordination Board
ECA	Ecologically Critical Area

ECC	Environmental Clearance Certificate
EE&C	Energy efficiency and conservation
EE&C-M/P	Energy Efficiency and Conservation Master Plan
EHS	Environment and Health Safety
EIA	Environmental Impact Assessment
EM	Energy Manager
ESAM	Environmental and Social Appraisal Manual
ESMAP	Energy Sector Management Assistance Programme
ESMF	Environmental and Social Management Framework
ESMS	Environmental and Social Management System
ESPR	Environmental and Social Performance Report
ESSF	Environmental and Social Safeguards Framework
FI	Financial Institution
F/R	Final Report
F/S	Feasibility Study
GCPF	Global Climate Partnership Fund
GEF	Global Environment Facility
GHG	Greenhouse effect gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoB	Government of Bangladesh
GPOBA	Global Partnership on Output-Based Aid
HBFC	House Building Finance Corporation
HBRI	Housing and Building Research Institute
HFO	Heavy Fuel Oil
HSD	High Speed Diesel
IC/R	Inception Report
ICB	Investment Corporation of Bangladesh
IDA	International Development Association
IDB	Islamic Development Bank
IDCOL	Infrastructure Development Company Limited
IEC	International Electrotechnical Commission
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IFI	Implementing Financial Institution
IIDFC	Industrial and Infrastructure Development Finance Company
IT/R	Interim Report
JICA	Japan International Cooperation Agency
KfW	KfW Entwicklungsbank
L/A	Loan Agreement
L/C	Letter of Credit
LED	Light Emitting Diode
LGED	Local Government Engineering Department
LNG	Liquefied Natural Gas
MAC	Marginal Abatement Cost
MIS	Management Information System
MFI	Microfinance Institution
MOF	Ministry of Finance
MOEF	Ministry of Environment and Forest
MOHPW	Ministry of Housing and Public Works

M/P	Master Plan
MPEMR	Ministry of Power, Energy and Mineral Resources
MRA	Microfinance Regulatory Authority
NAAQS	National Ambient Air Quality Standard
NBFI	Non-Bank Financial Institution
NGO	Non-Governmental Organization
ODA	Official Development Assistance
O&M	Operation and Maintenance
OPC	Ordinary Portland Cement
PCC	Portland Composite Cement
PD	Participating Distributor
PM	Particulate Matter
PIU	Project Implementation Unit
PKSF	Palli Karma Sahayak Foundation
PO	Participating Organization / Partner Organization
PPP	Public Private Partnerships
PSMP	Power System Master Plan
QPR	Quarterly Progress Report
RE	Renewable Energy
REB	Rural Electrification Board
ROE	Return on Equity
SC	Steering Committee
SECB	Securities and Exchange Commission of Bangladesh
SEVP	Senior Executive Vice President
SHS	Solar Home System
SLA	Subsidiary Loan Agreement
SOW	Scope of Work
SPC	Special Purpose Company
SREDA	Sustainable and Renewable Energy Development Authority
SVP	Senior Vice President
TAC	Technical Advisory Committee
T/C	Technical Cooperation
TFL	Tube Fluorescent Light
TOR	Terms of Reference
TOU	Time of Use
TPC	Triple Superphosphate
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USAID	US Agency for International Development
VP	Vice President
VRM	Vertical Roller Mill
WB	World Bank
WHO	World Health Organization

Units

GW	Gigawatt
GWh	Gigawatt Hour
kW	Kilowatt
kWh	Kilowatt Hour
kWp	Kilowatt Peak
MM scfd	Million standard cubic feet per day
MT	Metric Ton
MW	Megawatts
toe	Tonne Oil Equivalent
W	Watt
Wp	Watt Peak

BDT	Bangladesh Taka
JPY	Japanese Yen
USD	US Dollar

Currency Rates

BDT 1 = JPY 1.55
USD 1 = JPY 120.2
USD 1 = BDT 77.8

Main Text

1. Overview of the Preparatory Survey

1.1. Background

1.1.1. Power Demand-Supply Gap

People's Republic of Bangladesh with its economy steadily growing at the annual rate of more than 6%, is also becoming a large energy consuming country. As the result, the country's primary energy demand-supply gap is enlarging. Whereas in 2011-12 the maximum generation/supply was 6,066 MW against the maximum demand observed was 7,518 MW, in 2013-14 the generation/supply was 7,356 MW against the maximum demand was 9,268 MW.

Further, its indigenous natural gas, which comprises more than a half of the country's primary energy demand, as well as 63% of power generation energy, is no longer a reliable source of energy, with the supply capacity of 2,197 MM scfd not being able to cope with the daily demand of 2,543 MM scfd. Against this background, the Government of Bangladesh (GoB) has been endeavouring to fill the gap by boosting its power generation capacity as well as by diversifying the source of energy. These supply side measures, however, are not sufficient for addressing to the issue. There is a pressing requirement for GoB to take measures on the demand side.

1.1.2. EE&C as a Demand side Measure to Achieve Stable Power Supply

Electricity and gas price artificially kept at low range by the government is one of the major cause elements for the low awareness among the public to save energy. The Government, in the Seventh Five Year Plan (2016 – 2020), has placed the improvement of energy efficiency as a priority issue. In line with this policy, the promotion policy on EE&C and Renewal Energy (RE) was indicated in the SREDA Act, which was enacted in 2012. Then, based on the Act, Sustainable and Renewable Energy Development Authority (SREDA) was established in 2014 as the regulatory body for EE&C measures under the Ministry of Power, Energy and Mineral Resources (MPEMR). SREDA, with the assistance from Japan International Cooperation Agency (JICA), has drafted a comprehensive policy and relevant rules and regulations on EE&C.

To effectively introduce the institution, rules and regulations currently formulated by the Government, awareness for the necessity of EE&C measures is a key and in this light, incentives are essentially required for encouraging the introduction of energy efficient equipment and for other measures to become effective. A concessional loan is one of such incentives. Hence, demand side measures will be implemented, narrowing the demand-supply gap.

1.1.3. Past Assistance by JICA

JICA has been supporting MPEMR, as SREDA's superordinate Ministry, by assisting the drafting of the EE&C Rules (conducted as a task item in the Preparatory Survey on Renewable Energy Development Project). Further, JICA has implemented the "Project for the Development of EE&C Master Plan" (2014-2015), through which a Master Plan (M/P) and an action plan for SREDA, including institutional development proposal were prepared. The M/P was presented and shared among the governmental and business sectors.

Japan's Aid Policy for the People's Republic of Bangladesh (June 2012) lists as an urgent issue, the need to fundamentally improve the energy scarcity which is becoming a serious impediment

for the economic and industrial growth, from both demand and supply sides. Further, JICA's Analysis of Aid for Bangladesh (April 2013) stipulates the need for stable supply of power as the priority issue for assistance.

1.2. Purpose of the Preparatory Survey

The M/P points out the necessity of the governmental sector to provide incentives to the businesses as we well as the households so as to encourage these stakeholders to implement EE&C measures. Incentives were characterized as subsidy, concessional loan and regulations. With considerations for the demand for funding as well as the possible source for funding for these EE&C measures, the priority was set on providing concessional loans to promote the purchase of EE&C products, thus resulting in energy saving through the penetration of EE&C products.

Based on the situation as explained above, this preparatory survey (the Survey) is conducted with the aim to identify the purpose, subject, scope, required resource, implementation structure, operation and management structure, and environmental and social considerations as the reference for JICA to formulate a concessional loan provision project, in the form of Official Development Assistance (ODA) loan project.

1.3. Project Basic Information

This Survey aims to elaborate on the specifications of the ODA loan project (the Project) for promotion of EE&C measures to be conducted through concessional loan scheme. Overview of the Project to be formulated through the Survey is as follows:

1.3.1. Project Name

"Energy Efficiency and Conservation Promotion Financing Project" in Bangladesh
(Thereafter referred to as the "Project" or "JICA-EEF Project")

1.3.2. Objective of the Project

The objective of the Project is to promote EE&C measures, and to facilitate installation of EE&C equipment in Bangladesh as well as to assist the GoB's policy to realize Renewable Energy and EE&C promotion by extending concessional loans and other support for implementing the Project, thereby inducing the stability of the energy supply and demand and contributing to the mitigation of climate change.

1.3.3. Scope of the Project

1.3.3.1. Provision of Concessional Loan to be utilized as Low Interest Loan

Concessional loan for the purpose of promoting EE&C measures will be extended from the Government of Japan to the Ministry of Finance (MOF) of Bangladesh. The loan will be extended to the IFIs based on subsidiary loan agreement (SLA) between MOF and the IFIs. IFIs have been identified and designated based on request from SREDA and consent of JICA. In this Survey, two non-bank financial institutions (NBFIs) are assumed to be the candidates for the IFIs. One is Infrastructure Development Company Limited (IDCOL), a NBFI under the Economic Relations Division of MOF, while another is Bangladesh Infrastructure Finance Fund Limited (BIFFL), a NBFI under the Finance Division of MOF.

The subject of the concessional loans will be three components, which are (i) industry / commercial sector component (Component I); (ii) building sector component (Component II),

and; (iii) home appliances component (Component III).[1] These components were identified as the priority areas as the subject of low interest loan in the M/P, from the viewpoints of effectiveness and feasibility.

Table 1 Three Project Components

Component	User	Subject of loan	Supporting mechanism
(Component I) Industry / commercial sector component	Companies and other organizations	Energy efficient "listed" equipment at factory, office, commercial facility, etc.	Energy management and auditing
(Component II) Building sector component	Companies and other organizations	Energy efficient "listed" equipment in buildings	Green building rating programme
(Component III) Home appliances component	Households and small businesses	Energy efficient "listed" home appliances	Energy efficiency labelling programme

Source: Survey Team

1.3.3.2. Consulting Service:

To monitor and to promote the progress of the Project as well as to support the development of technical capacity of the Project executing agencies, including IFIs and any other stakeholders such as PDs and some major end users, etc., consulting services to be procured by the Project executing agencies (SREDA, ICOL and BIFFL), will be proposed. The consulting service in this Project will be an essential factor for rolling evolvement of the Project formation. This is because the form of lending within the Project is most likely to diversify as the EE&C measures penetrate. The consulting service will function to support SREDA in managing the eligibility criteria, data collection capacity development and MIS (management information system) development, while those for the IFIs will focus on the monitoring, financial appraisal support and capacity development. The cyclic management in the form of spiral for the Project will be supported by the consultants for all of the executing agencies.

1.3.3.3. Substitutional Expert Advisory Service

There will be a substitutional technical cooperation (T/C) from JICA, by means of despatching a team of expert advisors to SREDA during the first two years of the Project implementation. The terms of reference (TOR) for the advisory service are suggested as one of the outputs of the Survey.

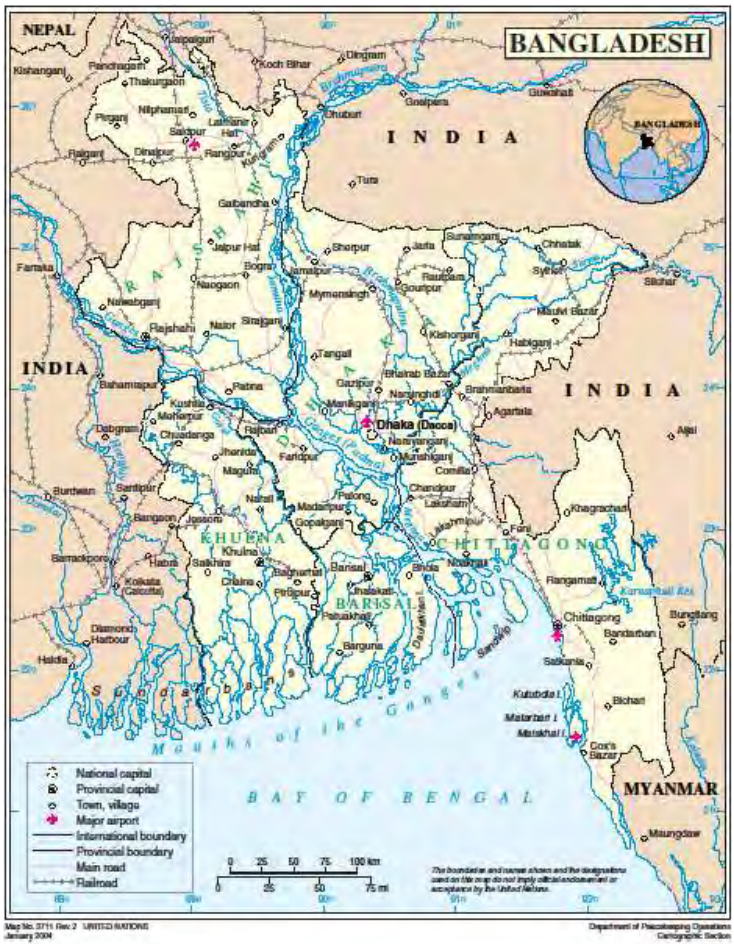
1.3.4. Target geographical area

The Project is expected to be deployed in the entire territory of Bangladesh.

1.3.5. Executing Agencies for the Project

There are three executing agencies in this Project. One of the three executing agencies is the SREDA, which is the administrative authority for the Project. MPEMR will be the sponsoring ministry supporting SREDA to execute the Project. Further, IDCOL and BIFFL are the two other executing agencies, expected to play a role as the IFIs for the Project.

[1] Names of these components mentioned in the M/P were: (i) energy management component, (ii) green building code component and (iii) energy labelling component.



Source: United Nations Cartographic Section

Figure 1 Map of Bangladesh

1.3.6. Project Structure

The proposed overall structure of the project is as illustrated in the following figure. SREDA is the administrative authority overseeing and monitoring the Project with the aim to pursue its function, to promote EE&C measures. SREDA collaborates with IFIs (IDCOL and BIFFL) for the Project. SREDA will provide policy and manuals for the IFIs to be able to extend loans in accordance with the aim of the Project.

There will be two types of loan, one being A-type loan: where IFIs directly extends the money to the borrower (industry / commercial businesses) as the end users, while another being B-type loan: which will be extended to PDs who is the intermediate between IFIs and the end user (households and small businesses) who purchases energy efficient home appliances. A-type loan will be utilized for (i) industry / commercial sector component (Component I) and (ii) building component (Component II), while B-type loan will be utilized for (iii) home appliances component (Component III). These are compared as in the following table:

Table 2 Two Types of Concessional Loan Provision Channels

	A-type loan (for industrial and commercial equipment)	B-type loan (for home appliances)
Purpose	To promote relatively larger scale EE&C equipment introduction at factories and commercial facilities.	To promote small scale EE&C home appliances purchase at residential and small businesses.
Borrower	Companies of other organizations owning factories and commercial facilities who acquire the EE&C equipment.	PDs that provide EE&C home appliances. PDs will offer the home appliances under installment payment to the end users.
Fund flowing channel	Fund will be paid from IFIs' account into the borrower's account.	Fund will be paid from IFIs' account into the PDs' account. The fund will be utilized by the PDs when laying-in the stocks of the EE&C home appliances.
Payback	Borrower companies / organizations will pay back to the IFIs.	End users will pay back to the PDs. PDs will then pay back to IFIs.
Approval procedure	IFIs will conduct appraisal for each application against A-type loan appraisal manual.	PDs will conduct screening of each end user against B-type loan re-financing manual.

Source: Survey Team

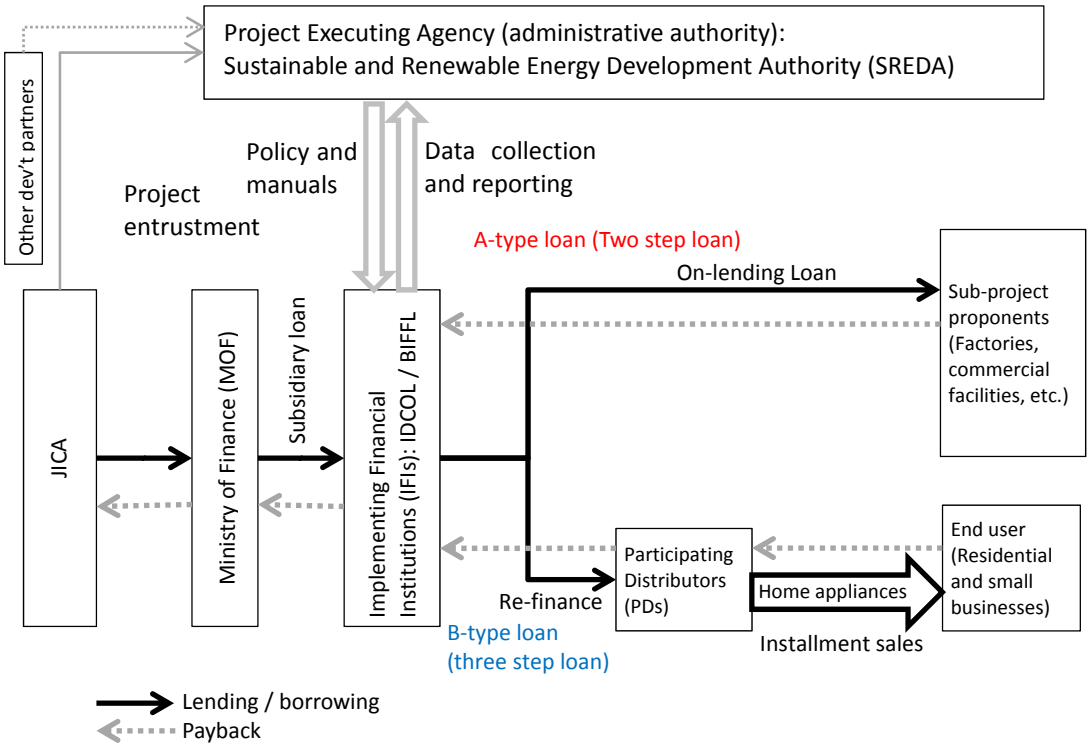


Figure 2 Project Structure

IDCOL and BIFFL, for B-type loan, will then accredit the distributors who will provide eligible home appliances by installment sales, mainly for residential sector and small business customers.
These distributors and finance service providers are the participating distributors (PDs). IDCOL and BIFFL are expected to extend concessional loans to these PDs, for them to re-finance the installment sales credit.

1.4. Survey Timetable

The Survey started from the first on-site activity in May 2015 when an inception report was shared among the stakeholders. A draft interim report was submitted to JICA in July, following the completion of the EE&C training programme in Japan. Draft Final report was shared with the stakeholders in the end of January soon after the business networking meeting in Dhaka. The Survey will be completed by February 2016, so as to propose the arrangement for the Project, which is expected to be officially launched with the conclusion of the loan agreement (L/A) in the beginning of Japanese fiscal year 2016 (April 2016 to March 2017).

Table 3 Survey Timetable

Major events and milestones	Period
First on-site survey	May 2015
Submission of Inception Report	May 2015
Second on-site survey	Jun-Jul 2015
EE&C training programme in Japan	Jul 2015
Submission of Draft Interim Report	Jul-Aug 2015
Third on-site survey	Aug-Sep 2015
JICA fact finding mission	Sep 2015
Fourth on-site Survey	Nov 2015
JICA appraisal mission	Nov-Dec 2015
Final on-site survey and business networking meeting in Dhaka	Jan-Feb 2016
Submission of Final Report	Feb 2016

Source: Survey Team

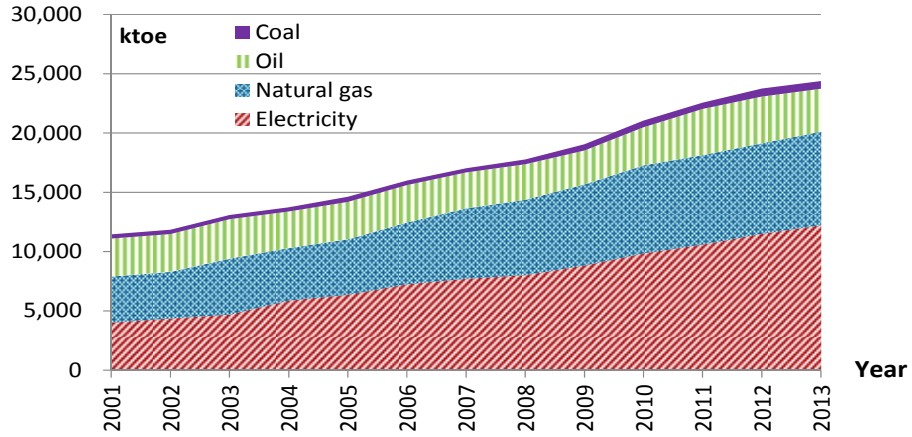
2. Positioning of the Project in the Contexts of Development Policies and Superordinate Plans

2.1. Implementation Status of Energy Efficiency and Conservation (EE&C) Policy and Remaining Issues

2.1.1. Energy demand and supply

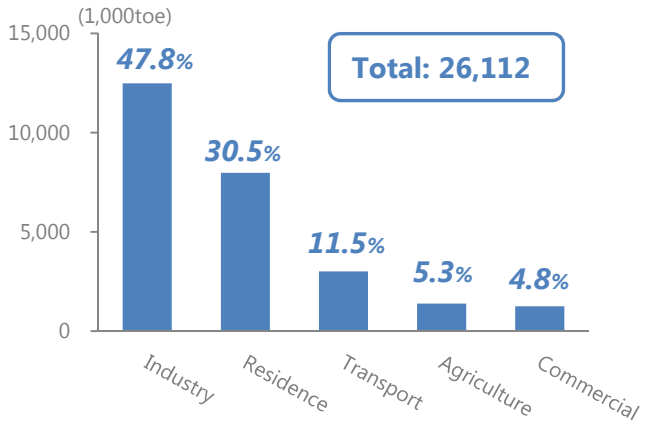
2.1.1.1. Overall energy demand

Bangladesh, being a rapidly-growing country, requires energy source to feed its large growth appetite. In the past decade, primary energy consumption increased over two folds as shown in Figure 3, and this trend is likely to continue. The latest sector-wise energy consumption (industrial, residential, transport, agricultural and commercial) is shown in Figure 4. The total energy consumption is 26 million toe, with the industry sector comprises almost a half of the entire energy consumption in the country, followed by residential sector. These two sectors can be identified as the principal targets for EE&C measures.



Note: Electricity is converted to primary energy with 2,867kcal/kWh (thermal efficiency 30% basis)
Source: IEA, Energy Balance for 2001 to 2013

Figure 3 Trend of Primary Energy Consumption by Energy types



Notes:
1. Primary energy basis: excluding biomass
2. Electricity: 2,867kcal/kWh (thermal efficiency 30% basis)

Source: Compiled by JICA Project Team based on the following data;
- Electricity: 2013-14, Power Cell, Power Division, Ministry of Power, Energy and Mineral Resources |
- Gas: 2013-14, MIS of Petrobangla,
- Oil: 2012-13, BPC,
- Coal:2012, IEA

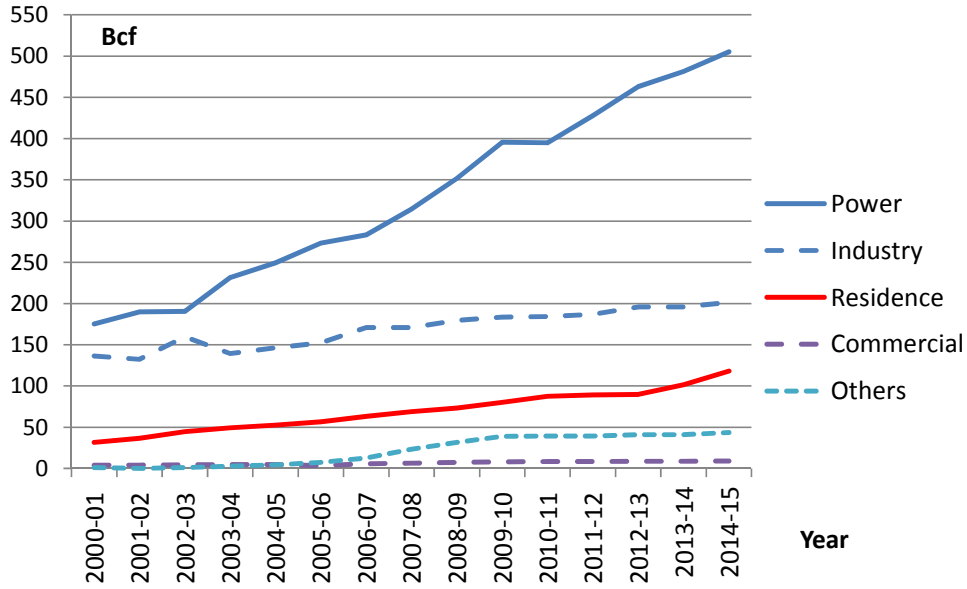
Figure 4 Primary Energy Consumption by Sector

2.1.1.2. Energy consumption by energy type and sector

Indigenous natural gas, imported petroleum and coal are the main sources of primary energy to meet country's energy demand. Natural gas is, by far, the important source of primary energy. Data shows that a significant portion of the natural gas is being used for power generation.

Apart from the consumption for power generation, the natural gas consumption of industry and residential sectors comprises a large portion among the total amount. The trend of increase in natural gas consumption is on rapid increase as shown in Figure 5. This is mainly due to the increase of demand in the power generation sector.

From the viewpoint of demand side EE&C, energy saving in electricity use, regardless of the sector, is the first priority as the subject for the measures. Saving of gas use in industry and residential sectors can also be targeted as the major subject for EE&C measures that will contribute to the relieving burden on the country's energy demand.

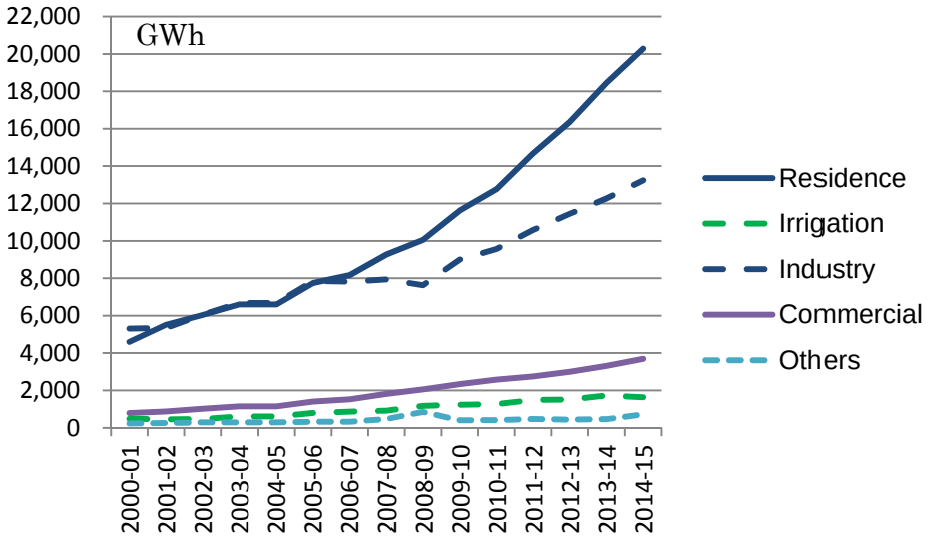


Source: Petrobangla, (October 2015), *Annual Report 2014, and MIS Report*

Figure 5 Trend of Natural Gas Consumption by Sector

Of the grid electricity consumption, the residential and industry sectors are both large consumers as shown in Figure 6. These two sectors combined takes up almost all of the power consumption. It should also be noted that these two sectors were the dominant uses of natural gas. Therefore industry and residential sectors can be said to be the main consumers of energy, both in terms of power and natural gas.

Further, these two major consumer sectors are also responsible for the rapid increase of power consumption. Figure 6 shows that the growth of power consumption in both residential and industry sectors are soaring, with the striking pace especially in the residential sector. This is another tendency that affirms the need for energy saving in these sectors. In addition, it can be said that the urgency is on relieving the rapid increase of electricity usage especially in residential sector as well as in industry sector.

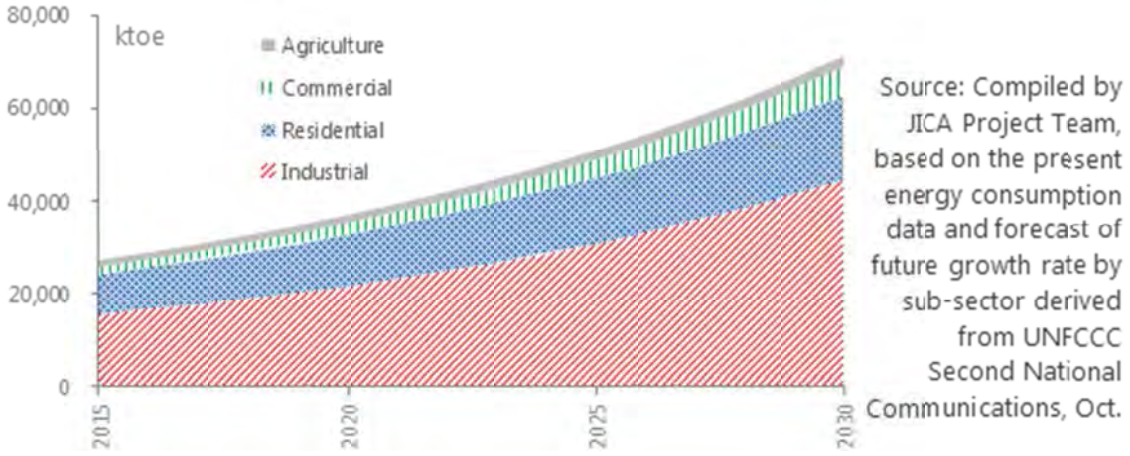


Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*, *Power Cell (2016)*

Figure 6 Trend of Consumption of Grid Electricity by Sector

2.1.1.3. Energy consumption forecast for 2030

The EE&C M/P also includes the energy consumption forecast up to 2030. It shows that the primary energy consumption in 2030 will be around 3 times as that of the current figure, in 2013-14 (BAU case). As shown in Figure 7, industry sector is seen to be the major contributor to further increase in energy demand.

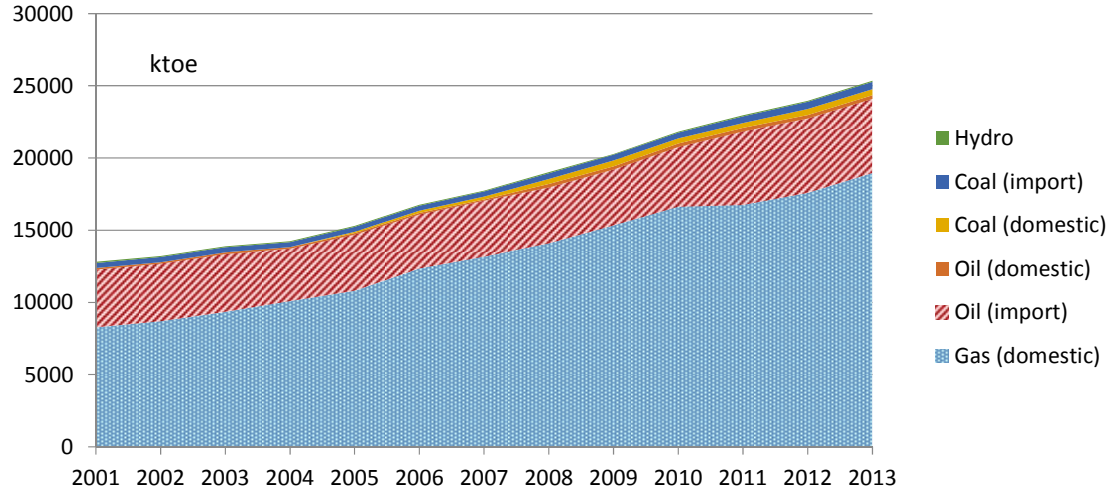


Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

Figure 7 Primary Energy Consumption Forecast for 2030 (BAU Case)

2.1.1.4. Overall energy supply

Bangladesh to date has been able to exploit its abundant natural gas reserves. As shown in the next graph, around three quarters of the energy supply of Bangladesh is dependent on its indigenous natural gas. The share of imported oil products and crude oil is merely 20% of the total energy supply. Further, it can also be observed that the trend of increase of energy supply has long been supported by the increase in the indigenous natural gas production. Import of oil has almost been steady at least for the last 12 years.



Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030, IEA data(2013)*

Figure 8 Trend of Source of Energy Supply

2.1.1.5. Power generation fuel mix

The fuel mix used for power generation in Bangladesh is shown in the next table. As already mentioned in the demand trends, electricity power strongly relies on indigenous natural gas, which comprises more than 70% of the total fuel source for power generation.

Table 4 Power Generation Fuel Mix (2013-14)

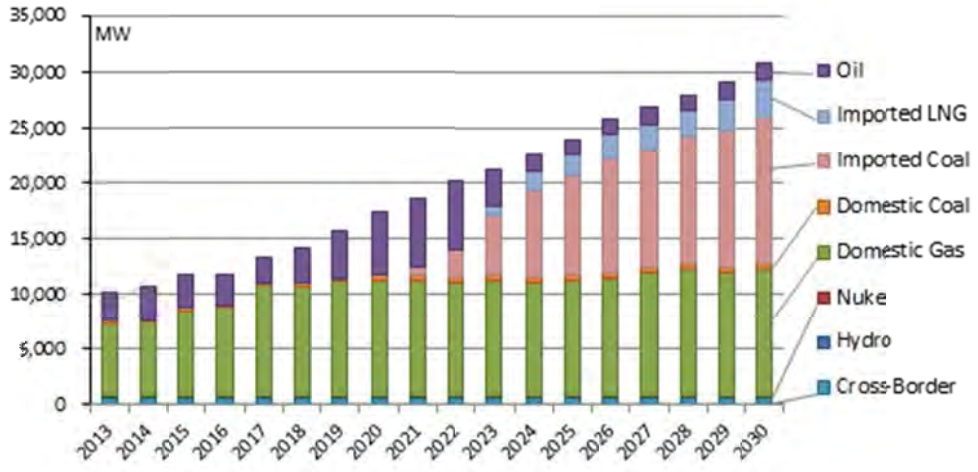
Total	Type	Share
Electricity generation: 42,195 GWh	Hydro	1.39%
	Gas	72.42%
	HFO	15.44%
	HSD	2.91%
	Coal	2.46%
	Import from India	5.37%

Source: System Planning Directorate, MPEMR

2.1.1.6. Electricity supply expansion plan

It is anticipated that the gas supply will reach its peak in 2018 and gradually decrease thereafter. Therefore, Bangladesh will have to reduce its dependency on natural gas fired power plants. Instead, it will have to resort to other resources for power generation, such as imported oil, LNG and coal. The next graph, which is the projection of energy mix for power generation up to 2030, shows that dependency on imported fuel source will rapidly increase.

Under such circumstances, there is a desperate need to seek for alternative source of fuel. Against this background, the Sixth Five Year Plan of Bangladesh, points out, in its first item of specific strategy, to increase the power generation to reduce demand-supply gap through public-private partnership and through import from the neighbours. However, there is no clear orientation on the source of fuel for its own power generation.

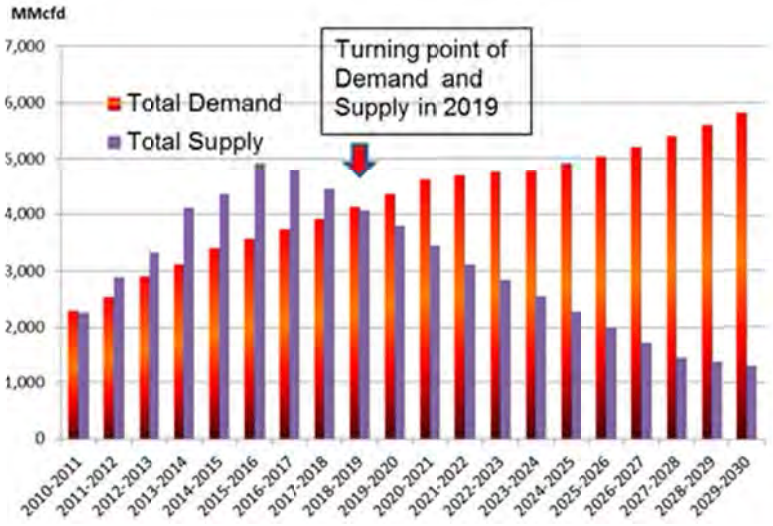


Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

Figure 9 Forecast of Transformation of Power Generation Resources

2.1.1.7. Natural gas production

According to the BP Statistical Review of World Energy 2014, the total natural gas proved reserves of Bangladesh as of 2013 is 200 million toe. The reserves-to-production rate is 12.6 years. Referring to this data, indigenous gas supply is expected to increase, only up to the next few years to come. The production, however, will soon reach its peak and then decline. With respect to the demand which will continue to grow, Bangladesh will have to import natural gas from abroad. Although a project to develop LNG receiving terminal in Cox Bazar is currently being considered by the Government, it is estimated to take years before the actual import can be realized, and therefore there still lies a risk or gas shortage in the near future.



Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

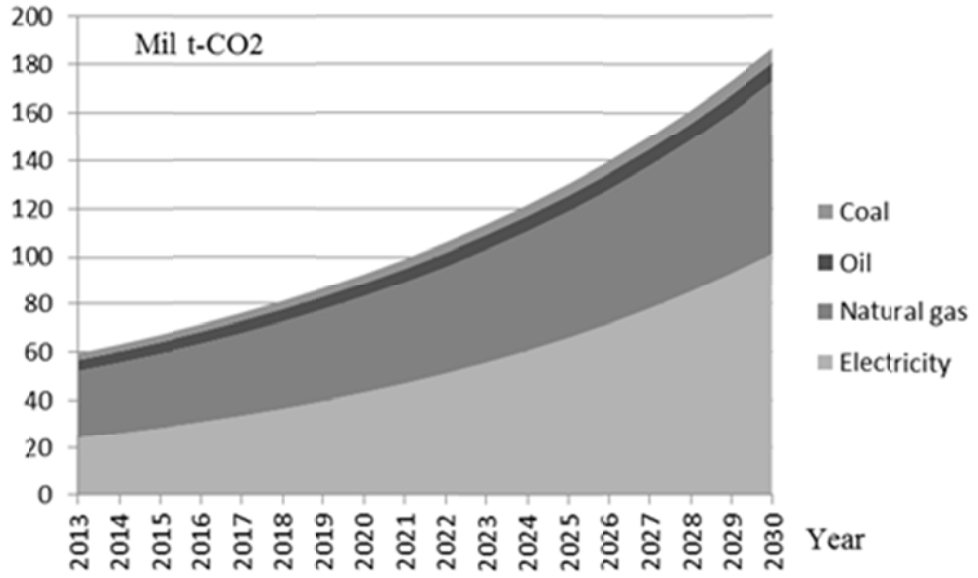
Figure 10 Indigenous Natural Gas Production and Demand

2.1.2. Electrification

As of 2008, countrywide average grid electrification ratio is 41%, with that of urban area being 76%, but that of rural area still at 28%.[2] Impediments for further deployment of electricity grid include not only the lack of financial source but also the lack of generation capacity of power plants. To complement the grid electrification, renewable energy (RE) based (mostly photovoltaic) solar home system (SHS) and mini grids have been deployed by IDCOL with the support of the WB, GEF, ADB, JICA, GIZ, KfW, DB, GPOBA, USAID and DFID since 2003. Rural Electrification Board (REB) also contributes to the penetration of RE based electrification. Through these activities SHS powered by photovoltaic panels of 50Wp or under, are being installed in more than 3 million households in rural areas.

2.1.3. Climate change policy

Bangladesh policy of climate change is not only mitigation activities including energy efficiency and CO2 emission reducing but also protection against the rising sea level and flood prevention as specified in the Sixth Five Year Plan. Greenhouse effect gases (GHGs) emission from Bangladesh represents less than 1% of the global emissions, and its per capita emission is around 0.9t-CO2, which is much lower than the global average of 6t-CO2 (2005 data), and 30 times lower in terms of per capita emission of US. In short, Bangladesh contribution to Climate Change is not significant. Almost all of Bangladesh CO2 emission is fuel origin and the forecast of CO2 emission by fuel up to 2030 as BAU is shown in the next graph. The trend is on rapid growth, reflecting the energy consumption growth.



Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

Figure 11 Forecast of CO2 Emission by Fuel

2.1.4. EE&C Promotion Policy

2.1.4.1. EE&C Rules and Regulations

The promotion policy on EE&C and RE was indicated in the SREDA Act, which was enacted in 2012. According to the Act, SREDA is established as the central organization for promotion of EE&C and RE. Official inauguration of the Authority was in 2014. SREDA has prepared a draft

[2] Reference data: Access to electricity as the percentage of population with access to electricity (2012) in Bangladesh is 59.6%, according to "Sustainable Energy for All (SE4ALL) database from World Bank, Global Electrification database, World Development Indicators"

of the EE&C Rules, to be deliberated with the Ministry of Law and other stakeholders, then to be enacted by early 2016. The related regulations are also prepared and will be deliberated with the related ministries and stakeholders after the enactment of the Rules. The Rules specifies the policy to: (i) promote EE&C measures including the listing of Designated Large Energy Consumers (DCs) programme, and (ii) the implementation of home appliances EE&C labelling programme. SREDA is also in collaboration with the Ministry of Housing and Public Works (MOHPW) in formulating Green Building rating Programme and revising the National Building Code to incorporate EE&C concept. Based on these activities, SREDA plans to launch (i) energy management and auditing, (ii) energy efficiency labelling, and (iii) Green Building Rating Programmes so as to encourage EE&C measures.

SREDA has presented the "Energy Efficiency and Conservation Master Plan (EE&C M/P) up to 2030" on its website in April 2015, which is the M/P developed with the support of JICA project. SREDA gave a presentation of the M/P to the concerned GOB officials at Joint Coordination Committee meeting in February 2015. The Project, by utilizing ODA loan to promote EE&C measures, is expected to be an essential tool for SREDA to achieve its goal. Further, the energy auditing, energy efficiency labelling, and green building rating programmes will strongly support the Project.

As for the energy auditing programme, there are approximately 100 companies that are expected to be designated as the DCs, which will be the principal candidates for the Project. Estimation of numbers of sector-wise candidates of DCs will be made through analysis of the companies' investment plans and through analysis of energy sales data and questionnaire survey data by the Survey Team. Nomination of the DCs will be made by SREDA according to EE&C Rules and regulations.

2.1.4.2. Sixth Five Year Plan FY2011 – FY2015

The Sixth Five Year Plan was the supreme policy in Bangladesh concerning the promotion of EE&C. It specifies the following core objectives and specific strategies on EE&C policy:[3]

(1) Core objectives

- To increase the efficiency of energy use as well as reducing system loss
- To conserve both power and energy
- To introduce 'Energy Manager' in energy consuming industries and 'energy auditing system' with a view to optimizing energy use
- To introduce labelling system with a view to ensuring the use of energy efficient equipment

(2) Specific strategies

- Energy saving through demand side management i.e. shop closing times, staggering holiday in industries and shopping complex, replacing 'incandescent lamp' by CFL and reducing 'air conditioning' load
- Install solar panels in public and private buildings where applicable in view of harnessing solar energy
- Increase use of renewable energy by 5% of electricity demand by the plan period
- Build public awareness through publicity in electronic and print media and introduce this issue in the Curriculum

[3] Source: Sixth Five Year Plan FY 2011 – FY 2015: Part 2 Sectoral Strategies Programmes and Policy: Chapter 3: Energy development plan to support higher growth and employment

2.1.4.3. Seventh Five Year Plan FY2016 – FY2020

The latest of the five year plans is the seventh five year plan which was set and disclosed in late 2015. This plan is the current supreme plan concerning the promotion of EE&C in Bangladesh.

In this plan, measures for energy demand side management outlines the measures for promotion of EE&C. SREDA is named as the organization responsible for promoting EE&C through the following three programmes: (i) energy management, (ii) energy efficiency labelling, and (iii) energy efficiency building. SREDA is empowered to implement these programmes so as to conserve power in the range of 1,000 MW power system equivalent during the plan period.[4]

These measures are consistent with the EE&C Master Plan. Further, the major means to promote EE&C are stipulated as preferential taxation, subsidy, and low interest financing. With regard to the stipulation this Project can be deemed to be in line with the Seventh Five Year Plan FY2015 – FY2020.

SREDA Act, EE&C Rules and Regulations are therefore consistent with both Sixth and Seventh Five Year Plans of Bangladesh. Furthermore, the Project is consistent with the superior policies of Bangladesh in promoting EE&C.

2.2. Institutional Arrangement of the Government

2.2.1. Legal Instruments for EE&C Promotion

SREDA Act specifies the establishment, responsibility and function of SREDA including SREDA Fund. Under the SREDA Act, there is the EE&C Rules, which is still under consultation between SREDA and the Ministry of Law to be approved by the Prime Minister Office by early 2016. The EE&C Rules contain regulations on energy audit and energy efficiency labelling.

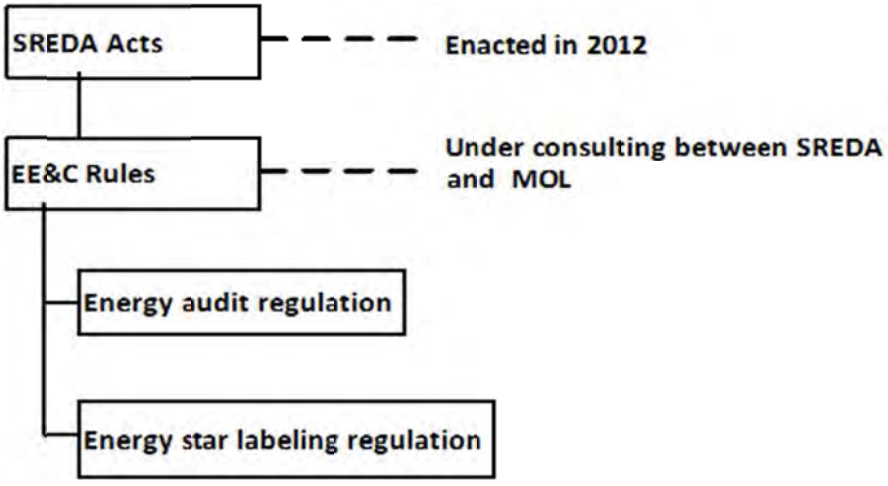


Figure 12 Legal Structure for EE&C Promotion

The contents of the EE&C Rules are as shown in the next figure. The rules concerning industry sector and service sector consist of stipulations on the DCs, including necessary arrangements for the establishment of energy auditing programme, such as certification of energy managers and energy auditors. The rules for residential sector consist of energy efficiency labelling programme and green building rating programme.

[4] Source: Seventh Five Year Plan FY2016 – FY2020: Part 2: Sector Development Strategies, Sector 5: Power and Energy, Chapter 5 Power and Energy Development strategy

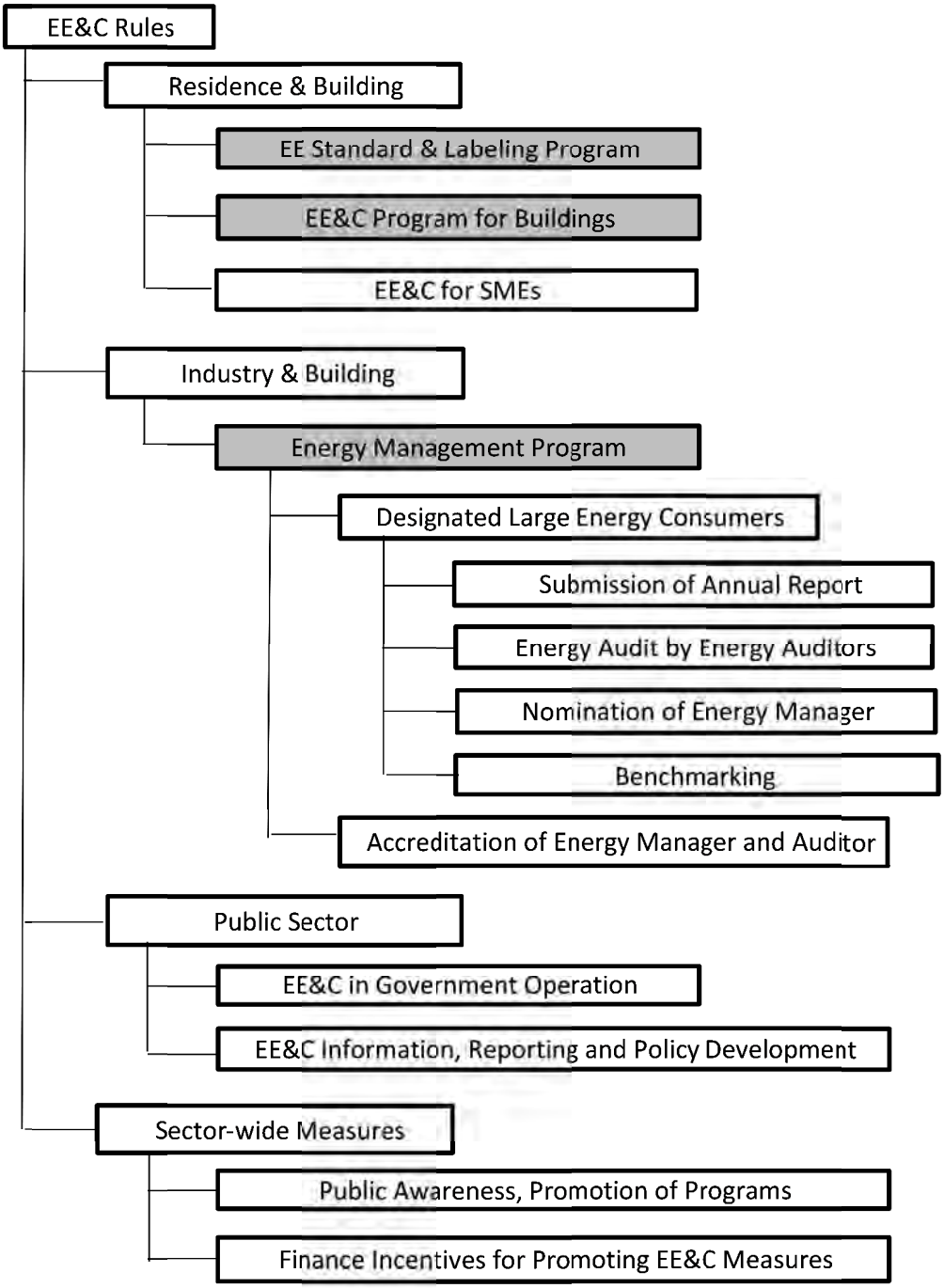


Figure 13 Contents of EE&C Rules

2.2.2. Organizational Arrangements for EE&C Promotion

SREDA prepares the EE&C targets, promotion policies and plans. SREDA also implements these policies and plans in collaboration with the related ministries and organizations as the central authority of RE and EE&C promotion. Other than the organizations under MPEMR, Ministry of Industry, Ministry of Housing and Public Works, Ministry of Environment and Forest, together with their concerned organizations, are the main stakeholders in the governmental sector in relation to EE&C policy.

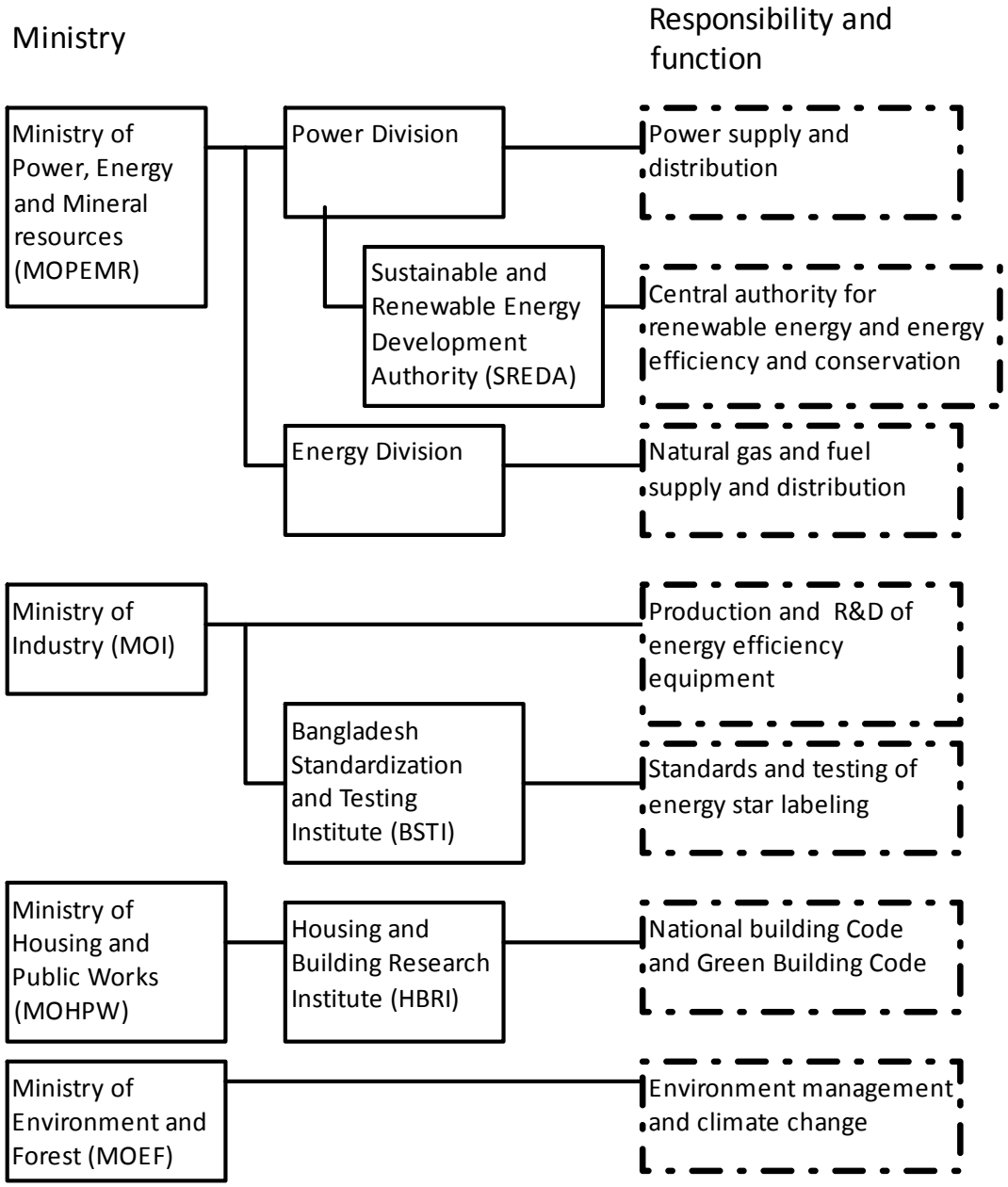


Figure 14 Structure of Governmental Organizations related to EE&C Policy

2.3. Contribution for Appropriate Power System Development

SREDA drafted an energy efficiency and conservation master plan (EE&C M/P) which sets out a target to reduce the primary energy consumption per GDP by 15% in 2021 (or Bangladesh FY 2020, as compared with that of FY 2013 as the baseline). Under certain assumption, this implies that 7,482 GWh of electricity, which is equivalent to the power generated annually by 2,000 MW power station, will be saved as the result of energy efficiency measures. The Power System Master Plan (PSMP) is currently being revised anticipating that this energy saving will be realized.

If Bangladesh fails to follow the energy saving path remaining on the BAU case, the energy saving of 7,482 GWh will not be realized and GOB would have to additionally invest on the construction of power station(s), possibly with the capacity of 2,000 MW. The Energy Efficiency and Conservation Promotion Financing Project (JICA-EEF) is probably the only available effective option for Bangladesh to trigger its practical energy saving programme in parallel with pursuing an appropriately planned investment on power sector.

Table 5 Energy Saving to Compensate for Additional Power Generation Capacity

(1) BAU Energy consumption	64,402,000 MWh
(2) EE Scenario energy consumption	56,919,000 MWh
(3) Energy saved = (1)-(2)	7,483,000 MWh
(4) Required generation capacity = saved energy / annual operation hours / facility operation ratio	1,993 MW = approx. 2,000 MW

Note:
Energy consumption and energy saving data referred from the EE&C M/P
Facility operation ratio (43%) is the grid average rate in Bangladesh (FY 2013)
Generation capacity: Matarbari Power Plant = 1,200 MW, Halipur Power Plant = 412 MW

2.4. Necessity of Low Interest Rate for End-Users

The Energy Efficiency and Conservation Promotion Financing Project (JICA-EEF) promotes the penetration of energy efficient equipment, contributing to saving energy without affecting the production. To encourage the industry, businesses and households to choose energy efficient equipment which, in many of the cases, is more expensive compared with the conventional ones, there is a need for compensating the cost difference.

2.4.1. Boosting Competitiveness of EE&C Equipment

Although energy efficient equipment may become economical on lifecycle cost basis, equipment buyers are most likely to make a decision solely based on investment cost, resulting in choosing cheaper, conventional non-energy efficient equipment. Against this background, the Project aims to provide a low interest loan to the buyers so that total payment amount (down payment + installment) for energy efficient equipment will become break even with when acquiring conventional equipment.

Payment simulations conducted for various types of equipment resulted in the need for such low interest loan to be 8 percentage points lower than commonly available commercial loans. For example, purchase of an energy efficient boiler which is approximately 27% more expensive compared with a conventional type will requires a 4% interest rate loan for the total payment to be equal with the payment for purchasing a conventional non-energy efficient boiler with commonly available commercial loan of 12% interest rate. Without such low interest rate facility, the energy efficient equipment will NOT be chosen from commercial rationality.

The implementing financial institutions in this Project can offer 4% interest loan only if they are able to obtain the capital at 1% interest rate (3% margin is the minimum requirement for the financial institutions to manage the operation). GoB is therefore suggested to offer the sub-loans to the financial institutions at exceptional rate of 1%, otherwise the Project will not be implemented (i.e. energy saving simply will not be realized). Further details of the analysis are as shown in Annex 3.3.

Table 6 Break Even Condition Payment Conditions for EE&C Equipment (High Efficiency Spinning Machine)

Particular	Unit	Ordinary Financing	Component I Loan Financing
		Conventional Technology Spinning Machine	High Efficiency Spinning Machine
Price	USD	119,000	149,000
Interest Rate	%	12.0%	**4.1%**
Repayment Period	year	7	7
Total Payment	USD	172,550	172,583

Source: Calculation by the Survey Team

Table 7 Break Even Condition Payment Conditions for EE&C Equipment (Small-sized Once-through Steam Boiler)

Particular	Unit	Ordinary Financing	Component I Loan Financing
		Conventional Technology Steam Boiler	Small-sized Once-through Steam Boiler
Price	USD	48,000	60,750
Interest Rate	%	12.0%	**3.9%**
Repayment Period	year	7	7
Total Payment	USD	69,600	69,635

Source: Calculation by the Survey Team

2.4.2. Reference to Other Cases

There are cases in the past where GoB offered preferential interest rate as exceptional cases. These are based on the notion that the projects are essential but were financially unviable under normal lending conditions. As these preceding examples show, exceptionally preferential arrangements are made for essential loan projects to become financially viable and to have them practically implemented.

Table 8 Preferential Interest Rate Examples

Project Name	Amount	Signing Date (L/A*)	Interest rate (SLA**)	Repayment Period (L/A*)
Karnaphuli Water Supply Project	JPY 12,224 mil	29/6/2006	1%	40 Yrs (10 yrs grace)
Karnaphuli Water Supply Project -Phase II	JPY 34,847 mil	10/3/2013	1%	40 Yrs(10 yrs grace)
Matarbari Ultra Super Critical Coal Fired Power Project	JPY 41,498 mil	16/6/2014	2%	40 Yrs (10 yrs grace)

(*) L/A: Loan Agreement between GoB and JICA
(**) SLA: Sub Loan Agreement between Gob and Executing Agency

There are preceding cases where low interest loans were offered in ODA projects. The GoB is therefore expected to make a rational decision by offering low interest loans in this Project, with the aim to promote energy efficient equipment based on commercial feasibility.

3. Current Status of Energy Efficiency and Conservation (EE&C) Measures Promotion in Bangladesh

3.1. Technologies Applied, Activities and Stakeholders

3.1.1. Technologies Applied

The JICA EE&C Master Plan (M/P) development project[5] reviewed the technologies applied in Bangladesh through on-site surveys. The energy efficiency, in terms of energy intensity unit figures for major energy consuming industry sub-sectors were also collected during the on-site survey. These are shown and compared with those of Japan, as the benchmark of EE&C advanced country. Further findings on the energy use conditions, as well as the possibility of applying the EE&C measures and potentials that were identified in the M/P development project.

Table 9 Summary of On-site Survey Result

No.	Factory and building type	Energy intensity (toe/ton)		Energy use condition	EE&C measures and potential
		Audit data	Average in Japan		
1	Cold storage-A	7.5 (kW/t)	-	Ammonia gas compressors are old	Replacement of gas compressor saves around 61%
2	Textile - A	2.62	-	Recovered waste heat of gas engines are used in spinning shop	Compressed air pressure should be lowered. Introduce LED lamps
3	Steel re-rolling - A	0.069	0.052	No combustion control of re-heating furnace No heat insulation on hot air pipe	Combustion control saves around 6% Heat insulation on hot air pipe
4	Textile & garment - B	No data	-	Sewing machines Fluorescent lamps are used in sewing shop	Replace motor of sewing machines with servo-motor Introduction of LED lamps
5	Textile & garment - C	0.49	-	Compressed air pressure Condensate recovery is not implemented Tube fluorescent lighting (TFL)	Reduce compressed air pressure Condensate recovery Replace TFL with LED lamps
6	Cement - A	0.013	0.010	A vertical roller mills (VRM) have been installed and operated.	VRM is about 40% more efficient than a ball mill.

[5] JICA Project for Development of Energy Efficiency and Conservation Master Plan in Bangladesh, 2015

7	Textile & garment - D	1.9	-	Gas engine generators and steam boilers are operated. TFL	Introduction of gas turbine cogeneration system saves around30% Replace TFLs with LED lamps
8	Steel making and re-rolling - B	0.050	0.052	No combustion control of re-heating furnace Wall temperature is high. Preheating devices of ladles are not efficient. Induction furnace	Introduction of combustion control Change castable refractories on reheating furnace to ceramic fiber. Introduce regenerative burner for ladle heating/ saves around 50%
9	Cold storage - B	1,270 (kWh/t)	-	Ammonia gas compressors are old.	Replacement of gas compressor saves around 10%
10	Fertilizer - A	0.69	0.57	Waste heat recovery system is implemented.	Energy intensity is top rank in this sub-sector
11	Governmental building - A	372 (kWh/m2)	139 (kWh/m2)	Monitoring and analyzing of power consumption by users has not been implemented. All ACs have not been controlled. Load of receiving transformers is as high as 90%: low efficiency	Turn-off unnecessary lamp in lunch time. Power monitoring to check unnecessary power. Introduce ACs with COP 3.2 or over Increase transformer capacity.
12	Office building - B	73 (kWh/m2)	174 kWh/m2)	Monitoring and recording of power consumption of tenants by users has not been implemented. All ACs have not been controlled. Power consumption at midnight is 45kW, which is too large. Window glass is covered with plastic film for heat insulation	Recording of daily and monthly power consumption Turn-off unnecessary lamp in lunchtime and midnight time
13	Textile & garment -E	0.00118 (toe/m)	-	Operation is conducted with many second hand machines. Lightings of sewing shop are tubular fluorescent lamps. Compressed air pressure is too high	Introduction of high efficient weaving machines. Introduction of high efficient fluorescent lamps or LED lamps Examination and control of compressed air

Note: Multiple on-site surveys were carried out for textile, steel and cold-storage factories.
Source: JICA (2015) Project for Development of Energy Efficiency and Conservation Master Plan in Bangladesh, Final Report

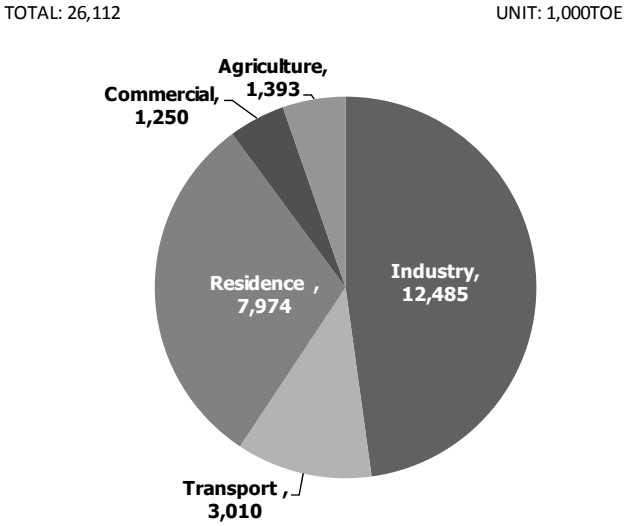
The main implication points from the on-site surveys are as follows:

- Lack of Information for effective EE&C measures (Required for eligible energy auditing);
- Lack of suitable maintenance for equipment (Required for efforts to maintain energy consuming equipment with appropriate conditions);
- Lack of operation standards in governmental buildings, such as control of room temperature and lighting in lunch time, and;
- Cement, Steel making and re-rolling, and Fertilizer are operated in good energy intensity, therefore there is a desperate need for installation of high efficiency equipment.

3.1.2. Activities

3.1.2.1. Energy Management and Auditing Programme

Introduction of suitable energy management is likely to become effective in promoting EE&C for both industry and commercial sectors. In Bangladesh, approximately 50% of primary energy is consumed in the industry sector.



Source: JICA (2015) Project for Development of Energy Efficiency and Conservation Master Plan in Bangladesh, Final Report

Figure 15 Energy Consumption by Sector (primary energy basis, excluding biomass)

Thus, in order to accelerate EE&C in the industry sector, the best way will be to introduce energy management and auditing programme. In this context, SREDA has decided to establish a national programme on energy management and auditing (Energy Management Programme).

The components of Energy Management Programme are as follows:

- Definition of Designated Large Energy Consumers (DCs)
- Certification of Energy Manager (EM), Certified Energy Auditor (CEA) and Accredited Energy Auditor (ACEA)
- Periodical reporting system for DCs
- Benchmarking on energy efficiency by industry subsector and/or production process

The “Framework of Energy Management Programme” which suggests the overview of the programme components was prepared. The framework is expected to become the base for the EE&C regulations.

Energy Management and Auditing Programme, once implemented, is expected to become a driving force for the industry sector and commercial sector companies and organizations to be encouraged to acquire energy efficient equipment. It will therefore promote the use of low interest loan to be provided within the Project (Component I).

3.1.2.2. Energy Efficiency Labelling Programme

In Bangladesh, approximately 30% of the primary energy is consumed in the residential sector (c.f. Figure 15), mostly by electric home appliances. Introduction of energy efficiency labelling programme is expected to be effective in promoting EE&C in the residential sector. SREDA has also decided to establish national energy efficiency labelling programme.

So far, there has been a voluntary rule for three products: (i) ceiling fans, (ii) compact fluorescent lights (CFLs), and (iii) electric ballasts, being introduced in Bangladesh, while there has only been a ceiling fan that has actually granted the energy efficiency labelling. This was the outcome of the UNDP-led initiative: Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling (BRESL). SREDA, in collaboration with the governmental testing laboratory at Bangladesh Standards and Testing Institution (BSTI), aims to further introduce and enhance the initiative. This energy efficiency labelling programme will be an essential mechanism when a list of eligible technologies and equipment for the home appliances component (Component III) of the Project is to be introduced.

3.1.2.3. Green Building Rating Programme

The energy consumption in offices and other buildings is rapidly increasing. Therefore, it is needed to implement an effective counter measures to mitigate this increase of energy consumption in this sector. Besides, a revised version of the Bangladesh National Building Code (hereinafter referred as "BNBC [Revised]") is going to be published by the Ministry of Housing and Public Works (MOHPW), promoting EE&C in buildings.

The Green Building concept is not only on EE&C but also on reduction of overall environmental impact and betterment of indoor air environment in buildings. SREDA is expected to introduce Green Building Rating Programme. Once such has been done, the Project component for the promotion of Green Buildings (Component II) can be implemented.

Note on the Stakeholders to Green Building Rating Programme

Stakeholders to the promotion of EE&C measures are expected to share the roles and responsibilities as follows:

(a) The Government should formulate legal framework, promote BNBC [Revised] to have the programme penetrating nationwide. MOHPW is the leading executing body for BNBC [Revised] enforcement. SREDA will provide supports and advices for promoting EE&C measures in building sector;
(b) Local governments should be in the front line of the implementation of BNBC [Revised]. They should implement BNBC [Revised] under MOHPW's awareness raising and capacity development activities in association with SREDA;
(c) Building owners, users, designers, constructors and other parties should comply with BNBC [Revised] and refer to the new Green Building Rating Programme to be introduced under SREDA initiative.

Understanding of all stakeholders' roles and responsibilities are needed to promote BNBC [Revised] implementation. Awareness raising and capacity development for local governments and other stakeholders are needed to overcome the present situation, as law and regulation are

not perfectly sustaining the program. All stakeholders' roles and responsibilities are shown in the following table.

Table 10 Roles and Responsibilities of Stakeholders

Concerned Organization and stakeholder		Design	Construction	Operation	Demolition	Roles and responsibilities
The Government	MPEMR/ SREDA	*	*	*	*	1) Comprehensive promotion of EE&C ・Formulation of EE&C requirement, criteria and evaluation method, in coordination with MOHPW and HBRI 2) Initiatives on implementation of EE&C ・Monitoring of program implementation reported by MOHPW and Housing and Building Research Institute (HBRI) ・Review of the program with MOHPW and HBRI ・Promotion of the program with MOHPW and HBRI 3) Information provision for MOHPW
	MOHPW /HBRI	*	*	*	*	1) Comprehensive promotion of EE&C on buildings ・Formulation of EE&C requirement, criteria and evaluation method coordinating with SREDA ・Review of the program with SREDA 2) Initiative on implementation of EE&C on buildings 3) Information provision for local governments, building owners & users, designers and constructors ・Promotion of the program to building owners & users, designers and constructors ・Instruction of the program to local governments and governmental agencies ・Monitoring of the program implementation, and report to SREDA
Local Government		*	*	*	*	1) Promotion of EE&C on buildings in accordance with the local characteristics 2) Initiatives on implementation of EE&C on buildings ・Examine the program suitability, considering local conditions ・Promotion of the program to building owners & users, designers and constructors ・Monitoring of the program implementation, and report to MOHPW and HBRI 3) Information provision for building owners & users, designers and constructors

Building Owner	*	*	*	*	1) Concrete implementation of EE&C ・Compliance to the program regulation 2) Lifestyle modification for EE&C 3) Consider the lifecycle cost
Designer	*				1) Concrete implementation of EE&C ・Compliance to the program regulation ・Explanation to building owners ・Documentation for application and approval of the local government 2) Lifestyle modification for EE&C 3) Consider the lifecycle cost
Constructor		*			1) Concrete implementation of EE&C ・Compliance to the program regulation ・Explanation to building owners ・Documentation for application and approval of the local government 2) Lifestyle modification for EE&C 3) Consider the lifecycle cost
				*	1) Concrete implementation of EE&C 2) Consider 3R (reduce, recycle and reuse)
Building User			*		1) Concrete implementation of EE&C ・Compliance to the regulation on the program ・Voluntary efforts on EE&C ・Cooperation with other stakeholders 2) Lifestyle modification for EE&C 3) Consider the lifecycle cost

Source: Survey Team

3.2. Proposed EE&C Promotion Measures

3.2.1. Flagship Sub-projects

The JICA EE&C Master Plan (M/P) development project suggested some of the priority sub-projects which are deemed to be cost effective in terms of energy saving. These were called the “Flagship” sub-projects, listed under three programmes identified, namely (i) energy management and auditing programme, (ii) green building rating programme, and (iii) energy efficiency labelling programme. The next table summarizes and describes the validity of these flagship sub-projects that were identified in the M/P preceding the Survey.

Table 11 Flagship EE&C Sub-projects Identified in the M/P

	EE projects	Govt. costs (a) (BDT/year)	Energy reduction amount (b) (toe/year)	Private sector investment costs (c) (BDT/year)	Economic benefit of private sector energy reductions (d)(BDT/year)	Cost effectiveness of energy reduction [(a+c-d)/b] (BDT/toe)	Total project costs (BDT)	EE sustainable years (year)	Annual energy reduction amount	Unit	Total amount of energy reduced for the Project	Unit	Unit price of energy	Unit	Converted unit price of energy (BDT/toe)	Simple payback period (year)
Green Building Rating	Medium sized public buildings retrofit (AC, lighting) for 4 units	1,248,000	44	0	1,456,160	-4,777	12,480,000	10	0.2	GWh	2	GWh	9.58	BDT/kWh	33,415	9
	Large public buildings retrofit (AC, lighting) for 4 units	12,480,000	436	0	14,561,600	-4,777	124,800,000	10	1.5	GWh	15	GWh	9.58	BDT/kWh	33,415	9
	New Green Building (lighting, etc.) for 4 units	0	1,147	17,940,000	38,320,000	-17,771	215,280,000	12	4.0	GWh	48	GWh	9.58	BDT/kWh	33,415	6
	New Energy Efficiency Building (lighting, etc.) for 4 units	0	573	7,176,000	19,160,000	-20,900	86,112,000	12	2.0	GWh	24	GWh	9.58	BDT/kWh	33,415	4
Energy Management	Once-through boiler (6 t/h, 3 units)	0	4,819	5,880,000	31,349,534	-5,285	117,000,000	20	5,700,000	m3	114,000,000	m3	5.50	BDT/m3	6,506	4
	Gas turbine cogeneration (6-10MW, 2 units)	0	50,964	117,600,000	331,559,500	-4,198	2,340,000,000	20	60,284,441	m3	1,205,688,820	m3	5.50	BDT/m3	6506	7
	Lighting (LED/25W) for textiles (20,000 lamps×11units)	0	787	8,580,000	20,047,698	-14,565	85,800,000	10	2.7	GWh	27	GWh	7.30	BDT/kWh	25,462	4
	Ammonia cooling/ chilling (10,000t) for food processing (3 units)	0	602	4,696,500	15,330,000	-17,662	140,400,000	30	2.1	GWh	63	GWh	7.30	BDT/kWh	25,462	9
	Exhaust heat recovery (100,000 t/h) for steel (2 units)	0	3,421	31,200,000	22,258,169	2,614	312,000,000	20	4,047,000	m3	80,940,000	m3	5.50	BDT/m3	6,506	14
	Cement kiln (5,000 t/day, 4 units)	0	1,147	23,400,000	29,200,000	-5,058	468,000,000	20	4.0	GWh	80	GWh	7.30	BDT/kWh	25,462	16
	High efficient weaving machine (100 sets, 1 unit)	0	1,192	31,200,000	30,353,400	710	390,000,000	20	4.2	GWh	83	GWh	7.30	BDT/kWh	25,462	13
	Biogas power generation (400kW) for poultry (2 units)	0	1,720	28,080,000	43,800,000	-9,138	351,000,000	20	6.0	GWh	120	GWh	7.30	BDT/kWh	25,462	8
	Biogas power generation (2kW) for poultry (30 units)	0	745	4,563,000	18,980,000	-19,341	91,260,000	20	2.6	GWh	52	GWh	7.30	BDT/kWh	25,462	5
Label	AC & Refrigerator (16,000 households)	0	1,835	28,704,000	36,800,000	-4,412	287,040,000	10	6.4	GWh	64	GWh	5.75	BDT/kWh	20,056	8

Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

3.2.2. Estimated Cost for Implementing the Flagship Sub-projects

The estimated costs for implementing the flagship sub-project are available from the EE&C M/P. The total investment costs estimated as of November 2014 for the six large-energy consuming industrial sub-sectors are shown in the following table.

Table 12 Proposed EE&C Measures for 6 Industrial Sub-sectors

EE investment candidates		Unit cost (BDT 1,000)	Quantity	Investment amount (BDT 1,000)
1	Chemical fertilizer			
1.1	Replacement of 2 old plants with 3rd generation technology plants	100,000,000	1	100,000,000
1.2	Waste heat recovery technology and rehabilitation in 4 plants	13,000,000	3	39,000,000
2	Steel-making & re-rolling			
2.1	Reheating furnace: Re-generative burner	70,000	10	700,000
2.2	Reheating furnace: Combustion control unit	1,500	20	30,000
2.3	Reheating furnace: waste heat recovery	3,000	20	60,000
2.4	Reheating furnace: heat insulation with ceramic fiber	6,000	20	120,000
2.5	Replcement of induction furnacse with arc furnaces	1,000,000	5	5,000,000
3	Cement grinding			
3.1	Vertical roller mill	250,000	20	5,000,000
4	Textile & Garment			
4.1	Spinning machine	3,000,000	1	3,000,000
4.2	Air Jet Loom (Weaving machine)	2,000,000	1	2,000,000
4.3	Sawing machine	40	100,000	4,000,000
4.4	Lighting: HF TFL and LED lamp	3	100,000	300,000
4.5	Gas engine waste heat recovery	70,000	10	700,000
4.6	Gas turbine cogeneration	1,200,000	3	3,600,000
4.7	Steam boiler waste heat recovery	3,000	30	90,000
4.8	Steam boiler combustion control	1,000	50	50,000
4.9	Once-through steam boiler (2t/h)	3,500	100	350,000
4.1	High efficient stenters	150,000	5	750,000
5	Cold storage			
5.1	Gas compressor renewal	40,000	20	800,000
6	Chemical			
6.1	Caustic soda electrolyte process	2000000	1	2,000,000
	Total			167,550,000

Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

3.2.3. Viability of Flagship Sub-projects

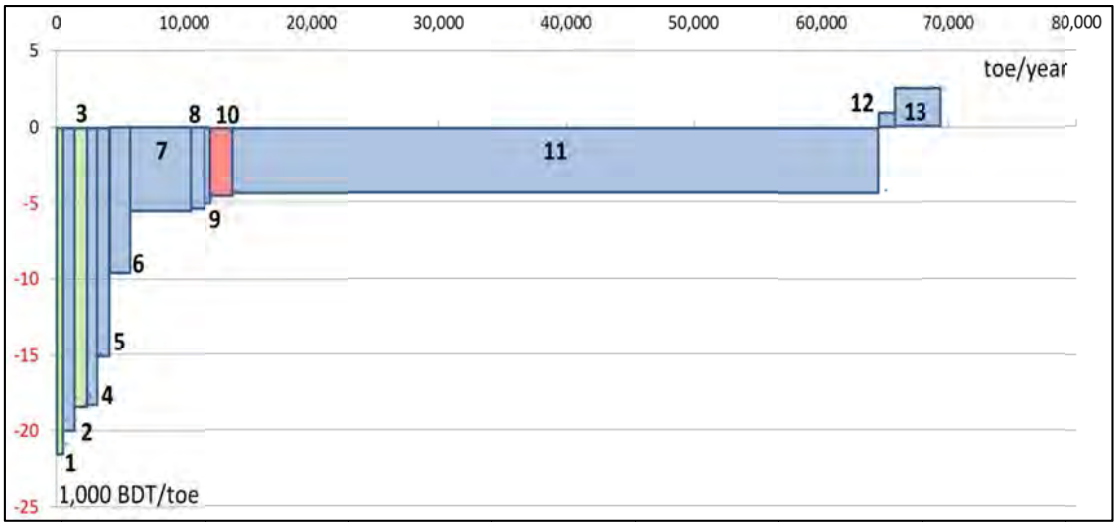
The EE&C M/P proposes a package of financial resources for promoting EE&C measures from the public sector. In order to effectively prioritize the government budget allocation, cost effectiveness analysis was conducted for several public- and private-sector EE&C projects representing each EE&C policy measures. The calculation formula is as below:

(a + c – d) / b Where:

a: Annual investment costs for the government (BDT/year)
b: Annual energy reduction amount (toe/year)
c: Annual investment costs for the private sector EE investments (BDT/year)
d: Annual economic benefits of private-sector energy reduction (BDT/year)

According to the calculation formula and assumptions stipulated above, the costs per unit of energy for the candidate flagship sub-projects as identified in the M/P were calculated. The flagship sub-projects are plotted on a bar chart, to create a marginal abatement costs (MAC) curve.

The lower left part of x- and y- axis shows the group of projects that are most cost effective, whereas the upper right part of the axes shows the least cost effective ones. Each square area represents the net costs of an EE&C sub-project, with the height and width representing, respectively, the unit costs and quantity of energy saved. Most of the EE&C projects are located under the zero unit costs, implying that they can be implemented at negative costs (i.e. total energy savings surpass the total costs). Sub-projects Nos. 2, 4, 5, 6, 7, 8, 9, 11, 12 and 13 may be promoted by the introduction of energy management and auditing programme; sub-project No. 10 will be accelerated through the implementation of the energy efficiency labelling programme; and sub-projects Nos. 1 and 3, by the introduction of the green building rating programme.



Notes: Numbers represent the following EE&C projects: 1. New EEB (lighting, etc., 4 units), 2. Biogas power generation for poultry (2kW, 30 units), 3. New GB (lighting, etc., 4 units), 4. Ammonia cooling/ chilling for food processing (10,000t, 3 units), 5. Lighting for textiles (LED/25W, 20,000 lamps×11units), 6. Biogas power generation for poultry (400kW, 2 units), 7. Once-through boiler (6 t/h, 3 units), 8. Cement kiln (5,000 t/day, 4 units), 9. Large public buildings retrofit (AC, lighting, 4 units), 10. AC & Refrigerator (16,000 households), 11. Gas turbine cogeneration (6-10MW, 2 units), 12. High efficient weaving machine (100 sets, 1 unit), 13. Exhaust heat recovery for steel (100,000 t/h, 2 units)

Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

Figure 16 Marginal Abatement Costs (MAC) Curve of Selected EE&C Measures

3.2.4. Funding

The intervention of the public sector is still very critical to disseminate the technologies and enhance the effective investment. However, the access to financing for EE&C cost is still limited in Bangladesh. GoB is yet to allocate specific budget for the promotion of EE&C. The implementation of EE&C measures should therefore resort to private or international development partners' funding sources.

3.3. Commonly Available Funds

Recent statistics from Bangladesh Bank shows that the currently available loan interest rate for industry is within the range 11% ~ 18%, while consumer credit is around 12% ~ 18.5%.

Table 13 Selected Lending Interest Rates

Banks	Agriculture	Term Loan to large & medium scale industry	Term Loan to small Industry	Export	Trade financing	Housing loan	Consumer credit
AGRANI	8	14.5	13	7	15	15	15
BDBL	10	13-14	14	7	14.5	15	0
JANATA	4-10	13-15	13-14	7	14-15	14.50-15	15
RUPALI	4-11	14	14	7	15	15-16	15
SONALI	4-10	14	14	7	15	15-15.5	15.5
BANK ASIA	11	12.5-15.5	14-17	7	12-15	12.5-15.5	12-15
BRAC	9-11	10-13	14-17	7	10.5-13.5	11.5-14.5	13.5-16.5
DHAKA	11	11-14	13-16	7	12.5-15.5	12-15	12-15
DUTCH-BANGLA	11	11-14	12-15	7	12-15	12-15	14-17
EBL	9.5-11	11-14	13-16	7	13-16	11.5-14.5	14-17
EXIM	11	12.5-15.5	15-18	7	12.5-15.5	15-18	15-18
JAMUNA	11	15	13-16	7	13.5-16.5	13.5-16.5	15-18
ONE BANK	9.50-11	12-15	14-17	7	12-15	12-15	15-18
PREMIER	8-11	11-14	14-17	7	12-15	12.5-15.5	12.5-15.5
PRIME	11	14	14	7	15	14	15-17
PUBALI	10-11	12-15	13-16	7	13-16	13-16	13-16
SIBL	4-11	11-14	13.5-16.5	7	12-15	12-15	14-17
THE CITY	9.5	13.5	17-18	7	14	16	16
TRUST BANK	11	11-14	12-15	7	11-14	12.5-15.5	15.5-18.5

Unit: percent
As of September 2015
Source: extracted by Survey Team from BB statistics

In order to achieve the objective of the Project, the dissemination of EE&C product in Bangladesh utilizing concessional loan, the interest rate available to the end users must be as low as possible. It should be advantageous enough to cover the extra initial cost that an end user will have to bear when purchasing EE&C product, compared with when buying a non-EE&C product.

There are some preferential financing facilities already available for EE&C measures. Most of them are offered by international developing partners either through local financial institutions or directly to the borrowers. For example, DEG facility currently offers 4.5% interest rate 7 year USD loan for environmentally-friendly activities. These are foreign currency denominated loans thus will differ from JICA Energy Efficiency and Conservation Promotion Project loan which will be extended in BDT. Although the case, existing financing facilities are already available at relatively preferential conditions.

Table 14 Existing Financing Facilities for EE&C Measures

Financier	Financial Institution	Interest Rate Formula	Current Interest Rate	Tenure	Credit line	Usage
GCPF	City Bank	Libor+7%	7.5%	5～7 yrs	USD 30 million	Energy efficient equipment
GCPF	Southeast Bank	Libor+7%	7.5%	5～7 yrs	USD 20 million	Energy efficient equipment
ADB	IIDFC Prime Bank	5% (BB to FIs)	Varies among FIs	Varies	USD 50 million	Brick industry, energy efficient investment
DEG	(Direct to borrowers)	Libor+4.2%	4.5%	7 yrs	-	Environmentally-friendly activities in general
BB	All FIs	Varies	Varies	Varies	-	Environmentally-friendly projects and business

Note: ADB: Asian Development Bank Bangladesh Industrial Energy Efficiency Finance Program
BB: Bangladesh Bank
DEG: Deutsche Investitutions-und Entwicklungsgesellschaft mbH
GCPF: Global Climate Partnership Fund
IIDFC: Industrial and Infrastructure Development Finance Company
Source: compiled by Survey Team based on interviews

3.4. Necessity of Public Support

Financial incentives are monetary rewards which can provide economic benefits for implementation of EE&C projects through changes in people's behaviour. Mainly, there are three types of financial incentives which are considered as the most effective financial measures to promote EE&C: (i) subsidies, (ii) preferential taxation, and (iii) low-interest loans.

Investment subsidies are what the government or government-related organization pays to companies and/or individuals in order to reduce their investment costs. Rebate program and buy-down grants (investment subsidies for loans) are examples of the subsidies. It is effective to stimulate economic effects because beneficiaries can purchase goods with lower prices when they receive subsidies. However, to implement the measure, it requires high administrative and transaction costs, which means it is necessary to establish an organization to manage funding source for subsidies and to create application processes and procedures for receiving money.

Preferential taxation includes tax reduction and exemption, and accelerated depreciation. This measure applies to anyone who makes investments according to the criteria. It is easy to implement because there is no need to add special procedure on the normal taxation process. However, the economic impacts of tax measures such as accelerated depreciation and tax reductions on EE&C are hard to be measured as they are accounting procedures to reduce taxable income. Thus, the government also needs to consider how to cover its income when tax collection is to be reduced.

As for low-interest loans, financial institutions will provide loans to their customers with lower interest rate than the market rate. The government and/or international donor agencies will provide concessional funds to financial institutions in order to promote specific policies, which make financial institutions capable of providing loans with low interest. On the other hand, disadvantage of this measure is that beneficiaries are limited: the borrowers are to be screened by the eligibility criteria.

3.5. Existing Support Facilities

3.5.1. Green Banking Policy

There is also the Government's support measure for EE&C. Bangladesh Bank (BB) is the central bank of the country, which is a part of the Government. BB has introduced a Green Banking Policy in 2011 in which financial institutions under its authority were instructed to volunteering support for environmentally-friendly financial needs.[6] The policy aims at promoting green economy on the basis of renewable energy, green buildings, green products and materials, clean transportation, water management, land management, and so on.

Among the requirements, there is a stipulation for the financial institutions to introduce a "green finance" facility for environmental infrastructure such as renewable energy project, clean water supply project, wastewater treatment plant, solid & hazardous waste disposal plant, bio-gas plant, and bio-fertilizer plant. To encourage these projects the green finance should be designed to provide preferential lending terms. Organizations deemed to be energy efficient were eligible to access to this green finance facility for corporate finance.

There is BB's refinance scheme that covers solar home system, bio-gas, effluent treatment plant, hybrid Hoffman kiln and others. However, the facility does not directly target the promotion of EE&C measures.

3.5.2. EE&C support activities by international development partners

The below table summarizes the activities of the international development partners. GCPF and DEG funds are not included in the table as these facilities address to fund requirement in general.

Table 15 Activities of International Development Partners

Component	GIZ	UNDP	WB	ADB	USAID
(a) Institutional capacity development (regulations and organization),	N/A	Labelling and energy efficiency standard program (BRESL Project (2010-2015))	N/A	N/A	N/A
(b) Support for introduction of energy management and auditing	Under preparation in the program, "Strengthening SREDA and Dissemination of Solar Lanterns in Bangladesh"	N/A	Information dissemination under ESMAP: Energy Sector Management Assistance Programme	Industrial Energy Efficiency Finance Program	Certifies Energy Auditor (CEA) Program
(c) Support for enhancement of energy efficiency labelling	Strengthening SREDA and Dissemination of Solar Lanterns in Bangladesh	Labelling and energy efficiency standard program (BRESL Project (2010-2015))	N/A	N/A	N/A
(d) Promotion of green building rating	N/A	N/A	N/A	N/A	N/A

[6] Bangladesh Bank (2011) Policy Guidelines for Green Banking

Component	GIZ	UNDP	WB	ADB	USAID
(e) Development and management of an energy database.	N/A	N/A	N/A	N/A	N/A

Note: GCPF and DEG funds are excluded from the table as the facilities address to fund requirement in general.
Source: Survey Team

3.5.2.1. GIZ

GIZ is planning to implement the technical assistance project 'Strengthening SREDA and Dissemination of Solar Lanterns in Bangladesh", which is funded by DFID. The program has two components which are support for capacity development of SREDA and encouraging the dissemination of solar lanterns through technical assistance and grant. Within the SREDA capacity development component, there are two task items of regulation drafting. These are: (i) Energy audit regulations and (ii) Energy star labelling standards. The terms of reference of the program are currently under preparation.

3.5.2.2. UNDP

UNDP, through BRESL initiative, has provided the technical assistance program for the energy efficiency standard and the energy labelling. (The counterpart is BSTI.) The target facilities for the labelling system are air-conditioner, refrigerator, motor, CFL, ballast, and electric fan. The other items would be followed. The program also assisted equipment manufacturer in developing the energy efficiency equipment.

UNDP also intends to commence a new project, "Sustainable City Project", in which the green building would be one of the components. UNDP also wishes to work on the capacity development programs for SREDA and the financial institutions on the technical expertise for energy balance, photovoltaic lantern and financial management.

3.5.2.3. WB

The WB is implementing the feasibility study to disseminate the energy efficiency light bulbs and equipment for domestic use. The Bank has also provided substantial amount of CFLs in return for incandescent in the past project, and is considering a second phase project. This could be the distribution of LED lamps instead of CFL. The WB is also preparing the technical assistance on energy audit under the Energy Sector Management Assistance Programme (ESMAP). Even though the assistance aims to disseminate the information and expertise, the introduction of energy audit system is out of scope.

3.5.2.4. ADB

Contribution to energy efficiency by ADB has mostly been on the supply side of power, through financing of power generation and distribution infrastructure. Its regional initiative to introduce renewable energy "Asia Solar Energy Initiative" which constitutes the basis of the renewable energy deployment strategy of Bangladesh, "500 MW Solar Plan", has also contributed to relieving of power demand and supply gap in Bangladesh.

ADB's direct contribution to the demand side EE&C started from "Industrial Energy Efficiency Finance Program", which is a USD 30 million loan facility extended through the Industrial and Infrastructure Development Finance Company (IIDFC) and other financial institutions for on-lending to eligible energy efficiency projects. The targeted areas are: brick making, textiles, steel, cement, ceramics, chemicals, and agro-industries. The program is conducted with the aim to contribute to reducing Bangladesh's energy supply-demand gap and mitigating climate change.

3.5.2.5. USAID

USAID is currently conducting the technical assistance program, "Catalyzing Clean Energy in Bangladesh (CCEB)". The program has the five components.

- Task 1: Improve Regulatory Environment for Clean Energy Development
- Task 2: Strengthen Analytical Capacity for Energy Sector Planning and Policy Making
- Task 3: Promote Industrial Energy Efficiency Analysis and Adoption
- Task 4: Demand-Side Management Programs for Electric Utilities
- Task 5: Market Analysis and Development for Improved Cook Stoves

In Task 3, facility renewal plans for the selected 100 factories were considered. Among them, forty factories actually embarked on the proposed investment for energy efficiency plans. The grant fund that covers thirty percent of the total investment cost was mobilized. The program also provides trainings for financial institutions on the appraisals for energy efficiency.

USAID has also provided the Certifies Energy Auditor (CEA) program, and certified eighty-eight auditors. The program is designed by the Association of Energy Engineers (AEE) and the certified engineers are registered in the Bangladesh branch of the association.

While the program is not officially certified by the government of Bangladesh, the appraisals for the Green Fund of the Bangladesh Bank needs to be conducted by the CEA or the auditors that are certified by other internationally recognized program, therefore these certified auditors are actually conducting the tasks.

USAID will also provide the training programs for the Certified Energy Manager (CEM) and the Certified Carbon Reduction Manager (CRM). No coordination has been made with SREDA and the certification programs will be private.

3.5.2.6. Global Climate Partnership Fund (GCPF)

The Global Climate Partnership Fund (GCPF) is a fund dedicated to mitigating climate change through a reduction of greenhouse gas emissions in emerging and developing markets. It focuses on financing energy efficiency and renewable energy projects primarily in cooperation with local financial institutions.

The Global Climate Partnership Fund targets investments into emerging and developing economies in the form of two types of investments:

(i) Investments into Financial Institutions

These include local commercial banks, leasing companies and other selected financial institutions that either finance or are committed to financing projects of the final beneficiaries meeting the eligibility criteria of GCPF.

(ii) GCPF Direct Investments

The Fund invests directly into small-scale renewable energy projects, i.e. where the project company or its owner is financed directly, rather than the funds being provided to a bank or other financial institution, which then on-lends to its client. The Fund directly finances renewable energy and energy efficiency projects. These should:

Be able to demonstrate the technical feasibility of the project;
Require debt financing of between USD 5 m and USD 20 m;
Comply with relevant environmental and social standards; and
Lack the access to private local or international funding sources.

3.5.2.7. DEG (Deutsche Investitions- und Entwicklungsgesellschaft)

DEG is Germany's public development financial institution belonging to KfW Bankengruppe. It has been providing long term financing and advisory services to private businesses investing in developing economies for over a half decade. The focus sectors in Bangladesh are electricity, renewable energy, manufacturing as well as social sectors. Much of its investment in the ready-made garments (RMG) sector was addressed to promoting energy efficient machineries.

3.6. Issues for Promotion and Enhancement of EE&C

Many of the issues identified in the JICA EE&C M/P Project report are still pending. Need for enacting the EE&C Rules, relevant regulations are still to be achieved. Strengthening the institutional capacity of SREDA with the suitable human resources, sufficient budget and effective cooperation with the international development partners will be crucial for addressing these identified but yet remaining issues.

Apart from these issues that are already mentioned in the JICA EE&C M/P Project report, there are also some other issues that requires attention so as to promote EE&C measures in more comprehensive manner. Those listed below are some of the examples:

3.6.1. EE&C Master Plan for Transportation Sector

EE&C Master Plan for transportation sector will be formulated in the near future. In Bangladesh, energy consumption in transportation sector is the third largest and is increasing steadily. The matters to be discussed are 1) city planning coordination, 2) mass transportation with less air pollution shifting, and 3) traffic jam, etc. The discussion to formulate "EE&C Master Plan for Transportation Sector" will be led by a collaboration of SREDA and Dhaka Transport Coordination Board (DTCB) and other related local authorities.

3.6.2. Supply-side EE&C Plan

Supply-side EE&C master plan will be drafted under on-going JICA Power System Master Plan (PSMP) Project. It is important that supply-side and demand-side plans should be discussed at the same time. Demand-side EE&C is considered to be one new energy source, known as "Negawatt". SREDA has a plan to include power plants as the targets of national Energy Management Program.

3.6.3. Energy Tariff System

Historically and politically the energy prices in Bangladesh have been set at lower levels, lower than the costs. Such low costs come from a huge amount of government subsidy and this prevents people from saving energy. And in the near future around 2020, Bangladesh will have to import gas and coals from abroad, because domestic energy consumption has been steadily increasing.

In this context, a revision/increase of electricity and gas tariffs is worth being considered to keep sustainable and healthy development of the economy. The measures to be discussed are (i) more effective TOU (time of use) tariff, (ii) fuel price adjustment tariff, which has been applied in Japan and recently in Indonesia to reduce energy subsidy.

3.6.4. Need for EE&C Finance Facility

The bottlenecks of EE&C promotion in Bangladesh are considered below:

- Lack of urgency of energy saving among individuals and companies: The Government highly subsidizes energy and power sector to lower the costs of fuel and electricity for the household and industries
- Tight budget constrains: The Government does not have enough budget to implement subsidies or tax incentive measures.

Taking into considerations the above circumstances, the JICA-EEF Project is expected to contribute to the penetration of EE&C equipment through low interest loan. This measure, under low financial burden for the government, enables low interest long-term financial support for end users for the equipment. The main goal of the Project is to promote the dissemination of the EE&C equipment, thus contributing to saving energy.

3.6.5. Future Power Tariff

The projection study on the future power tariff is currently being conducted. The prospect of the tariff revision is not presented at the moment. The Project to be implemented will need to be carefully designed with an eye on the development of the tariff in order to evaluate the impacts on the investment on energy efficiency improvement.

4. Demand for EE&C Promotion Financing

4.1. Potential for Energy Efficiency in Bangladesh

To promote EE&C in industry and commercial sectors, the DCs should improve energy intensity by means of introducing energy efficient equipment. DCs will be nominated and their energy use will be monitored by SREDA. The survey has identified 114 DC candidates. These DC candidates are expected to be the main end-users of the financing facility for energy efficiency promotion in the Project. This is due to the fact that the energy consumption of the DCs candidates adds up to 28% of that of the industrial entire sector. Energy consumption of the DC candidates is as follows:

- Energy consumption of DC candidates: 3,586,031 toe;
- Energy consumption in industrial sector in 2013: 12,482,000 toe
- Share of energy consumption of the DC candidates: 28.7%

The numbers and estimated energy consumption of DC candidates by sub-sector are as shown in the next table. In this project, priority sector should have large potential energy saving by companies. Therefore, the focus is only on the sub-sectors in which there is at least one DC candidate.

Table 16 DC Candidates

No.	Sub-sector	Criteria	Numbers in total	Numbers by annual energy consumption (toe/y)				Energy consumption (toe)
		toe/year or above		3000< X <6,000	6000< X <10,000	10,000< X <30,000	30,000< X	
1	Fertilizer	10,000	10	0	0	0	10	1,675,017
2	Cement	10,000	12	0	0	9	3	307,341
3	Steel-making & rerolling	10,000	12	0	0	9	3	304,974
4	Sugar	-	-	-	-	-	-	0
5	Brick	-	-	-	-	-	-	0
6	Chemical	6,000	9	0	4	5	0	91,076
7	Cold storage	-	-	-	-	-	-	0
8	Glass	6,000	5	0	2	3	0	60,841
9	Paper & pulp	6,000	8	2	4	4	0	90,397
10	Petroleum refinery	6,000	2	0	0	1	1	452,500
11	Jute	-	-	-	-	-	-	0
12	Sanitary & ceramics	6,000	9	0	6	3	0	102,910
13	Textile	3,000	25	5	11	7	2	310,003
14	Garment	3,000	11	5	3	3	0	96,425
15	Building	3,000	11	9	1	0	1	94,546
	Total	-	114	21	31	44	10	3,586,031

Source: Survey Team

4.2. Industry Sector (Component I)

Based on literature and interview research, the overview and potentials of installing energy efficiency technology are described as follows. Note the some statistics has not consistency because of different reference.

4.2.1. Chemical Fertilizer

Comparing energy consumptions of all companies and DC candidates, most of energy consumptions in chemical fertilizer sub-sector are covered by DC candidates. Therefore, target of energy saving should be focused on the DC candidates. In this sub-sector, Bangladesh Chemical Industries Corporation (BCIC) is managing 13 large and medium size industrial enterprises. They have nine stated-owned companies and one joint venture company as the potential DCs. The annual productions of fertilizer are 1.03 million MT of Urea, 0.04 million MT of triple superphosphate (TSP), and small amount of ammonia sulphate.

In general, fertilizer companies consume the large amount of natural gas, however, most of that is consumed as a raw material. Also, the large amount of investment cost will be needed to replace fertilizer plant for improving energy efficiency. Therefore, this project only focuses on process improvement such as waste recovery. Common technologies like high efficiency transformer, water pump, motor, etc. also have potential for installation.

Table 17 Overview of Cemical Fertilizer Sub-sector

Item	Data	Note
Numbers of Large Company	28	"Large company" is more than 250 employees. (Source) BBS, Manufacturing Industries 2012
Numbers of DC Candidates	10	(Source) Survey Team
Expected Annual Energy Consumption	1,666 [1,000toe/year]	(Source) SREDA, "Efficiency and Conservation Master Plan up to 2030"
Expected Annual Energy Consumption by DCs	1,675 [1,000toe/year]	(Source) Survey Team
Annual Production	1,075 [1,000t/year]	Annual production of "fertilizers" in 2012-2013 (Source) BBS, Statistical Pocketbook of Bangladesh 2013

4.2.2. Cement & Clinker Grinding

Regarding energy consumptions, cement sub-sector is similar to chemical fertilizer sub-sector, that most of energy consumptions in this sub-sector are covered by DC candidates. Therefore, target of energy saving would be focused on the DC candidates.

Cement factories are located in variety of places in Bangladesh like Dhaka, Chittagong, Barisal, Sylet, etc. Main products are Ordinary Portland Cement (OPC) and Portland Composite Cement (PCC).

In this sub-sector, most energy is consumed in both firing and grinding process. Especially, 70% of total electricity is consumed in grinding process. Vertical roller mill, type of grinder, is energy efficiency alternative for a ball mill which is low energy efficiency technology because cement plants in Bangladesh are mainly clinker grinding plants. However, total process system of cement production is important. Therefore, this project mainly focuses on Greenfield project rather than a replacement.

Table 18 Overview of Cement & Clinker Grinding Sub-sector

Item	Data	Note
Numbers of Large Company	N/A	-
Numbers of DC Candidates	12	(Source) Survey Team
Expected Annual Energy Consumption	394 [1,000toe/year]	(Source) SREDA, "Efficiency and Conservation Master Plan up to 2030"
Expected Annual Energy Consumption by DCs	307 [1,000toe/year]	(Source) Survey Team
Annual Production	4,965 [1,000t/year]	Annual production of "cement" in 2012-2013 (Source) BBS, Statistical Pocketbook of Bangladesh 2013

4.2.3. Iron & Steel (Rerolling Mills)

In iron& steel sub-sector, energy consumption of DC candidates covers less than 50% of all companies. This means many small or medium companies are operated in this sub-sector. However, most companies are located in Dhaka, Chittagong and Narayanganj, where easily accessible by ship transport.

Main productions are Rods, Bars, corrugated iron, galvanised plain sheet, angle, etc. Ingredients of steel production are used for ship scrap which is mostly imported. This is why this project only focuses on steel making and rolling process. Regarding steel making process, mostly induction furnace is installed in Bangladesh. Therefore, new high efficiency induction furnace and combustion control unit of reheating furnace have the potential for installation. Furthermore, another option about energy efficiency technology is electric arc furnace. This technology is highly energy efficiency technology but the shortage of electricity power supply in Bangladesh is obstacle installation.

Table 19 Overview of Iron & Steel (Rerolling Mills) Sub-sector

Item	Data	Note
Numbers of Large Company	50	"Large company" is more than 250 employees. (Source) BBS, Manufacturing Industries 2012
Numbers of DC Candidates	12	(Source) Survey Team
Expected Annual Energy Consumption	649 [1,000toe/year]	(Source) SREDA, "Efficiency and Conservation Master Plan up to 2030"
Expected Annual Energy Consumption by DCs	305 [1,000toe/year]	(Source) Survey Team
Annual Production	2,500 [1,000t/year]	"Quality Rod" (Source) BSRM

4.2.4. Chemical & Pharmaceutical

Chemical & Pharmaceutical sub-sector is rapidly growing up recently. This is why most domestic consumption comes from domestic pharmaceuticals factories. In the near future, the numbers of DC candidates are expected to increase and have the potential to install energy efficiency technologies.

Table 20 Overview of Chemical & Pharmaceutical Sub-sector

Item	Data	Note
Numbers of Large Company	65	"Large company" is more than 250 employees. (Source) BBS, Manufacturing Industries 2012
Numbers of DC Candidates	9	(Source) Survey Team

Expected Annual Energy Consumption	316 [1,000toe/year]	(Source) SREDA, “Efficiency and Conservation Master Plan up to 2030”
Expected Annual Energy Consumption by DCs	91 [1,000toe/year]	(Source) Survey Team
Annual Production	N/A	-

4.2.5. Foods & Beverages (Cold Storage)

Foods & beverage sub-sector has mainly bread and bakery, frozen foods, beverage industry in Bangladesh. In this sub-sector, cold storage facilities are installed for keeping cold for vegetables (potato, tomato) and seafood (mainly shrimp). Some factories and warehouse are taking energy-saving measures such as double glazed windows, high-efficiency compressors; however, those are still minority.

Table 21 Overview of Foods & Beverages (Cold Storage) Sub-sector

Item	Data	Note
Numbers of Large Company	140	“Member List of BCSA” (Source) BCSA: Bangladesh Cold Storage Association
Numbers of DC Candidates	N/A	-
Expected Annual Energy Consumption	71 [1,000toe/year]	(Source) SREDA, “Efficiency and Conservation Master Plan up to 2030”
Expected Annual Energy Consumption by DCs	N/A	-
Annual Production	N/A	-

4.2.6. Glass

In glass production sub-sector, combustion control of glass melting furnace is one option. However, because expected the amount of energy consumptions is smaller than other sub-sectors, eligible energy efficiency technologies are not selected in this sub-sector

Table 22 Overview of Glass Sub-sector

Item	Data	Note
Numbers of Large Company	N/A	-
Numbers of DC Candidates	5	(Source) Survey Team
Expected Annual Energy Consumption	13 [1,000toe/year]	(Source) SREDA, “Efficiency and Conservation Master Plan up to 2030”
Expected Annual Energy Consumption by DCs	61 [1,000toe/year]	(Source) Survey Team
Annual Production	N/A	-

4.2.7. Paper & Pulp

Most demand of paper is supplied from imported paper because production capacity is limited in Bangladesh. At the local factory, ingredients are imported dry pulp and local waste paper and main products are newsprint, facial tissue, printing paper, and so on.

In the production process, energy efficiency technologies like stock preparation (pulper, beater, refiner, screen) and drying process of paper machine could be adopted in this project. However, there are low needs of replacement and new construction plan is also limited. This is why this project only focused on black liquor boiler which burns black liquor and recovers agents such as soda, and de-inking plant.

Table 23 Overview of Paper & Pulp Sub-sector

Item	Data	Note
Numbers of Large Company	42	"Large company" is more than 250 employees. (Source) BBS, Manufacturing Industries 2012
Numbers of DC Candidates	8	(Source) Survey Team
Expected Annual Energy Consumption	150 [1,000toe/year]	(Source) SREDA, "Efficiency and Conservation Master Plan up to 2030"
Expected Annual Energy Consumption by DCs	90 [1,000toe/year]	(Source) Survey Team
Annual Production	57 [1,000t/year]	Annual production of "paper" in 2012-2013 (Source) BBS, Statistical Pocketbook of Bangladesh 2013

4.2.8. Petroleum Refinery

There are a few petroleum refineries in Bangladesh. One is stated-own company and the other is private company. Therefore, 70% of demands of final oil products are imported. In general, a large amount of investment cost will be needed to replace refinery plant for improving energy efficiency.

Table 24 Overview of Petroleum Refinery Sub-sector

Item	Data	Note
Numbers of Large Company	1	"Large company" is more than 250 employees. (Source) BBS, Manufacturing Industries 2012
Numbers of DC Candidates	2	(Source) Survey Team
Expected Annual Energy Consumption	1 [1,000toe/year]	(Source) SREDA, "Efficiency and Conservation Master Plan up to 2030"
Expected Annual Energy Consumption by DCs	452 [1,000toe/year]	(Source) Survey Team
Annual Production		

4.2.9. Sanitary & Ceramics

In sanitary and ceramics sub-sector, technologies and energy related data is still limited in Bangladesh. Because expected the amount of energy consumptions is smaller than other sub-sectors, eligible energy efficiency technologies are not selected in this sub-sector

Table 25 Overview of Sanitary & Ceramics Sub-sector

Item	Data	Note
Numbers of Large Company	N/A	-
Numbers of DC Candidates	9	(Source) Survey Team
Expected Annual Energy Consumption	211 [1,000toe/year]	(Source) SREDA, "Efficiency and Conservation Master Plan up to 2030"
Expected Annual Energy Consumption by DCs	101 [1,000toe/year]	(Source) Survey Team
Annual Production	N/A	-

4.2.10. Textile & Garments

Textile & Garments sub-sector is one of the biggest industries in Bangladesh. There are over 3,000 enterprises as textile and garment manufactures. However, by identifying DC in this project, only 25 textiles and 11 garments have total energy consumptions over 3,000 toe/year.

This means small and medium companies, which are not identified as DC, occupy majority in this sub-sector.

Table 26 Overview of Textile & Garments Sub-sector

Item	Data	Note
Numbers of Large Company	358(Textile) 2,775(Garment)	"Large company" is more than 250 employees. (Source) BBS, Manufacturing Industries 2012
Numbers of DC Candidates	25(Textile) 11(Garment)	(Source) Survey Team
Expected Annual Energy Consumption	1,695(Textile) 2,107(Garment) [1,000toe/year]	(Source) SREDA, "Efficiency and Conservation Master Plan up to 2030"
Expected Annual Energy Consumption by DCs	96(Textile) 94(Garment)	(Source) Survey Team
Annual Production	175[Million kg] 57[Million m]	"Cotton Yarn [million kg]", "Cotton Cloth [million metre]" (Source) BBS, Statistical Pocketbook of Bangladesh 2013

Energy efficiency technologies in this sub-sector are classified into production machineries and electricity & heat supply machineries. Regarding production machineries, BTMA (Bangladesh Textile Mills Association) published capacity of machineries in their member companies as follows.

Table 27 Installed Capacity and Production Capacity in Textile & Garments Sub-sectors

Item	Installed Capacity	Production Capacity
Textile Spinning Mills (Yarn Manufacturing)	10.3[million Spindles] 0.218[million Rotors]	2,100[million kg]
Textile Weaving Mills (Fabric Manufacturing)	47,006[loom]	2,800[million Meters]
Dyeing-Printing and Finishing Mills	n/a	300[Million kg] (Yarn) 600[Million kg](Knit) 1,700 [Million Meters](Woven)

Source: BTMA

Based on BTMA data and interview for BKMEA (Bangladesh Knitting Manufacturing & Export Association), estimated existing machineries are estimated as follows.

Table 28 Estimated Exsisting Production Machineries in Textile & Garments Sub-sectors

Item	Estimated Existing Machineries[unit]	Note
Spinning machine	20,600	Calculated by 500spindles/unit (Source) Survey Team
Loom (Weaving machine)	47,000	(Source)BTMA
Sewing machine	800,000	(Source)BKMEA

Stenter /dryer	1700	Calculated by 1million meters /year/unit (Source) Survey Team
Dyeing machine	9,000	Calculated by 100,000kg/year/unit (Source) Survey Team

From the above, market size is calculated by unit prices and market volume. According to calculation, market volume is regarded as only replacement of existing machineries.

4.3. Building Sector (Component II)

Total floor areas (including the stock and new constructions) in the entire Bangladesh in 2015 was estimated to be around 250 million square metres in the EE&C M/P Project. This is expected to increase by an annual 4%, on average, between 2016 and 2030 to, reach approx. 440 million square metres by 2030.

Electricity is the major energy source in buildings. Around 50% of the total energy consumed in the building is for conditioning, while 10 to 30% is consumed for lighting. Energy saving potential for these two electricity usages are:

- Air conditioning: 50% by applying high efficient ACs with inverter technology;
- Lighting: 50% by applying high efficient lighting system, such as LED lamp, T5 florescent lamp with electronic ballast or utilizing solar light.

It is expected that a simple replacement of ACs and lighting systems with the eligible products can save about 50% of total electricity consumptions in the commercial sector. However, due to the uncertainty of EE&C measures for the buildings, the conservative energy saving potential was set to 10% in the EE&C Master Plan.

4.4. Home Appliances (Component III)

4.4.1. Market Size for B-type loan

Among various home appliances, AC (split type) and refrigerators are selected as the eligible equipment for the project. The reason being: (i) there are clear technical characteristics that segregate energy saving models as opposed to the conventional types; (ii) energy efficient models are readily available in the market, but not being penetrated; (iii) these are the likely equipment to be purchased on installment payment. The EE&C M/P estimates the market stock of each eligible appliance. Annual sales figure is estimated to be 1 million for refrigerators and 90 thousand for ACs. The growth rates respectively are assumed to be 6% and 20%.

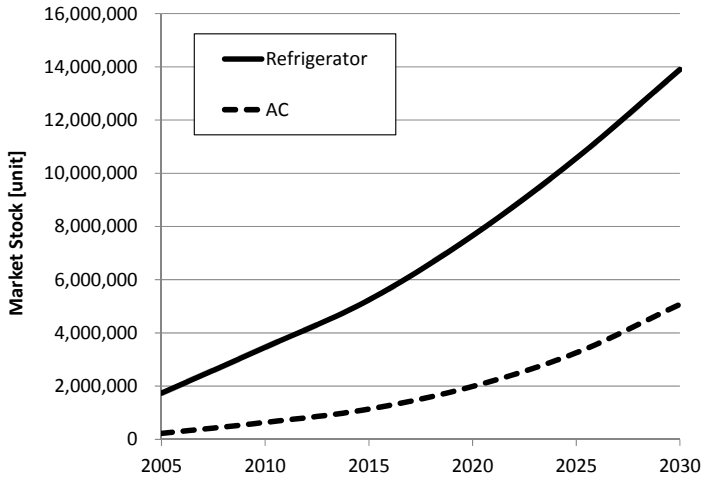


Figure 17 Market Stock (Forecast)

Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

Table 29 Calculation Condition of the Market Sales

	Annual Sales (2015, Unit)	Sales Growth
Refrigerators	1,000,000	6.0%
ACs	90,000	20.0%

Source: SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

Under the above-mentioned conditions, the market sales of EE-type appliances from 2016-2020 are calculated as follows.

Table 30 Total Market Sales of EE-type Appliances (From 2016-2020, 5years)

(Unit)	EE-Type Sales Share		
	5%	10%	20%
Refrigerators	298,766	597,532	1,195,064
ACs	40,185	80,369	160,739

Source: Survey Team

4.4.2. Distribution of Demand for B-type loan

The survey team, during the field survey and interviews with the potential PDs, understood that the B-type loan users are unevenly distributed depending on the electrification and urbanization conditions as well as on the income level. Much of the potential demand was identified in on-grid middle income dwellers.

Table 31 Distribution of Demand for B-type loan

	On- Grid Area	Off- Grid Area	Remarks
	Urban	Local	
High income	small	none	Pay in cash or use credit card
Middle income	large	none	Some use credit card or personnel loan from banks
Low income	medium	none	Limited access to finance

Source: Survey Team

5. Executing Agencies and Other Major Stakeholders

SREDA is the nodal institution for identification, promotion, facilitation and overall coordination of all national renewable energy and EE&C policies and programmes in Bangladesh. SREDA may also play the role of the fund managerial organization with considerations to the following points:

- SREDA Act indicates that SREDA can possess their own fund, namely, SREDA Fund, procuring funds from public and private sources for the promotion of renewable energy and EE&C activities.
- SREDA, being a governmental organization, not requiring profit, can lend money at the most preferential rates to end-users by directly providing loans to sub-project owners, without financial intermediaries. This aspect is especially important in the first phase (flagship stage) of the Project, in which significantly competitive interest rates must be provided to the end users to stimulate their investments on EE&C measures.

Although theoretically possible, SREDA is still a new organization, yet to be fully institutionalized, especially in terms of human resources. For the actual implementation of EE&C promotion activities, SREDA will have to collaborate with other organizations especially when managing financial sources as with the funds.

There are two candidate governmental financial institutions that may collaborate with SREDA in managing its fund, which are: Infrastructure Development Company Limited (IDCOL), and Bangladesh Infrastructure Finance Fund Limited (BIFFL). Both of them are governmental organizations, which can receive JICA ODA loans via the MOF.[7] IDCOL, being an executing agency for Japan's ODA loan project "Renewable Energy Development Project", possesses an experience of implementing Japanese ODA loan project. BIFFL is currently preparing to become an executing agency for "Foreign Direct Investment Promotion Project", expects to have this case becoming their first experience of Japanese ODA loan project execution.

Table 32 Outline of IDCOL and BIFFL

	IDCOL	BIFFL
Establish year	May 1997	March 2011
Paid-up capital	BDT 2,600million (June 2014)	16,000milBDT(Dec2014)
Loan Portfolio	BDT 28,855million (June 2014)	1,033milBDT(Dec2014)
Operating income	BDT 2,826 million (June2014)	2,756milBDT(Dec2014)
Profit before tax	BDT 2,605 million (June 2014)	BDT 2,713million (Dec 2014)
Number of personnel	260 (incl. 200 at regional office) (June 2015)	24 (June 2015)
borrower	Private sector	Public sector, Private sector, PPP
Investment for equity	Not allowed	allowed

Source: Compiled by Survey Team

[7] Bangladesh Bank (BB) was not considered as a collaborating FI, as BB cannot extend loan directly to the end users.

Three executing agencies are SREDA (administrative authority), IDCO and BIFFL (IFIs). Under the IFIs, there are PDs and end users (sub-project proponents which are factories and commercial facilities, and households). JICA is the lender, MOF, as GoB is the borrower. The Survey Team has confirmed the main players in the Project and their role as follows:

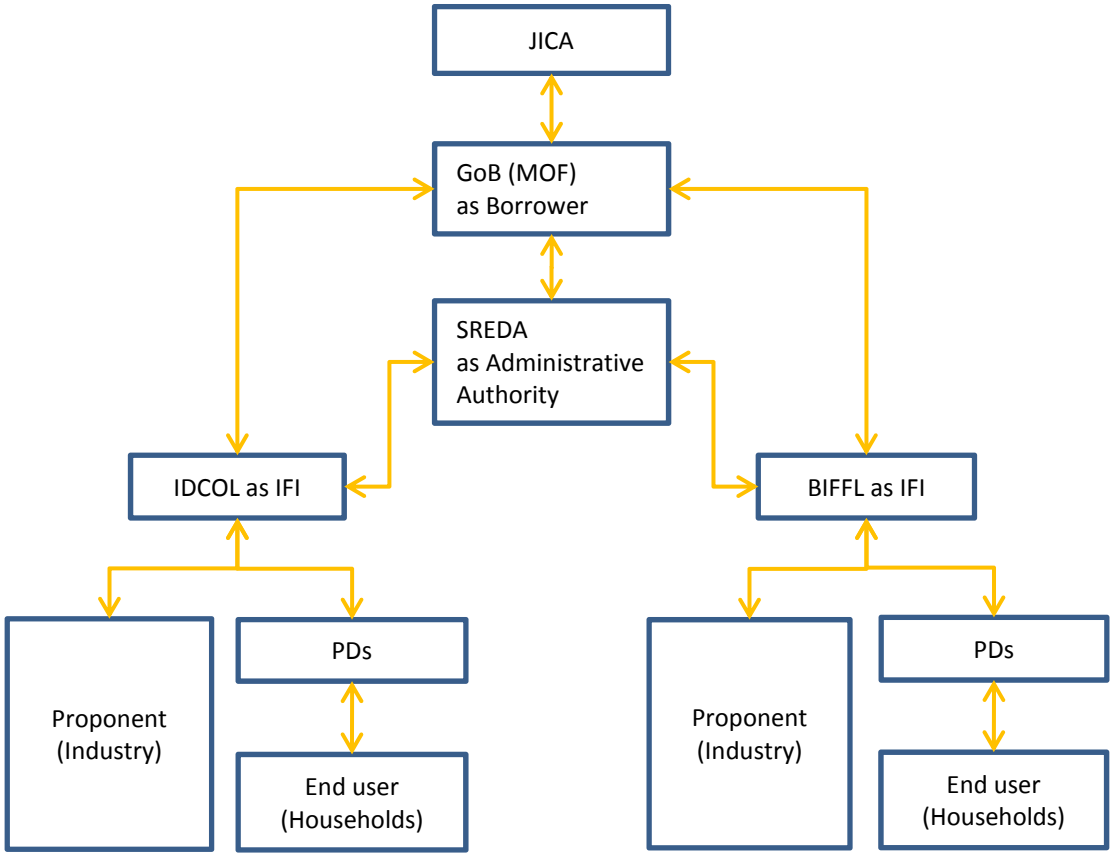


Figure 18 Executing Agencies and Other Major Stakeholders

5.1. SREDA

5.1.1. Overview of SREDA

Among the three executing agencies, SREDA is the administrative authority. The role of SREDA as the administrative authority under the Project is to set the policy and manuals for disseminating EE&C awareness to the public. SREDA is required to supervise/control the Project.

Sustainable and Renewable Energy Development Authority (SREDA) has been just formed in May 2014 according to the SREDA act as a nodal agency to promote, facilitate and disseminate sustainable energy, i.e. covering both the areas of renewable energy (RE) and energy efficiency and conservation (EE&C) to ensure the energy security of the country.

The Vision and Mission of SREDA are as follows:

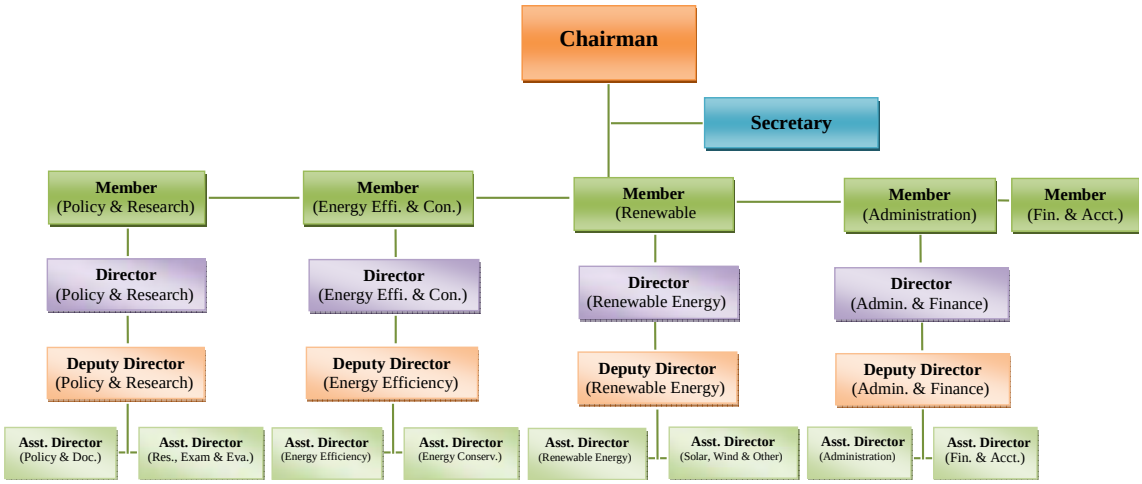
- Vision Statement: SREDA promotes sustainable energy and builds an energy conscious nation to ensure energy security and to reduce carbon emission.

- Mission Statement: Coordinate and facilitate the development of renewable energy and energy efficiency- to increase the share of renewable energy in the energy mix for reducing dependency on fossil fuel to take appropriate measures for energy saving and to assess continuously for new potential sustainable energy solutions

SREDA is under the Power Division of the Ministry of Power, Energy and Mineral Resources (MPEMR). At present SREDA is located within the offices of the Power Division as a tentative basis, and it is expected to move to its permanent workplace in September 2015.

The organization of SREDA is shown in Figure 19. There are 61 sanctioned posts among which 14 are actually positioned as of May 2015. The total numbers of employees will be 34 by June. The Organization structure will be drastically changed to be expanded to 101. The number of employees is expected to increase gradually through recruitment process.

The Board, consisting of a Chair, five honorary full-time members and eleven nominated members, is constituted for taking policy decisions. The eleven nominated members are from different Ministries/Divisions and representatives from academicians, professionals, technical experts, non-government organizations (NGOs) and business communities. They are officiated for the term of 2 years from the date of their nomination.



Source: SREDA

Figure 19 Organization of SREDA

The budget of SREDA for FY 2015-16 is BDT 48 million. The budget is mainly for office rent, transportation and personnel costs.

SREDA has just started its operation a year ago and has just preparing for promotion of EE&C measures and Renewable Energy. As of June 2015, SREDA is awaiting the enactment of the Energy Efficiency and Conservation Rules.

5.1.2. Evaluation of SREDA's Implementing Ability

As SREDA is a new organization, the analysis shown in Table 33 has been conducted from the viewpoint of project management. Final judgement of the feasibility must be based on an integrated appraisal of such issues as "scope of work", "cost/budget", "time", "quality", "communication", "human resources", "procurement" and "risk".

Table 33 Project Management Framework

	Final Target (to be)	Current Situation (as is)
Project Scope Management	1) Implementation of energy saving policy in general	1) While the Act has been in force, rules and regulations are still being formulated. As of November, 2015, the rules have the consent of the Ministry of Law, Justice and Parliamentary Affairs and it is expected that they will be finally adopted by the Prime Minister's Office by early 2016. Meanwhile, the formulation of the regulations is scheduled to take place with the assistance of the GIZ and their draft version should be presented by June, 2016.
	2) Steady implementation of EE&C Promotion financing	2) Any financing program will be based on the rules and regulations mentioned above and the work to prepare a financing scheme and to coordinate with financial institutions providing the actual financing are in progress.
	3) Finalization of the targeted amount for financing	3) The draft JICA plan envisages financing to the tune of JPY 12 billion in five years.

<table>
<tr><th></th><th>Final Target (to be)</th><th>Current Situation (as is)</th></tr>
<tr><td>Project Cost Management</td><td>1) Securing of the necessary budget in the medium to long-term period

2) Planning of the necessary expenses</td><td>1) The budget for FY2015/16 assumes 48 million BDT. Although a self-financing source (charge based on a certain proportion of the energy cost payable by businesses and consumers) is assumed in the medium to long-term, no concrete plan appears to exist yet.
2) The table below shows a breakdown of the SREDA budget for 2015/16, indicating that the necessary budget size has been secured. The SREDA budget consists of the budget for general expenses and budget for capital expenditure. Among the various expense items, those high on the list are salaries, rent for the new office and motor vehicle expenses.

<table>
<tr><th>Expenditure Issue</th><th>Amount of Allocation (BDT)</th></tr>
<tr><td>Salary</td><td>7,257,000</td></tr>
<tr><td>Allowances</td><td>4,568,580</td></tr>
<tr><td>Supply & Utility</td><td>21,953,420</td></tr>
<tr><td>(Office Rent)</td><td>(18,000,000)</td></tr>
<tr><td>Repair & Maintenance</td><td>120,000</td></tr>
<tr><td>General Account (a)</td><td>33,899,000</td></tr>
<tr><td>Capital & Asset Collection(b)</td><td>14,101,000</td></tr>
<tr><td>(Motor Vehicle)</td><td>(14,026,000)</td></tr>
<tr><td>Grand Total (a)+(b)</td><td>48,000,000</td></tr>
</table>
</td></tr>
<tr><td>Project Time/ Schedule Management</td><td>1) Preparatory year (planning stage)
2) Implementation stage (commencement year of financing ~ planned year of termination)</td><td>1) FY2015/16 and 2016/17
2) FY2016/17 ~FY2021/22</td></tr>
</table>

	Final Target (to be)	Current Situation (as is)
Project Quality Management	1) Certification of products and technologies for which EE&C promotion financing is applicable (industrial equipment, green buildings and domestic appliances)	1) Components: Industry and Commercial Sector component: The Technical Advisory Committee (TAC) will be established (with the participation of several stakeholders) and this committee will conduct the technical screening of the products and technologies eligible for financing. Building Sector Component: As the introduction of the revised National Building Code is planned, the eligible equipment, etc. will be determined along with the introduction of the said Code. Home Appliances Sector Component: The TAC will decide the certification criteria for domestic appliances (refrigerators, air-conditioning units and lighting equipment, etc. to start with) and those passing the relevant test at the BSTI laboratory, etc. will be awarded the star labelling.
	2) List of certified products and technologies and its periodic updating	2) The list in question will be approved by SREDA with the recommendation of the TAC and consent of JICA. The list will be expanded in the coming years in line with the advancement of the product certification system and relevant legal framework.
	3) Materialization of program financing and achievement of energy saving	3) While currently at the preparatory stage, discussions are in progress on the need to develop a procedure which enables the promotion of smooth financing by financial institutions.
	4) Cost-benefit analysis and achievement of a positive net benefit	4) It is planned to evaluate the social benefits of the financing program in reference to the (i) monitoring results, (ii) impact on health (improved health), (iii) beneficial effect on climate change, and (iv) improvement of an insufficient energy supply.

<table>
<tr><th></th><th>Final Target (to be)</th><th>Current Situation (as is)</th></tr>
<tr><td>Project Communications Management</td><td>1) Smooth coordination of opinions and views with such stakeholders as MPEMR, implementing institutions and JICA.

2) Establishment of the Project Implementation Unit (PIU) and development of good communication links with all stakeholders
3) TAC meetings and adequate certification of products and technologies</td><td>1) A stakeholder meeting, including the Survey Team members, has been held several times and the opinions, views and new proposals prepared by the Survey Team have been expressed (minor changes have been made).
2) PIU will be established within three months of the signing of the L/A.

3) Although the concept of the TAC has been finalized, a decision on the actual members has not yet been made.</td></tr>
<tr><td>Project Human Resource Management</td><td>1) Recruitment and management of people capable of appraising technologies, managing the TAC and preparing a list of eligible technologies and equipment.
2) Organizational structure enabling the promotion of EE&C financing

3) Capacity development to produce capable human resources and organization mentioned in 1) and 2) above</td><td>1) & 2) The authorized total manpower strength of SREDA is 61 staff members and 35 have been actually approved and posted as shown in the table below as of October, 2015.
<table>
<tr><th>Post</th><th>Approved</th><th>Posted</th></tr>
<tr><td>Chairman</td><td>1</td><td>1</td></tr>
<tr><td>Member</td><td>5</td><td>2</td></tr>
<tr><td>Secretary</td><td>1</td><td>0</td></tr>
<tr><td>Director</td><td>4</td><td>2</td></tr>
<tr><td>Deputy Director</td><td>4</td><td>2</td></tr>
<tr><td>Assistant Director</td><td>8</td><td>12</td></tr>
<tr><td>Program Associate</td><td>10</td><td>3</td></tr>
<tr><td>Program assistant</td><td>7</td><td>7</td></tr>
<tr><td>Others</td><td>21</td><td>6</td></tr>
<tr><td>Total</td><td>61</td><td>35</td></tr>
</table>
3) The planned training programs for staff members for human resources development are shown in the table below.
<table>
<tr><th>Training Program</th><th>Duration</th></tr>
<tr><td>Policy planning for EE&C</td><td>32days</td></tr>
<tr><td>Clean energy for Developing Countries</td><td>56days</td></tr>
<tr><td>Budget management</td><td>18days</td></tr>
<tr><td>Foundation training of newly recruited officers and staffs</td><td>35days</td></tr>
</table></td></tr>
</table>

	Final Target (to be)	Current Situation (as is)
Project Procurement Management	1) The main procurement items are an office (rental), vehicle, office staff, publicity, cost of convening TAC meetings, cost related to the Technical Advisory Team, test equipment for the appraisal of products and technologies and a laboratory. The securing of the necessary budgetary funding poses a challenge. 2) Effective budget execution in line with the progress from the preparation stage to the commencement of financing operation and acceleration of financing operation	1-1) The budget for 2015/16 is already shown in the Project Cost Management column. As this budget does not cover the cost of product testing equipment, early budgetary funding for such equipment is highly desirable to ensure a robust system to newly test and certify products in preparation for the establishment of an energy star labelling system. 1-2) Publicity will be financed by the project budget for the time being but the possibility of self-financing will be examined in the long-term. 2) It is essential to secure the necessary budget to fund changing operations and to prepare a viable budget execution plan.
Project Risk Management	1) Confirmation of risks 2) Examination of risk mitigation	1) Assumed risks 1-1) Risk of a possible change of the energy saving policies of the government 1-2) Risk of worsened communication between stakeholders 1-3) Risk of the actual size of the demand falling below the planned size of financing 1-4) Risk of increased unavoidable costs 1-5) Risk associated with the securing of the necessary budget 1-6) Risk associated with the securing of the necessary human resources 1-7) Risk of under-performing benefits 2) Risk mitigation measures (examples) 2-1) Review of the financing conditions (terms and conditions)

Source: Survey Team

Based on the results of the above analysis using the project management skills, the following facts can be pointed out along with the opinions of the Survey Team regarding the project implementation capability of SREDA.

- In addition to the SREDA Act, rules are being prepared and are likely to become statutory rules by the end of this year. The expected completion of the draft regulations by June, 2016 means that the necessary legal framework for the implementation of the project will be in place.

- SREDA has received the necessary budget to cover the general expenses and capital expenditure and appears to have the financial capability to back up the implementation of the project. Relocation to the new office is expected to take place by the end of 2015.
- The necessary concept for equipment, etc. of which the procurement is to be financed by the project has been developed and a list of the planned target items is being prepared for each of the three project components.
- Discussions with such stakeholders as IDCOL, BIFFL and JICA on the issue of project implementation have been progressing smoothly in a practical manner.
- The organizational strength of SREDA has been developed through the temporary assignment or transfer of staff members of other government ministries, etc. with experience in the energy saving field to SREDA. Although SREDA is a new organization, the recruitment of people with practical experience and knowledge in the relevant fields (Table 54) indicates that it should eventually possess the necessary technical competence to implement the project. It has already recruited 35 staff members, including those from the private sector, and plans to further develop the capability of its staff members through a number of training programs. It is also planned to recruit 26 additional staff members in the near future.

In the light of the progressing organizational set-up of SREDA, the Survey Team highly appraises the efforts made by SREDA to implement the Project and their results and there are currently no negative factors casting doubt on SREDA's project implementation capability.

Table 34 SREDA Staff Origin and Relevant Skills

Position	Original belongings before transferred	Relevant knowledge
Member	Power Division of Ministry of Power, Energy and Mineral Resources (MPEMR)	Demand and Supply Planning of Electricity
	Energy Efficiency division of MPEMR	Demand and Supply Planning of Natural Gas
Director	Power Cell, MPEMR	Technology on Power Generation
	Ministry of Water Resources	Technology on Energy Saving
	Rural power company, LTD.	Power Transmission Efficiency
Deputy Director	Ministry of housing & Public Works	Technology on Energy Efficiency Building
	Electricity Generation Company of Bangladesh	Power Generation Efficiency
Assistant Director	Ministry of Public Administration	Financial Analysis

Source: Survey Team interviews

5.1.3. Recommendations for SREDA's Capacity Development for Project Implementation

SREDA started its activities in May 2014, and is now under the process of establishing the management and operation structure of their own organization. The current situation of management is as follows:

- Basis of the organization: SREDA is a nodal agency to promote, facilitate and disseminate EE&C to Bangladesh according to the SREDA act;

- Policies and institutions: the draft of the Energy Efficiency and Conservation Rules are completed and now under discussion with Ministry of Law. It will be enacted by early 2016. Regarding the regulations SREDA is preparing TOR and expect to complete within a year (by the end of fiscal year 2015-2016);
- Organization: SREDA has a comprehensive organogram but current number of personnel is only 14 as of June, and SREDA will have it increased gradually.
- Budget: BDT 48million (2015-2016)
- Office and equipment: the office of SREDA is in the part of Power Division tentatively. SREDA has a plan to move to new office by 2016;
- Relation with stakeholders: SREDA has close relations to many stakeholders, governmental agencies, academics, industries, financial institutions, etc.

Recommendation for improvement of management:

- SREDA does not posses sufficient knowledge and experiences for implementing the EE&C policies. SREDA will have to prepare a concrete plan to implement the energy auditing system along with training, examination and certification system of energy auditors and energy managers, as well as establishment of regulations on those systems.

5.2. IDCOL

5.2.1. Overview of IDCOL

IDCOL is one of the two IFIs who extend low interest loans to the factories, commercial facilities, and participating distributors (PDs) with the aim to support their purchase of EE&C equipment and appliances.

IDCOL is a Government-owned Non-Banking Financial Institution (NBFI) which is regulated under the Financial Institution Act, 1993 and controlled by Bangladesh Bank. IDCOL was established in 1997 and licensed as a NBFI on 1998. It is playing a major role in bridging the financing gap for developing medium and large scale infrastructure and renewable energy projects in Bangladesh. It now stands as the market leader in private sector energy and infrastructure financing in Bangladesh.

The Vision and Mission of IDCOL are as follows;

VISION:

- To help ensure economic development of the country and improve standard of living of the people through sustainable and environment-friendly investments.

MISSION:

- To catalyse and optimize private sector participation in promotion, development, and financing of infrastructure as well as renewable energy, and energy efficient projects in a sustainable manner through public-private-partnership initiatives.

The organization of IDCOL, as of June 2015 is as shown in Figure 20. There are 6 branches under the management of Executive Director, Chief Executive Officer (CEO) and Deputy CEO. The branches are namely Renewable Energy, Investment, Legal & Compliance, Credit Administration, Finance & Account and Operations.

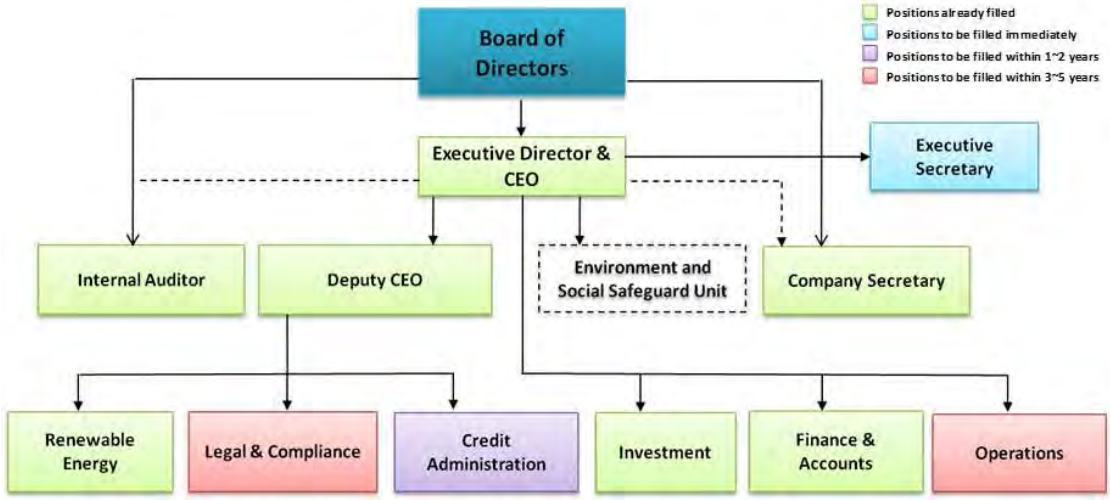
According to the interviews to IDCOL, it is not allowed to invest and hold equities to projects and companies.

The staffing maps of 2 project branches are shown in Figures 21 and 22.

In the Renewable Energy Branch, under the management of Chief Program Officer/Director, there are 5 divisions, namely Promotion & Capacity Building, SHS Program, Technical, Household Energy and Other RE Applications.
In the Investment Branch, under the management of Investment Officer, there are 3 divisions, namely large infrastructure unit, Small and Medium Infrastructure Unit and Corporate Advisory.

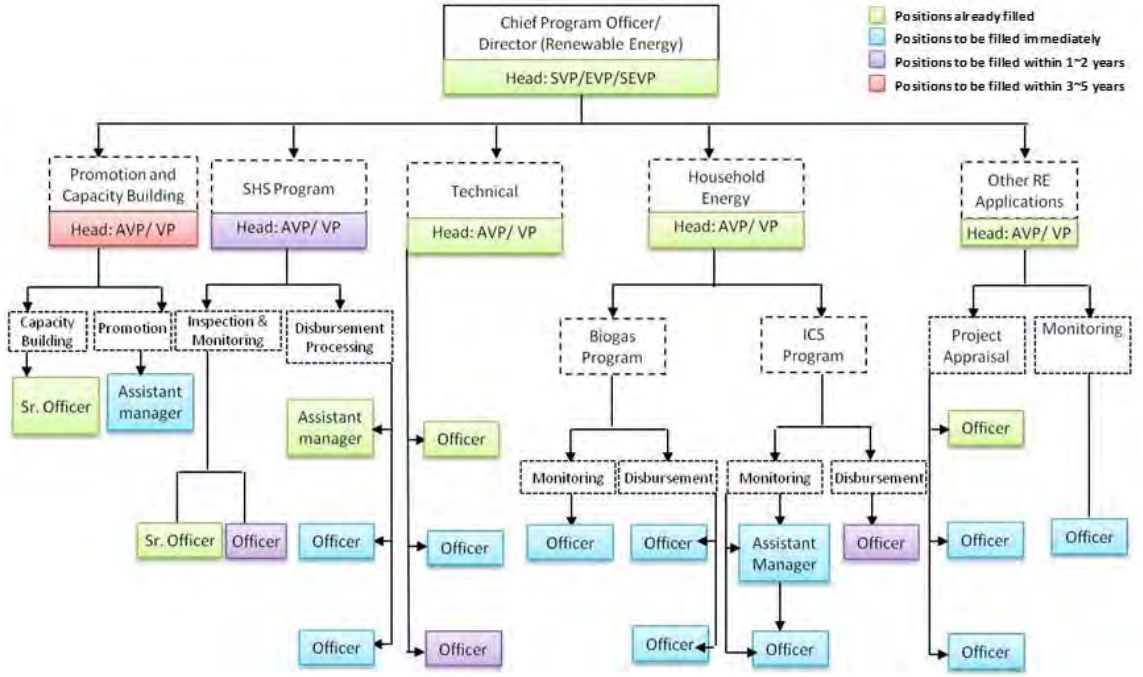
IDCOL has 260 personnel. Among them in the renewable energy branch and investment branch there are approximately 30 and 11 staffs respectively in the headquarters and 200 staffs in the 13 regional offices.

According to the interviews to IDCOL, the projects for promoting Energy Efficiency will be managed by the Renewable Energy Branch or the Investment Branch.



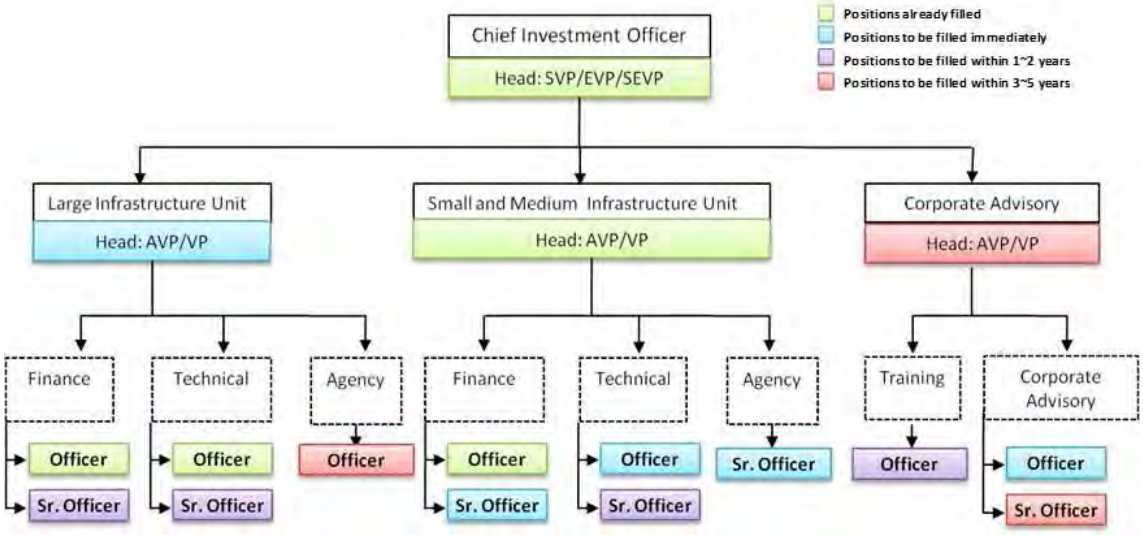
Source: IDCOL

Figure 20 Organization of IDCOL



Source: IDCOL

Figure 21 Staffing Map of Renewable Energy



Source: IDCOL

Figure 22 Staffing Map of Investment

The Board of Management of IDCOL consists of 8 members as below;
4 senior government officials:
- Senior Secretary of Economic Relations Division (Chairman)
- Senior Secretary of Finance Division, Ministry of Finance,
- Secretary of Ministry of Information & Communication Technology
- Secretary of Power Division (MPEMR)

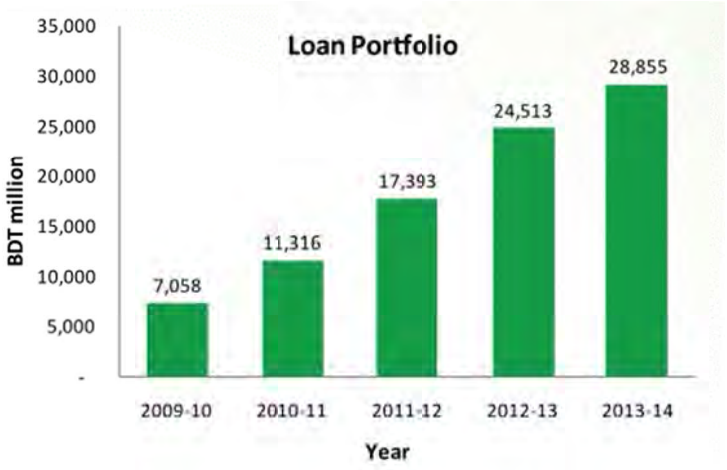
2 prominent business personalities:
- Advocate of Bangladesh Supreme Court & Senior Partner, Syed Ishtiaq and Associates
- Managing Director of Haq's Bay Automobiles Ltd.

2 full-time Executive Director & CEO and Director

The figures of key financial and operating performances of IDCOL are shown in the figures below. All of total assets, loan portfolio and profit are increasing steadily.

Source: IDCOL Annual Report 2013-14

Figure 23 Trends of Total Assets



Source: IDCOL Annual Report 2013-14

Figure 24 Trends of Loan Portfolio

Source: IDCOL Annual Report 2013-14

Figure 25 Trends of Profit

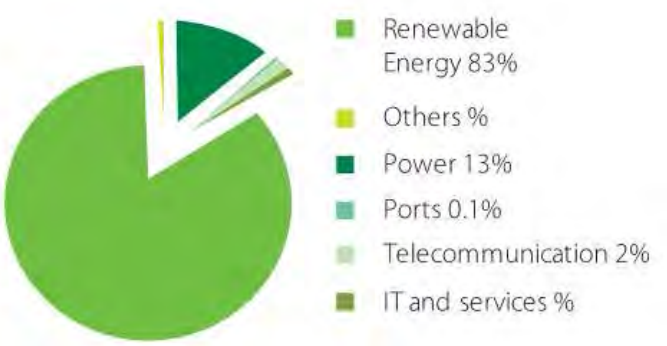
The sector wise loan portfolio of IDCOL is shown in Table 35 and Figure 26. IDCOL provides financial supports for developing infrastructures, renewable energy and energy efficiency projects. Among them the share of the loans for renewable energy projects are increasing for the last 3 years and accounts for over 80%. As shown in Figure 28, the share of the interest income from SHS program account for 78% among the interest income. It can be said that IDCOL accomplishes high performance mainly from renewable energy sector, especially from the SHS program.

Table 35 Sector wise Loan Portfolio

(Unit: BDT Million)

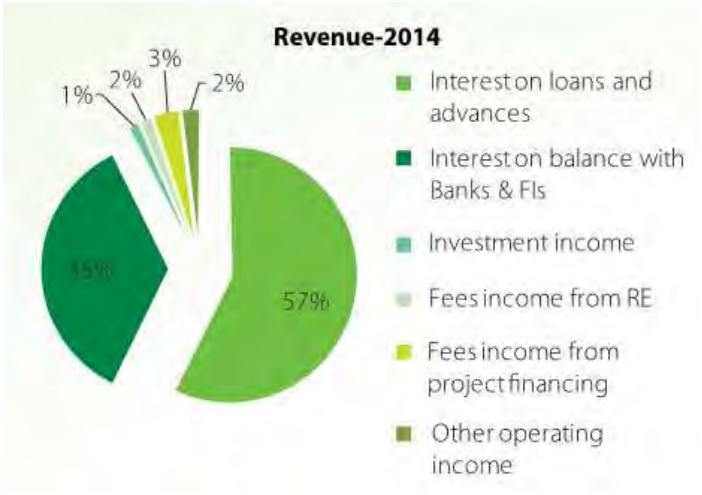
	2011–12	composition ratio	2012–13	composition ratio	2013–14	composition ratio
Power	4,040	23.2%	2,904	11.8%	3,817	13.2%
Ports	203	1.2%	82	0.3%	82	0.3%
Telecomunication	1,866	10.7%	968	3.9%	431	1.5%
IT and Service	603	3.5%	299	1.2%	224	0.8%
Renewable	10,572	60.8%	20,074	81.9%	24,080	83.5%
Others	110	0.6%	186	0.8%	221	0.8%
Total	17,394	100.0%	24,513	100.0%	28,855	100.0%

Source: IDCOL Annual Report 2013-14



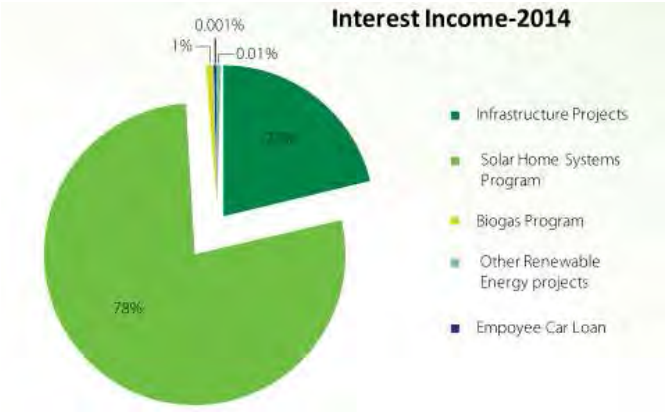
Source: IDCOL Annual Report 2013-14

Figure 26 Sector Wise Loan Portfolio



Source: IDCOL Annual Report 2013-14

Figure 27 Trends of Profit



Source: IDCOL Annual Report 2013-14

Figure 28 Sector Wise Interest Income

The profit loss account and the balance sheet of IDCOL are shown in Tables 36 and 37 respectively. The profit loss account of IDCOL shows that its total revenue during 2013-14 was BDT 3,870 million (2,826+1,044). During the same period, the IDCOL's operating and interest expenses were BDT 1,179 million (135+1,044) and profit before tax and provision was BDT 2,691 million. Provision of BDT 86 million has been made for loans and advances and BDT 1,152 million for tax. While, retained earnings at the end of 2013-14 was BDT 1,453 million.

Evolvement of income and expenses for the recent three years shows that IDCOL's operation has been rapidly growing. Therefore, IDCOL has been successful in increasing the retained surplus every fiscal year, also enabling the constant increase of earning per share.

IDCOL's paid up capital increased from BDT 1,200 million in 2011-12 to BDT 2,600 million in 2013-14. With a 217 percent increase in asset base, IDCOL achieved after tax income growth by nearly 232 percent. Shareholders' equity also experienced almost 200 percent growth over the previous fiscal year.

Table 36 Profit Loss Account of IDCOL

(Unit: BDT 1,000)

		30.6.2012	30.6.2013	30.6.2014
Operating income				
	Interest income	1,631,256	2,610,309	3,577,189
	less. interest expense	410,702	727,407	1,043,726
Net interest income		1,220,554	1,882,902	2,533,463
Investment income		109,500	82,125	47,850
Fees, Commission & brokerage		51,146	112,731	170,536
Other operating income		18,027	46,046	74,054
Total operating income		1,399,227	2,123,804	2,825,903
Operating expenses				
	Salary and allowance	9,559	13,042	40,906
	Rent, tax, insurance, electricity etc.	879	1,121	1,692
	Legal expense	1,288	405	171
	Postage, stamp, telecommunication etc.	666	868	768
	Stationery, printing, advertisement etc.	1,744	4,545	4,242
	Chief Executive's salary and fees	4,482	6,735	9,734
	Director's fee	449	468	771
	Auditor's fee	97	107	112
	Depreciation and repair of Company's assets	7,231	7,945	10,856
	Other operating expenses	43,550	120,365	65,723
	Changes on loan losses	0	0	0
Total operating expenses		69,943	155,602	134,974
Profit/(Loss) before provision & tax		1,329,283	1,968,203	2,690,929
	provision for loans and advances	135,008	103,982	86,022
Total provision		135,008	103,982	86,022
Net profit/(Loss) before Tax		1,194,275	1,864,221	2,604,907
Tax expenses		568,370	828,669	1,152,168
Net profit/(Loss) after Tax		625,904	1,035,552	1,452,740

Source: IDCOL Annual Report 2013-14

Table 37 Balance Sheet of IDCOL

(Unit: BDT 1,000)

		30.6.2012	30.6.2013	30.6.2014
PROPERTY AND ASSETS				
Cash		71,429	84,091	1,039,058
	Cash in hand	3	0	24
	Balance with Bangladesh Bank and its agent bank	71,426	84,091	1,039,034
Balance with other banks and financial institutions		4,695,092	9,920,506	17,364,848
	in Bangladesh	4,695,092	9,920,506	17,364,848
	Outside Bangladesh	-	-	-
Money at call and short notice		-	200,000	-
Investment		800,000	400,000	-
	Government	-	-	-
	Others	800,000	400,000	-
Loans and advances		17,393,492	24,513,143	28,855,157
Fixed assets including land, building, furniture and fixtures		33,555	41,551	50,624
Other assets		1,433,866	2,080,489	1,533,330
Total assets		24,427,234	37,239,780	48,843,017
LIABILITIES & CAPITAL				
Liabilities				
	Borrowings from other banks and financial Institutions	20,812,049	31,640,633	41,737,714
	Deposit and other accounts	-	-	-
	Other liabilities	1,763,436	2,806,045	2,999,461
	Total liabilities	22,575,485	34,446,678	44,737,175
Capital/Shareholders' equity				
	Paid-up Capital	1,200,000	1,720,000	2,600,000
	Statutory reserve	-	-	-
	Retained earnings	651,948	1,073,102	1,505,841
	Total shareholders' equity	1,851,948	2,793,102	4,105,841
Total liabilities and shareholders' equity		24,427,234	37,239,780	48,843,017

Source: IDCOL Annual Reports

Based on the trend of profit loss account of IDCOL for the past 3 years, profit amount as well as business scale is expanding rapidly. Net profit before tax is increasing at around 40~60% annually. On the other hand it may be noted that salary and allowance is increasing more rapidly compared with that of the business scale. Regarding the financial status, both of liability and capital / shareholders' equity are increasing by rapid business expansion and total assets is increasing at the rate of 30~50% annually. The trend of ROA (Return on Asset) which shows earning capacity of the organization is around 5% stably. It means that IDCOL is conducting a stable business operation. As a conclusion, it can be said that IDCOL is an appropriate organization to conduct the Project with reference to its ability to perform a stable business operation, even under rapid business and organization expansion.

5.2.2. IDCOL as an Implementing Financial Institution

At the time of the second field survey, IDCOL and BIFFL are considered to be candidate implementing financial institutions. Table 38 briefly compares these two institutions.

Table 38 Features of IDCOL and BIFFL

	IDCOL	BIFFL
Date of Establishment	May, 1997	March, 2011
Capitalization	2.6 billion BDT Wholly government funded	20 billion BDT Wholly government funded
Targets for Lending	Private enterprises (SPCs and individual enterprises)	PPPs (public-private partnerships) Private enterprises (SPCs and individual enterprises) Public bodies
Investing Function	No	Yes
Relationship with National Bookkeeping	-	Further capital injection possible (closely connected to government finance)
Outstanding loans	BDT 25,855 million (June, 2014)	BDT 1,033 million (December, 2014)

Source: IDCOL and BIFFL

Interviews with these organizations have found that while BIFFL is a non-bank financial institution (NBFI) which is wholly funded by the government as in the case of IDCOL, it was established fairly recently in 2011. BIFFL greatly differs from IDCOL in that its main purpose is to finance or invest in infrastructure projects based on PPP. In contrast, the main purpose of IDCOL is to finance (not invest in) SPCs based on partnerships of private enterprises. BIFFL can also fund individual enterprises as in the case of IDCOL.

5.2.3. IDCOL's Lending Manuals

IDCOL was established in 1997 as a private limited company wholly owned by GoB. Its role is to trigger and consolidate linkage between the funding capacity and business management capacity with a view to contributing to the efficient development of the industrial foundations of Bangladesh through debt financing.

IDCOL has prepared a business management manual to properly execute its role of financing various business operations in the private sector. This manual, in fact, consists of four manuals detailing the policy, procedure and guidelines to enable members of the Board of Directors, staff members, advisors and consultants to duly perform their obligations and responsibilities.

Table 39 IDCOL's Operating Manuals

	Name of Manual	Main Contents
Volume 1	Administration Manual	1) Procedures and guidelines for everyday administrative work 2) Guidelines required specifically for personnel affairs and human resources policies
Volume 2	Accounting, Audit and Internal Control Manual	1) Policies, procedures and guidelines relating to the accounting of the financing business 2) Capital spending, monitoring of project finance, legal compliance system, internal auditing and internal control

Volume 3	Project Appraisal Manual	1) Procedures and guidelines for project appraisal, financing negotiations and financing execution
Volume 4	Environmental and Social Appraisal Manual	1) Procedures and guidelines for the environmental impacts of projects on communities and residents

Source: IDCOL

IDCOL has also prepared other guidelines and manuals as listed below.

Table 40 IDCOL's manuals

Name of Guidelines or Manual	Main Contents
Credit Risk Management (CRM) Guidelines	1) Policy and strategic guidelines Loan guidelines Credit assessment and risk management Loan approval policy Internal control 2) Organizational structure for risk management and responsibilities Organizational structure for risk management Main responsibilities 3) Procedure guidelines Loan approval procedure Loan management Post-loan management Loan collection
Internal Control and Compliance Manual	1) Manual to underpin the achievement of objectives in the following areas: Effectiveness and efficiency of projects Reliability of accounting statements Compliance with governing laws, regulations and organizational policies
Management Information System (MIS) User's Manual	1) Manual to confirm that the expenditure in each account of IDCOL is within the relevant budget, appropriate accounts are used and financial statements are filed using the management information system.
Project Appraisal Manual	1) Procedures and guidelines listed below which are necessary to conduct project appraisal, approval and loan negotiations with private sector investors in infrastructure projects in an effective manner Infrastructure projects and project finance Loan application and preliminary loan appraisal Appraisal of the technical, legal and environmental aspects FIRR and EIRR evaluation Negotiations on the terms and conditions of loans Loan approval and post-approval procedures Glossary

Source: IDCOL

Review of these manuals and guidelines has confirmed that IDCOL possesses fully established internal procedures and loan appraisal manuals which are essential for financing operations.

However, there are still some pending issues as listed below.

- Some manuals (especially the project appraisal manual) have too many detailed headings and sub-headings as a result of the assistance of external organizations at the time of IDCOL's establishment.
- As appraisal items are introduced for the purpose of appraising project finance, the procedure for the appraisal of individual enterprises (especially enterprises in the manufacturing sector which IDCOL has not historically dealt with) is insufficient.
- The first source for loan collection is cash flow generated by the project, followed by cashing of the project assets, guarantee provided by enterprises investing in the project (sponsors) and personal guarantee provided by the owners of sponsors in that order. The appraisal of sponsors and owners primarily features their ability to provide a loan guarantee.

These pending issues and possible measures to deal with them are discussed later.

Considering these manuals and guidelines, the Survey Team can decide IDCOL prepares loan systems on a satisfactory level, while there are following issues to be resolved.

- Project Appraisal Manual were drawn backed by international agency when IDCOL was established and was not revised for a long time.
- Project Appraisal Manual focuses mainly on appraisal of project finance, does not fully cover aspects of corporate finance (especially for manufacturers).
- IDCOL requires security package including personal guarantee and corporate guarantee from sponsor which becomes a heavy burden for sponsor.

5.2.4. State of Loans extended by IDCOL

IDCOL's Annual Report for 2015 reveals the loan performance shown in the following table.

Table 41 Overall Loan Performance

(Unit: BDT million)

	2013	Share	2014	Share
Infrastructure Loans	4,470	18.2%	4,796	16.6%
Renewable Energy Projects	20,037	81.8%	24,045	83.4%
Employee Car Loans	2	0.0%	6	0.0%
Total	24,509	100.0%	28,847%	100.0%

The main recipients of IDCOL loans are renewable energy projects while loans for infrastructure development account for only some 17%. The next table shows the breakdown of loans for renewable energy projects.

Table 42 Breakdown of Loans for Renewable Energy Projects

(Unit: BDT million)

	2013	Share	2014	Share
Solar Home Systems	19,453	79.4%	23,368	81.0%
Biogas Programs	247	1.0%	288	1.0%
Other Renewable Energy Projects	338	1.4%	389	1.3%
Total	20,038	81.8%	24,045	83.4%

The table shows that solar home systems (SHSs) are by far the main recipients of IDCOL loans for renewable energy projects and this type of loan accounts for 81.0% (2014) of the overall loan amount provided by IDCOL. In terms of the financing structure, the original fund for loans for SHSs is made up of loans and grants from JICA and other aid organizations, constituting a two-step loan by IDCOL via POs (NGOs and other participating bodies). As such, the proportion of project loans directly provided for debtors is less than 20%.

The Annual Report includes a consolidated cash flow statement in addition to the settlement of accounts for IDCOL itself. Based on this consolidated cash flow statement, the loan performance through a revolving facility using repaid principal and interest is shown in the following table.

Table 43 Consolidated Cash Flow Statement (Excert)

(Unit: BDT million)

Item	June, 2013 Term	June, 2014 Term
Cash Inflow		
Repair Principal and Interest	11,375	12,698
(- Private Sector Infrastructure Development Projects)	8,392	9,162
(- Rural Electrification and Renewable Energy Development Projects)	2,984	3,536
Cash Outflow		
Lending Using Repair Principal and Interest	6,222	6,702
(- Private Sector Infrastructure Development Projects)	4,899	5,202
(- Rural Electrification and Renewable Energy Development Projects)	1,323	1,500

On consolidated basis, refinancing from Revolving Facility of Private Sector Infrastructure Development Project reaches to BDT 5,202 million. Based on the consolidated cash flow statement, the cash inflow as well as outflow amounts for the Private Sector Infrastructure Development Project far exceed those for the Rural Electrification and Renewable Energy Development Project. It must be noted that the annual report states that the non-consolidated accounting does not include the programs which are directly financed by international organizations and that such financing is only indicated in the cash flow statement.

5.2.5. IDCOL's Financial Conditions

Table 44 Statement of Financial Position

(Unit: BDT million)

	FY 2012	FY2013	FY2014
Cash	71	84	1,039
(Bangladesh Bank)	71	84	1,039
Balance With Other Banks	4,695	9,921	17,365
Money at Short Cal	0	200	0
Investment	800	400	0
Loans & Advances	17,393	24,513	28,855
Fixed Assets	34	42	51
Other Assets	1,434	2,080	1,533
Total Assets	24,427	37,240	48,843
Borrowings from Other Banks & Financial Institutions	20,812	31,641	41,738

Deposit	0	0	0
Other Liabilities	1,763	2,806	2,999
Provision for Loans & Advances	351	455	541
Total Liabilities	22,575	34,447	44,737
Total Shareholders' Equity	1,852	2,793	4,106
(Paid-up Capital)	1,720	1,720	2,600
Total Liabilities and Total Shareholders' Equity	24,427	37,240	48,843

Source: IDCOL

Table 45 Statement of Comprehensive Income

(Unit: BDT million)

	FY 2012	FY2013	FY2014
Interest Income	1,631.2	2,610.3	3,577.2
Interest Expenses	410.7	727.4	1,043.7
Net Interest Income	1,220.5	1,882.9	2,533.5
Investment Income	109.5	82.1	47.9
Fees, Commissions & Brokerage	51.2	112.7	170.5
Other Operating Income	18.0	46.1	74.1
Total Operating Income(A)	1,399.2	2 123.8	2,826.0
Operating Expenses	26.4	35.2	69.3
Salary & Allowance	9.6	13.0	40.9
Rent, Taxes, Insurance, Electricity, etc.	0.9	1.1	1.7
Legal Expenses	1.3	0.4	0.2
Postage, Stamp, Telecommunication etc.	0.7	0.9	0.8
Stationary, Printing, Advertisement, etc.	1.7	4.5	4.2
Chief Executive's Salary and Fees	4.5	6.7	9.7
Directors' Fee	0.4	0.5	0.8
Auditors' Fee	0.1	0.1	0.1
Depreciation and Repair of Company's	7.2	8.0	10.9
Other operating expenses	43.5	120.4	65.7
Changes of loan losses	0	0	0
Total Operating expenses(B)	69.9	155.6	135.0
Profit(Loss) before Provision & Tax(C=A-B)	1,329.3	1,968.2	2,691.0
Provision for loan losses and advances	104.0	104.0	86.0
Total provision(D)	135.0	104.0	86.0
Net profit /(loss)before tax （E)=(C-D)	1,194.3	1,864.2	2,605.0
Tax expenses	568.4	828.7	1,152.5
Net profit /(loss)after tax	625.9	1035.5	1,452.8

Source: IDCOL

Table 46 Statement of Cash Flow

(Unit: BDT million)

	FY 2012	FY2013	FY2014
Cash flow from operating activities			
Interest Received	1,628	2,610	3,577
Interest paid	-414	-727	-1,044
Investment income received	110	82	48
Fees and commission received	51	113	171
Paid to employee and suppliers	-63	-148	-124
Receipts from other operating activities	20	43	68
Cash generated from operating activities before in operating assets and liabilities	1,335	1,975	2,696
(Increase)/decrease in operating assets and liabilities			
Decrease/(increase) advances, deposits and prepayment	-3	-22	-36
Decrease/(increase) advances income tax	-513	-760	-1,109
Decrease/(increase) accounts receivables	-227	166	-115
Decrease/(increase) differed expenses	0	11	0
Increase/(decrease) interest suspense account	38	37	-26
Increase/(decrease) payable and accrued expenses	292	48	775
Increase/(decrease) employees' gratuity fund	2	3	7
Net cash flow from operating activities	-411	-517	-504
Cash flow from investing activities			
Acquisition of fixed assets	-9	-7	-8
Investment	0	400	400
Loans and advances	-6,068	-7,119	-4,342
Net cash flow from investing activities	-6,077	-6726	-3,950
Cash from financing activities			
Loan from Government of Bangladesh	7,122	10,829	10,097
Dividend paid	-100	-120	-140
Net cash flow from financing activities	7,022	10,709	9,957
Net increasing cash and cash equivalents	1,869	5,439	8,199
Cash and cash equivalent at the beginning	2,897	4,766	10,205
Cash and cash equivalent at the end	4,766	10,205	18,404

Source: IDCOL

The financial statements of IDCOL suggest the following strengths and weaknesses:

- The balance of loans and advances as of June, 2014 is BDT 28,855 million which is a substantial increase of 17.7% of the balance as of June, 2013 (BDT 24,513 million) and 40.9% of the balance as of June, 2012 (BDT 17,393 million).

- The original funds for lending are primarily borrowing from such aid organizations as IDA and JICA and the amount stands at BDT 41,738 million as of June, 2014.

- Among financial indicators, the equity to total asset ratio as of June, 2014 is 8.41% based on simple calculation. Commercial banks are required to set their own equity to total asset ratio which takes the weight of risk involving loans made into consideration as required by the BASEL-III under the guidance of the central bank and the average ratio is 10.7%.

- Loans for SHSs are made in the form of a two-step loan via POs. As two POs, i.e. Grameen Shakti and Rural Service Foundation, have made 50.2% of the outstanding total amount of these loans, the structure of these loans is somewhat biased.

- From the viewpoint of the soundness of assets, the ratio of classified loans is very small at 0.80% or BDT 232 million, making the provision for loan losses of BDT 541 million relatively low. In short, the financial situation of IDCOL is sound.

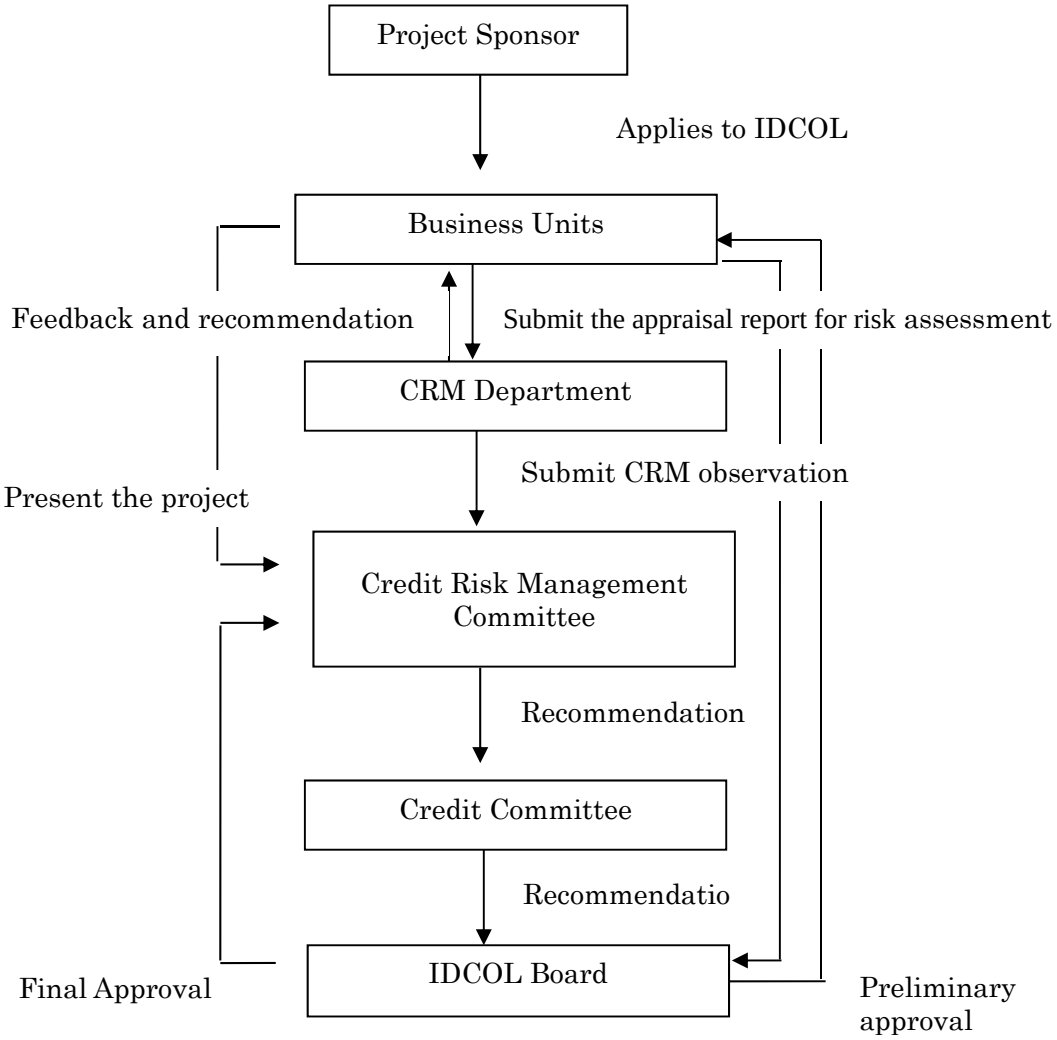
- In terms of profit and loss, the net profit before tax for the June, 2014 term is BDT 2,605 million. It has increased steadily over the three year period shown here in line with the increase of the total amount of loans and advances. The received interest rate for average loans outstanding in the June, 2014 term is 13.41% and the average borrowing cost rate of 2.84% is low, resulting in a high margin of gross profit of 10.56% (9.68% for the first half).

IDCO has recorded a favourable earnings performance in recent years due to the steadily increasing outstanding loans primarily featuring SHSs, high level of the margin of gross profit and few bad debts up to the present.

In view of such performance, the Credit Rating Agency of Bangladesh (CRAB), a private credit-rating company, gives IDCOL the highest AAA credit rating.

5.2.6. Loan procedure at IDCOL

The flow of project loan provided by IDCOL is shown in the next figure.



Source: IDCOL

Figure 29 Loan procedure for project finance

The functions at each stage of the procedure are as shown in the following table:

Table 47 Issues examined in each section

Stage	Functions
Business Unit	1) Receives a credit application from a client 2) Conducts a preliminary project appraisal 3) Submits it to the Board 4) After clearance by Board, conducts a detailed project appraisal and submits it to the CRM Department 5) Makes a presentation to the Credit Risk Management Committee
CRM Department	1) Makes a detail risk assessment of project appraisal 2) Feeds back to the business unit for any necessary changes 3) Submits observations and recommendations to the Credit Risk Management Committee
Credit Risk Management Committee	1) Makes a risk assessment and forwards it to the Credit Committee with recommendations

Credit Committee	1) Considers the project on the basis of recommendations made by the Business Unit and the CRM Committee 2) Forwards it to the Board
Board	1) Conducts a preliminary appraisal and makes a go/no-go decision 2) Has the authority to make an investment decision 3) May delegate some approval to management
Section	Issues examined

IDCOL's project loan procedure has the following characteristics and problems.

- When an application is made, initial screening at the point of application is conducted with the advance approval of the Board to check such issues as whether or not any enterprises sponsoring the project in question have incurred a bad debt with other banks.
- This initial screening is followed by further credit appraisal involving five stages, making the fastest final approval time at least three months.
- All projects must be finally approved by the Board and there is basically no delegation of authority (according to the interview results).

While the flow of IDCOL loans is described above, the Survey Team believes that the forthcoming finance program should aim at simplifying the loan procedure and shortening the period to finalise the loan as much as possible.

The flow of the two-step loan which is mostly used under the SHS program is described in the following figure. The lending procedure for two-step loans, the amount of which has been increasing recently, for POs (participating organizations) is shown in the following figure.

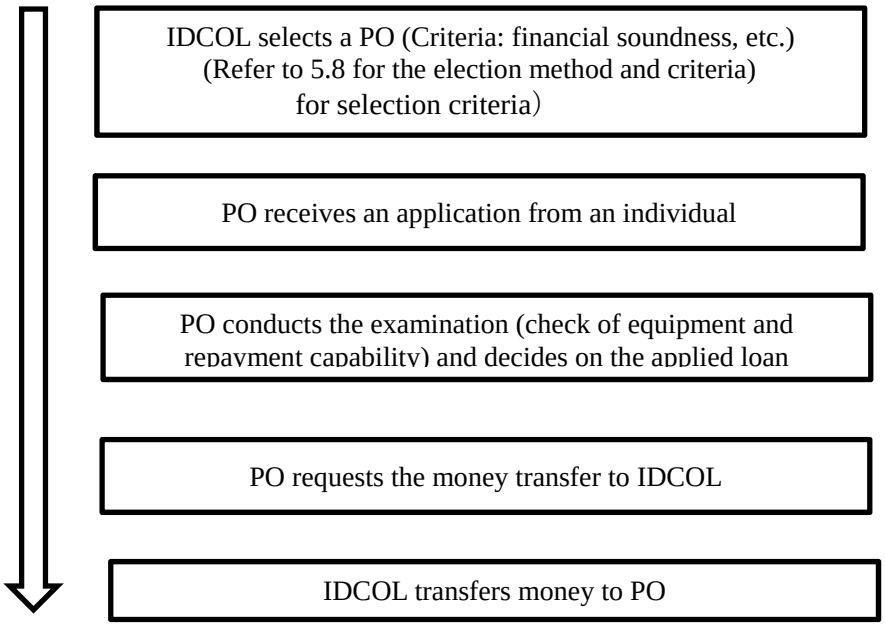


Figure 30 Flow of SHS Loan Procedure

A PO selected by IDCOL in advance directly receives an application which it then appraises (checking of the compliance of the equipment to be procured and the repayment capability of the applicant). IDCOL is not directly involved in judgement of the application. The decision-making authority concerning money transfer rests with the management.

The transfer of money from IDCOL to a PO will take three weeks at the shortest after a request by the said PO. According to IDCOL, the reason for this is the need to conduct the random inspection (5% to 15% of applicants) of the state of equipment installation at users. It will be difficult to shorten this period provided that the current inspection regime remains unchanged. Meanwhile, the need to maintain a certain level of stock (equivalent to one to two months' supply) to immediately respond to procurement requests by users and the waiting time to receive money from IDCOL post financial burdens for POs.

A PO receives the difference between the interest payable to IDCOL and the interest receivable from the client as its profit but bears a lot of the administrative burden, including a risk associated with a possible loan collection rate of 90 – 95% from debtors and any work when repayment is delayed or any other eventuality (demand for the payment of a charge for delayed payment, etc.). Some POs have requested modification of the lending scheme as their profit is relatively small compared to the risks and administrative burden and also because of the declining demand for SHS.

According to POs, the profitability of the SHS program has been worsening because of (i) the gradual increase of the electrification rate in rural areas, (ii) the availability of a government subsidy for consumers in non-electrified areas separately from the SHS program and (iii) the intensifying competition among SHS suppliers. In short, the SHS program is unlikely to see a large increase of associated loans in the coming years. Given the worsening business situation of POs, IDCOL will face scrutiny of its administrative capability to monitor and rectify where appropriate the business performance, including the loan repayment situation, of the POs.

5.2.7. Credit Appraisal by IDCOL

IDCOL uses the CRM guidelines and project appraisal manual to appraise loan applications.

Table 48 CRM Guidelines and Project Appraisal Manual

CRM Guidelines	These guidelines summarise the project appraisal items listed below. 1) Project analysis 2) Sponsor analysis 3) Technical analysis 4) Country, sector and market analysis 5) Financial analysis 6) Economic analysis 7) Legal and security aspects 8) Risk assessment and mitigation measures
Project Appraisal Manual	Although this manual explains the appraisal method in detail, it is heavily biased towards project appraisal due to the assistance provided by external organizations for the establishment of IDCOL rather than appraisal of the performance of individual enterprises. To minimize the ultimate loan collection risk, it requires securities and/or a guarantee from not only a SPC, which plays a central role in a project, but also from sponsors and the owners of sponsors (in this sense, it is a recourse loan compared to an ordinary non-recourse project loan).

Source: IDCOL

5.2.8. Implementation Capacity of IDCOL

The results of the analysis of IDCOL's capability to implement a financing project from the viewpoint of past performance, loan procedure and project appraisal method suggest that there is no special area of concern, partly because IDCOL has experience of both A-type loans involving direct finance for debtors, which is the scheme under consideration for the present project, and B-type loans using POs for financing and partly because of the sound business

performance of IDCOL itself.

There are, however, some issues requiring further examination as listed below including those already raised.

- Although IDCOL has experience of project finance, it has little experience of corporate finance (especially in the manufacturing sector), making the acquisition of know-how on corporate appraisal essential.
- A simpler and faster loan procedure is required.
- For the provision of B-type loans, it is necessary for IDCOL to improve the risk sharing mechanism with POs and to simplify the administrative procedure governing its loans.

To deal with these pending issues, IDCOL has been examining the following responses based on the exchange of opinions with the Survey Team.

- Establishment of a section in charge of the present EE&C loan project in relation to A-type loans while making conscious efforts to build up the know-how for company appraisal.
- Narrowing of the reference materials to be submitted by companies for loan appraisal and of the appraisal items for the purpose of shortening the loan appraisal time.
- In regard to B-type loans, relaxation of the minimum deposit requirement for consumers (lowering to 7.5%), review of the independent loan ratio of PD (possibly 7.5% of the procurement price by consumers) and reduced burden in terms of the recovery ratio and fixed amount imposed on PDs in the DSRA (Debt Service Reserve Account) regarding the selection criteria of the PDs.

5.2.9. Recommendations for IDCOL'S Capacity Development for Project Implementation

As IDCOL is a financial institution by main function, they do not necessarily possess knowledge on the technologies for energy efficiency as well as enough number of engineers. Technology transfer for the loan appraisal in the area of energy conserving technologies will be desirable for these organizations.

5.3. BIFFL

5.3.1. Overview of BIFFL

BIFFL is another IFI in for the Project sharing the same functions as IDCOL, in parallel with IDCOL. BIFFL is a public limited company registered under Companies Act, 1994 (ACT XVIII of 1994) and incorporated on 21 March 2011. BIFFL has also received license from Bangladesh bank on 16 October 2011 to operate as a Non-bank Financial Institution under the Financial Institutions Act, 1993. The main objective of BIFFL is to provide predominantly long-term financing for PPP projects through issuance of bonds and debt instruments and equity offerings. BIFFL envisages attracting private investments from local & foreign investors and to invest companies that are implementing infrastructure projects in Bangladesh.

The Vision and Mission of BIFFL are as follows;

VISION:

- Acceleration of economic growth by leveraging relative strengths of Public and Private Sector through financing Infrastructure Projects.

MISSION:

- To perform as a professional Financial Institution by adopting the internationally accepted best practices and maintaining highest level of moral and ethical standards.
- To promote Country's economic development by facilitating and encouraging Private Sector Investment in all infrastructure projects.
- To support sustainable economic growth of Bangladesh through facilitating Infrastructure Development.

BIFFL promotes, encourages and finance private sector in all critical infrastructure sectors shown in below from the annual report;

- Power & Energy
- Natural Resources Development
- Fertilizer
- Transportation System
- Port Development
- Air & Railway Transportation
- Telecommunication System
- Tourism
- Utility & Environmental Management
- Green & Renewable Energy Efficient Projects
- Social and Industrial Infrastructure Projects
- Poverty Alleviation Projects
- Urban & Rural Development Projects

According to the interviews to BIFFL, it is allowed to invest and hold equities to projects and companies.

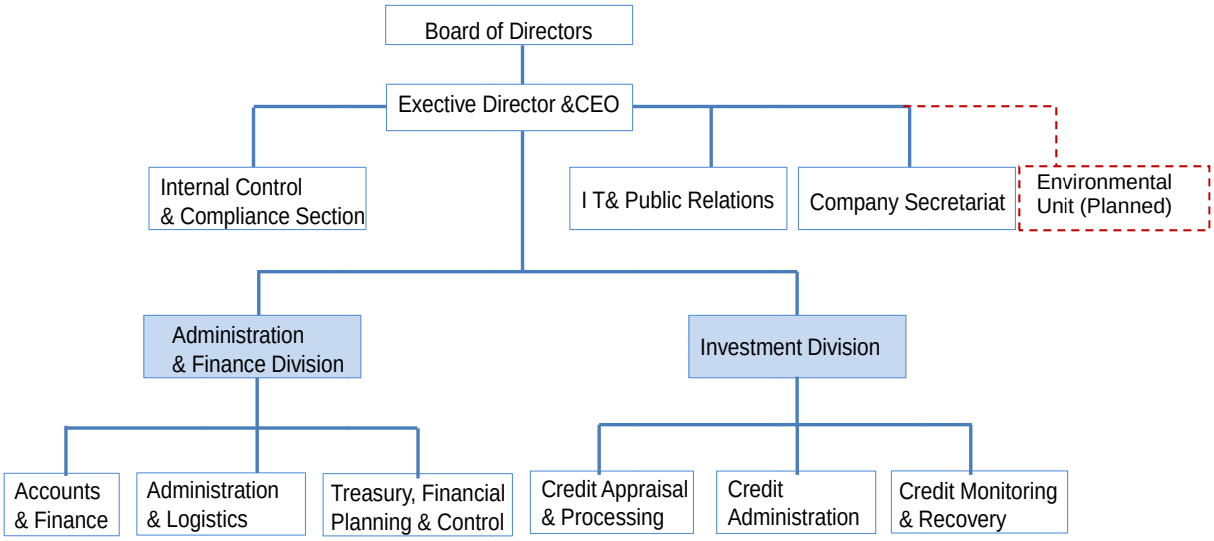
The organization of BIFFL is shown in Figure 31 as of June 2015. According to the financial statement at and for the year ended 31 December 2014, BIFFL has an 8-member Board of Directors. The overall policy decisions are vested with the Board of Directors. The member of it is as follows;

- Secretary, Prime Minister's Office
- Secretary, Power Division, Ministry of Power, Energy & Mineral Resources
- Secretary, Energy & Mineral Resources Division, Ministry of Power, Energy & Mineral Resources
- Secretary, Road's Division, Ministry of Construction
- Secretary, Bridge Division, Ministry of Construction
- Additional Secretary, Finance Division, Ministry of Finance
- Secretary, Finance Division, Ministry of Finance
- Executive Director of & CEO

Besides, BIFFL has a Nine Members Advisory Board which is to be an apex body to provide guidelines and strategy to BIFFL in accordance with the Article of BIFFL. It is consisted of the related Ministers and high level Governors.

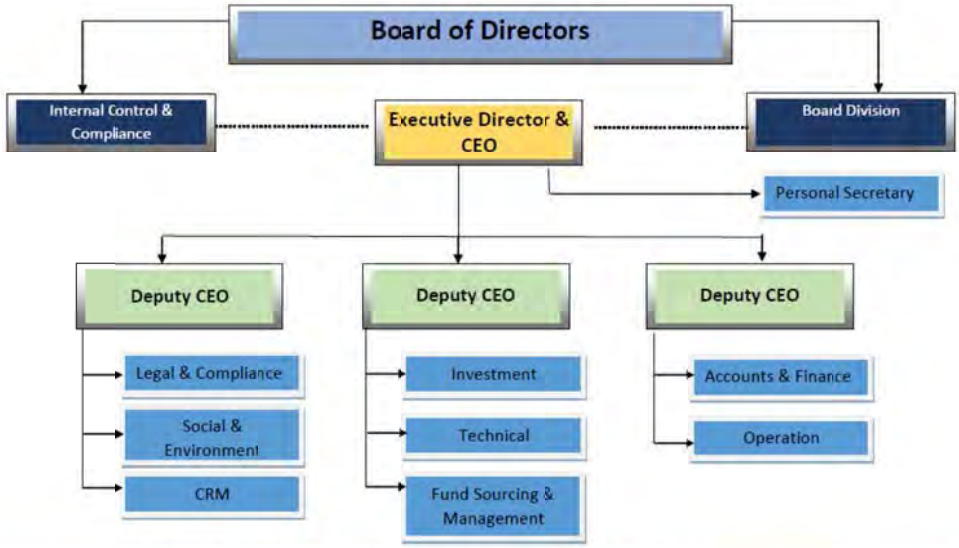
According to the present organogram there are two major implementing divisions, 'Administration & Finance Division' and 'Investment Division' and three administrative divisions, 'Internal Control & Compliance Section', 'IT & Public Relations' and 'Company Secretariat'. Each major division divided into three units. According to the interviews held on July5 2015, the number of personnel is currently 24 including 16-officials and 8-staffs. The number of officials is expected to expand to 36 in two months and 50 by the end of this year. From next year it will be expanded as necessary.

Addition to the present organogram, BIFFL's proposed organogram and the number of officials was shown as of July 2015 (c.f. Figure 32). BIFFL has a future plan to develop comprehensive organization and have more than 100 officials.



Source: Prepared by the Survey Team based on interview with BIFFL

Figure 31 Present Organogram of BIFFL



Category	Legal & Compliance	Social & Environment	CRM	Invest-ment	Tech-nical	Fund Sourcing	A&F	Opt	ICC	Board Division	CEO Secretariate	Total
Existing	1	0	1	4	1	0	3	3	0	1	2	16
To be filled immediately	1	2	2	6	3	0	3	3	1	1	0	22
To be filled within 1-2 years	2	0	5	10	1	3	4	4	2	1	0	32
To be filled 3-5 years	1	1	6	8	0	2	9	6	2	1	0	36
Total	5	3	14	28	5	5	19	16	5	4	2	106

Source: BIFFL

Figure 32 Proposed Organogram and the number of officer of BIFFL

The profit loss account and the balance sheet of BIFFL are shown in Tables 49 and 50 respectively. Until December 2013, BIFFL has not conducted any loans although they earned the profit. In the fiscal year 2014, the first loan to the power plant has been conducted and now over 10 projects are in the pipeline.

On the other hand the paid up capital of BIFFL is huge, which is over 6times of it of IDCOL. The new CEO who has come into the office in June 2015 is the former Deputy CEO of IDCOL, and was engaged in developing renewable energy and energy efficiency and conservation projects in IDCOL. BIFFL, although has just started their activities and is the new organization, is under well-establishment management. BIFFL is expected to becoming a core financial institution in the area of energy efficiency projects as well as large infrastructure projects.

Table 49 Profit Loss Account of BIFFL

(Unit: BDT Thousand)

	31.12.2012	31.12.2013	31.12.2014
Operating income			
Interest income	-	-	63,961
less. interest expense	-	-	1,482
Net interest income	-	-	62,479
Investment income	-	-	-
Commission, exchange & brokerage	-	-	-
Other operating income	2,155,425	2,257,274	2,693,956
Total operating income	2,155,425	2,257,274	2,756,435
Operating expenses			
Salary and allowances	2,410	4,511	11,863
Rent, taxes, insurance, electricity, etc.	594	479	430
Legal expense	-	-	298
Postage, stamp, telecommunication etc.	75	225	447
Stationery, printing, advertisement etc.	659	935	3,551
Managing Director's salary and allowances	3,713	3,982	6,082
Director's fee	135	117	211
Audit fees	58	58	58
Depreciation and repairs of company's assets	2,280	3,925	5,391
Other operating expenses	24,565	23,904	4,375
Total operating expenses	34,489	38,172	32,707
Profit before provision	2,120,936	2,219,102	2,723,728
provision for leases, loans and advances	-	-	10,331
Total provision	-	-	10,331
Total profit before Income tax	2,120,936	2,219,102	2,713,398
Provision for income tax	901,398	943,118	1,296,719
Net profit after tax & provisions	1,219,538	1,275,984	1,416,678
Statutory reserve	243,908	255,197	283,336
Retained surplus	975,630	1,020,787	1,133,343
Earnings per share	7.62	7.97	8.85

Source: BIFFL Annual Report

Table 50 Balance Sheet of BIFFL

(Unit: BDT Thousand)

		31.12.2012	31.12.2013	31.12.2014
PROPERTY AND ASSETS				
Cash		461	32	47,018
	In hand (including foreign currencies)	3	23	18
	Balance with Bangladesh Bank and its agents (including foreign currencies)	458	9	47,000
Balance with other banks and financial institutions		18,689,926	20,699,879	19,904,146
	in Bangladesh	18,689,926	20,699,879	19,904,146
	Outside Bangladesh	-	-	-
Money at call and short notice		-	-	-
Investment		-	-	-
	Government	-	-	-
	Others	-	-	-
Leases, loans and advances		-	-	1,033,064
Fixed assets including premises, furniture and fixtures		8,686	7,090	6,304
Other assets		330,457	541,758	1,557,003
Total assets		19,029,531	21,248,759	22,547,535
LIABILITIES & CAPITAL				
Liabilities				
	Borrowings from banks other financial Institutions and agents	-	-	-
	Deposits and other accounts	-	-	-
	Other liabilities	1,287,935	2,231,179	2,113,277
	Total liabilities	1,287,935	2,231,179	2,113,277
Capital/Shareholders' equity				
	Paid up Capital	16,000,000	16,000,000	16,000,000
	share premium	-	-	-
	Statutory reserve	348,319	603,515	886,852
	Other reserve	-	-	-
	Retained earnings	1,393,277	2,414,064	3,547,406
Total liabilities and shareholders' equity		19,029,531	21,248,759	22,547,535

Source: BIFFL Annual Report

BIFFL is an organization which was newly established in 2012. As it has just gained first profit from loan in 2014, the trend of its financial performance is yet to be analyzed. Most of the profit, which is over BDT 2 billion, is an interest income earned from the paid up capital in the bank saving, which is over BDT 16 billion whereas the profit from loan business is still extremely small, as well as its operating expense. As the result, the financial status of BIFFL is under stable status.

Under this situation, BIFFL is capable of managing a stable business even under a rapid expansion of activities and organization. This is because it has a huge cash reserve from where stable interest income can be expected. Nevertheless, as the conclusion, it can be said that BIFFL possesses sufficient financial resource for conducting the Project.

5.3.2. Credit Policy of BIFFL

Although BIFFL was established in 2011 and has not enough experiences like IDCOL, BIFFL is quickly preparing organization, loan process and experiences as follows:

- BIFFL, in June 2015, welcomed the new CEO who is the former Deputy CEO of IDCOL who expanded IDCOL's performance through SHS Program.
- BIFFL plans to increase the number of staffs from 16 to 38 in the near future and plans to expand to 70 within 2years.
- BIFFL prepares Credit Policy as described Table 51 and uses it for loan procedure, credit appraisal, and loan administration on present application.

Table 51 Credit Policy of BIFFL and related template

Name	Contents
Credit Policy	(a) Credit Policy, Strategy & Other Guidelines (b) Credit Assessment & Risk Analysis (c) Credit Risk Grading (d) Risk Management Structure (e) Credit Administration (f) Credit Documentation (g) Legal and Security aspect (h) Risk assessment and mitigation measures
Detailed contents of Credit Assessment & Risk Analysis	(a) Project Analysis (b) Financial & Economic Analysis (c) Environmental Impact Analysis (d) Technology Analysis/Technical Aspects (e) Country, Sector and Market Analysis (f) Borrower/Sponsor Analysis (g) Financing Document (h) Risk Assessment and Mitigation Measures
Template for appraisal report	(a) Economic Zone (b) Power Plant

Source: BIFFL

According to the financial statement in FY2014, Loan outstanding is reported as BDT 1,033 Million. However, currently BIFFL receives 11 applications including PPP projects and deals from both private and public companies.

According to Credit Policy of BIFFL (2.5 Eligibility Criteria), BIFFL can lend up to a maximum of 40% of total project cost but cannot exceed USD 50Million for the first 3-4 loans and thereafter increase to USD 100Million with Board Approval. Shares of BIFFL are mostly less than 20%.

There is no mention about minimum share. BIFFL can extend loan in corporation with other banks and financial institutions including IDCOL. For conducting appraisals for project like brick factory, corporate finance-oriented credit appraisal should be applied.

5.3.3. Implementation Capacity of BIFFL

The government policy regarding the allocation of funds for PPP projects by sector adopts such target figures as 45% for power and energy, 35% for transport, ports and airports, 5% for tourism facilities, 2.5% for public works and environmental management, 5% for green and renewable energies, 5% for social and industrial development and 2.5% for poverty reduction, indicating the special emphasis on infrastructure development even though green and renewable

energies are given some consideration in the overall investment portfolio.

The decision-making authority lies with the Board in the case of project approval but the authority regarding disbursement for project-related programs is delegated to the management. BIFFL has prepared several manuals, etc., including the Credit Policy and Detailed Credit Appraisal Template. In short, BIFFL is inferior to IDCOL in terms of its overall size and experience. However, BIFFL is still judged to be capable of implementing the EE&C Promotion Financing Project in view of the fact that it has been building up its experience of project finance, proceeding with the development of its organizational strength, especially its loan appraisal capability, and enjoying strong financing foundations with massive investment by the government. It still requires further strengthening of its loan appraisal capability (especially in relation to the manufacturing sector) and has a positive stance of accepting technical cooperation to improve such capability. Another pending issue when dealing with B-type loans is the further improvement and consolidation of the relevant administrative system.

Here, the relevant facts concerning B-type loans are (i) the CEO of BIFFL has sufficient experience at IDCOL and (ii) the CEO has expressed an intention to adopt a prudent approach in that the number of PDs will be kept small after the launch of the loan program with a view to expanding the scope of the loan business only after the building-up of suitable administrative experience and capability to provide loans. Furthermore, it plans to engage in capacity development through the active use of external consulting services. As a result, the team can conclude that there is not much difficulty for BIFFL to conduct B-type Loan as long as they start in a limited manner.

5.3.4. Recommendations for BIFFL'S Capacity Development for Project Implementation

BIFFL, being a financial institutions by main function, they do not necessarily possess knowledge on the technologies for energy efficiency as well as enough number of engineers. Technology transfer for the loan appraisal in the area of energy conserving technologies will be desirable for these organizations.

5.4. Participating Distributors

5.4.1. PD Candidates

The role of PDs is to disseminate EE&C appliances to their customers like residential and small business who cannot afford these appliances by cash or credit card in one time. As PDs provide installment sales with low interest rate under this scheme of the Project, their customers will be able to obtain the EE&C appliances.

The Survey Team listed up a tentative list of PD candidates as of September 2015, based on interviews to several POs in IDCOL's SHS Programs. These are as follows:

Table 52 List of Identified PD candidates

PD Name	Organization Type	Remarks
SolarEn Foundation	Retailer	
HAMCO Corporation	Retailer (Company)	
TMSS	Microfinance Institution	
Bright Green Energy Foundation	Retailer (NGO)	
Saif Powertec LTD.	Retailer (Company)	Listed Company
Ingen Technology LTD.	Retailer (Company)	

Rimso Foundation	Retailer (NGO)	
Bengal Renewable Energy Limited	Retailer (Company)	A subsidiary of listed company

Source: Interviews by the Survey Team

In the light of a variety of information accessed, the Survey Team considered that the likely candidates for PDs in the program will be (i) POs in the SHS program, (ii) retailers and (iii) financial institutions. The Survey Team then conducted an intentions survey and its findings are described below.

- Many POs are generally affirmative about their participation in the program because (i) they have been aiming at diversifying their business operation in view of the stagnant or even declining business performance with the SHS program, (ii) they believe that they can use their branches located in electrified areas as sales bases even though their conventional users typically reside in non-electrified areas and (iii) some of them (including their parent companies) are already handling household electrical appliances in connection with the handling of electrical appliances using solar home systems.
- Leading retailers of household electrical appliances are less enthusiastic about their participation in the program because (i) they use a credit card operator, thus avoiding the risk associated with installment sales and (ii) those offering installment sales can raise funds with favourable terms due to their good creditability.
- Financial institutions (commercial banks) are said to require funding with a lower interest rate under the program than their fund raising costs for their existing credit card and personal loan schemes. Given the necessity for monitoring before and after actual sale (loan disbursement), their participation is likely to prove difficult. Some commercial banks show interest in participation as an IFI in A-type loans.

5.4.2. Required Implementation Capacity for PDs

The Survey Team prepared the selection criteria to be used by IFIs (IDCOL and BIFFL) in order to measure the implementation capacity of individual PDs. These criteria are outlined below while their details are as shown in Annex 14.1.

There are two types of selection criteria: that which is applicable to all PDs and that which is only applicable to MFIs. The criteria applicable to all PDs cover such matters (criteria) as (i) organization, (ii) sound financial position, (iii) financial criteria, (iv) consistency of financial criteria, (v) existence of an electrified area(s) inside the business area, (vi) adequate business plan for the EE&C loan promotion financing project and (vii) debt service reserve account. In comparison, the criteria only applicable to MFIs are (i) general eligibility criteria and (ii) specific financial criteria. As described later, it has been decided that the PD Selection Committee will be established at IDCOL and BIFFL and provisional rules for the operation of these committees have been proposed.

6. Project Implementation Plan

After identifying the stakeholders, eligible equipment, lending scheme, the Project cost estimation, appraisal procedures schedule and expected effects will be elaborated. This chapter will comprise the implementation plan for the Project.

6.1. EE&C Promotion Components

Three components that were identified and suggested in the EE&C M/P which was prepared preceding this Survey, were found to be well reflecting the priority in terms of urgency, effectiveness and demand for funding. The Project will therefore be formulated with the following three components as the subject for concessional loan:

Component I	Industry / commercial sector component
Component II	Building sector component
Component III	Home appliances component

Components I and II will be implemented only through A-type loan while Component III will be through B-type loan only.

Table 53 Type of loan applicable to the Project Components

	A-type loan	B-type loan
Component I Industry / commercial sector component	Yes	No
Component II Building sector component	Yes	No
Component III Home appliances component	No	Yes

Source: Survey Team

6.1.1. Component I: Industry / Commercial Sector Component

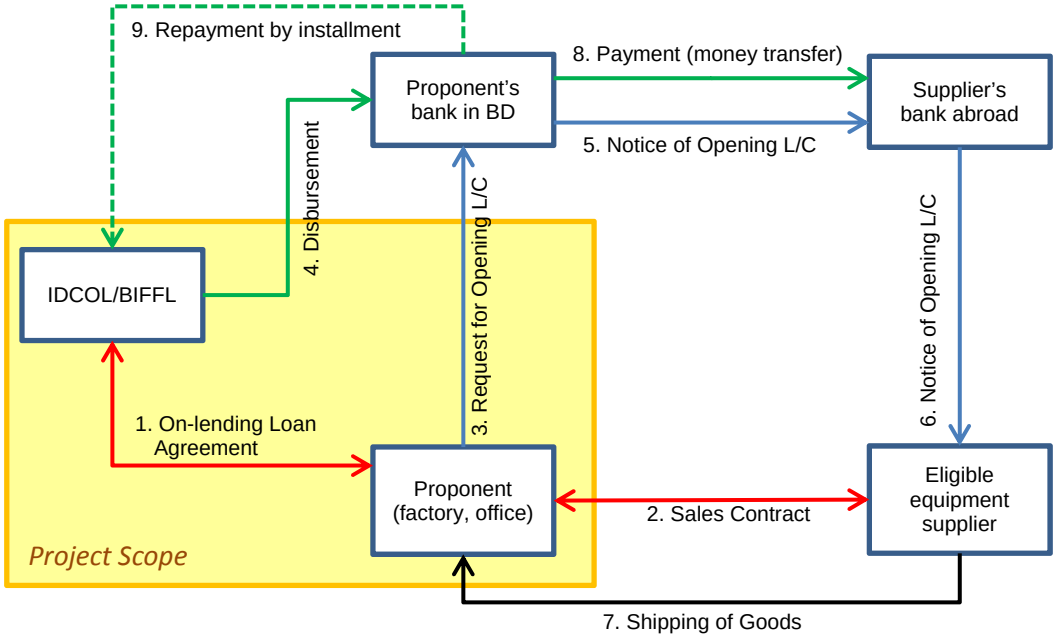
Component I is dedicated to supporting the introduction of energy efficient equipment in industry / commercial sectors. Beneficiaries (or the proponents of sub-projects) are companies and other organizations who acquire energy efficient equipment for their factories, office or commercial facilities. Here, the equipment must be those which are on the eligibility list to be prepared by SREDA. By making use of this component, the proponent will be offered a concessional loan from the IFIs, to be utilized for financing the cost of the energy efficient equipment.

The proponent, after the appraisal procedure has been completed, concludes an on-lending agreement with an IFI, after which a sales contract for the equipment purchase agreement will be made with the supplier of the equipment (here, assumed to be an overseas company). The IFI will disburse the cost for the energy efficient equipment, after which the proponent requests its bank to open a letter of credit (L/C) to secure the fund for the supplier of the equipment. The supplier, receiving the notice of L/C opening, will ship the goods to the proponent, completing the purchase procedure. The proponent will pay back the concessional loan by monthly repayment.

The sub-project proponents will report its energy consumption data together with the operation performance to SREDA. In future, a mechanism to support and to promote the use of this Component I is the energy management and auditing programme. Through the programme, the

DCs will be encouraged to introduce energy efficient equipment by means of this component. Companies and other organizations which are not designated as the DCs (non-DCs) will continue to be eligible to make use of this component.

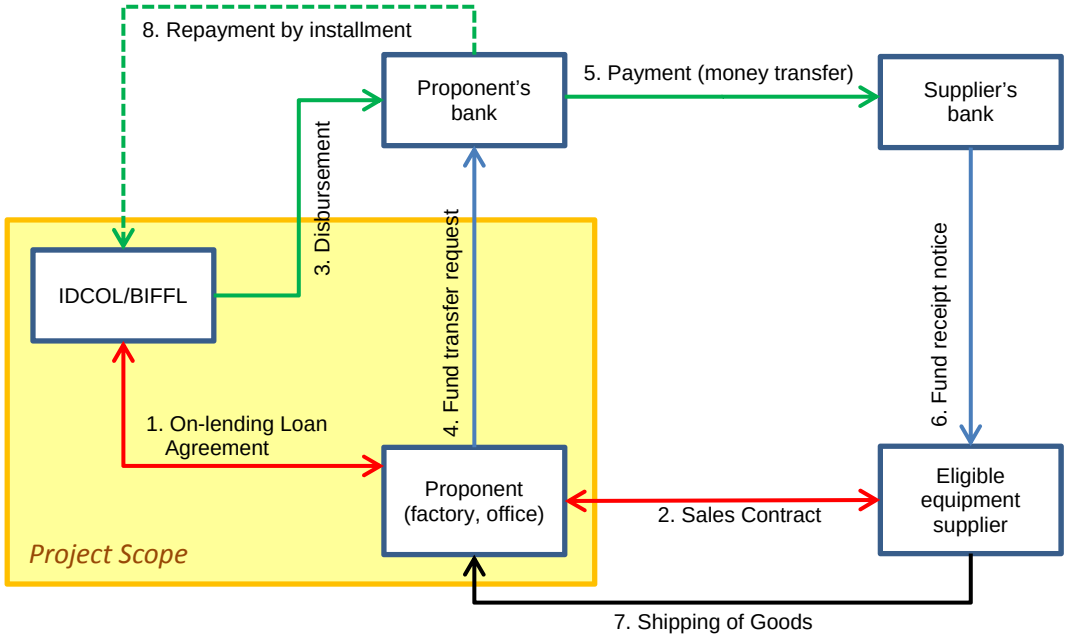
The component will be introduced prior to the energy management and auditing programme with the aim to hasten the promotion of EE&C measures among the industry / commercial sectors. With the launch of energy management and auditing programme, this Component I is expected to be further widely utilized.



Source: Survey Team

Figure 33 Component I and II Sub-Project Implementing Process (overseas procurement)

If the eligible EE&C equipment and materials were to be procured locally, L/C will not be required for the settlement, with the process becoming simpler, as shown in the next figure.



Source: Survey Team

Figure 34 Component I and II Sub-Project Implementing Process (local procurement)

6.1.2. Component II: Building Sector Component

Component II is designed to contribute to the penetration of EE&C equipment in buildings by facilitating the building users, owners or developers to make use of the low interest loan when acquiring and installing eligible energy efficient equipment and materials in a building.

Component II was originally considered to be supporting the introduction of green buildings in accordance with the recommendations in the EE&C M/P. The implementing process is identical to that of Component I.

Leadership in Energy and Environmental Design (LEED)[8] is the only available green building rating in Bangladesh (Platinum and Gold ratings are deemed to be high rated in energy efficiency). SREDA plans to launch its own green building rating programme by 2017. This is because LEED, being a US developed rating criteria, may not necessarily be an optimal green building rating programme to be applied to Bangladesh. SREDA therefore aims to develop an indigenous rating programme to suit the climate and other conditions in Bangladesh. Once SREDA's green building rating programme is launched, the Component II may be applicable for the promotion of green buildings that are suited for the condition and climate in Bangladesh.

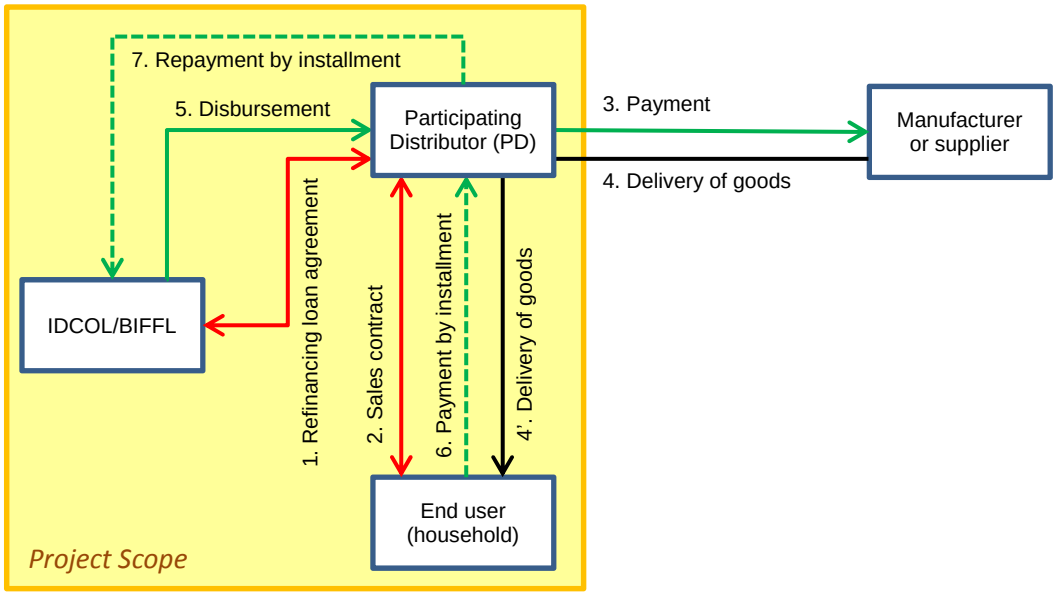
6.1.3. Component III: Home appliances component

Principal motivation for introducing Component III is to provide an opportunity for the households and small businesses to participate in the promotion of EE&C activities. This is because the other components are for companies and organizations only. Further, the anticipated rapid penetration of air conditioners and refrigerators in households around Bangladesh will impose burden on the country's electricity demand and supply gap, and therefore a mitigation measure should be in place at earliest convenience.

[8] Leadership in Energy and Environmental Design (LEED) is a set of rating criteria for the design, construction, operation, and maintenance of energy efficient and environmentally friendly buildings developed and introduced by the US Green Building Council (USGBC). Some of the newly constructed buildings in Bangladesh are intended to be LEED certified.

Consumers, mostly in households and small businesses, will be entitled to concessional loan when they purchase energy efficient equipment listed on SREDA's eligibility list. At initial stage of the Component implementation, air conditioners and refrigerators which are controlled by an inverter will be eligible. After the introduction of the energy efficiency labelling programme, the eligibility criteria may be adjusted to be synchronized with the programme.[9]

When a consumer, as an end-user, purchases an appliance which is listed in SREDA's eligible equipment list from a PD, the PD procures the appliance to be delivered to the consumer. The PD, back-to-back with the purchase agreement with the supplier, receives the refinancing loan based on the refinancing loan agreement with an IFI. The consumer pays back the appliance purchase cost to the PD by installment, which will be passed onto payment from the PD to the IFI.



Source: Survey Team

Figure 35 Component III Sub-Project Implementing Process

6.2. Eligible Technologies and Equipment

6.2.1. Criteria and Standards for Eligibility

The technologies and equipment eligible for the Project will only be those which are included in the designated list (i.e. eligible technologies and equipment list). By doing so, the executing agencies in the Project can conduct appraisal procedure in simple and time saving manner. This simplified appraisal procedure will enable the loan applications to be processed in a short time, making the Project user friendly.

The eligible technology and equipment list will be carefully drafted with reference to the selection standards. The criteria for selection are: features, access (possibility of introduction and promotion), scale, sustainability, profitability, support condition, energy saving effect and environmental impact. Required standards are as shown in the next table:

[9] BSTI's energy star labelling, which was developed under UNDP's BRESL initiative, is currently partially in operation with only three products, ceiling fan, CFL bulbs and ballasts being labelled only. Labelling for air conditioners, refrigerators and motors will be introduced once BSTI acquires proper testing facilities and SREDA authorizes the whole Programme.

Table 54 Equipment Eligibility Standards

No	Criteria	Standards	Note
1	Basic features	■ Having energy efficiency and conservation (EE&C) performance such as in thermal efficiency, COP or energy efficiency labelling; ■ Improves both energy intensity performance and productivity; ■ Popularly introduced in developed countries.	
2	Possibility of introduction and promotion	■ Applicable to industrial sector in Bangladesh; ■ Demonstrated in Bangladesh.	
3	Scale	■ BDT 3 million or more per application lot	
4	Sustainability of business	■ Life of equipment is 10 years or more	
5	Profitability (Pay-back year)	■ Simple pay-back year is 5 years or less except for natural gas use equipment ■ Simple pay back years 10 years or less for natural gas use equipment ■ Or, equipment that contributes to improving productivity or product quality	
6	Support condition	■ Warranty is 1 year or more.	
7	Energy saving effect and environmental impact	■ Energy saving ratio is 10% or more than that of existing equipment or conventional equipment.	

COP: Co-efficient Of Performance
Source: Survey Team proposals

6.2.1. Methodologies to Define Eligible Technologies and Equipment

In Bangladesh, around 50 % of national primary energy is consumed in industry sector. Further 30% is consumed in residential sector (excluding biomass). Industry and residential sectors are the two priority sectors where EE&C measures should be addressed. Another focus is the building sector. However, the primary energy consumed in building sector is only around 5%. Nevertheless, the annual growth in energy consumption in buildings is almost twice of those in industry and residential sectors. The building sector therefore cannot be neglected as the priority target for EE&C promotion.

With respect to the need to prioritize industry, residential and buildings sectors, the target fields of technologies and equipment as the sub-projects in JICA Energy Efficiency and Conservation Promotion Financing Project are defined as follows:

- Industry (50% of national primary energy): addressing to Component I
- Residence (30%): addressing to Component III
- Building (5%, increasing rapidly): addressing to Component II and partially Component I

6.2.2. Eligible technologies and equipment in Component I (under A-type loan)

The striking characteristic of industry sector in Bangladesh is that the textile and garment sub-sector comprises a significant portion of the whole sector. From the viewpoint of energy consumption, the characteristics in that waste hear recovery is hardly practiced. Considering such existing market condition, the following technologies are selected as the eligible technologies to promote EE&C measures:

- Waste heat recovery technology
- Inverter technology
- High Coefficient of Performance (COP) technology

Table 55 Eligible Technologies and Equipment in Component I

No	Sub-sector and items	Specification / Production Capacity	Energy source
I	Industry / Commercial Sector		
1	Chemical fertilizer		
1.1	Heat exchanger replacement of urea fertilizer plant	Heat exchanger (waste heat recovery system), whose capacity is equal to 10,000 kJ/h or more	Gas
2	Paper & pulp		
2.1	Black liquor boiler	Boiler which burns black liquor and recovers agents such as soda	Gas
2.2	De-inking plant	50 TPD or more	Gas
3	Textile and garment		
3.1	Spinning machine	Roving frames with pneuma-less waste collection system Ring spinning frames with permanent magnet motor Automatic winder with balloon controller Air jet spinning	Electricity
3.2	Loom (weaving machine) and warper & sizer	Air-jet loom with technology for reducing both air consumption and air pressure. Warper & sizer with inverter control (motor should meet the standard which is stipulated in item 9.7.1).	Electricity
3.3	Sewing machine	Sewing machine driven by directly connected motor. Main driving motor type is to be a servomotor (motor should meet the standard which is stipulated in item 9.7.1)	Electricity
3.4	Stenter	Stenter controlled by inverter, whose air volume and width of nozzle are adjustable.	Gas & Electricity
3.5	Heat exchanger	Heat exchanger (waste heat recovery system), whose capacity is equal to 10,000 kJ/h or more.	Gas
4	Glass		

No	Sub-sector and items	Specification / Production Capacity	Energy source
4.1	Combustion control of glass melting furnace	Combustion control unit controlled by air ratio in exhaust gas.	Gas
5	Cement & Clinker grinding		
5.1	Vertical roller grinding mill for cement clinker and slag	A mill is to be equipped with main rollers for grinding materials and sub-rollers for stabilizing materials. Having delivery record of mill with power consumption of less than 29 kWh/ton (mill + separator + fan) at 3,300 cm2/g OPC basis.	Electricity
5.2	Vertical roller grinding mill for pre-grinding	Having delivery record of mill facility with power consumption of less than 33kWh/ton (pre-grinding mill + ball mill + separator + fan) at 3,300 cm2/g OPC basis.	Electricity
6	Iron & steel (rerolling mills)		
6.1	Induction furnace	Induction furnace	Gas
6.2	Combustion control unit of reheating furnace	Combustion control unit controlled by air ratio in exhaust gas	Gas
7	Foods and beverages (cold storage)		
7.1	Screw compressor refrigeration unit	Screw compressor with motor whose capacity is equal to 10 kW or more, including chiller, condensing unit, and cold storage capital machineries (Insulation panel, cooling tower, control panel, pumps, and pressure vessels) COP>=4.0 @ +3°C (e.g. potato cold storage) COP>=1.9 @ -25°C (e.g. cold storage in general) COP>=1.4 @ -35°C (e.g. cold storage in general) COP>=1.1 @ -40°C (e.g. ice cream factory)	Electricity
8	Telecommunication		
8.1	Lithium ion battery	When replacing lead/acid battery + captive power generation combination to lithium ion battery	Electricity
9	Common technology		
9.1	Power receiving and distribution		
9.1.1	Transformer	Transformer with amorphous metal core	Electricity
9.2	Water pump		
9.2.1	Pump with inverter	Pump with inverter control, whose motor output is 10 kW or more (motor should meet the standard which is stipulated in item 9.7.1).	Electricity
9.3	Fan and blower		

No	Sub-sector and items	Specification / Production Capacity	Energy source
9.3.1	Fan and blower with Inverter	Fan and blower with inverter control, whose motor output is 10 kW or more (motor should meet the standard which is stipulated in item 9.7.1)	Electricity
9.4	Air compressor		
9.4.1	Air compressor	Screw compressor with inverter control, or centrifugal compressor, whose motor output is 10 kW or more.	Electricity
9.4.2	Multi air compressor control unit	Numbers of air compressor is 2 sets or more, equipped with an optimum control system.	Electricity
9.5	Inverter		
9.5.1	Inverter	Inverter whose connected motor output is 10 kW or more.	Electricity
9.6	Boiler and steam system		
9.6.1	Once-through steam boiler	Steam generation capacity is between 1 ton/h to 4 ton/h. Boiler efficiency is to be 90% or more at rated load.	Gas
9.6.2	Multiple installation system of once-through steam boilers	Steam generating capacity of a single boiler is from 1 ton/h to 4 ton/h. Efficiency of a single boiler is to be 90% or more at rated load and the efficiency of total system is to be 80 % or more at 50% load. Total steam generating capacity is 2 ton /h or more by multiple numbers of boilers.	Gas
9.6.3	Economizer for boiler	Exhaust gas economizer	Gas
9.7	Motor		
9.7.1	Motor	Efficiency is IE2 or IE3 specified in IEC 60034	Electricity
9.8	Air conditioner		
9.8.1	Air conditioner	1) Centrifugal chiller; 2) Absorption chiller; 3) Variable Refrigerant Flow (VRF) air conditioner whose COP is 4.2 or more; 4) Air cooled chiller, whose COP is 3.0 or more, without using R22 or R123; 5) Water cooled chiller, whose COP is 4.0 or more, without using R22 or R123.	Electricity
9.9	Heat pump		
9.9.1	CO2 Heat pump	Motor Capacity is 10 kW or more COP>= 3.5 (Hot water supply : heat source=air) COP>= 5.0 (Cooling + Heating supply)	Electricity
9.10	Lighting		

No	Sub-sector and items	Specification / Production Capacity	Energy source
9.10.1	LED lamp	LED lamp with 100 lm/W or more, life time: 40,000 hours or more, number of lamps is 500 or more, and with LED patent license certificate.	Electricity
9.11	Co-generation, tri-generation		
9.11.1	Gas engine	Conversion from existing gas engine power generation to gas engine co-generation / tri-generation by utilizing waste heat, whose total rated thermal efficiency is more than 60%. Maximum capacity per sub-project is 10 MW.	Gas
9.11.2	Gas turbine	Gas turbine co-generation / tri-generation, whose total rated thermal efficiency is more than 80%. Maximum capacity per sub-project is 10 MW.	Gas
9.12	Waste heat recovery		
9.12.1	Once-through steam boiler	Once-through boiler with automatic gas bypass device	Gas
9.12.2	Waste heat recovery system	Exhausted heat recovery system, whose capacity is equal to 10,000 kJ/h or more.	Gas

Note:
COP: Coefficient of Performance
IEC: International Electrotechnical Commission
LED: Light Emitting Diode
OPC: Ordinary Portland Cement
Note: Fuel oils may apply as the energy source in lieu of gas in some of the cases.

6.2.3. Eligible technologies and equipment in Component II (under A-type loan)

SREDA plans to establish its original and indigenous Green Building Rating Programme by 2017. With the aim to encourage the development of high rated green buildings in this programme, those rated as energy efficient in this programme should be set as eligible target as sub-projects.

Eligible buildings, prior to the introduction of SREDA's new Green Building Rating Programme will not be stipulated. It will be when SREDA's new Green Building Rating Programme is officially launched (either by regulation or guidelines approved by SREDA) that the programme criteria will be deemed as the eligibility criteria in the Project. Target rating will be set by SREDA with respect to the recommendation from the Technical Advisory Committee, and should be agreed with JICA. Eligible technologies and equipment for Green Building are as follows:

Table 56 Eligible technologies and equipment in Component II

No	Items	Specification	Energy source
II	Building sector (Priority will be given to green buildings)		
1	Heat reflective glass	Low-e pair glass and solar reflective glass (solar heat reflective ratio is 50% or more)	Electricity
2	Elevator	Elevator with PM motor and LED lighting	Electricity
3	BEMS	BEMS, which visualizes a real time energy consumption of the building and controls energy consumption for air conditioning and lighting	Electricity
4	Others	Equipment listed in Component I and III are also eligible	-

6.2.4. Eligible technologies and equipment in Component III (under B-type loan)

In Energy Efficiency & Conservation Master Plan Project, it was observed that lightings, ceiling fans, TVs, refrigerators and air conditioners are major appliances consume a significant amount of electricity in residential sector. In response to this notion, SREDA has a plan to establish an Energy Efficiency Labelling Programme mainly for home appliances. Ultimately, the eligible technologies and equipment will be defined in line with this programme.

As the first stage of the Project, eligible appliances will be air conditioners (split type) and refrigerators, for the following reasons: (i) there are clear technical characteristics that segregates energy saving models as opposed to the conventional types; (ii) energy efficient models are readily available in the market, but not being penetrated; (iii) these are the likely equipment to be purchased on installment payment. The target appliances may be increased eventually as necessary. Those rated as 3, 4 or 5 star in the programme will be the eligible equipment.

Prior to the introduction of the Energy Efficiency Labelling Programme, the additional eligibility criteria will be set, based on technology. Those equipment with inverter control will be deemed as the targets of eligible technologies and equipment. With the introduction of SREDA's Energy Efficiency Labelling Programme, the criteria will be more performance oriented, to be based on star accreditation.

Table 57 Eligible technologies and equipment (home appliances) in Component III

No	Home Appliance	Specification	Energy source
III	Residential sector (Following equipment to be provided by Participating Distributors (PDs))		
1	Refrigerator	Inverter controlled (energy efficiency label: 3 stars or more, when the programme is established)	Electricity
2	Air conditioner	Inverter controlled (energy efficiency label: 3 stars or more, when the programme is established)	Electricity
3	Others	Further additions are expected in accordance with the establishment of energy efficiency labelling programme	-

6.3. Loan Scheme

6.3.1. Borrowing Procedures

In order for proponent or end user to utilize the concessional loan from JICA, several agreements are required between each player in addition to L/A between JICA and GoB as shown in the Figure 36.

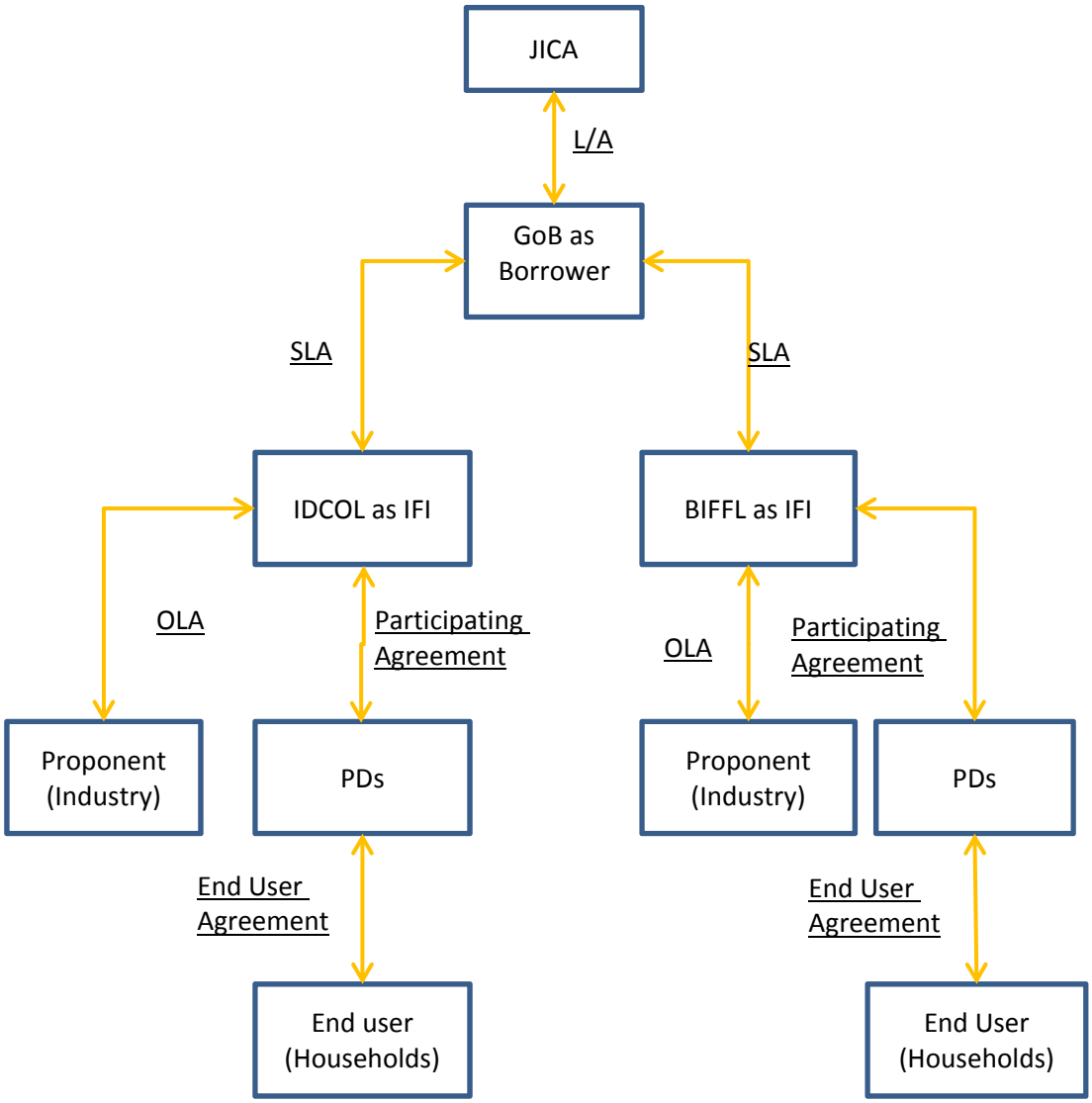


Figure 36 Borrowing Procedures for the Project

6.3.2. Subsidiary Loan Agreement

Subsidiary Loan Agreement (SLA) is an agreement which GoB and IFIs enter into for IFIs to utilize fund from JICA. Since there will be two IFIs, IDCOL and BIFFL, in the Project and MOF will directly finance to each IFI, two SLAs need to be made independently.

Sample SLA format for each IFI is shown in Annex 12.1 for IDCOL and Annex 12.2 for BIFFL respectively. In order for IFIs to enable to borrow the fund based on their performance of subproject, the loan amount is not fixed in the SLAs, although the ceiling amount is fixed to the

loan amount categorized for subproject portion in the L/A. Accordingly, IFI which develops sub-project faster will enjoy utilizing the loan larger.

The Project differs from the other loan project in that there are two implementing financial institutions offering identical services under equal environment. These financial institutions are expected to compete with each other in implementing the Project.

With the aim to encourage their competition, the GoB is suggested not to set the fund threshold for each financial institution, and to leave the whole fund amount available to either of the institutions. The sub-loan agreement therefore may be prepared separately for each financial institution, with the lending threshold amount equivalent to the total fund amount (not shared between the two institutions). The GoB is requested to consider the possibility of arranging the Sub-loan agreement in accordance with the suggested arrangement.

6.3.3. On-lending Loan Agreement

On-lending Loan Agreement (OLA) is an agreement which IFIs and proponents enter into for proponent to acquire the EE&C equipment under A-type loan. OLA will be prepared based on terms and conditions as shown in Annex 13.2.

6.3.4. Participating Agreement

Participating Agreement is an agreement which IFIs and PDs enter into for PDs to supply eligible home appliances under installment payment to an end user in the sub-project under B-type loan. Sample of participating agreement is attached in Annex 14.2.

6.3.5. End User Loan Agreement

End User Loan Agreement is an agreement which PDs and end users enter into when an end user purchases the eligible home appliance against installment payment under B-type loan (The agreement is simply for sales against installment payment and is not a loan agreement. However, due to the persisting custom in Bangladesh, the agreement is called the “loan” agreement). Sample of end user loan agreement is attached in Annex 14.4.

6.4. Fund Flow

Once these above-mentioned agreements become effective, the fund will be disbursed as shown in Figure 37 in case of IDCOL and in Figure 38 in case of BIFFL respectively.

1. JICA to disburse IFIs’ requested amount nominated in JPY into Government A/C at BB based on their financial forecast under advance procedure for Japanese ODA loans in accordance with L/A.
2. IFIs to transfer the fund at BB to IFIs’ project operating A/C and at the same time, IFIs to convert the fund in JPY to BDT in accordance with SLA.

(In case of A-type loan)

3. IFIs to lend a part of the fund to proponents who wish to install EE&C equipment based on OLA.
4. Proponent to repay capital and interest to IFIs’ revolving fund A/C in accordance with terms and condition of OLA.
5. IFIs to reuse the fund in the revolving fund A/C for another subproject.

(In case of B-type loan)

3. IFIs to lend a part of the fund to PDs who wish to distribute approved home appliance based on Participating Agreement.
4. PDs, based on End User Loan Agreement, offer low interest installment payment to the end users when selling eligible home appliance.
5. End user to pay back to the PDs in accordance with terms and condition of End User Loan Agreement.
6. PDs to repay the capital and interest to to IFIs' revolving fund A/C in accordance with terms and condition of Participating Agreement.
7. IFIs to reuse the fund in the revolving fund A/C for another subproject.

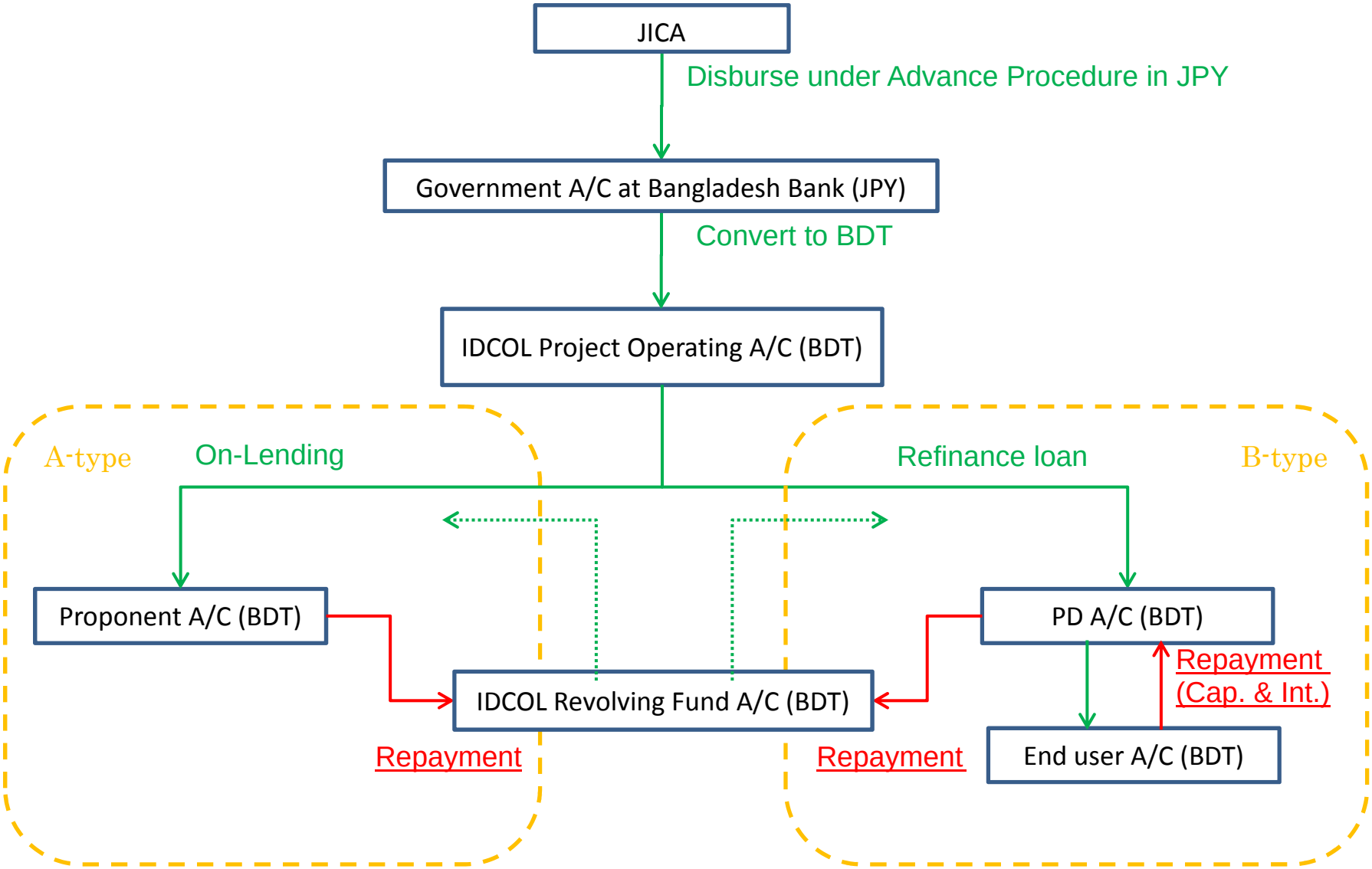


Figure 37 Fund Flow Image (IDCOL)

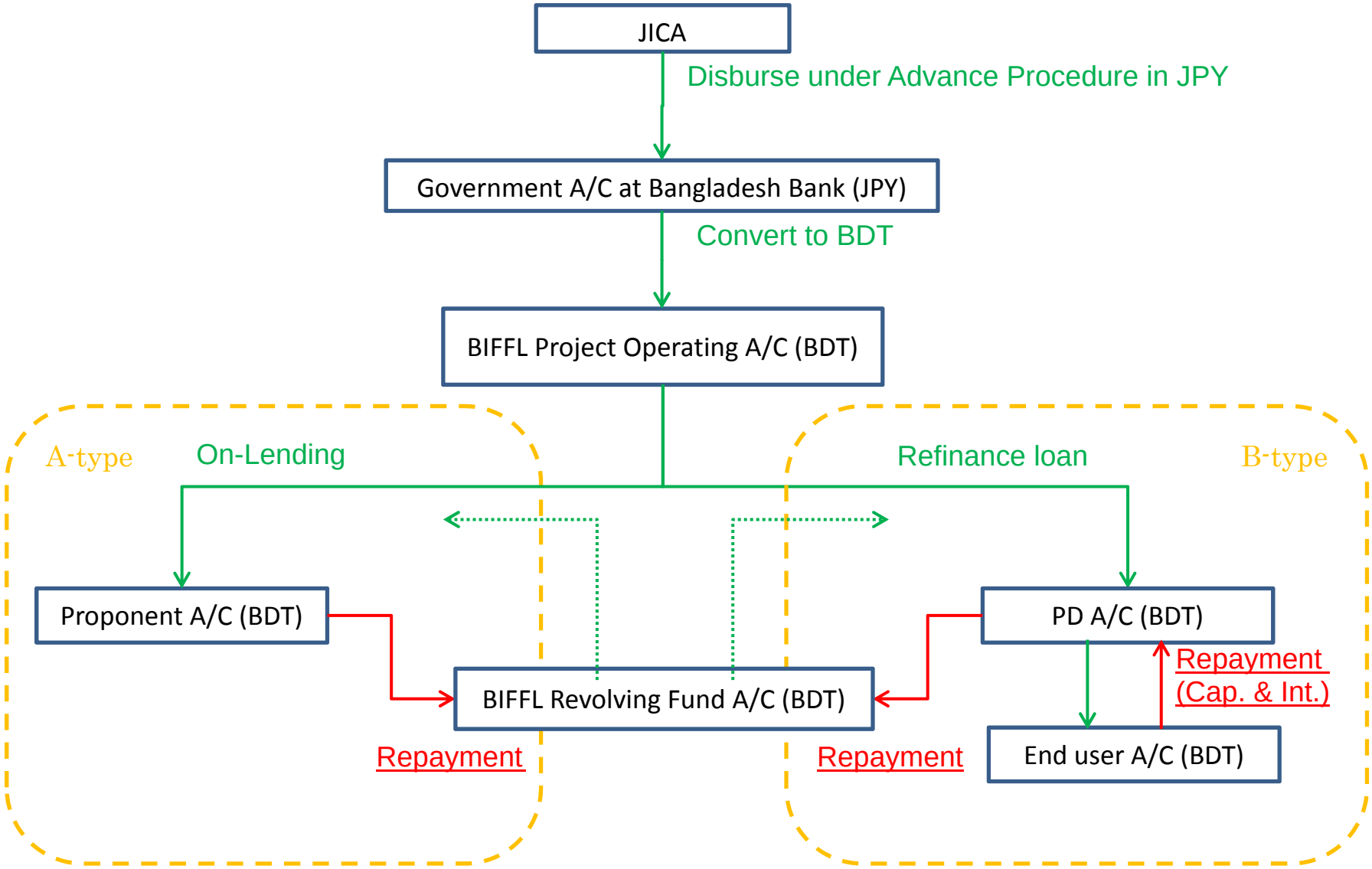


Figure 38 Fund Flow Image (BIFFL)

Note on B-type Loan Implementation

■ Overview of B-type loan

B-type loan involves a scheme designed to loan/lease household electrical appliances (in the beginning stage: air-conditioning units, refrigerators are eligible) to such end users as consumers and small business owners through PFIs (private financial institutions) as explained in the section on financing schemes. The candidate PDs are financial institutions, NGOs and distributors of these appliances.

B-type loan scheme requires the development of three stages for it to properly function. The first stage is for SREDA to certify the energy saving performance of household electrical appliances. The second stage involves the certification of PDs to which IDCOL (and BIFFL) entrust the loan/leasing of appliances to consumers, etc. as in the case of a SHS loan facility. The third stage is for PDs to appraise (i) the suitability of the equipment/appliances applied and (ii) the feasibility of repayment by loan applicants. Here, the second stage is primary discussed.

■ Distribution Channel in Bangladesh

Past surveys have identified the distribution routes for household electrical appliances in Bangladesh and how consumers raise the necessary funds to purchase these appliances as described below. The figure shows the distribution route for household electrical appliances.

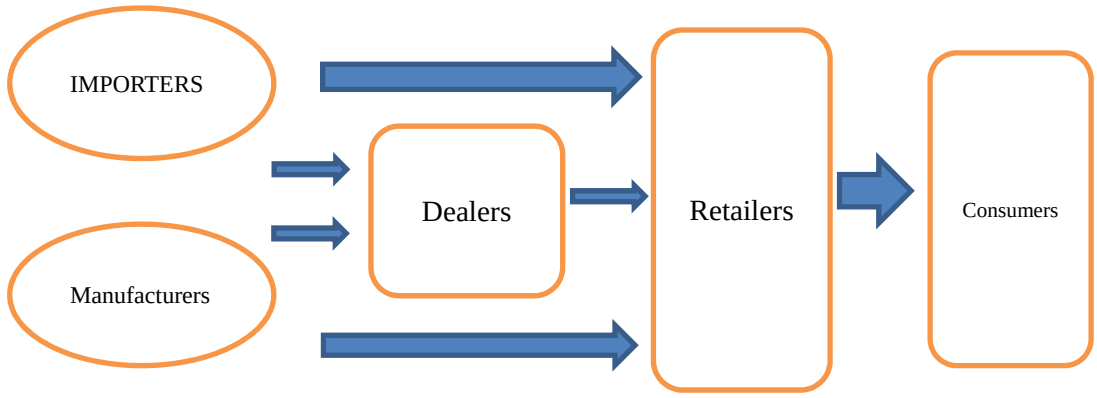


Figure 39 Distribution Channel of Home Appliances in Bangladesh

In Bangladesh, household electrical appliances are supplied by importers of finished goods (mostly from China and East Asian countries) and domestic assembly makers [core components (for example, inverters for air-conditioning units and motors for refrigerators) are imported for assembly with other components which are domestically produced; a typical domestic manufacturer is Walton] to distributors (often the same as importers or domestic manufacturers) and further to retailers (mainly specialist retailers although there are some retail stores which are affiliated to distributors) and finally to consumers.[10] It is reported[11] that Walton has a 64% share of the domestic refrigerator market. In 2011, the value of imported refrigerators and air-conditioning units stood at USD 5.4 million and USD 30.3 million respectively.[12]

[10] Based on the results of interviews with manufacturers and distributors.

[11] JETRO Institute of Developing Economies, Bangladesh-Little Known Industrialised Country, December, 2014

[12] Bangladesh Bureau of Census

Retail stores display inverter-controlled air-conditioning units and energy saving type refrigerators. Even though they are slightly more expensive than others[13], their sale in Dhaka are said to be favourable as the price difference can be more than absorbed by after-sale saving of the electricity charge.

The following observations are made regarding the situation of loan repayment by consumers.

- Many transactions at retailers in Dhaka are made in cash or by credit card.
- For credit cards, 0% interest for six months is offered by credit companies as part of their marketing strategy. The card handling fee is generally added to the sales price. Excluding the preferential rate under a marketing strategy, the common annual interest rate for credit cards is 24% or higher.
- Credit cards are owned by middle or higher income people. Lower income people without a credit card often rely on payment by installments (over a period of 1-2 years) which is a facility offered by retailers for the purchase of household electrical appliances. Walton has introduced a sales promotion measure of extending the installment repayment period up to three years.[14]
- Commercial banks provide personal loans (with an annual interest rate of approximately 15% or more) and such loans may be used for the purchase of household electrical appliances.
- In addition to the use of credit cards, some retailers offer credit through sale by installments with the condition of a repayment period of 1-3 years and an annual interest rate of approximately 13 – 14%.

Desired conditions for PD candidates to be participating in the Project are as in the following table. The information is based on the interviews conducted by the Survey Team.

Table 58 Opinions from PD candidates

Types of Business	Opinions regarding preferable Terms & conditions
NGO	(a) Interest rate to PDs should be lowered (ex.: 5% – 6% p.a.). (b) Interest rate to users should be at 10% – 12% p.a. (c) Tenor should be 12 – 18 months. (d) Security burden to borrower should be lessened. (e) Administration cost for PD should be lowered.
Distributors	(a) Interest rate to PDs should be lowered (ex.: less than 10%).
Commercial Banks	(a) Interest rate to PDs should be lowered (ex.: less than 7%). (b) Interest rate to users should be at less than 15% p.a.

Source: Interviews by the Survey Team

For reference, a typical example of the annual loan interest rate under the SHS program is 8% for a loan period of one year, 10% for two years and 12% for three years. The similarity of these rates among different POs has been confirmed through interviews with POs. There is, however, a gap between these nominal rates and the effective interest rates because of the application of a flat rate [where the interest amount is calculated by multiplying the initial loan amount (sales price) by the set interest rate for the entire loan period and the sum of the principal and interest is divided into a regular (monthly) payment amount for the entire loan period].

[13] The standard cost of a 1.5 ton air-conditioner system is 90,000 BDT with an inverter and 80,000 BDT without an inverter, resulting in a price difference of some 10,000 BDT. The price difference among different types of refrigerators is also around 10,000 to 15,000 BDT. (Based on interviews at MK Electronics)

[14] Article in the Daily Star in July, 2015

6.5. Implementation Support for the Project

The implementation support for the Project is comprised from three components: (i) assistance by JICA advisors during the initial stage of Project implementation, (ii) consulting service for SREDA to oversee the Project, and (iii) consulting service for the IFIs to support the project implementation. The three components have specific features such as main target for support, funding source, procurement arrangement, consultants to be employed and duration/timing. The overview of the three components is as summarized in the following table:

Table 59 Mapping of Terms of Reference for Technical Support on Project Implementation

TOR Item	Assistance by JICA Advisor for Initial Stage of Project Implementation	Consulting Services for SREDA	Consulting Services for IDCOL and BIFFL
	2016 - 2017 (2 year2)	2018 - 2020 (4 years)	2016 - 2022 (6 years)
1. Facilitating Implementation	Assistance for PIU (e.g. operation guidelines)	Assistance for PIU	Assistance for PIU (e.g. operation guidelines)
	Planning project implementation	Planning project implementation	Planning project implementation
		Public relations and awareness	Marketing
2. Capacity Development	Capacity development for implementing agencies	Exposure facilitation	
		Seminars to introduce technology and equipment	
3. Monitoring	Development of tools for data and information analysis	Analysis and processing of EE data	Assistance in monitoring activities by IDCOL and BIFFL
4. Reviewing and Improvement	Support for Technical Advisory Committee	Support for Technical Advisory Committee	
		Support for revision of manuals	
Main Target for Support	SREDA plus IDCOL/BIFFL	SREDA	IDCOL/BIFFL
Funding Source	(Grant Finance) from JICA to implementing agencies (outside of project costs)	(Lending from GoJ to GoB) Japanese ODA loan (Grant from MOF to IFIs)	(Lending from GoJ to GoB) Japanese ODA loan (Grant from MOF to IFIs)
Procurement Arrangement	JICA in charge (JICA procurement rule)	SREDA in charge	IFIs in charge
Consultants to be employed	International and National Consultants		

Source: Survey Team

6.5.1. JICA Advisors (Experts) for Project Implementation

The special assistance by JICA advisors for initial stage of project implementation will help jump-start the project implementation in the first two years. The beneficiary organizations include SREDA, IDCOL and BIFFL. The scope of the services will cover wide-ranging areas necessary for project implementation, such as (i) facilitating implementation, (ii) monitoring, (iii) review and improvement, and (iv) capacity development. The details of the plan for the implementation support are discussed in Annex 15.1.

6.5.2. Consulting Services for SREDA

The consulting services for SREDA assume that SREDA would utilize the fund from the Japanese ODA loan and that GoB would provide SREDA with the fund on a grant basis because SREDA would generate no revenue from the operation. The consulting services will assist SREDA in facilitating implementation, monitoring of project implementation, review and improvement and capacity development. The details of the plan for the implementation support are discussed in Annex 15.2.

6.5.3. Consulting Services for IFIs

IDCOL and BIFFL will also expect to receive the grant funding for the employment of consultants for assisting the project implementation. The consulting services would cover the facilitation of the project implementation and the monitoring work. The consulting services for IDCOL and BIFFL will be separate two contracts, each of which is managed by IDCOL and BIFFL. The details of the terms of reference are as shown in Annex 15.3.

6.6. Rough Project Cost Estimation

The project cost has been estimated by the approach shown in the below based on the "Manual for Design and Cost Estimation for Assistance Preparatory Survey (draft)" (March 2009). The final outputs will be compiled using the excel file in the "Cost Estimate Supporting System".

The cost of the main components will be categorized into the three components:

Component I	Industry / commercial sector component
Component II	Building equipment component
Component III	Home appliances component.

The costs for consulting services for SREDA, IDCOL and BIFFL have also been estimated.

Consulting Services for SREDA
Consulting Services for IDCOL
Consulting Services for BIFFL

The cost breakdown for the Project is summarized in the Annex as follows:

Annex 16.1	Overall Project Cost Breakdown
Annex 16.2	Annual Fund Requirement
Annex 16.3	Consulting Services Cost

6.7. Application and Appraisal Procedure

6.7.1. Appraisal Procedure for A-type Loan

Appraisal Procedure for A-type loan is as follows:

1. A proponent for A-type loan sub-project submits a loan application to an IFI for installing EE&C equipment;
2. The IFI conducts preliminary financial screening;
3. The IFI forwards the application to SREDA to check the technical eligibility;
4. SREDA checks the eligibility;
5. SREDA issues No Objection Certificate (NOC) and submit it to IFIs;
6. The IFI forwards the NOC to the Proponent;

7. The IFI conducts appraisal based on financial appraisal manual as shown in Annex 13.1;
8. The IFI institutionally approves the application (Board (or CEO));
9. The IFI notifies the result to SREDA monthly
10. IFIs to disburse to the proponent (JICA's concurrence is required for the first 5 to 10 subprojects before the disbursement).

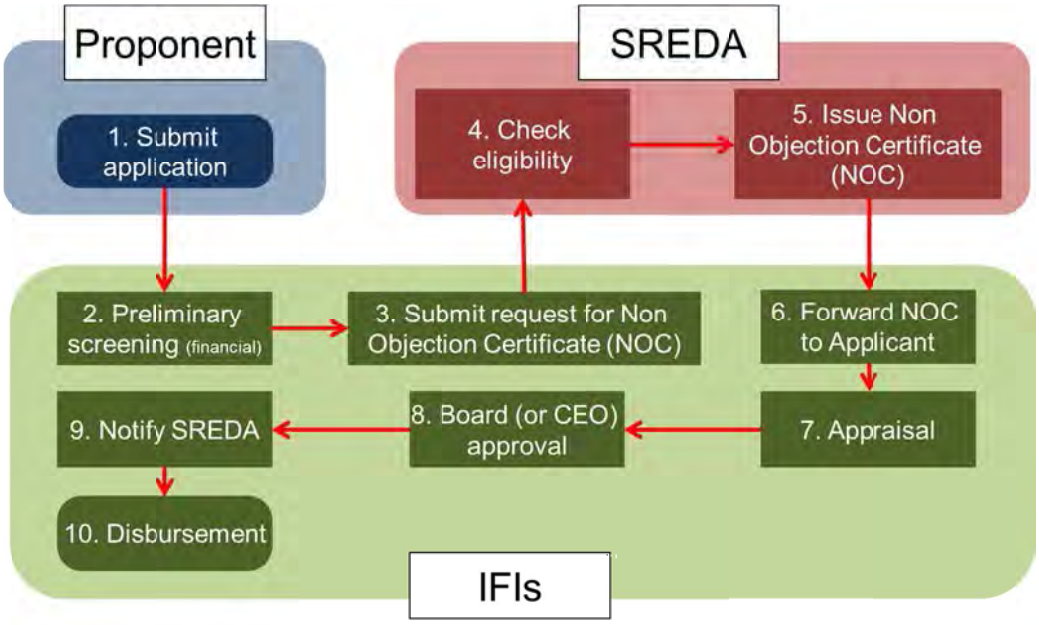


Figure 40 Borrowing Procedure for A-type Loan

6.7.2. Appraisal Procedure for B-Type

In B-type Loan, there are two steps which are (i) selection of PDs and (ii) financing to the end users. PDs may sell the EE&C home appliances which are prescribed in the Eligible Technology and Equipment List (as shown in Tables 55 to 57) only with installment payment methods. As for financing to end users, for example, the IFIs may choose either reimbursement procedure or advance payment procedure to disburse the loan fund to PDs. However, it does not necessary mean the B-type loan limits the procedures. IFI may apply other procedures at their own responsibility and risk with prudent monitoring system which prevents the misuse of the loan funds.

The followings are the two steps for B-type loan appraisal:

(1) Firstly, PDs should be selected as follows;

1. An IFI conducts public invitation for PDs (PD candidates as of present are as listed in Annex 14.5);
2. An organization which desires to become a PD submit the application;
3. The IFI checks the applications based on the eligibility criteria as shown in Annex 14.1 and select proper candidate as PDs;
4. The IFI signs the participating agreements as shown in Annex 14.2 with the selected PDs;

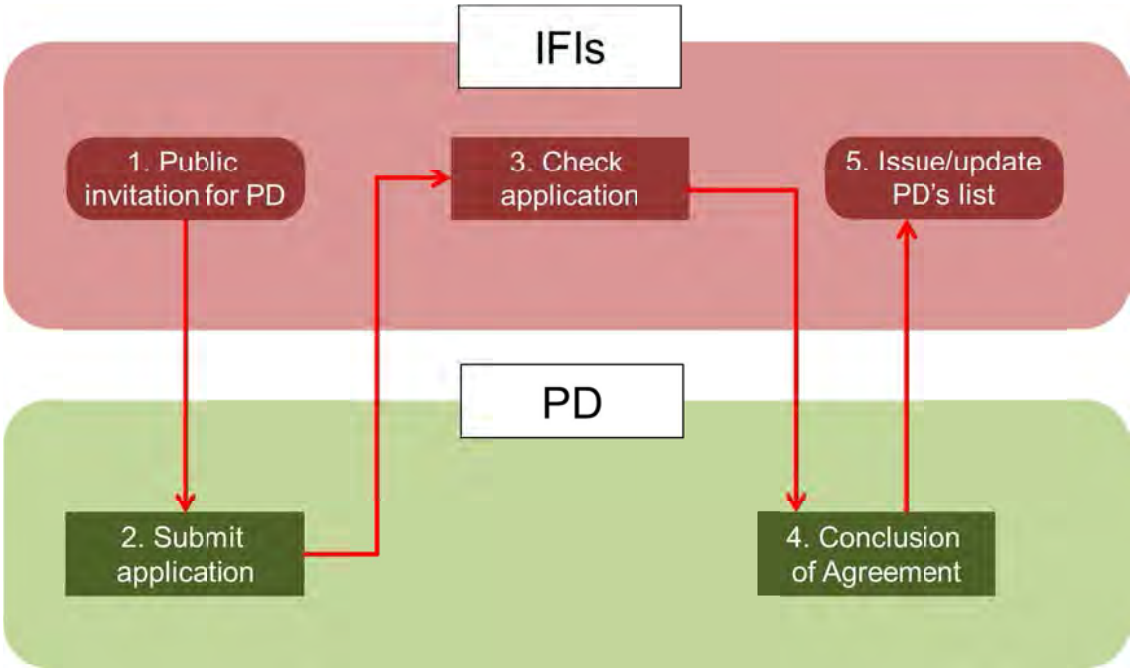


Figure 41 Steps for PD selection in B-type loan

(2a) Appraisal Procedure for B-Type: Example 1 - Reimbursement Procedure;

1. Applicant submits application for EE&C home appliances;
2. The PD checks the application based on the screening sheet of Annex 14.3;
3. The PD signs an End User Loan Agreement as shown in Annex 14.4 with the successful applicant as the end user for installment payment contract;
4. The end user pays the down payment;
5. The PD installs the home appliance;
6. The PD submits the fund request to an IFI;
7. The IFI checks the request from PD;
8. The IFI conducts onsite inspection if necessary;
9. The IFI disburses the requested amount to the PD (JICA's concurrence is required for the first 5 to10 sub-projects before prior to the disbursement of the fund).

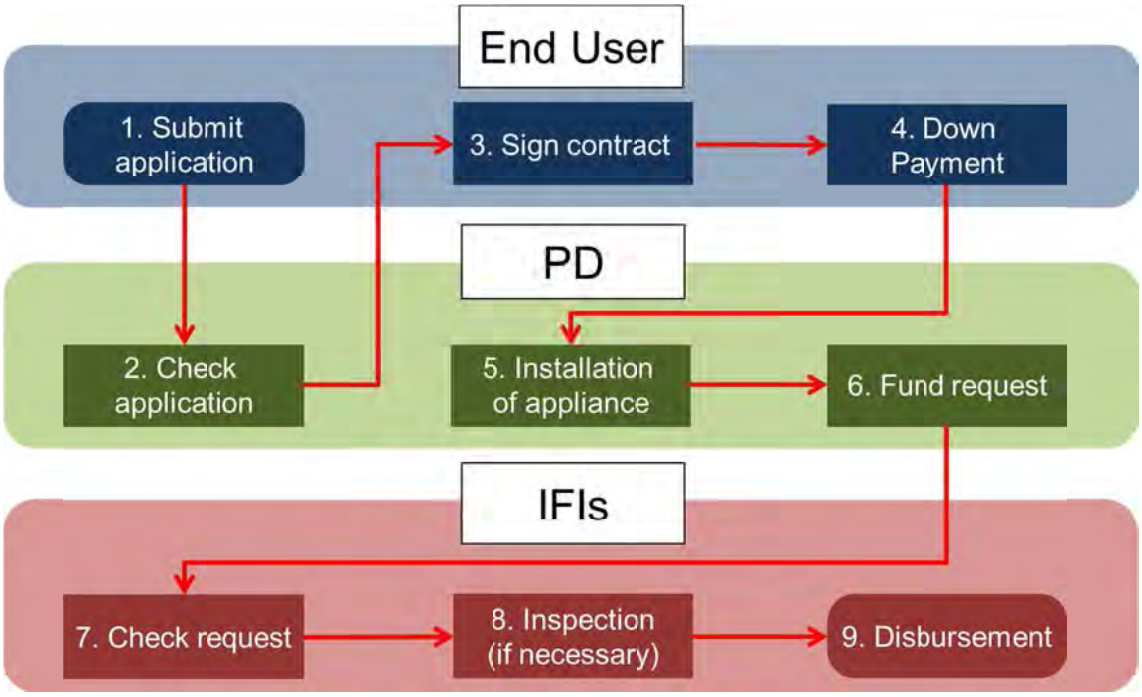


Figure 42 Borrowing Procedure for B-Type Reimbursement Procedure

(2b) Appraisal Procedure for B-Type: Example 2 - Advance Payment Procedure;

The PD needs to be permitted by IFIs based on the past performances including experiences of the reimbursement procedure explained in the above section to go for Advance payment Procedure.

1. The PD submits Procurement documents of EE&C equipment including Proforma invoice and L/C by PD at the timing of L/C opening;
2. The PD submits Letter from the bank and shipping documents based on which IFI disburses the remaining L/C payment as Advance Payment
3. The PD procure the EE&C home appliances;
4. Applicant submits application for EE&C home appliances;
5. The PD check the application based on the screening sheet as in Annex 14.3;
6. The PD signs an End User Loan Agreement as shown in Annex 14.4 with the successful applicant as the end user for installment payment contract;
7. The end user pays the down payment;
8. The PD installs the home appliance;
9. The PD submits evidences and required documents based on which PD request IFI to adjust the Advance Payment;
10. The IFI checks the evidence and documents;
11. The IFI conducts onsite inspections and adjust the Advance Payment amount disbursed to PDs if necessary.

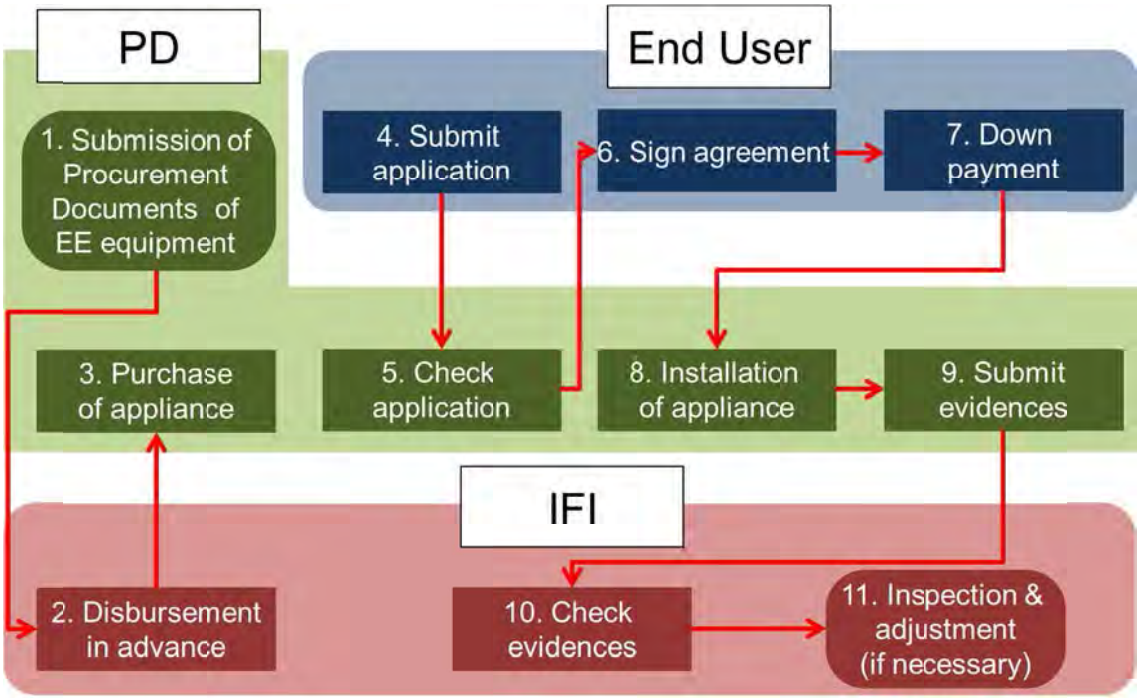


Figure 43 Borrowing Procedure for B-Type Advance Payment Procedure

6.8. Lending Conditions

For competing with the EE&C equipment in terms of price as well as in terms of other conditions such as payment modes (cash or credit card), the interest rate to the end user should be 4% in case of A-type loan and 8% in case of B-type loan in accordance with the result of interview with some major proponents. Considering that there are financing facility for EE&C products already available at 8%, and that private loan is commonly available from 10%, the policy driven loan of this Project will have to be more attractive compared with the readily available facility.

Table 60 Proposed Lending Conditions for A-type Loan

	Interest Rate Currency	Repayment Period including Grace Period
JICA – MOF	0.01% JPY	40 years (Grace period: 10 years)
MOF – IFIs Subsidiary loan	1% BDT	20 years (Grace period: 5 years)
IFIs – Proponents On-lending loan	4% (standard) BDT	Varies

Source: Survey Team Proposal

Table 61 Proposed Lending Conditions for B-type Loan

	Interest Rate Currency	Repayment Period including Grace Period
JICA – MOF	0.01% JPY	40 years (Grace period: 10 years)
MOF – IFIs **Subsidiary Loan**	1% BDT	20 years (Grace period: 5 years)
IFIs –PDs **Participating Agreement**	4% (standard) BDT	Varies
PDs – Residential/Small Business	8% (4 points plus standard) BDT	Varies

Source: Survey Team Proposal

6.9. Credit Risk Rating Framework

Considering the crucial importance of energy efficiency policy, the standard interest rate to the end-users would be set as standard rate of 4%, and credit risk of the end users (A-type loan) and Participating Distributors (B-type loan) would be considered according to the following framework. Maximum spread added to the standard interest rate would be 2%. Spread would be determined by each IFI under this framework and, in case of adding spread, such interest rate must be at least 8 percentage points lower than the interest rate of commonly available loans from each IFI.

Table 62 Credit Risk Rating Framework

Category	Reference Factors	Spread
A: Superior - Low Risk	■ Credit is fully secured by collateral, government gurantee, corporate or bank guarantee, and other equivalent elements.	0%
B: Good - Satisfactory Risk	■ Credit is substantially secured by collateral, government gurantee, corporate or bank guarantee, and other equivalent elements. ■ Strong financial situation (strong earnings, liquidity and other equivalent elements)	Up to 1%
C: Acceptable - Fair Risk	■ Credit is partly or not secured by collateral, government gurantee, corporate or bank guarantee, and other equivalent elements.. ■ Adequate financial situation (adequate earnings, liquidity and other equivalent elements).	Up to 2 %

Source: Survey Team Proposal

6.10. Funding Plan and Implementation Schedule

The implementation schedule of the Project is shown in the table on the next page. The Survey Team assumes that a Loan Agreement (L/A) for the Project will be concluded during the first half of Japanese fiscal year 2016 (April - September 2016: assumed to be in May 2016). In parallel, preparation for the employment of consultants will start, which includes preparation of TOR, invitation for tender, shortlisting of candidates, submission of proposals from the

candidates, evaluation of the proposals and contract signing. The consulting service will start by January 2017 for IDCOL and BIFFL, while it will be in March 2018 for SREDA. During the delay period before the start of the consulting service for SREDA, JICA is planning to extend expert advisory service, funded additionally from JICA.

The actual activities of the Project by means of providing loans in Component 1 to 3 are expected to start by the end of the Japanese fiscal year 2016, which will be by March 2017. The loan will be made available through to 2022, provided that the fund (including the revolving fund) will remain available.

Table 63 Schedule and Major Milestones

Items	Timing
TPP Approval	by April 2016 (before the L/A signing)
Loan Agreement (L/A)	by May 2016
Loan Effective	by July 2016
Selection of Consultant for IFIs	January 2016- December 2016
Consulting Services for IFIs	January 2017 - August 2022
Provision of Funds to End Users	March 2017 - December 2020
Project Completion Date*	August 2022

Note: Project Completion was defined as (i) the last JICA's disbursement for A-type or B-type loans, or (ii) the expiry of the L/A period of the Project, whichever comes earlier.

Table 64 Project Implementation Schedule

	2016	2017	2018	2019	2020	2021	2022	Month
								0
Pledge								0
Signing of Loan Agreement	1							1
								0
Component I	1	12	12	12	12	0	0	49
Component II	1	12	12	12	12	0	0	49
Component III	1	12	12	12	12	0	0	49
Consulting Services -SREDA	0	1	12	12	12	11	0	48
Consulting Services -IDCOL	3	12	12	12	12	12	5	68
Consulting Services -BIFFL	3	12	12	12	12	12	5	68

7. Project Management

7.1. Management Structure

7.1.1. Steering Committee (SC)

Steering Committee will be formulated by Power Division, MPEMR who is the head executing ministerial body for the Project. The formulation timing is on the commencement of the Project, which is within 2 months from Loan Agreement. SREDA will provide secretarial service for the Committee.

The Steering Committee is responsible for the following tasks:

- Convene Project review meetings annually inviting all the stakeholders to discuss on the status of the implementation and possible improvement in the Project;
- Find out the problem and bottlenecks and recommend necessary collection in policy level such as rules and regulations, taxes, etc.

The Committee will be comprised of the following members:

- Secretary, Power Division, MPEMR (Chairperson)
- Chairman, SREDA;
- One representative from External Relations Division, MOF as ministerial body for IDCOL (not below the rank of Joint Secretary);
- One representative from Finance Division, MOF as ministerial body for BIFFL (not below the rank of Joint Secretary);
- Project Director of the PIU, SREDA (Secretary)
- CEO, IDCOL;
- CEO, BIFFL;
- One representative from JICA;
- Any other person who may be appropriate.

Ordinary meetings (annual reporting meetings) are convened annually, within 3 months of the end of the fiscal year. The Chairperson will instruct the secretariat to arrange and call for the meetings. Extraordinary meetings may be arranged with short notice based on the consent of the members.

7.1.2. Technical Advisory Committee (TAC)

Technical Advisory Committee will be formulated by SREDA upon the commencement of the Project which is within 1 month after the formulation of SC. SREDA will provide secretarial service for the Committee. Technical Advisory Committee is responsible for the following tasks:

- To discuss the neceisty of revising the exsiting EE&C equipemnt list and submit the proposed revision SREDA;
- To advise SREDA on the preparation and revision of EE&C equipemnt list;
- To give advice to the Executing Agencies, when requested, on the eligibility of the applications for sub-projects;
- To evaluate energy audit report relating to the sub-projects as needed in such cases as the regulation on energy audit is in place;
- To advise the Executing Agencies concerning any technical issues;
- To give advice to SREDA for improvement in technical aspect of the Project;

The Committee will be comprised of no more than 10 members. The members will be nominated from the following organizations:

- Chairman, SREDA, will be the chairperson of the TAC;
- One each will be nominated by the executing agencies (SREDA, IDCOL and BIFFL) ;
- One each expert member for the three components;
- Up to two to more, nominated by the chairperson, subject to the consent of all the Executing Agencies;

The nominees will be one of the followings:

- Academic experts from higher education organizations;
- Expert consultants on Energy Efficiency Improvement and Conservation (EE&C) field;
- Officials from the governmental organizations;

Meetings are convened with the request of any comprising member to the Committee or the secretariat. The Chairperson will instruct the secretariat to arrange and call for the meetings. The secretariat will arrange and call for the meetings, at least a week in advance. Shorter notice may be accepted upon consent of the entire member.

7.2. Operation and Effect Indicators

With respect to the quantitative effects, the indicators as output of the activities and energy efficiency will be selected (operating indicators). The baseline value, if available and the target value for the two-year after the project completion will also be set. Output indicators are: amount of sub-project approved and extended, rate of receivables in arrears counts and amount basis. Energy efficiency indicators are the total energy saved and the emissions reduction.

Table 65 Project Monitoring Indicators

Indicator		Baseline (actual figure in CY 2016)	Target (CY 2023) [Two years after the Project completion]
Output			
Amount of sub-project approval and lending	JPY	-	Entire loan amount extended
Rate of receivables in arrear (amount basis)	%		To be set upon Project commencement
Rate of receivables in arrear (count basis)	%		To be set upon Project commencement
Energy Efficiency			
Total energy saved	toe		To be set upon completion of disbursement
Emissions reduction	t-CO2		To be set upon completion of disbursement

The qualitative effect can also be assessed by such factors as (i) stability of demand and supply situation, (ii) awareness of energy efficiency improvement in industry and residences, and (iii) improved capacity of SREDA and IFIs in appraising the loans.

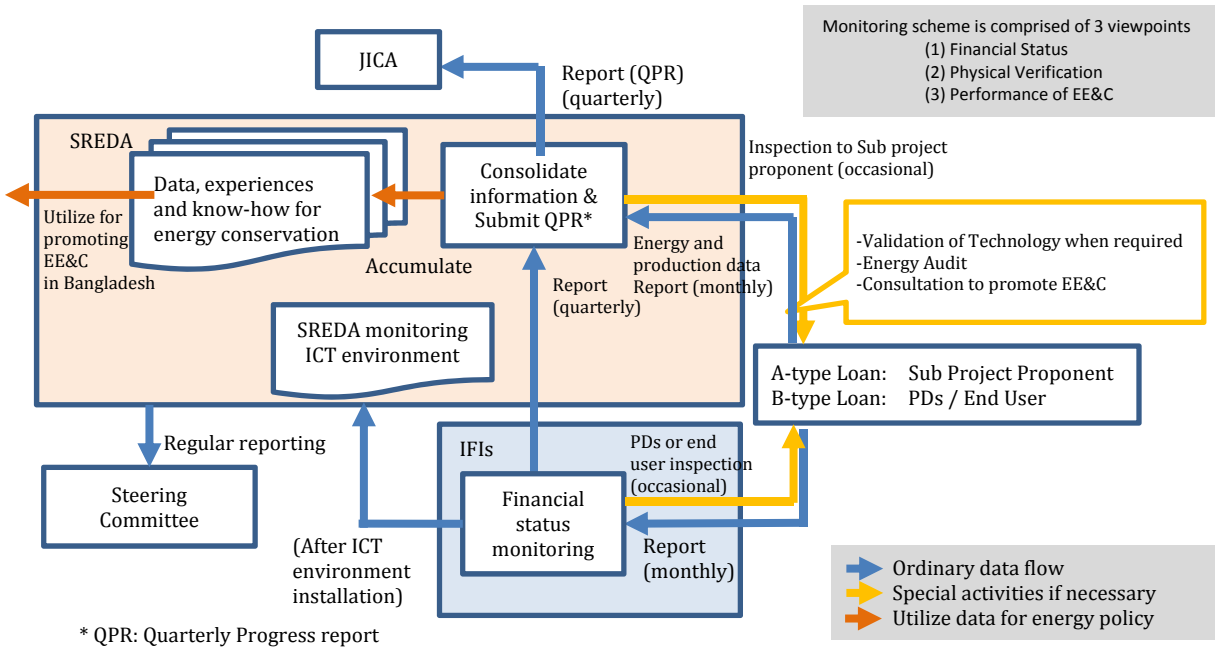
7.3. Monitoring Structure

The overview of monitoring scheme is shown in Figure 44. SREDA submits a QPR to JICA as a representative Executing Agency on quarterly basis by consolidating information from various resources which include information reported by IFIs (IDCOL and BIFFL), sub-project proponents and also those collected directly by SREDA through inspection etc. SREDA also reports to the Steering Committee the status of implementation on quarterly basis.

IFIs collect information on the current financial status from the sub-project proponents and PDs monthly. Based on these information, the IFIs report the financial status to SREDA quarterly. Once ICT environment is installed, the financial status information may be submitted on-line.

The sub-project proponents of A-type loan and PDs of B-type loan report the financial information to IFIs. Additionally and in parallel to this, the sub-project proponents will be required to report their energy and production data monthly direct to SREDA. This requirement is due to SREDA's mandate to monitor the progress of energy efficiency and conservation measures, while IFIs are mandated to monitor the financial activities. These ordinary monitoring scheme explained above are shown by blue line in the figure.

In addition to the blue line, yellow line in the figure shows the inspections that may be held occasionally. SREDA can conduct energy audit to sub-project proponents, gather precise information on energy use and energy efficiency. SREDA also can validate energy efficient technology and consult with the sub-project proponents to promote EE&C. Further, the IFIs can inspect the status of business activities and products to PDs and the end users. Orange line of the figure shows that all these data and experiences are accumulated in SREDA and must be utilized for promoting EE&C through policy making and implementation in all Bangladesh.



Source: Survey Team

Figure 44 Monitoring Structure

7.4. Reporting System

The list of monitoring reports by stakeholders and the timing of reporting is shown in Table 66, in accordance with the monitoring structure explained in section 7.3 of this report. Reporting by stakeholders is as follows:

7.4.1. SREDA

SREDA should submit an annual report with PSR format including FIs' potions (to JICA) with the following attachments;

- ESMS Checklist as shown in Annex 20.1
- Environmental and Social Performance Report (ESPR) as shown in Annex 20.3
- Time-bound Action Plan
- Anticorruption monitoring sheet as shown in Annex 18.1
- On-going Sub-Project Summary Report as shown in Annex 18.5
- Statement of the Designated Account, Sub Account and the Revolving Fund Account of the proceeds of the Loan as shown in Annex 18.2
- Current repayment and Overdue status Report as shown in Annex 18.3

And SREDA should submit the QPR with PSR format including FIs' potions (to JICA) with the following attachments quarterly:

- Environmental and Social Performance Report (ESPR) as shown in Annex 20.3
- Time-bound Action Plan
- Anticorruption monitoring sheet as shown in Annex 18.1
- On-going Sub-Project Summary Report as shown in Annex 18.5

And on event, SREDA should submit the following letters. For example, SREDA should request to Technical Advisory Committee (TAC) to consult with revision of the Eligibility List by clarifying the detailed specification, if necessary, based on the data and on-site inspection (possible issue: Energy Efficiency Level is less than expected value, any other claim or suggestion from the proponent).

- Request Letter for discussion in case if any on technical issue (to Technical Advisory Committee (TAC))
- Request Letter for extraordinary meeting on exceptional occasions (to Steering Committee (SC))

7.4.2. IDCOL / BIFFL

IDCOL/BIFFL should submit the Annual report with PSR format to SREDA including the following attachments;

- ESMS Checklist as shown in Annex 20.1
- Environmental and Social Performance Report (ESPR) as shown in Annex 20.3
- Time-bound Action Plan
- Anticorruption monitoring sheet as shown in Annex 18.1
- On-going Sub-Project Summary Report as shown in Annex 18.5
- Statement of the Designated Account, Sub Account and the Revolving Fund Account of the proceeds of the Loan as shown in Annex 18.2
- Current repayment and Overdue status Report as shown in Annex 18.3

IDCOL/BIFFL should submit the QPR with PSR format (to SREDA) with the following attachments quarterly;

- Environmental and Social Performance Report (ESPR) as shown in Annex 20.3
- Time-bound Action Plan
- Anticorruption monitoring sheet as shown in Annex 18.1
- On-going Sub-Project Summary Report as shown in Annex 18.5
- On site Physical Verification Report (to SREDA) more than 25% of the number of total loan cases as shown in Annex 17.6 (1) for A-type loan and as shown in Annex 17.6 (2) for B-Type
- IFI financial report on A-type loan sub-project proponent and B-type loan PD (to SREDA) as shown in Annex 17.4
- Implementation Status Report (to SREDA) as shown in Annex 17.5

On event, IDCOL/BIFFL should submit incident report on any overdue by Proponents and PDs (to SREDA).

Besides of the above-mentioned monitoring reports, IDCOL and BIFFL, will employ a chartered accountant firm for internal audit of the Project in accordance with the draft TOR as shown in Annex 19. The cost of its employment should be borne by the executing agencies. The executing agencies will submit the annual internal audit report as shown in Annex 18.4 to JICA within 9 months after the end of each fiscal year.

7.4.3. End User for A-type Loan Sub-project (Proponent)

After disbursement, the End User for A-type loan sub-project (Proponent) should submit documents and evidences on purchasing and installing EE&C equipment to IFIs as shown in Annex 17.7. The End User for A-type loan sub-project (Proponent) should also submit a Financial Statement (to IFIs) annually, and energy efficiency data as shown in Annex 17.8 (to SREDA) on quarterly basis. Further, the End User for A-type loan sub-project (Proponent) should submit data and information required during inspection and energy audit to SREDA.

7.4.4. PDs

PDs should submit Financial Statement to IFIs annually, PD financial report on B-type end users to IFI as shown in Annex 17.9 quarterly and monthly. Further, PDs should submit data and information required during inspection and energy audit to SREDA.

7.4.5. B-type loan End Users

End Users will make application for B-type loan to PDs and after installation should submit data and information required during inspection and energy audit to SREDA.

Table 66 List of Monitoring Reports

Prepared by	Type	On Event	Commencement	Monthly	Quarterly	Annually
SREDA	**Both A- and B-Type Loan**	・Request Letter for discussion in case if any on technical issue (to TAC) No fixed format ・Request Letter for extraordinary meeting on exceptional occasions (to AC) No fixed format ・On site Physical Verification Report, Attachment RR			・QPR with PSR format including FIs' potions (to JICA)with the following attachments; Environmental and Social Performance Report (ESPR) Annex 20.3, Time-bound Action Plan, Anticorruption monitoring sheet (Annex 18.1) , On-going Sub-Project Summary Report (Annex 18.5)	・Annual report with PSR format including FIs' potions (to JICA) with the following attachments: ESMS Checklist Annex 20.1, Environmental and Social Performance Report (ESPR) Annex 20.3, Time-bound Action Plan (Annex IV), Anticorruption monitoring sheet (Annex 18.1) , On-going Sub-Project Summary Report (Annex 18.5), Statement of the Designated Account, Sub Account and the Revolving Fund Account of the proceeds of the Loan (Annex 18.2),Current repayment and Overdue status Report (Annex 18.3)
IDCOL/BIFFL	**Both A- and B-Type Loan**	・Incident report on any overdue by Proponents and PDs (to SREDA) No fixed format			・QPR with PSR format (to SREDA)with the following attachments; Environmental and Social Performance Report (ESPR) Annex 20.3, Time-bound Action Plan, Anticorruption monitoring sheet (Annex 18.1) , On-going Sub-Project Summary Report (Annex 18.5) ・On site Physical Verification Report, (to SREDA) more than 25% of the number of total loan cases, Annex 17.6 (1) for A-type loan and	・Annual report with PSR format (to SREDA) including the following attachments: ESMS Checklist Annex 20.1, Environmental and Social Performance Report (ESPR: Annex 20.3), Time-bound Action Plan, Anticorruption monitoring sheet (Annex 18.1), On-going Sub-Project Summary Report (Annex 18.5), Statement of the Designated Account, Sub Account and the Revolving Fund Account of the proceeds of the Loan (Annex 18.2), Current repayment and Overdue status Report (Annex 18.3) ・Certified Audit Report on Statements of Expenditures (SOEs) and Audit Report prepared by Auditor as a part of Disbursement Requirement (to JICA and SREDA)

Prepared by	Type	On Event	Commencement	Monthly	Quarterly	Annually
					Annex 17.6 (2) for B-type loan ・IFI financial report on A-type loan end user and B-type PD (to SREDA) Annex 17.4 ・Implementation Status Report (to SREDA) Annex 17.5	
End Users A (Proponent)	**A**	・Data and information required during inspection and energy audit (to SREDA) No fixed format ・EE&C equipment data with Annex 17.7 (to SREDA) immediately after the installment of the EE equipment	**(After disbursement)** Documents and evidences on purchasing and installing EE&C equipment (to IFIs) Annex 17.7		・Energy efficiency related data on Annex 17.8 format (to SREDA)	・Financial Statement (to IFIs) No fixed format
PDs	**B**	Data and information required during inspection and energy audit (to SREDA) No fixed format		・PD financial report on B-type end users (to IFI) which may use Annex 17.9	・PD financial report on B-type end users (to IFI) Annex 17.9	・Financial Statement (to IFIs) No fixed format
End users B	**B**	Data and information required during inspection and energy audit (to SREDA) No fixed format	(Application for B-Type loan)		N/A	

7.5. Loan Screening Criteria, Loan Screening Manual and Technical Standards

7.5.1. A-type Loan Appraisal Manual for Large sub-projects

A-type loans are for sub-projects which differ from one to another. As this is the case, the appraisal standard and procedure will have to be simplified so as to avoid the appraisal lasting for a long time as such will discourage the sub-project proponent from using the loan.

The conventional loans of IDCOL or BIFFL are primarily for project finance. As such, it is necessary to clarify the differences between the screening process for A-type loans for individual enterprises and B-type loans for projects.

Table 67 Differences between project finance and corporate finance

	Project Finance	Corporate Finance
Debtor	Special-purpose company (jointly invested company by sponsors)	Individual enterprises
Financial Source for Repayment	Income from the project	Overall business income of each enterprise, including investment effects
Subject matters for creditability appraisal	Project profitability and financial status of the SPC	Profitability and financial status of each enterprise

The field surveys have verified that some types of information relating to loan appraisal listed in the next table are available under the unique practices of financial institutions in Bangladesh.

Table 68 Accessible credit information in Bangladesh

External Information, etc.	Use of Information	References
Credit Rating	Based on the Credit Rating Companies Rules formulated by the Securities and Exchange Commission of Bangladesh (SECB) in 1996, seven rating companies are currently in operation. While commercial banks are required to calculate the risk ratio of borrowing enterprises when calculating their own equity to total asset ratio as required by the Bank for International Settlement (BIS) rules, the central bank recommends the use of the credit rating determined by these companies. As a result, the use of credit rating for lending has increased to the extent that the number of rated enterprises as of December, 2012 is 5,557. The rating of small enterprises started in 2014.	Rating in Bangladesh is based on local rules and differs from rating based on the international criteria used by American and Japanese rating companies. Financial institutions in Japan conduct rating based on the bankruptcy probability or use the model developed by the Credit Risk Database (CRD) Association.
CIB Report	In 1992, the central bank established the Credit Information Bureau (CIB). The CIB report provides credit information (repayment history, balance, loan type, securities and guarantee offered) on borrowers from domestic financial institutions to domestic financial institutions.	There is no equivalent system in Japan.

CRG Scale	The CRG (credit rating grade) scale is a simple scoring model developed and offered by the central bank to allow financial institutions to produce in-house credit grades for potential borrowers. The risk ratio is calculated based on the rating produced by this model.	Each financial institution uses its own model or uses the model developed by the CRD Association.

Source: Asian Development Bank (2013) *Regulatory Framework and Role of Domestic Credit Rating Agencies in Bangladesh*

Next figure is an image of the proposed credit appraisal procedure for A-type loans. This procedure uses both information possessed by domestic financial institutions in Bangladesh and information submitted or acquired from applying companies.

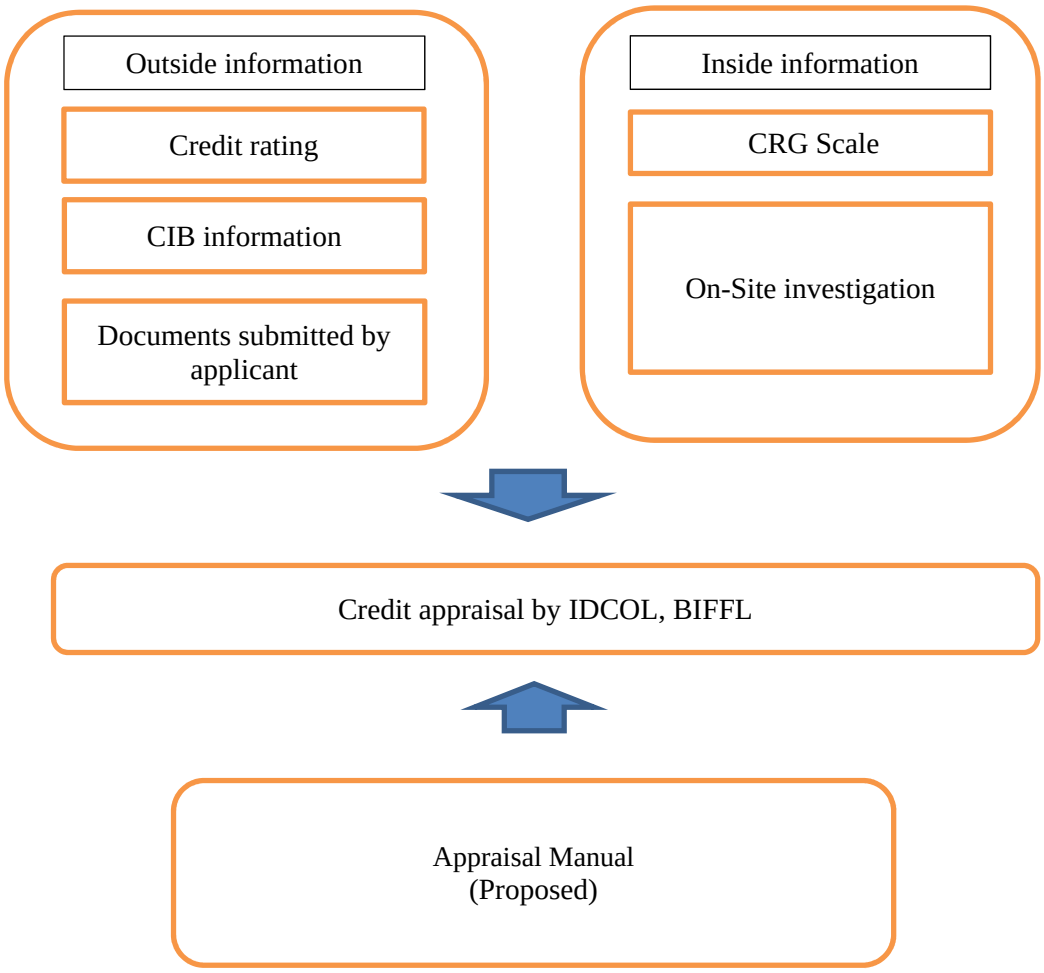


Figure 45 Image of proposed Credit Appraisal Manual for A-type loan

This procedure is outlined below while its details are as shown in Annex 13.1.
The largest task proposed in relation to this appraisal procedure is shortening of the appraisal process.

1) The applying company (applicant) submits the documents required for preliminary selection by IDCOL/BIFFL.

2-1) The CEO of IDCOL has the authority to approve a loan when the applied amount is up to 100 million BDT. Likewise, the Executive Committee of BIFFL has similar authority up to an applied loan amount of 500 million BDT.

2-2) When the applied amount to IDCOL exceeds 100 million BDT, the decision to approve a loan is taken by the Board of Directors. In the case of BIFFL, the Board of Directors handles the loan application when the applied amount exceeds 500 million BDT.

3) This is followed by technical pre-screening by SREDA. It is intended that the procedure up to this point should be completed in seven business days and SREDA issues either a NOC (No Objection Certificate) or a rejection letter.

4) A loan application for which a NOC is issued then proceeds to the financial appraisal stage to undergo due diligence. There are two types of due diligence: simple type and general type depending on the applied loan amount. The findings of such a focused appraisal are written in the form of a credit report. The check points at this financial appraisal stage are listed in the Annex 13.1.

5) The credit report is subject to the approval process based on the arrangements explained in 2) above. The loan approval criteria are explained in the Annex 13.1.

7.5.2. PD selection manual for B-type Loan

The PD selection (eligibility) criteria and rules adopted by the PD Selection Committee are used for the selection of PDs. The eligibility criteria cover such matters as (1) organization, (2) sound financial position, (3) financial criteria, (4) consistency of financial criteria, (5) existence of an electrified area(s) inside the business area, (6) adequate business plan for the EE&C loan program, and (7) debt service reserve account.

The assumed candidate organizations to function as PDs are MFIs, NGOs, private companies and foundations. In Bangladesh, any installment finance (sales finance) is treated as a loan or lease agreement from the viewpoint of a contract. When a MFI or NGO provides installment finance as a PD, it must obtain a license from the MRA (Microfinance Regulatory Authority) although a private company (joint stock company) or foundation does not require such a license. PDs will be finalized on the basis of these criteria and the individual appraisal of the candidates by IDCOL/BIFFL and the PD Selection Committee.

7.5.3. B-type Loan Refinancing Manual for Screening End User application

A selected PD conducts the screening of the feasibility of granting a credit facility to an applying consumer (end-user). The detailed contents of this screening are given on the End-User Screening Sheet which is as shown in Annex 14.3. This sheet covers such issues as (1) processing procedure, (2) consumer selection, (3) loan amount, (4) terms and conditions, (5) loan appraisal, and (6) loan approval.

According to a PO of SHS loan which is a candidate for a PD, the credit check of an applicant can be completed in one or two days at the quickest (up to approximately one week at the longest) by means of collecting the relevant information through a home visit and visits to various local organizations. This credit check is then followed by (i) the conclusion of a loan agreement (on the condition that a down payment is made), (ii) installation of equipment, (iii) reporting of equipment installation and request for money transfer to IDCOL/BIFFL, (iv) random inspection by IDCOL/BIFFL, and (v) money transfer to the PD from IDCOL/BIFFL.

8. Environmental and Social Considerations

8.1. Current Social and Environmental Conditions as a Baseline

8.1.1. Socioeconomic Situation

The map of Bangladesh is shown in Figure 46. There are six (6) Divisions and sixty four (64) Districts (zila) in Bangladesh described in Table 69.

Source: Socio-Economic and Demographic Report, Pollution and Housing Census 2011, BBS, SID and Ministry of Planning

Figure 46 Administrative Map of Bangladesh

Table 69 Number of Upazila / Thana, Union, Village and Municipality by Zila, 2011

Division and zila (District)		Total Area Sq. Km	Upazila/ Thana	Union	Village	Municipalities
	Barisal Division	**13225.2**	**40**	**349**	**4098**	**25**
1.	Barisal	2784.5	10	85	1116	6
2.	Bhola	3403.5	7	68	439	5
3.	Jhalakathi	706.8	4	32	455	2
4.	Pirojpur	1277.8	7	51	648	3
5.	Barwuna	1831.3	5	42	562	4
6.	Patuakhali	3221.3	7	71	878	5
	Chittagong Division	**33908.4**	**116**	**945**	**15240**	**60**
7.	Bandarban	4479.0	7	30	1554	2
8.	khagrachhari	2749.2	8	38	1702	3
9.	Rangamati	6116.1	10	49	1555	2
10.	Chittagong	5282.9	26	197	1288	11
11.	Cox's Bazar	2491.8	8	71	989	4
12.	Brahmanbaria	1881.2	9	100	1323	4
13.	Chandpur	1645.3	8	87	1230	7
14.	Comilla	3146.3	16	181	3532	10
15.	Feni	990.4	6	43	553	5
16.	Lakshmipur	1440.4	5	58	547	4
17.	Noakhali	3685.9	9	91	967	8
	Sylhet Division	**12635.3**	**38**	**333**	**10250**	**20**
18.	Habiganj	2636.6	8	77	2142	6
19.	Moulvibazar	2799.4	7	67	2015	5
20.	Sunamganj	3747.2	11	87	2887	4
21.	Sylhet	3452.1	12	102	3206	5
	Dhaka Division	**31177.9**	**164**	**1247**	**25215**	**86**
22.	Dhaka	1463.6	46	79	2001	4
23.	Gazipur	1806.4	5	43	1114	5
24.	Manikganj	1383.7	7	65	1660	2
25.	Munshiganj	1004.3	6	67	919	2
26.	Narayanganj	684.4	5	41	1204	6
27.	Narsingdi	1150.1	6	70	1048	6
28.	Faridpur	2052.9	9	79	1899	4
29.	Rajbari	1092.3	5	42	967	3
30.	Gopalganj	1468.7	5	68	889	4
31.	Madaripur	1125.7	4	59	1062	3
32.	Shariatpur	1174.1	6	65	1254	5
33.	Jamalpur	2115.2	7	68	1361	6
34.	Sherpur	1364.7	5	52	695	4
35.	Kishoreganj	2688.6	13	108	1725	8
36.	Mymensingh	4394.6	12	146	2692	10
37.	Netrokona	2794.3	10	86	2282	5
38.	Tangail	3414.3	12	109	2443	9
	Khulna Division	**22284.1**	**64**	**574**	**9287**	**37**
39.	Jessore	2606.9	8	92	1419	8
40.	Jhenaidah	1964.8	6	67	1144	6
41.	Magura	1039.1	4	36	711	1
42.	Naraii	968.0	3	38	635	3
43.	Bagerhat	3959.1	9	76	1048	3
44.	Khulna	4394.4	14	70	1122	3
45.	Satkhira	3817.3	7	79	1440	2
46.	Chuadanga	1174.1	4	32	521	4
47.	Kushtia	1608.8	6	66	973	5
48.	Meherpur	751.6	3	18	274	2

Division and zila (District)		Total Area Sq. Km	Upazila/ Thana	Union	Village	Municipalities
	Rajshahi Division	34338.0	128	1101	14079	87
49.	Bogra	2898.7	12	108	2618	11
50.	Joypurhat	1012.4	5	32	887	4
51.	Dinajpur	3444.3	13	101	2131	8
52.	Panchagath	1404.6	5	43	825	2
53.	Thakurgaon	1781.7	5	51	641	3
54.	Pabna	2376.1	9	73	1562	9
55.	Sirajganj	2402.1	9	82	2016	6
56.	Naogaon	3435.6	11	99	2779	3
57.	Natore	1900.2	6	52	1351	8
58.	Chapi Nawabganj	1702.5	5	45	1135	4
59.	Rajshahi	2425.4	13	71	1727	14
60.	Gaibandha	2114.8	7	82	1250	3
61.	Kurigram	2245.0	9	72	1872	3
62.	Lalmonirhat	1247.4	5	45	478	2
63.	Nilphamari	1546.6	6	61	361	4
64.	Rangpur	2400.6	8	84	1492	3
	Bangladesh	**147568.9**	**550**	**4549**	**78169**	**315**

Source: Population and Housing Census, 2011, BBS

8.1.2. Pollution Control

8.1.2.1. Air Quality

The National Ambient Air Quality Standards for Bangladesh are shown in Table 70.

Table 70 National Ambient Air Quality Standards for Bangladesh

Pollutant	Objective	Average
CO	10 mg/m3 (9 ppm)	8 hours (a)
	40 mg/m3 (35 ppm)	1 hour (a)
Pb	0.5 µg/m3	Annual
NOx	100 µg/m3 (0.053 ppm)	Annual
PM10	50 µg/m3	Annual (b)
	150 µg/m3	24 hours (c)
PM2.5	15 µg/m3	Annual
	65 µg/m3	24 hours
O3	235 µg/m3 (0.12 ppm)	1 hour (d)
	157 µg/m3 (0.08 ppm)	8 hours
SO2	80 µg/m3 (0.03 ppm)	Annual
	365 µg/m3 (0.14 ppm)	24 hours (a)

Notes:

(a) Not to be exceeded more than once per year

(b) The objective is attained when the annual arithmetic mean is less than or equal to 50µg /m3

(c) The objective is attained when the expected number of days per calendar year with a 24- hour average of 150 µg/m3 is equal to or less than 1

(d) The objective is attained when the expected number of days per calendar year with the maximum hourly average of 0.12 ppm is equal to or less than 1

Source: Monthly Air Quality Monitoring Report, Reporting Month: April 2015, Clean Air and Sustainable Environment Project, May 2015, Department of Environment

The monthly air quality monitoring data such as SO_2, NO_2, CO, O_3, $PM_{2.5}$ and PM_{10} in April, 2015 are shown in Table 71.

Table 71 Summary Air Quality and Meteorological data measured during April, 2015 at different CAMS operated under DoE

Parameter	unit	NAAQS	Summary	Dhaka			Gazipur	Narayangonj	Chittagong		Khulna	Rajshahi	Sylhet	Barisal
				CAMS-1 (S- Bhaban)	CAMS-2 (BARC)a	CAMS-3 (D-salam)	CAMS-4 (Gazipur)	CAMS-5 (Narayonganj)	CAMS-6 TV-St (Chittagong)[a]	CAMS-7 Agrabad (Chittagong)	CAMS-8 (Sylhet)	CAMS-9 (Khulna)[a]	CAMS-10 (Rajshahi)[a]	CAMS-11 (Barisal)
SO_2 -24 hr	ppb	140	Average	DNA*	DNA*	7.02	DNA*	DNA*	DNA*	16.99	DNA*	DNA*	DNA*	DNA*
			Max	DNA*	DNA*	11.27	DNA*	DNA*	DNA*	24.70	DNA*	DNA*	DNA*	DNA*
			Min	DNA*	DNA*	5.33	DNA*	DNA*	DNA*	11.41	DNA*	DNA*	DNA*	DNA*
			Exceedance(Days)	DNA*	DNA*	0	DNA*	DNA*	DNA*	0	DNA*	DNA*	DNA*	DNA*
			Data capture(%)	DNA*	DNA*	94	DNA*	DNA*	DNA*	79	DNA*	DNA*	DNA*	DNA*
NO_2 -24 hr	ppb	53 (Annual)	Average	DNA*	DNA*	14.81	DNA*	14.89	DNA*	DNA*	14.90	DNA*	DNA*	DNA*
			Max	DNA*	DNA*	39.01	DNA*	50.86	DNA*	DNA*	27.15	DNA*	DNA*	DNA*
			Min	DNA*	DNA*	3.77	DNA*	3.98	DNA*	DNA*	7.40	DNA*	DNA*	DNA*
			Exceedance(Days)	DNA*	DNA*	0	DNA*	0	DNA*	DNA*	0	DNA*	DNA*	DNA*
			Data capture(%)	DNA*	DNA*	92	DNA*	82	DNA*	DNA*	69	DNA*	DNA*	DNA*
CO- 1 hr	ppm	35	Average	DNA*	3.44	2.48	1.17	0.73	0.75	1.83	3.54	DNA*	0.55	0.83
			Max	DNA*	11.28	4.51	2.92	2.40	4.35	11.08	5.66	DNA*	1.17	3.00
			Min	DNA*	0.05	0.28	0.08	0.29	0.05	0.93	2.64	DNA*	0.12	0.35
			Exceedance(Hour)	DNA*	0	0	0	0	0	0	0	DNA*	0	0
			Data capture(%)	DNA*	64	94	78	82	93	77	69	DNA*	90	77
CO-8hr	ppm	9	Average	DNA*	3.88	2.49	1.16	0.73	0.75	1.83	3.54	DNA*	0.55	0.83
			Max	DNA*	8.22	4.11	2.47	1.97	2.29	6.48	4.76	DNA*	0.80	2.39
			Min	DNA*	0.55	0.33	0.25	0.32	0.29	1.21	2.91	DNA*	0.38	0.53
			Exceedance(Hour)	DNA*	0	0	0	0	0	0	0	DNA*	0	0
			Data capture(%)	DNA*	53	95	74	79	92	79	69	DNA*	88	72
O_3-1hr	ppb	120	Average	DNA*	20.29	DNA*	DNA*	6.43	DNA*	10.81	DNA*	12.45	11.41	5.64
			Max	DNA*	75.25	DNA*	DNA*	55.94	DNA*	48.21	DNA*	43.13	52.58	20.58
			Min	DNA*	1.10	DNA*	DNA*	1.35	DNA*	1.08	DNA*	1.21	0.06	0.26
			Exceedance(Hour)	DNA*	0	DNA*	DNA*	0	DNA*	0	DNA*	0	0	0
			Data capture(%)	DNA*	93	DNA*	DNA*	82	DNA*	79	DNA*	89	87	77
O_3-8hr	ppb	80	Average	DNA*	20.32	DNA*	DNA*	6.34	DNA*	10.81	DNA*	12.52	11.57	5.59
			Max	DNA*	45.05	DNA*	DNA*	33.94	DNA*	40.98	DNA*	36.57	39.98	15.70
			Min	DNA*	6.23	DNA*	DNA*	1.43	DNA*	1.37	DNA*	2.15	0.34	0.71
			Exceedance(Hour)	DNA*	0	DNA*	DNA*	0	DNA*	0	DNA*	0	0	0
			Data capture(%)	DNA*	93	DNA*	DNA*	78	DNA*	82	DNA*	86	84	72

Parameter	unit	NAAQS	Summary	Dhaka			Gazipur	Narayangonj	Chittagong		Khulna	Rajshahi	Sylhet	Barisal
				CAMS-1 (S- Bhaban)	CAMS-2 (BARC)a	CAMS-3 (D-salam)	CAMS-4 (Gazipur)	CAMS-5 (Narayonganj)	CAMS-6 TV-St (Chittagong)[a]	CAMS-7 Agrabad (Chittagong)	CAMS-8 (Sylhet)	CAMS-9 (Khulna)[a]	CAMS-10 (Rajshahi)[a]	CAMS-11 (Barisal)
$PM_{2.5}$ -24hr	$\mu g/m^3$	65	Average	43.38	55.69	53.22	39.94	55.68	DNA*	58.48	DNA*	DNA*	DNA*	47.26
			Max	79.59	102.83	111.71	81.21	107.42	DNA*	107.50	DNA*	DNA*	DNA*	93.31
			Min	13.98	25.36	23.52	20.58	33.30	DNA*	29.66	DNA*	DNA*	DNA*	31.31
			Exceedance(Days)	4	6	6	1	3	DNA*	5	DNA*	DNA*	DNA*	1
			Data capture(%)	95	90	88	60	53	DNA*	63	DNA*	DNA*	DNA*	62
PM_{10} -24hr	$\mu g/m^3$	150	Average	84.31	DNA*	97.54	84.94	156.71	DNA*	92.82	DNA*	DNA*	DNA*	70.18
			Max	144.87	DNA*	195.47	169.36	278.16	DNA*	148.88	DNA*	DNA*	DNA*	152.71
			Min	46.44	DNA*	55.38	46.42	84.92	DNA*	48.53	DNA*	DNA*	DNA*	45.95
			Exceedance(Days)	0	DNA*	3	1	7	DNA*	0	DNA*	DNA*	DNA*	1
			Data capture(%)	90	DNA*	87	64	73	DNA*	51	DNA*	DNA*	DNA*	63

CAMS= Continuous Air Monitoring Station, NAAQS=National Ambient Air Quality Standard, a=Refurbishment CAMS, PM= Particulate Matter
DNA= Data Not Available, *=DNA due to malfunction of the analyser/sensor or poor data capture rate

Source: Monthly Air Quality Monitoring Report, Reporting Month: April 2015, Clean Air and Sustainable Environment Project, May 2015, Department of Environment

8.1.2.2. Water Quality

The laws, rules, and ordinances related to water quality are shown below:

1) National Environment Policy (1992)
2) EIA Guidelines for Water Resources (1992)
3) Environment Conservation Act (1995)
4) National Environment Management Action Plan (1995)
5) Environment Conservation Rules (1997)
6) EIA Guidelines for Industries (1997)
7) National Policy for Safe Water Supply and Sanitation (1998)
8) National Fisheries Policy (1998)
9) Environment Conservation Act (1998)
10) Environment Court Act (2000)
11) National Policy for Arsenic Mitigation (2004): provides a guideline for mitigating the effect of arsenic on people and the environment in a realistic and sustainable way.
12) National Water Management Plan (2004): appropriates sanitation to all by 2010 and has also made a provision for waterborne sanitation and storm water drainage in major cities.
13) Sector Development Framework (2004): guides planning, coordination, and monitoring of all future sector development activities.
14) Sanitation Related Policy Decisions (2004): the GoB allocated 20% of the annual development program fund to Upazillas (sub-districts) for improving sanitation coverage.
15) Pro-Poor Strategy for Water and Sanitation Sector (2005): provides the operational definition of hard core poor households, basic minimum service level, and so forth.

Table 72 shows Bangladesh standards for inland surface water.

Table 72 Bangladesh Standards for Inland Surface Water

Best Practice based classification	Parameter			
	pH	BOD mg/l	DO mg/l	Total Coliform number/100
Source of drinking water for supply only after disinfecting	6.5-8.5	2 or less	6 or above	50 or less
Water usable for recreational activity	6.5 – 8.5	3 or less	5 of more	200 or less
Source of drinking water for supply after conventional treatment	6.5 – 8.5	6 of less	6 or more	5000 or less
Water usable by fisheries	6.5 – 8.5	6 of less	5 or more	---
Water usable by various process and cooling industries	6.5 – 8.5	10 or less	5 or more	5000 or less
Water usable for irrigation	6.5 – 8.5	10 or less	5 or more	1000 or less

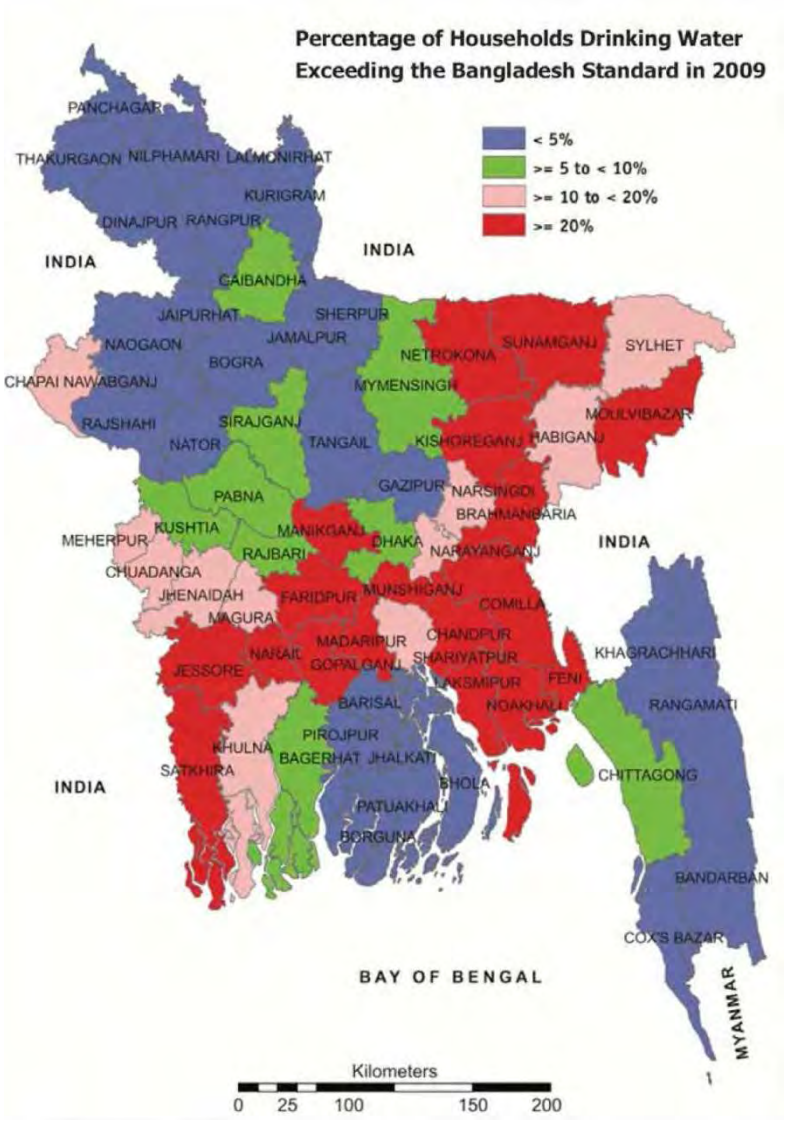
Notes:
1. In water used for pisciculture, maximum limit of presence of ammonia as Nitrogen is 1.2 mg/l.
2. Electrical conductivity for irrigation water – 2250 mmhoms/cm (at a temperature of 25°C); Sodium less than 26%; boron less than 0.2%.

Source: The Environment Conservation Rules, 1997

A water quality survey in 2009, by the Bangladesh Bureau of Statistics and UNICEF, found that 12.6% of drinking water samples collected from 13,423 households around the country did not meet the Bangladesh drinking water standard for arsenic. This is equivalent to approximately 20 million people still being exposed to excessive quantities of arsenic. In addition, high levels of

iron are widespread, with approximately 40% of the population exposed to more than the Bangladesh limit of 1.0 mg/L. The situation is even worse for manganese, which also has health impacts: more than 60% of the population consumes drinking water above the Bangladesh limit of 0.1 mg/L, and approximately one-third of the population drinks water exceeding the less stringent WHO Guidelines value of 0.4 mg/L.

As shown in Figure 47, the areas in which more than 20% of households were exposed to drinking water contaminated by arsenic (> 50 ppb) generally concentrates along the rivers and the north-eastern part of the country, in Shatkhira, Jessore, Narail, Magura, Gapalganj, Faridpur, Munshiganj, Manikganj, Chandpur, Lakshmipur, Noakhali, Feni, Comilla, Brahmanbaria, Kishoreganj, Netrokona, Sunamganj, and Maulvibazar.



Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

Figure 47 Percentage of Households Drinking Water Exceeding the Bangladesh Standard in 2009

8.1.2.3. Noise

To prevent noise pollution, the Government of Bangladesh enacted Noise Pollution (Control) Rules in 2006. Table 73 shows Bangladesh national ambient noise quality standards vs. Wold Bank Guidelines.

Table 73 Bangladesh National Ambient Noise Quality Standards vs. World Bank Guidelines

Location	Bangladesh Guidelines dB(A)		World Bank Guidelines dB(A)	
	Day (6 am to 9 pm)	Night (9 pm to 6 am)	Day (7 am to 10 pm)	Night (10 pm to 7 am)
Silent	50	40	–	–
Residential	55	45	55	45
Commercial	70	60	70	70
Industrial	75	70	70	70

Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

Table 74 shows Measured Noise Levels in Some Sensitive Areas of Dhaka.

Table 74 Measured Noise Levels in Some Sensitive Areas of Dhaka

Location (outside the facility)	Measured noise level (dB)	
	Morning	Afternoon
Shaheen School	74	83
Motijheel Govt. High School	79	83
Dhanmondi Govt. Boy's High School	75	80
Azimpur Girl's College	78	80
Tejgaon Women's College	67	75
P.G. Hospital	78	82
Dhaka Medical College Hospital	69	80
Mitford Hospital	73	76
Children's Hospital	69	72

Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

8.1.2.4. Waste

The waste generation in Dhaka is shown in Table 75.

Table 75 Waste Generation Volume and Quality

Waste generation site	Domestic	Business	Street	Average
Estimated volume of generation (t/d)	1,950	1,050	200	–
Generation rate (kg/d/person)	0.34	–	–	0.56
Bulk density (t/m^3)	–	–	–	0.24 (t/m^3)
Calorific value (kcal/kg)	–	–	–	550–850

Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

The sources of solid waste are shown in Table 76. The households account for nearly half of the wastes generated in the city while commercial contribute one fifth, industrial waste accounts for about 24% and hospitals and clinic contribute about 7%.

Table 76 Total Solid Waste Generation per Day

Types	Amount (tones)	Percentage
Residential	1,718	49.08
Commercial	722	20.86
Industrial	835	23.86
Hospital and Clinical	255	7.29
Total	3,500	100.00

Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

The components of solid waste are shown in Table 77. The food and vegetables account for about 60% of the entirety.

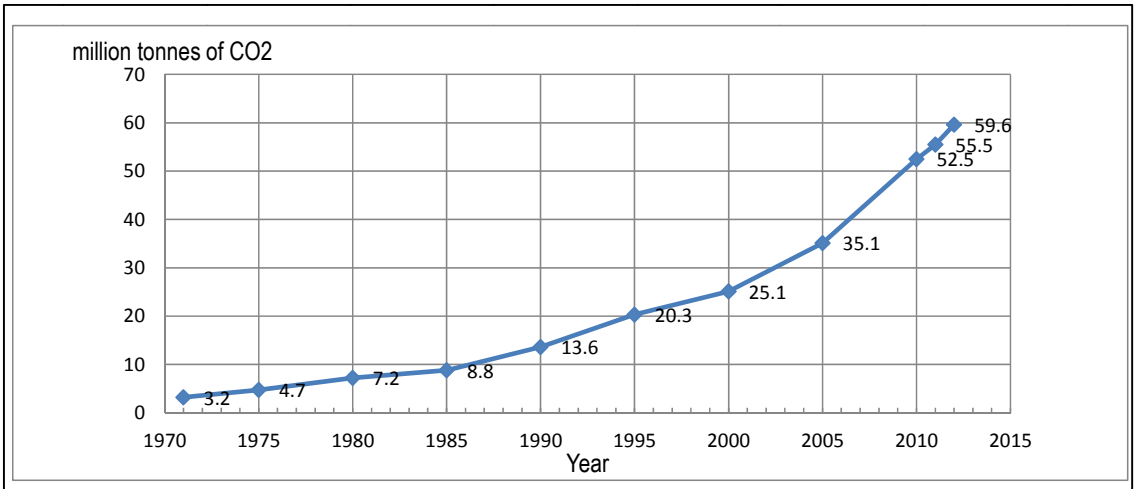
Table 77 Components of Solid Waste and Their Proportions in Dhaka

Components	Percentage
Food and vegetables	59.91
Plastic, rubber, wood and leather	17.67
Paper products	11.21
Garden wastes & etc.	8.76
Rock, dirt, debris & misc.	2.3
Metals	0.15
Total	100.00

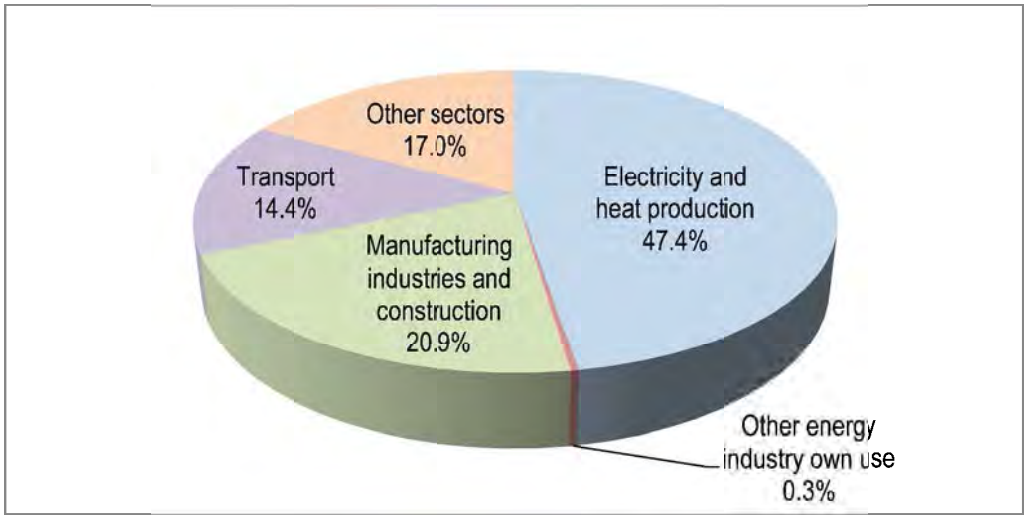
Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

8.1.2.5. CO2 Emission

CO2 emission from fuel combustion in Bangladesh in 2012 was 59.6 million tons that is 4.38 times as much as one in 1990, and had doubled for the past decade. CO2 emission from electricity and heat production sector was 47 % of the total emission in 2012.



Changes in CO2 emission



CO2 emissions by sector in 2012

Source: International Energy Agency, CO2 EMISSIONS FROM FUEL COMBUSTION 2014 EDITION

Figure 48 CO2 Emission from Fuel Combustion in Bangladesh

8.1.3. Natural Environment

8.1.3.1. Protected Areas

Protected areas in Bangladesh follow the following Wildlife (Conservation and Security) Act 2012 (26 Ashar, 1419) that has been passed by the Bangladesh National Parliament on 10 July 2012. The definitions related to Wildlife (Conservation and Security) Act 2012 are shown in Table 78.

Table 78 Definitions related to Wildlife (Conservation and Security) Act 2012

Term	Definition
Protected Area	All sanctuaries, national parks, community conservation areas, safari parks, eco-parks, botanical gardens, special biodiversity conservation area and traditional heritage
Sanctuary	An area where hunting, killing, shooting or trapping of wild animal is prohibited and managed for the protection of all natural resources such as vegetation, soil and water primarily for undisturbed breeding of wildlife
National Park	Comparatively large area of outstanding scenic and natural beauty with the primary object of providing public education, research and recreation and managed for preservation of natural state of flora and fauna and outstanding charming scenery
Eco-Park	An area of natural ecological habitat of flora and fauna with outstanding scenic beauties which is managed for providing recreational facilities for visitors
Biodiversity conservation area	Genetic diversity and species diversity of all species or sub-species of flora and fauna living in aquatic, terrestrial and marine ecosystems or diversity of their ecosystems
Safari Park	An area where indigenous and exotic wild animal species are protected in an approximation of a natural environment for increasing the population and grazing openly
Botanical Garden	An area where different native and exotic plan species are conserved or managed for education, research and conservation and improvement of source of genepool introducing from another habitat
Community Conservation Area	Any area which is a private or community or government land under management for the protection of flora and fauna and as a conservation site of traditional or cultural heritage

Source: Bangladesh Forest Department, Ministry of Environment and Forests

The Notified Protected Areas such as National Parks and Wildlife Sanctuaries and other conservation sites are shown in Tables 79 and 80 respectively. The Protected Area Covers 10.72% of total forest area.

Table 79 National Parks and Wildlife Sanctuaries

National Parks				
Sl. No.	Name	Location	Area (ha.)	Established
1	Bhawal National Park	Gazipur	5,022.00	11-5-1982
2	Madhupur National Park	Tangail & Mymensingh	8,436.00	24-2-1982
3	Ramsagar National Park	Dinajpur	27.75	30-4-2001
4	Himchari National Park	Cox's Bazar	1,729.00	15-2-1980
5	Lawachara National Park	Moulavibazar	1,250.00	7-7-1996
6	Kaptai National Park	Chittagong Hill Tracts	5,464.00	9-9-1999
7	Nijhum Dweep National Park	Noakhali	16,352.23	8-4-2001
8	Medhakachhapia National Park	Cox's Bazar	395.92	8-8-2008
9	Satchari National Park	Habigonj	242.91	15-10-2005
10	Khadimnagar National Park	Sylhet	678.8	13-04-2006
11	Baroiyadhala National Park	Chittagong	2,933.61	06-04-2010
12	Kuakata National Park	Patuakhali	1,613.00	24-10-2010

13	Nababgonj National Park	Dinajpur	517.61	24-10-2010
14	Singra National Park	Dinajpur	305.69	24-10-2010
15	Kadigarh National Park	Mymensingh	344.13	24-10-2010
16	Altadighi National Park	Naogaon	264.12	24-12-2011
17	Birgonj National Park	Dinajpur	168.56	24-12-2011
Wildlife Sanctuaries				
Sl. No.	Name	Location	Area (ha.)	Established
18	Rema-Kalenga Wildlife Sanctuary	Hobigonj	1,795.54	7-7-1996
19	Char Kukri-Mukri Wildlife Sanctuary	Bhola	40	19-12-1981
20	Sundarban (East) Wildlife Sanctuary	Bagerhat	31,226.94	6-4-1996
21	Sundarban (West) Wildlife Sanctuary	Satkhira	71,502.10	6-4-1996
22	Sundarban (South) Wildlife Sanctuary	Khulna	36,970.45	6-4-1996
23	Pablakhali Wildlife Sanctuary	Chittagong Hill Tracts	42,087.00	20-9-1983
24	Chunati Wildlife Sanctuary	Chittagong	7,763.97	18-3-1986
25	Fashiakhali Wildlife Sanctuary	Cox's Bazar	1,302.43	11-4-2007
26	Dudpukuria-Dhopachari Wildlife Sanctuary	Chittagong	4,716.57	6-4-2010
27	Hajarikhil Wildlife Sanctuary	Chittagong	1,177.53	6-4-2010
28	Sangu Wildlife Sanctuary	Bandarban	2,331.98	6-4-2010
29	Teknaf Wildlife Sanctuary	Cox's Bazar	11,615.00	24-03-2010
30	Tengragiri Wildlife Sanctuary	Barguna	4,048.58	24-10-2010
31	Dudhmukhi Wildlife Sanctuary	Bagerhat	170	29-01-2012
32	Chadpai Wildlife Sanctuary	Bagerhat	560	29-01-2012
33	Dhangmari Wildlife Sanctuary	Bagerhat	340	29-01-2012
34	Sonarchar Wildlife Sanctuary	Patuakhali	2,026.48	24-12-2011
35	Nazirganj Wildlife (Dolphin) Sanctuary	Pabna	146	01-12-2013
36	Shilanda-Nagdemra Wildlife (Dolphin) Sanctuary	Pabna	24.17	01-12-2013
37	Nagarbari-Mohanganj Dolphin Sanctuary	Pabna	408.11	01-12-2013
38	Swatch of No-Ground Marine Protected Area	South Bay of Bengal	173,800.00	27-10-2014

Source: Bangladesh Forest Department, Ministry of Environment and Forests

Table 80 Other Conservation Sites

No.	Name	Location	Area (ha.)	Established
1	National Botanical Garden	Dhaka	84.21	1961
2	Baldha Garden	Dhaka	1.37	1909
3	Madhabkunda Eco-Park	Moulavibazar	265.68	2001
4	Sitakunda Botanical Garden and Eco-park	Chittagong	808	1998
5	Bangabandhu Sheikh Mujib Safari Park	Cox's Bazar	600	1999
6	Modhutila Eco-Park	Sherpur	100	1999
7	Banshkhali Eco-Park	Chittagong	1200	2003
8	Kuakata Eco-Park	Patuakhali	5661	2005
9	Tilagar Eco-Park	Sylhet	45.34	2006
10	Borshijora Eco-Park	Moulavibazar	326.07	2006
11	Bangabandhu Sheikh Mujib Safari Park	Gazipur	1493.93	2013
12	Rajeshpur Eco-Park	Comilla	185.09	n.a.

Source: Bangladesh Forest Department, Ministry of Environment and Forests

8.1.3.2. Ecosystem

In addition to protected areas, the 1995 Bangladesh Environment Conservation Act includes provision for Ecologically Critical Area (ECA) declarations by the Department of the Environment in certain cases where the ecosystem is considered to be in danger of reaching a critical state.

Table 81 Ecologically Critical Areas (ECA)

No.	Name	District(s)	Area (ha)
1	The Sundarbans	Bagerhat, Khulna, Satkhira	762,034
2	Cox’s Bazar (Teknaf, Sea beach)	Cox’s Bazar	10,465
3	St. Martin Island	Cox’s Bazar	590
4	Sonadia Island	Cox’s Bazar	4,916
5	Hakaluki Haor	Maulavi Bazar	18,383
6	Tanguar Haor	Sunamganj	9,727
7	Marjat Baor	Jhinaidha	200
8	Gulshan-Banani-Baridhara Lake	Dhaka	n.a.

Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

8.1.4. Social Environment

8.1.4.1. Cultural and Natural Heritage

In Bangladesh, the Antiquities (Amendment) Act stipulates that cultural properties located in 345 places are subject to protection by the nation. In addition, there are the following three places of Cultural and Natural Heritage that are registered in the United Nations Educational, Scientific and Cultural Organization (UNESCO) list as World Heritage Sites. Figure 49 shows the distribution of these sites.

(1) Cultural heritage (1985)

1) Historic Mosque City of Bagerhat

The mosque is situated in the suburbs of Bagerhat, at the meeting-point of the Ganges and Brahmaputra rivers, where the ancient city formerly known as Khalifatabad was founded in the 15th century. An exceptional number of mosques and early Islamic monuments, many of which are built from bricks, can be seen there.

2) Ruins of the Buddhist Vihara at Paharpur (1985)

The ruin is an evidence of the rise of the Buddhism in Bengal from the 7th century onwards. With its simple harmonious lines and profusion of carved decorations, this cultural heritage influenced Buddhist architecture as far away as Cambodia.

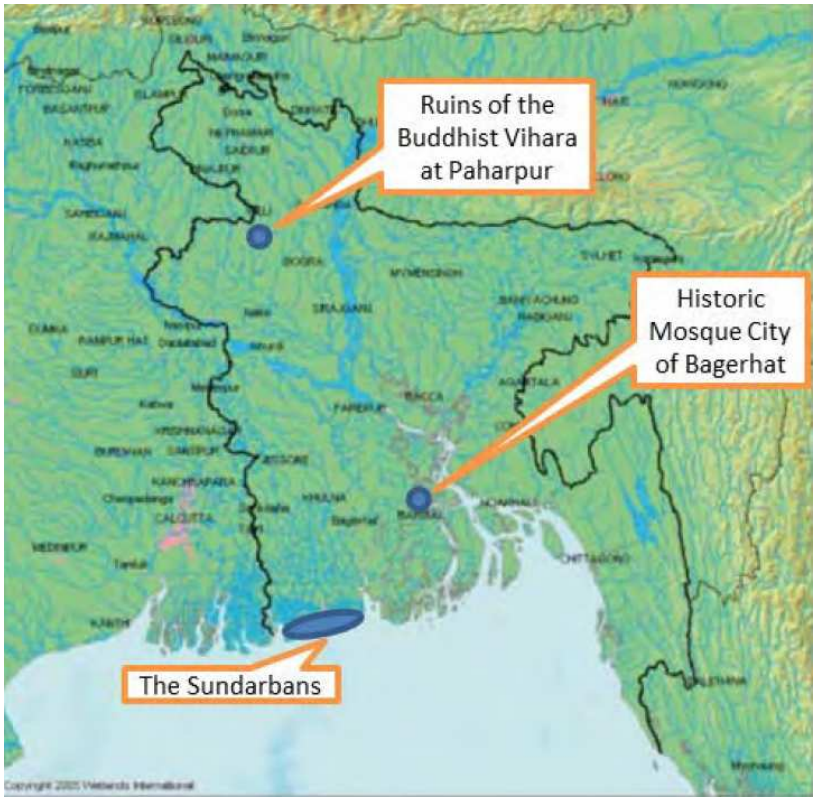
(2) Natural heritage

1) The Sundarbans (1997)

The total area of World Heritage Site is 1400 sq. km. out of which 910 km. is land area and 490 km. is water area. The area has been recognized globally for its importance as a reservoir of biodiversity. This mangrove supports a unique assemblage of flora and fauna, including charismatic megafauna like the Royal Bengal Tiger, Estuarine Crocodile and the Ganges River Dolphin. The Sundri tree, for which the sundarban is named, is an endemic species of this forest.

There are other properties that have been submitted to the Tentative List of UNESCO World Heritage. These properties are as follows (UNESCO 2012):

- Mahansthangarh and its Environs (1999)
- The Lalmai-Mainamati Group of Monuments (1999)
- Lalbagh Fort (1999)
- Halud Vihara (1999)
- Jaggadala Vihara (1999)



Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

Figure 49 World Heritage in Bangladesh

8.1.4.2. Ethnic Minorities

Table 82 shows distribution of ethnic population and households by Zila (District).

Table 82 Distribution of Ethnic Population and Households by Zila, 2011

Name of Zila	Tribal					
	Household	Institutional	Others	Population	Male	Female
Bangladesh	**353727**	**370**	**2078**	**1586141**	**797477**	**788664**
1. Bagerhat	698	0	5	3327	1677	1650
2. Bandarban	36288	75	313	172401	87670	84731
3. Barguna	325	0	3	1143	565	578
4. Barisal	15	0	2	76	45	31
5. Bhola	11	0	0	57	28	29
6. Bogra	2008	0	7	7981	3984	3997
7. Brahmanbaria	25	0	2	118	59	59
8. Chandpur	282	0	2	1292	674	618
9. Chittagong	6834	23	0	32165	16329	15836
10. Chuadanga	329	0	149	1268	611	657
11. Comilla	604	4	10	2974	1667	1307
12. Cox's Bazar	2885	1	34	14551	7045	7506
13. Dhaka	4615	31	323	20123	10400	9723
14. Dinajpu	15999	7	43	66861	33030	33831
15. Faridpur	651	0	5	3233	1670	1563
16. Feni	117	3	15	639	351	288
17. Gaibandha	1123	0	1	4312	2111	2201
18. Gazipur	3525	7	48	15368	7702	7666
19. Gopalganj	348	1	3	206	1080	986
20. Habiganj	14534	0	38	65802	33038	32764
21. Joypurhat	5705	1	11	23139	11712	11427
22. Jamalpur	376	0	9	1569	803	766
23. Jassore	3790	0	5	17432	8779	8653
24. Jhalokati	11	0	0	57	28	29
25. Jhenaidah	698	0	6	3108	1528	1580
26. Khagrachhari	70175	23	26	316987	159310	157677
27. Khulna	476	1	2	2054	1022	1032
28. Kishoreganj	94	0	2	433	227	206
29. Kurigram	115	0	3	486	226	260
30. Kushtia	373	0	2	1666	819	847
31. Lakshmipur	56	0	3	244	131	113
32. Lalmonirhat	23	0	0	126	59	67
33. Madaripur	17	0	1	76	38	38
34. Magura	1760	1	3	8099	4043	4056
35. Manikganj	115	1	0	582	313	269
36. Meherpur	4	0	1	18	9	9
37. Maulvibazar	13217	3	42	63466	31422	32044
38. Munshigani	24	0	7	103	78	25
39. Mymenihgh	8632	18	39	35907	17288	18619

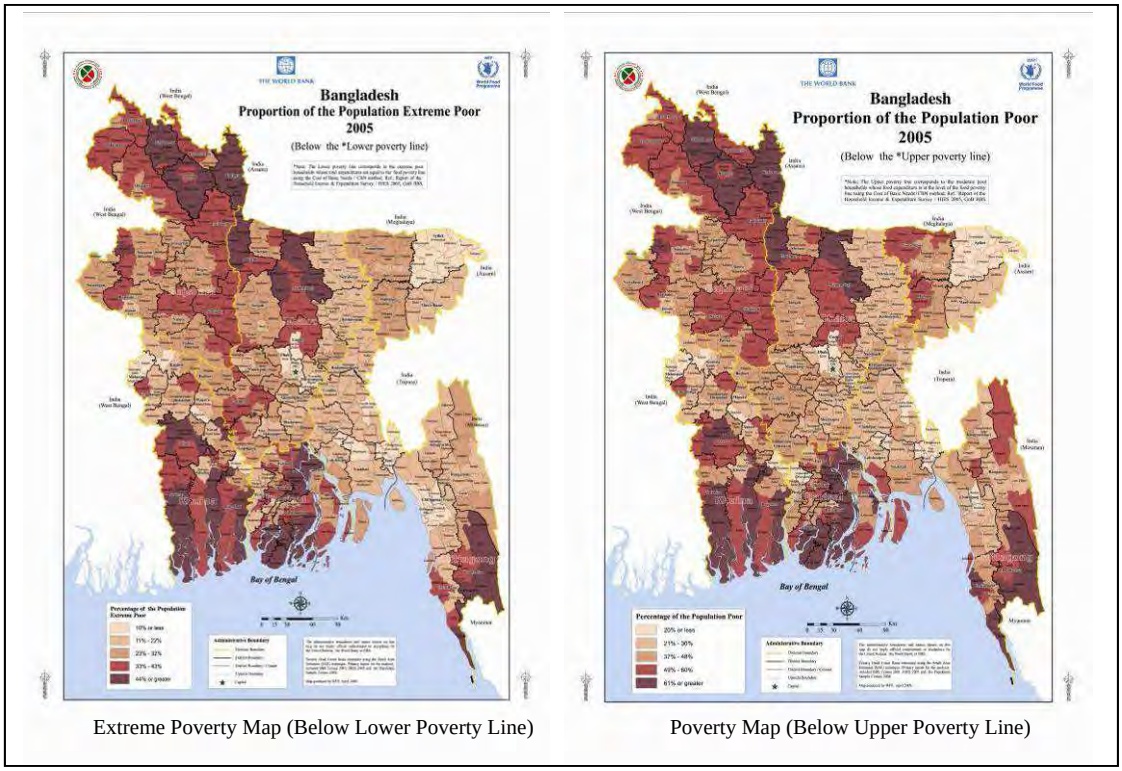
Name of Zila	Tribal					
	Household	Institutional	Others	Population	Male	Female
40. Naogaon	28374	3	20	116736	57863	58873
41. Narail	208	0	0	943	465	478
42. Narayanganj	165	2	26	899	603	296
43. Narsingdi	40	0	4	208	109	99
44. Natore	2853	1	6	11912	5927	5985
45. Nawabganj	3216	1	4	14190	7031	7159
46. Netrokona	6021	10	38	25247	12323	12924
47. Nilphamari	109	0	0	495	257	238
48. Noakhali	51	0	7	347	201	146
49. Pabna	501	0	2	1973	973	1000
50. Panchagar	383	0	3	1528	751	777
51. Patuakhali	376	0	3	1399	707	692
52. Pirojpur	12	0	1	53	26	27
53. Rajshahi	11132	6	78	49312	24136	25176
54. Rajbari	293	0	0	1285	612	673
55. Rangamati	76821	121	411	356153	181820	174333
56. Rangpur	4727	4	10	18561	9180	9381
57. Shariatpur	10	0	1	93	80	13
58. Satkhira	569	0	2	2615	1278	1337
59. Sirajganj	4676	5	7	19772	9583	10189
60. Sherpur	4180	4	12	16231	8091	8140
61. Sunamgani	1444	4	6	6911	3521	3390
62. Sylhet	2484	1	10	12781	6470	6311
63. Tangail	6071	8	18	25584	13022	12562
64. Thakurgaon	2139	0	4	9632	4891	4741

Source: Population and Housing Census- 2011, Bangladesh Bureau of Statistics,.

8.1.4.3. Distribution of Poverty Region

The official Bangladesh poverty measurement includes two types of poverty lines: (i) Upper Poverty Lines and (ii) Lower Poverty Lines. The Cost of Basic Needs Method (CBN) is adopted for setting of the poverty lines. In Bangladesh, the upper poverty lines are on average 20 percent higher than the lower poverty lines.

The following two maps are the Poverty Map (based on the upper poverty lines) and the Extreme Poverty Map (based on the lower poverty lines). Both maps indicate a similar spatial distribution of poverty. The Extreme Poverty Map displays relatively affluent areas between Dhaka and Chittagong more clearly than the Poverty Map. Areas around Dhaka record low poverty headcount rates; however the absolute size of the poor population is large. Bandarban District (the south-eastern part), in contrast, has a high poverty rate; however the size of its poor population is relatively small. Monga areas (the north-western part) record high poverty headcount rates and also have large poor populations.



Extreme Poverty Map (Below Lower Poverty Line)

Poverty Map (Below Upper Poverty Line)

Source: Bangladesh Bureau of Statistics, Updating Poverty Map of Bangladesh 2009

Figure 50 Poverty Map 2005

8.2. Regulatory and Institutional Arrangements

8.2.1. Administration, Strategy and Laws for Environmental and social Considerations

8.2.1.1. Environmental Administration and National Environmental Strategy

The highest level government agency responsible for environment administration in Bangladesh is the Ministry of Environment and Forests (MOEF). The ministry is divided into two departments: the Department of Environment takes care of conservation and improvement of environment as well as coordination and supervision of those activities, the Forest Department carries out forest management and development. The key functions and roles of the Department of Environment are as follows:

- Planning and Development
- Documentation Centre
- Compliance and Enforcement
- Environmental Awareness
- Laboratory Analysis
- Environmental Impact Assessment (EIA) and Environmental Clearance and EIA Processing

The National Environment Policy of 1992 as a national environmental policy has the following major objectives:

- Maintaining a balance in nature by preserving and improving the environment;
- Minimizing the impact of natural disaster on national land;
- Identifying and controlling all environment polluting and degrading activities;
- Ensuring environment friendly development in all sectors;
- Ensuring long term sustainable and environmentally sound utilization of natural resources;
- Active promotion and participation in all international initiatives for the improvement of global and regional environment.

To achieve these objectives, the National Environmental Policy has set up environmentally friendly guidelines as well as the Environmental Action Plan for 15 different sectors of the Government of Bangladesh such as agriculture, industry, transport and communication, housing and urbanization and land.

8.2.1.2. Environmental Laws

(1) Environmental Basic Laws

The Bangladesh Environmental Conservation Act, 1995 and the Environment Conservation Rules, 1997 are the two basic environmental laws in Bangladesh.

The Environmental Conservation Act has 21 Articles stipulating 1) Conservation of the environment; 2) Right (Power) to control development and environmental pollution; 3) Determination of the environmental standards and standards for effluent and discharge; 4) EIA and its review and approval; 5) Right to enter any building or other place; and 6) Penalties for violation of a provision or non-compliance of a direction. This Act was amended

The Environment Conservation Rules which is based on the Environmental Conservation Act stipulates that: 1) Determination of national environmental standards for air, water, industrial effluent and gas, noise, vehicle exhaust gas and so on; 2) Need for issuing Environmental Clearance Certificate for undertaking Initial Environmental Examination (IEE) or EIA based on

a project's category; and 3) Declaration of Ecologically Critical Area such as mangrove, forest sanctuary, ancient monument.

Both the Bangladesh Environmental Conservation Act and the Environment Conservation Rules can be downloaded from the Department of Environment's website (http://www.doe-bd.org/legalbase.html).

(2) Environmental Impact Assessment

Under the Environmental Conservation Act, Article 12 stipulates need for obtaining an Environmental Clearance Certificate issued by the Department of Environment to undertake industrial activities and development projects and Article 20 stipulates procedures for EIA and its review and approval as well as determination of fees for obtaining Environmental Clearance Certificates and other services. Also, as specified in the Environment Conservation Rules, an industrial unit or project, which may cause a negative impact on the environment, is required to submit EIA report and detailed procedures for EIA.

Industrial units and projects are classified into the following four categories: a) Green; b) Orange-A; c) Orange-B; and d) Red. Documents attached with an application vary from categories. For Green Category,
Both are not required to undertake IEE or EIA studies
Industrial units and projects under Green and Orange-A categories are not required to undertake IEE or EIA studies, those under Orange-B require an IEE. Red Category projects are required to undertake both IEE and EIA or just EIA. Schedule-1 of the Environment Conservation Rules specifies Classification of industrial units or projects. Industrial projects subject to Orange-B and Red categories and documents to be submitted for approval in the Transportation sector are as follows:

- Orange-B Category

  The following documents and assessment are required for approval:

  1) Report on the feasibility of the industrial unit or project;
  2) IEE Report;
  3) Report on the Environmental Management Plan
  4) No objection certificate from the local authority;
  5) Emergency plan relating adverse environmental impact and plan for mitigation of the effect of pollution;
  6) Outline of the relocation, rehabilitation plan;
  7) Other necessary information;
  8) Location Clearance Certificate;
  9) Environmental Clearance Certificate.

- Red Category

  The following documents and assessment are required for approval:

  1) Report on the feasibility of the industrial unit or project;
  2) IEE Report and EIA report;
  3) Report on the Environmental Management Plan
  4) No objection certificate from the local authority;
  5) Emergency plan relating adverse environmental impact and plan for mitigation of the effect of pollution;
  6) Outline of the relocation, rehabilitation plan;
  7) Other necessary information;
  8) Location Clearance Certificate;
  9) Environmental Clearance Certificate.

Bangladesh EIA process consists of three stages: Screening; IEE; and EIA.

1. Screening categorizes a development project based on information regarding contents, size, and location of the project and then screening decides whether the EIA process should be applied to the project, and if it is required, its type such as IEE or EIA.
2. IEE predicts and evaluates an environmental impact of a project according to available information or similar projects in the past and then studies a mitigation measure for environmental impact. IEE also includes unsolved issues or supporting evidence as to whether a detailed EIA is needed or not.
3. EIA is carried out when either the result of IEE review or the project itself indicates that the project potentially has a serious adverse effect on the environment. A project owner (operator) is responsible for IEE/EIA and thus the project owner (operator) bears the expenses. The Department of Environment and its local offices examine IEE/EIA. Public participation (involvement) requires at every major phase of EIA procedures. The recommended methods are radio, TV, newspapers, official reports, advertisements, sampling, opinion polls, lobbying, public hearings, interviews, information disclosure and advisory panels. While EIA reports are basically open to the public, English version of the reports are only made.

(3) Other relevant acts and regulations

Other acts and regulations concerning the environment are as follows:

- The forest Act, 1927 as modified in 1973
- The Wildlife (Preservation) Order, 1973
- The Protection and Conservation of Fish Act, 1950
- The Protection and Conservation of Fish (Amendment) Ordinance, 1982
- The Factory Act, 1965; The Factory Rules, 1979
- The Motor Vehicle Rules, 1940 as modified up to 1983
- The Bangladesh Panel Code, 1860

8.2.1.3. Waste Management

The Hazardous Waste and Ship Breaking Waste Management Rules 2011 has enacted. The Solid Waste Management Rules is in its final stage to be enforced.

National 3R Strategy for Waste Management was issued by Department of Environment in 2010. The goal of this strategy is achieve complete elimination of waste disposal on open dumps, rivers, flood plains by 2015 and promote recycling of waste through mandatory segregation of waste at source as well as create a market for recycled products and provide incentives for recycling of waste. The main objective is to delineate ways and means of achieving national 3R goals through providing a uniform guideline for all stakeholders. Specific objectives of this strategy are to:

- address the key issues and challenges of waste management acting as a barrier for promotion of 3R in the country ;
- define the roles of various actors to promote 3R in the country; and
- guide the creation of enabling conditions for success regarding implementation of 3R in the country.

8.2.2. Consistency with JICA Guidelines for Environmental and Social Considerations

There are no significant gaps between Bangladesh EIA system and "Guidelines for Environmental and Social Considerations, April 2010" (Thereafter referred to as JICA guidelines) in terms of the objectives of the EIA. Governmental legislation, however, pays scant attention to transparency, predictability and accountability. One of the reasons for this is that the EIA is conducted within the framework of the Environmental Clearance Certificate (ECC), which makes the EIA more acceptable than otherwise. The procedure of the EIA has recently been clarified, considerably narrowing the gaps between JICA's recommended procedure and that of Bangladesh. It is also important to note that domestic acts and ordinances pay little attention to social impacts and public participation.

8.2.3. Role of Related Organizations

Table 83 presents a list of governmental organizations and research institutions relevant to the environmental and social sectors in Bangladesh.

Table 83 List of Governmental Organizations and Research Institutions Related to Environmental and Social Considerations in Bangladesh

Organizations	Assigned Role
Ministry of Agriculture	Policy formulation, planning, monitoring and administration of agriculture related projects
Ministry of Cultural Affairs	The ministry is primarily responsible for preservation, research and development of national cultural heritage, fine arts of Bangladesh.
Ministry of Chittagong Hill Tracts Affairs	Special ministry responsible of the region of Chittagong Hill Tracts Affairs, the most culturally and environmentally diverse region of the country
Ministry of Education	Ministry of Education is the apex policy making institution of the Government regarding administration and development of post-primary education sector.
Ministry of Environment and Forests	Responsible of planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programs. MOEF oversees all environmental matters in the country and is a permanent member of the Executive Committee of the National Economic Council.
Department of Environment	Department responsible of ensuring sustainable environmental governance
Ministry of Fisheries and Livestock	To preserve fisheries resources, increase socio-economic conditions of fishermen, create employment opportunities for rural unemployed and landless people, expand foreign exchange earnings by exporting fish and fishery products and to innovate new technologies through research for fisheries development and preservation.

Ministry of Religious Affairs	The vision of the Ministry is to improve the religious affairs. It works to contribute in the national development through human resource development and working in encouragement of brotherhood, values, religious belief in both national and international level.
Ministry of Water Resources	The Ministry of Water Resources is the apex body of the Government of the People's Republic of Bangladesh for development and management of the whole water resources of the country. It formulates policies, plans, strategies, guidelines, instructions and acts, rules, regulations, etc. relating to the development and management of water resources, and regulation and control of the institutions reporting to it.
Ministry of Women and Children Affairs	The Ministry of Women Affairs was established in 1978 under the initiative of Shaheed President Ziaur Rahman, to fulfil government commitments toward women development
Planning Commission	Responsible for the preparation of development plans and allocating funds to individual ministries responsible for implementing specific projects. Authorized to supervise and coordinate cross-sectoral and inter-ministerial activities affecting the use of natural resources and the environment.
Department of Livestock	Works for improvement of livestock resources and production
Local Government Engineering Department (LGED)	Planning, designing and implementing rural infrastructure development projects, Thana/Union drainage and embankment planning and irrigation planning. Land and water use planning, small scale water schemes, canal digging programs and town protection schemes
Roads and Highway Department	Constructing and maintaining primary and secondary roads
Department of Public Health Engineering (DPHE)	Rural and urban water supply and sanitation
Bangladesh Bureau of Statistics (BBS)	Environmental statistical data compilation

Source: Profile on Environmental and Social Considerations in Bangladesh, JICA, July 2012

8.3. Environmental and Social Considerations on Sub-Project Selection Criteria and Procedure

8.3.1. Potential Environmental and Social Impact and Mitigation Measures

The locations of the sub-projects are whole area of Bangladesh and have not fixed in this survey stage. The potential environmental and social impacts were assessed on the basis of general conditions. The result of the impact assessment is shown in the following Table. The proposed sub-projects are classified as “Category B or C level of JICA Guidelines”.

Table 84 Result of Environmental Scoping

Component of Sub-Projects		- Money loan to replace with energy efficient facilities and equipment in existing factories (A-type loan)		- Money loan to install energy efficient facilities and equipment in newly constructed factories (A-type loan) - Money loan to newly constructed green buildings (A-type loan)		- Money loan to purchase energy efficient home appliances (B-type loan)	
Without Sub-Projects		Continuing use of existing facilities and/or equipment, or purchase and use of facilities and/or equipment without energy saving.		Installation and use of facilities and/or equipment without energy saving		No purchase, continuing use of existing home appliances, or purchase and use of home appliances without energy saving	
No.	Impact Item	Phase		Phase		Phase	
		Installation	Operation	Installation	Operation	Installation	Operation
		Activities		Activities		Activities	
		Installation works of energy efficient facilities and equipment	Use and existence of energy efficient facilities and equipment	Installation works of energy efficient facilities and equipment	Use and existence of energy efficient facilities and equipment	Installation works of energy efficient facilities and equipment	Use and existence of energy efficient facilities and equipment
Pollution							
1	Air pollution	D	B+	D	B+	D	D
2	Water pollution	D	D	D	D	D	D
3	Waste	B-	D	D	D	D	D
4	Soil pollution	D	D	D	D	D	D
5	Noise and vibration	D	D	D	D	D	D
6	Ground subsidence	D	D	D	D	D	D
7	Offensive odors	D	D	D	D	D	D
8	Bottom sediment	D	D	D	D	D	D
Natural Environment							
9	Protected areas	D	D	D	D	D	D
10	Ecosystem	D	D	D	D	D	D
11	Hydrology	D	D	D	D	D	D
12	Geographical features	D	D	D	D	D	D

Social Environment							
13	Resettlement/ Land Acquisition	D	D	D	D	D	D
14	Poor people	D	D	D	D	D	D
15	Ethnic minorities and indigenous peoples	D	D	D	D	D	D
16	Local economies, such as employment, livelihood, etc.	D	D	D	D	D	D
17	Land use and utilization of local resources	D	D	D	D	D	D
18	Water usage	D	D	D	D	D	D
19	Existing social infrastructures and services	D	D	D	D	D	D
20	Social institutions such as social infrastructure and local decision-making institutions	D	D	D	D	D	D
21	Misdistribution of benefits and damages	D	D	D	D	D	D
22	Local conflicts of interest	D	D	D	D	D	D
23	Cultural heritage	D	D	D	D	D	D
24	Landscape	D	D	D	D	D	D
25	Gender	D	D	D	D	D	D
26	Children’s rights	D	D	D	D	D	D
27	Infectious diseases such as HIV/AIDS	D	D	D	D	D	D
28	Working conditions (including occupational safety)	D	D	D	D	D	D
29	Accidents	D	D	D	D	D	D
Other							
30	Trans-boundary impacts or climate change	D	B+	D	B+	D	B+

Evaluation	- Because of improved combustion efficiency, amount of air pollutants in exhaust gas may be reduced. - Considerable impacts on industrial efferent and labor environment are unlikely to occur. - Solid waste of existing facilities and equipment will generate due to replacement. - Total amount of CO2 emission will be reduced compared to without sub-project. **Category B**	- Because of improved combustion efficiency, amount of air pollutants in exhaust gas may be reduced. - Total amount of CO2 emission will be reduced compared to without sub-project. - Considerable negative impacts are unlikely to occur. **Category C**	- Total amount of CO2 emission will be reduced compared to without sub-project. - Because dissemination of costly energy efficient products will take long time, drastic changes in existing market of home appliances without energy saving are unlikely to occur. - Considerable negative impacts are unlikely to occur. **Category C**

A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the survey progresses)
D: No impact is expected

Category A : Proposed projects are likely to have significant adverse impacts on the environment and society.
Category B : Potential adverse impacts of proposed projects on the environment and society are less adverse than those of Category A projects.
Category C : Proposed projects are likely to have minimal or little adverse impact on the environment and society.
* Impact Items refer to "JICA Guidelines for Environmental and Social Considerations April 2010"

Source: Survey Team

- A-type loan (Money loan to replace with energy efficient facilities and equipment in existing factories)

  Impact:

  Because most of the activities will be limited in factories, considerable negative impacts are unlikely to occur. However, if used or old facilities and equipment due to replacement remain in inappropriate sites or are treated improperly, these facilities and equipment may cause environmental pollution.

  Mitigation:

  Owners of scraped facilities and equipment should prepare and strictly implement adequate solid waste management plans. Because there are wide various reuse and recycle entities including informal sector in Bangladesh, the owners can entrust the waste management to these entities. The owner should select proper entities to dispose of the solid waste.

- A-type loan (Money loan to install energy efficient facilities and equipment in newly constructed factories or to newly constructed green buildings)

  Impact:

  Because most of the activities will be limited in factories or buildings, considerable negative impacts are unlikely to occur.

- B-type loan (Money loan to purchase energy efficient home appliances)

  Impact:

  Because most of the activities will be limited in houses or buildings, considerable negative impacts are unlikely to occur.

8.3.2. Screening Criteria for the Selection of Appropriate Sub-Projects

The sub-projects will have to be examined to see whether these could be classified into Category A level projects in JICA Guidelines that are likely to have significant adverse impacts on the environment and society. Category "A" level sub-projects will not be selected as EE&C sub-projects. The following projects are included in the category "A" level projects.

- Construction of thermal power plant
- Construction of hydraulic power plant with reservoir or dam
- Projects that will result in large-scale involuntary resettlement
- Projects that will result in large-scale land reclamation, land clearing and logging
- Projects that will have adverse impacts on natural protected areas

Specific sub-projects have not been determined in this stage yet. However, the EE&C sub-projects to be proposed are unlikely to include category "A" level sub-projects. The detailed information of the categorization is as shown in the Annex 20.2.

The sub-project shall observe related environmental laws, regulations and strategy including "The Bangladesh Environment Conservation Act, 1995", "The Environment Conservation Rules, 1997" and National 3R Strategy for Waste Management, 2010. The IFI should conduct the environmental screening to select appropriate sub-projects from a viewpoint of environmental and social considerations in the appraisal stage.

Role of IFI:

- The IFI checks the environmental clearance certificate, explanations to the public, complaints from local residents and solid waste management concerning the proposed subprojects in the apresal stage.
- The IFI should monitor waste disposal of scraped facilities and equipment if needed.
- The IFI submits an annual environmental and social performance report (attached in the Annex 20.3) to JICA.

Obligation of proponent:

- The propoment shall conduct the environmental procedure regulated in relevant laws and report the progress and results to IFI.
- The propoment should conduct the environmental monitoring and submit the results to the IFI if needed.

8.4. Proposed Environmental and Social Considerations Capacity Development for Executing Agency

8.4.1. Environmental Management Capacity

8.4.1.1. SREDA

SREDA has not set up an environmental management section yet and employed an environmental specialist. As SREDA expands the activities, an environmental section and environmental specialists will be required in the future.

8.4.1.2. IDCOL

IDCOL has financed not only renewable energy and energy conservation sectors but power generation, transportation, water supply and gas infrastructure sectors that require the implementation of IEE or EIA and the obtaining of an Environmental Clearance Certificate in compliance with "the Environment Conservation Rules". IDCOL developed an "Environmental and Social Appraisal Manual (ESAM)" as the first environmental and social management framework in 2000. Through the technical support of the Asian Development Bank, the ESAM has been revised in 2011 and was renamed as the Environmental and Social Safeguards Framework (ESSF). As IDCOL is working with the World Bank, ADB, IFC and other organization, this ESSF has been prepared in a way that would cover the safeguards requirement of all reputed development partners. In addition, for renewable energy projects, IDCOL is also practicing an Environmental and Social Management Framework (ESMF) that was prepared for the “Rural Electrification and Renewable Energy Development Project”, which is supported by the World Bank. The ESMF has been updated according to needs in the activities. The 2014 version is the latest. IDCOL has conducted preliminary surveys on environmental and social impact for many kinds of projects in the appraisal stage and guided project proponents in IEE, EIA and environmental management. IDCOL employs two fulltime environmental specialists that one takes charge of renewable energy projects and the other take charge of infrastructure projects. IDCOL has considerable experience in environmental management.

8.4.1.3. BIFFL

BIFFL prepared an "Environmental Social Monitoring Framework (ESMF)" as the first environmental and social management framework in 2014. Moreover, BIFFL refers to “Environmental Risk Management (ERM) Guidelines for Banks and Financial Institutions in Bangladesh” developed by Bangladesh Bank in 2011 as environmental guidelines. However, BIFFL has no environmental experts and units at this time. BIFFL will employ at least one environmental specialist in the near future.

8.4.2. Reinforcing Environmental Management Framework

IDCOL’s ESSF and ESMF, and BIFFL’s ESMF mention necessary requirements for environmental management in various projects such as relevant policies and regulations, environmental checklist, potential impacts, mitigation measures and monitoring items. Because these frameworks will essentially cover required environmental management in the proposed EE&C sub-projects, it will not be necessary to prepare new frameworks for EE&C sub-projects. However, because JICA-EEF Project is a new component, the following additional text to cover JICA-EEF Project will be added to the existing ESMFs’ annex.

- Outline of JICA-EEF Project
- Outline of JICA Guidelines
- Check items

The proposed additional text is as shown in the Annex 20.4.

The environmental capacity of the executing agencies and improvement plans are as shown in the Annex 20.1 Environmental and Social Management System (ESMS) Checklist.

8.4.3. Consulting Service for Environmental and Social Considerations

The Environment and Health Safety (EHS) aspects of new eligible technologies and products should be considered besides energy efficiency. To ensure the EHS aspects in proponents, suppliers, users and disposers of EE&C equipment by conducting awareness raising activities on proper management, it is recommendable that IFIs and SREDA should apply consulting services. Proposed tasks of the consulting services are as follows:

- The consultants will prepare training manuals and brochures for awareness raising activities on EHS of new eligible technologies and equipment and waste management to the IFIs, proponents, suppliers and end-users.
- The consultants will conduct a series of training on the EHS and waste management to the IFIs, proponents, suppliers and end-users.

9. Training in Japan

Training in Japan was implemented with the aim to share the same knowledge and notion of EE&C technology, equipment, environment and measures. Trainees were exposed to various EE&C technologies, equipment, measures and policies (through lectures, site visits and discussions). Number of participants was 11, and was held during 22-29 July 2015, right after the Eid ul Fitr holiday.

The participants and curriculum are as follows:

Table 85 Training Participants

	Organization	Position	Name
1	Power Division, Ministry of Power, Energy and Mineral Resources	Joint Secretary (Sustainable Energy)	Mohammad Alauddin
2	Sustainable and Renewable Energy Authority (SREDA)	Member (Joint Secretary)	Sheikh Faezul Amin
3	Department of Mechanical Engineering, Bangladesh University of Engineering & Technology	Professor / Head	Md Zahurul Haq
4	Finance Division, Ministry of Finance	Deputy Secretary	Shirajun Noor Chowdhury
5	Power Cell, Ministry of Power, Energy and Mineral Resources	Director (Sustainable Energy)	Md Abdur Rouf Miah
6	Sustainable and Renewable Energy Authority (SREDA)	Director	Shah Zulfiqar Haider
7	Sustainable and Renewable Energy Authority (SREDA)	Deputy Director	Md Nafizur Rahman
8	Sustainable and Renewable Energy Authority (SREDA)	Assistant Director (Finance)	Prodip Chandra Sarker
9	Infrastructure Development Company Ltd. (IDCOL)	Senior Investment Officer	Md Mehedi Hasan
10	Bangladesh Standards & Testing Institution (BSTI)	Assistant Director (Power)	Mohammad Shahadat Hossain
11	Bangladesh Garments Manufacturers & Exports Association (BGMEA)	Additional Secretary	Md Shamsul Haque

Concept of training curriculum:

- Includes observing and directly communicating with the EE&C technology development manufacturers;
- All of the target fields of the Project loan (industry, residence and building) will be covered;
- Includes visits to laboratories to visualize the effect of EE&C technologies.

Table 86 Training Programme

Date		Curriculum	Venue
21(Tue)		<Flight: tentative> Dhaka (13:35) / Bangkok (17:00) Thai Airways International TG322 Bangkok (22:45) /Tokyo-Haneda (06:55) Thai Airways International TG682	
22(Wed)	9:00	Arrival: 6:55 Tokyo (Haneda) Hotel check-in	Conference room:A
	13:00-14:00	Lunch & Briefing and Program orientation	
		Meeting at JICA HQ with the Deputy DG	Tokyo Dome Hotel
23 (Thu)	Japanese EE&C policies and measures		Conference room:*Horai*
	09:15-10:15 (1hr)	Lec.1: EE&C policy and measures *Lecturer: The Energy Conservation Center, Japan:(TBC)*	
	10:30-12:30 (2hr)	Lec.2: Financial support system for EE&C *Lecturer: Japan Finance Corporation*	
	13:30-15:00 (1hr30)	Lec.3: Japanese EE&C technologies: Efficient chiller *Lecturer: Expert From a chiller manufacturing company*	Tokyo Dome Hotel
	16:00-18:00	Meeting with the Japanese Business Sector	
24 (Fri)	Japanese EE&C technologies		
	10:00-12:00 (2hr)	Site visit and Lec.: EE&C technology for Building “Exhibition room of heat reflective glass” *Lecturer: Expert from a glass manufacturing company*	Kyobashi
	14:00-16:00 (2hr)	Site visit: Laboratories for testing *An air conditioning and refrigeration testing laboratory*	Tokyo Dome Hotel
25 (Sat)	AM	Transfer to Nagoya	
	14:00-17:00	Site visit: Textile Machinery *(Exhibition)* *A museum of industry and technology in Nagoya City*	
	18:30	Transfer to Osaka	Hotel New Hankyu Osaka
26 (Sun)		Preparation for interim discussion	Hotel New Hankyu Osaka
27 (Mon)	9:00-10:00 (1hr)	Interim discussion (participants)	Conference room H: AP Chayamachi *(near Hotel)*
	10:30-12:00 (1hr30)	Site visit: home appliances shops	
	Japanese EE&C technologies		
	15:30-17:00 (1hr30)	Lec.: EE&C equipment (i.e. Efficient boiler) *Lecturer: Expert from a boiler manufacturing company*	

Date		Curriculum	Venue
28 (Tue)	Japanese EE&C technologies and measures		
	9:00-12:00 (3hr, including break)	Lec.1: EE&C measures in textile industry *Lecturer: Expert on textile engineering*	Conference room H: AP Chayamachi *(near Hotel)* <u>Hotel New Hankyu Osaka</u>
	14:00-16:30 (2hr30)	Site visit: EE&C technology (air conditioning-related products for commercial use) *An air conditioner manufacturing factory, Sakai City*	
29 (Wed)	9:00-11:00 (2hr)	Wrap up & evaluation	Conference room H: AP Chayamachi *(near Hotel)*
	13:00-14:00 (1hr)	Site visit: EE&C technology (cogeneration facility in Osaka)	
	21:00	Departure at Hotel	
30 (Thu)		<u>Departure <Flight ></u> Osaka-kansai (00:30) / Bangkok (04:20) Thai Airways International TG673 Bangkok (10:35) / Dhaka (12:10) Thai Airways International TG321	

10. Orientation & Networking Workshop

With the aim to kick start the Project smoothly and effectively, SREDA, with the support of the Survey Team, held an orientation and networking workshop in Dhaka. Invitees were the stakeholders including government officials, business people, the energy consuming industries, the academics and other participants to the JICA EE&C M/P Project participants. The number of the participants was more than 250 in total. Active discussions took place in the morning presentations, followed by the networking among the potential borrowers, equipment suppliers and the IFIs. More than 50 companies and organizations participated in the networking session.

The purpose of the workshop is:

- to reach to a common understanding on the importance of EE&C;
- to publicize the planned financial support by the government and FIs, and;
- to promote the introduction of eligible EE&C technologies and providing opportunities for face-to-face discussions among the potential borrowers, EE&C equipment manufacturers and the IFIs .

The workshop was held on 27th January 2016 at Mukti Hall, MPEMR, Dhaka. The EE&C manufacturers which participated in the workshop are described below. Table 87 shows the agenda. Figures 51 and 52 show the photos of the workshop.

- Number of participants:
  Just over 250; Potential borrowers, EE&C equipment manufactuers and other Project participants.
- Purpose: Introduction of JICA Project including financing scheme, explanation of target EE&C technologies and networking
- Role: SREDA (overall and technical), IDCOL and BIFFL (financing), JICA (loan scheme and technical)
- 14 manufacturers presented their products in the workshop:
  - Textile EE&C;
  - Cement vertical mill;
  - Industrial cooling/chilling;
  - Compressor;
  - Once-through boiler
  - Inverter;
  - LED;
  - Waste Heat Recovery;
  - Co-generation.

Table 87 Agenda for the Workshop

Time	Event
09:00-09:50	Registration
Part1	
09:50-09:55	Opening remarks: Mr Md. Anwarul Islam Sikder, Chairman, SREDA
09:55-10:00	Remarks: Ms Masako Yoshihara, JICA Representative
10:00-10:25	Outline of Energy Conservation Master Plan: Mr Siddique Zobair, Member, SREDA; Joint Secretary, Power Division.
10:25-10:40	Overview of JICA Energy efficiency & Conservation Financing Project: JICA Survey Team Leader Mr Yoshihiko Kato
10:40-11:10	Outline of loan scheme: IDCOL (CEO, Mr Mahmood Malik) and BIFFL (CEO, Mr Formanul Islam) and Mr Nazmul Haque, IDCOL
11:10-11:30	Target technologies: JICA Survey Team, Dr Kimio Yoshida
11:30-11:45	Q&A
11:45-12:00	Break
12:00-13:40	Introduction of eligible EE&C technologies (incl. Q&A): EE&C product manufacturers
13:40-13:45	Vote of thanks: Mr Faezul Amin, Member, SREDA; Joint Secretary, Power Division
13:45-14:30	Lunch
Part2	
14:30-16:00	Net-working (15 min/ each meeting): Face to face discussion between IFIs/ manufacturers and potential borrowers

Major discussions are as follows:

1. Conditions for loan scheme: There were several questions. And FIs replied that detailed conditions, eg. grace period, interest rate and guarantee etc., will be decided by case. In this workshop, draft structure was explained prior to the loan implementation, starting at the end of this year.
2. Interest rate of loan: SREDA explained that EE&C equipment prices are higher than those of standard ones, and in order to promote EE&C, introduction of a quite concessional interest rate is necessary. In this context, under this loan scheme, quite low interest rate will be offered, compared with the existing rates.
3. Technical aspects: Several participants asked SREDA about the idea to support or conduct energy audits in order to implement EE&C equipment effectively. And SREDA replied that it is preparing to formulate Energy Manager Program and Energy Auditor Program. At present, there exists no official Energy Managers and Auditors.
4. However after the implementation of the above mentioned programmes, they can support more effective implementation of EE&C equipment.
5. Energy tariff: SREDA explained the on-going process to check and revise energy tariffs in the Government. The major opinions will be gathered by mid of February and then

will go into discussions in the Government.

6. Networking (PM): Around 50 potential borrowers had additional face to face meetings with concerned manufacturers. And more detailed and deeper discussions for project implementation have been conducted.
7. Awareness raising video: During the break time, awareness video to raise the importance of promotion of EE&C was projected.

Figure 51 Photo of the Workshop

Figure 52 Photo of the Networking

11. Publicity Activities

11.1. Development of video clips

It is essential to raise awareness on the necessity and significance of EE&C measures in the first place to effectively promote EE&C measures, since the concept is not yet widely known in the society. As an effective way of publicizing media, two video clips ("Jalani Shasroyee Bangladesh") were developed. The seven- minute video clip contains basic introduction to EE&C with focus on people's everyday life as well as on business activities, brief description of the Project, and three successful case studies. It is widely available through the internet (youtube), and also is recommended to be utilized in business seminars and school classes. The thirty-second video clip catches audience's attention and guides them to further sources of information, and is suitable to be used as a TV commercial movie.

Figure 53 Image (captured) of "Jalani Shasroyee Bangladesh"

11.2. Strategy on publicity activities

11.2.1. Objectives

A strategy is needed to effectively implement the publicity activities.

The objectives of publicity activities are:

- Raise awareness on EE&C among the entire society and encourage people to have a positive attitudes towards saving energy.
- Increase knowledge and understanding of EE&C related policies among the target groups.
- Encourage the target groups to adopt energy saving technologies and habits, through utilizing the Project.

11.2.2. Publicity materials

To effectively reach to the target groups and deliver suited information, different materials are necessary.

■ Instructional literature

Instructional literature helps readers acquire basic knowledge on EE&C and encourage them to start taking actions. It can include useful information such as:

- Background information on EE&C
- Policies to support EE&C measures
- Introduction to energy saving technologies
- Strategic guide to good practice (including financial implications for the industries)
- Easy tips for EE&C (for example "10 simple things you can do at home")

■ Video clip

■ Detailed documents on the JICA-EEF Project

For those interested in introducing energy saving technologies, detailed information on the JICA-EEF Project will be provided.

- Introduction to loans and methodological guidelines
- Application documents

There are various media to deliver above mentioned materials.
a. Internet: website (organization's official website, you tube, facebook (fb), etc)
b. TV and Radio: especially national stations
c. Face to face communications: such as workshops, seminars and helpdesks

Different materials need to be delivered to the target groups via appropriate media.

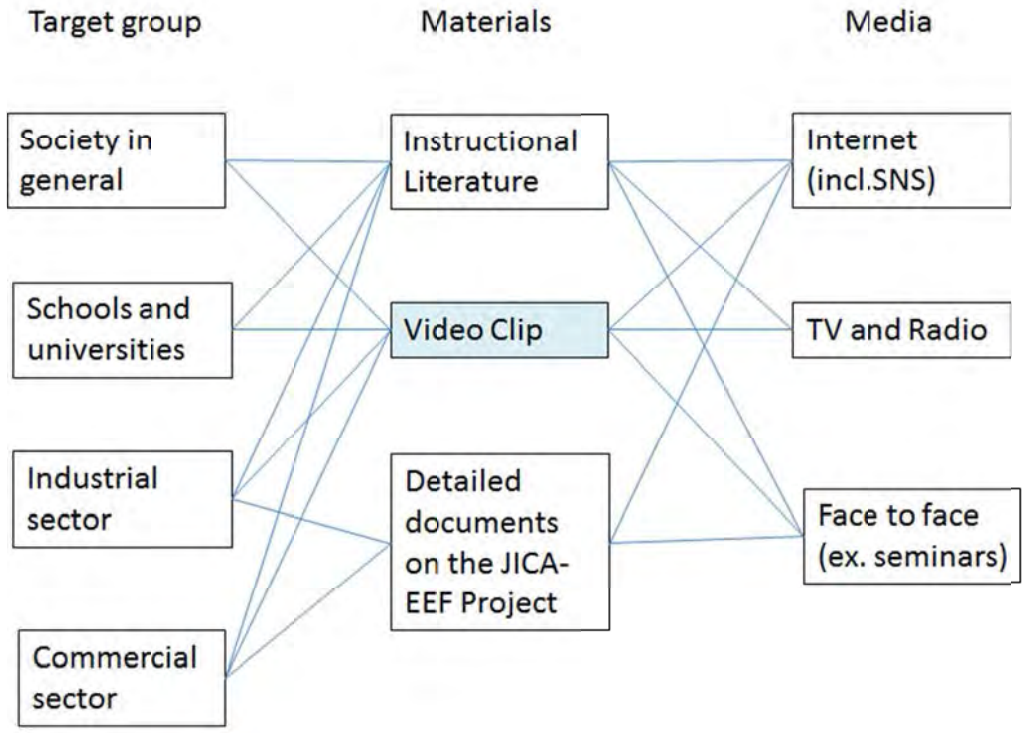


Figure 54 Materials for publicity activities

11.2.3. Action Plan

Short-term (2015-2016)

In the short-term, the Video Clips will be the main material to raise awareness of the people and to disseminate information on the JICA-EEF Project among the target groups.

Table 88 Action Plan (Short-term)

SREDA	IDCOL/BIFFL	JICA Advisors / Consultants
1. Development of the video clip		
・ Advise on video production	・ Advise on video production	・Propose the scenarios ・Produce the video clips
2.Dissemination of the video clip		
・ Organize a seminar and launch the video ・ Broadcast it in TV and radio ・ Make a press release ・ Post it on SNS (fb)	・ Broadcast it in TV and radio ・ Make a press release ・ Post it on SNS (fb)	・Publicize the video on Youtube ・Distribute copies of the video clip to media, industry groups (garment & textile, cement, iron & steel, real estate) and universities ・Post it on SNS (incl posting it on fb fan pages of NGOs, student groups)
3. Development of the detailed documents on the JICA-EEF Project		
・ Develop documents	・ Develop documents	・ Give assistance

Mid-term (2017-)

In the mid-term, SREDA will be acting as an information hub on EE&C. Mechanisms that allow SREDA to collect relevant information (such as successful case studies on EE&C, data showing evidence in achieving EE&C, or development of energy efficient technologies) will be introduced. Any company or organization who has an interest in and seeks more information on EE&C (policies, regulations, technologies, and other solutions) will consult with SREDA. IDCOL/BIFFL will effectively assist companies who introduce energy efficient equipment and provide them with updated information.

Table 89 Action Plan (Mid-term)

SREDA	IDCOL/BIFFL	JICA Advisors / Consultants
Development of instructional literature		
・ Develop literature ➢ Basic theory on EE&C ➢ Good practice, successful case studies (general, industry specific) ➢ Evidence on EE&C potential	・ Disseminate literature	・Give assistance
Communicate with the target groups		
・ Organize seminars and workshops (industry specific) ・ Make on-site visits to factories/buildings, collect case studies, and foster trust ・ Work with media to disseminate information	・ Organize seminars and workshops (industry specific) ・ Develop website of the Project ・ Function as helpdesk of the Project	・Give assistance, especially in operating the Project and in providing technical knowledge

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- Bangladesh Bureau of Statistics (2009), *Updating Poverty Map of Bangladesh*

- Government of Bangladesh (2015), *Seventh Five Year Plan (2016 – 2020)*
- Government of Bangladesh (2010), *Sixth Five Year Plan (FY2011 – FY 2015)*

- JICA (2010) *Guidelines for Environmental and Social Considerations, April 2010*
- JICA (2015) *Project for Development of Energy Efficiency and Conservation Master Plan in Bangladesh*
- JICA (2012a), *Profile on Environmental and Social Considerations in Bangladesh, July 2012*
- JICA (2012b) Preparatory Survey on Renewable Energy Development Project, November 2012

- SREDA and Power Division (2015), *Energy Efficiency and Conservation Master Plan up to 2030*

Laws and Regulations:

- The Bangladesh Environment Conservation Act, 1995
- The Environment Conservation Rules, 1997
- National 3R Strategy for Waste Management, 2010
- The forest Act, 1927 as modified in 1973
- The Wildlife (Preservation) Order, 1973
- The Protection and Conservation of Fish Act, 1950
- The Protection and Conservation of Fish (Amendment) Ordinance, 1982
- The Factory Act, 1965; The Factory Rules, 1979
- The Motor Vehicle Rules, 1940 as modified up to 1983
- The Bangladesh Panel Code, 1860

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