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Report No: PAD2413

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A PROPOSED CREDIT

IN THE AMOUNT OF SDR 112.90 MILLION
(US\$ 156 MILLION EQUIVALENT)

A PROPOSED STRATEGIC CLIMATE FUND LOAN

IN THE AMOUNT OF US\$ 26.38 MILLION

AND A PROPOSED STRATEGIC CLIMATE FUND GRANT

IN THE AMOUNT OF US\$ 2.87 MILLION

TO THE

PEOPLE'S REPUBLIC OF BANGLADESH

FOR A

BANGLADESH SCALING-UP RENEWABLE ENERGY PROJECT

February 5, 2019

Energy & Extractives Global Practice
South Asia Region

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CURRENCY EQUIVALENTS

(Exchange Rates Effective Oct 31, 2018)

Currency Unit = Bangladeshi Taka (BDT)

BDT 83.85 = US\$ 1.00

US\$ 1.38213 = SDR 1.00

FISCAL YEAR

July 1 – June 30

ABBREVIATIONS AND ACRONYMS

CAPEX	Capital Expenditure
CO ₂ e	Carbon dioxide equivalent
CIF-SREP	Climate Investment Funds Scaling-up Renewable Energy Program
CPF	Country Partnership Framework
EGCB	Electricity Generation Company of Bangladesh
EIRR	Economic Internal Rate of Return
EPC	Engineering, Procurement and Construction
ESMAP	Energy Sector Management Assistance Program
ESIA	Environment and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMS	Environmental and Social Management System
ESPP	Environment and Social Policies and Procedure
FIRR	Financial Internal Rate of Return
FM	Financial Management
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HFO	Heavy Fuel Oil
IDA	International Development Association
IDCOL	Infrastructure Development Company Limited
IFC	International Finance Corporation
IPP	Independent Power Producer
kWh	kilo-Watt-hour
MW	Mega-Watt
NDC	Nationally Determined Contribution
O&M	Operation and Maintenance
PPA	Power Purchase Agreement
PPSD	Project Procurement Strategy for Development

PV	Photovoltaics
RAP	Resettlement Action Plan
REFF	Renewable Energy Financing Facility
REREDII	Rural Electrification and Renewable Energy Development Project II
RPF	Resettlement Policy Framework
SE4ALL	Sustainable Energy for All
SREDA	Sustainable and Renewable Energy Development Authority
WACC	Weighted Average Cost of Capital

Regional Vice President: Hartwig Schafer

Country Director: Qimiao Fan

Senior Global Practice Director: Riccardo Puliti

Practice Manager: Demetrios Papathanasiou

Task Team Leader(s): Jari Väyrynen; Joonkyung Seong

**BASIC INFORMATION**

Country(ies)	Project Name	
Bangladesh	Bangladesh Scaling-up Renewable Energy Project	
Project ID	Financing Instrument	Environmental Assessment Category
P161869	Investment Project Financing	B-Partial Assessment

Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Disbursement-linked Indicators (DLIs)	<input type="checkbox"/> Small State(s)
<input checked="" type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
01-Mar-2019	31-Jan-2024

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The Project Development Objective is to increase installed generation capacity of, and mobilize financing for, renewable energy in Bangladesh.

Components

Component Name	Cost (US\$, millions)
Feni Utility-scale Solar PV	89.17
Renewable Energy Financing Facility (REFF)	320.23



Technical Assistance	3.64
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Organizations

Borrower:	People's Republic of Bangladesh
Implementing Agency:	Infrastructure Development Company Limited (IDCOL) Sustainable and Renewable Energy Development Authority (SREDA) Electricity Generation Company of Bangladesh (EGCB)

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	413.04
Total Financing	413.04
of which IBRD/IDA	156.00
Financing Gap	0.00

DETAILS**World Bank Group Financing**

International Development Association (IDA)	156.00
IDA Credit	156.00

Non-World Bank Group Financing

Counterpart Funding	48.79
Borrower/Recipient	15.79
Borrowing Country's Fin. Intermediary/ies	33.00
Trust Funds	29.25
Strategic Climate Fund Credit	26.38
Strategic Climate Fund Grant	2.87
Commercial Financing	120.00
Unguaranteed Commercial Financing	120.00
Other Sources	59.00



Bilateral Agencies (unidentified)	59.00
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IDA Resources (in US\$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
National PBA	156.00	0.00	0.00	156.00
Total	156.00	0.00	0.00	156.00

Expected Disbursements (in US\$, Millions)

WB Fiscal Year	2019	2020	2021	2022	2023	2024
Annual	5.00	30.00	45.00	40.00	40.00	25.25
Cumulative	5.00	35.00	80.00	120.00	160.00	185.25

INSTITUTIONAL DATA**Practice Area (Lead)**

Energy & Extractives

Contributing Practice Areas

Climate Change

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag**Does the project plan to undertake any of the following?**

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF	Yes
b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment	Yes
c. Include Indicators in results framework to monitor outcomes from actions identified in (b)	Yes

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)



Risk Category	Rating
1. Political and Governance	● Substantial
2. Macroeconomic	● Moderate
3. Sector Strategies and Policies	● Moderate
4. Technical Design of Project or Program	● Substantial
5. Institutional Capacity for Implementation and Sustainability	● Substantial
6. Fiduciary	● Substantial
7. Environment and Social	● Substantial
8. Stakeholders	● Moderate
9. Other	
10. Overall	● Substantial

COMPLIANCE**Policy**

Does the project depart from the CPF in content or in other significant respects?

Yes No

Does the project require any waivers of Bank policies?

Yes No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36		✓
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11		✓
Indigenous Peoples OP/BP 4.10	✓	
Involuntary Resettlement OP/BP 4.12	✓	



Safety of Dams OP/BP 4.37	✓
Projects on International Waterways OP/BP 7.50	✓
Projects in Disputed Areas OP/BP 7.60	✓

Legal Covenants

Sections and Description

(Financing Agreement, Section I.A of Schedule 2). By no later than one (1) month after the Effective Date, the Recipient shall establish and thereafter maintain, throughout the period of implementation of the Project, a Project coordination committee with a mandate and composition satisfactory to the Association.

For implementing Part 1 of the Project, the Recipient shall cause the EGCB to maintain throughout the implementation of the Project, a Project Implementation Unit, with functions, resources and staff in satisfactory to the Association. Without limitation on the foregoing, said unit shall be: (a) headed by one (1) full-time Project director and comprise, one (1) full-time Deputy Project director and one (1) full-time Deputy/Assistant manager (finance/accounting).

The Recipient shall cause the EGCB to engage, a bid/proposal evaluation committee for the procurements of solar PV power plant and owner’s engineer, with composition and terms of reference acceptable to the Association, which shall include an international procurement consultant and an international technical consultant.

For implementing Part 2 of the Project, the Recipient shall cause it to be carried out by IDCOL’s Renewable Energy Department under the management and supervision of its Head of the Renewable Energy Department with staff in adequate numbers having the qualifications, experience and terms of reference satisfactory to the Association.

Sections and Description

(CTF-SCF Grant Agreement, Section I.A of Schedule 2) For implementing Part 3 of the Project, within ninety (90) days of the Effective Date, the Recipient shall cause SREDA to establish and maintain throughout implementation, the PIU within SREDA, with an adequate organizational structure led by a Project director, with functions, powers, staff and resources necessary and satisfactory to the World Bank and hire: (a) a financial management consultant, (b) safeguards consultant, and (c) a procurement consultant whose terms of reference are satisfactory to the World Bank.

Sections and Description

(EGCB Project Agreement) EGCB shall carry out and cause to carry out Part 1 of the Project in accordance with the provisions of the relevant Safeguards Instruments being the ESIA, ESMP, ESMF, and the RAP respectively and the Grievance Redress Mechanism

Sections and Description

(IDCOL Project Agreement(s)) IDCOL shall ensure that the Sub-Loans supported under Part 2 of the Project, are



prepared and operated through adequate implementation of the provisions of the ESMS including the RPF and such safeguards instruments have been prepared and approved by the World Bank, and all measures required to be taken in accordance with this Section prior to commencement of the activities covered by the safeguards instruments, have been taken.

Sections and Description

(CTF-SCF Grant Agreement) The Recipient shall ensure that the Project is carried out in accordance with the applicable Safeguard Instruments, respectively, all in a manner acceptable to the World Bank.

Sections and Description

(under the Financing Agreement or the CTF-SCF Loan Agreement). The Recipient shall ensure that the following expenditures are not financed out of the proceeds of the Financing (or the Loan in case of Part 2) :

For Part 1 of the Project, the following expenditures are financed exclusively out of its own resources, or the resources of EGCB: (i) all land required for the Project; (ii) all resettlement and rehabilitation compensation and other assistance to Affected Persons, in accordance with the RAPs; (iii) Incremental Operating costs including purchase of vehicles subject to the clarification below; (iv) consultancy costs excluding the costs of safeguard consultants, owner’s engineer, procurement consultants and/or technical consultants hired under this Project; (v) the operations and maintenance contract for the solar PV plant; (vi) interest during construction; (vii) recurrent expenditures such as salaries, workshop allowances, sitting allowances, cash per diems, honoraria and fuel; (viii) import and supplementary duties and value-added taxes on goods at import stage; and (ix) value-added taxes on contracts entered into by the EGCB, other than consulting services, non-consulting services, and Training.

For Part 2 of the Project, following expenditures are financed exclusively out of its own resources, or the resources of the IDCOL, or the resources of the Beneficiary(ies) (if applicable): (i) all land required for the Project; (ii) all resettlement and rehabilitation compensation and other assistance to Affected Persons, in accordance with the RAPs; (iii) purchase of vehicles; (iv) interest during construction; and (v) recurrent expenditures such as salaries other than as permitted under the Incremental Operating Costs, workshop allowances, sitting allowances, cash per diems, honoraria and fuel.

It is clarified that the Incremental Operating Costs of EGCB may, at the discretion of the Association and upon prior consultation and agreement with it, be financed out of the proceeds of the Financing, provided that the allocation by the Recipient towards Incremental Operating Costs have been exhausted and/or is insufficient.

Sections and Description

(Section I, Schedule to the IDCOL Project Agreement(s)) For the purpose of carrying out Part 2 of the Project the Project Implementing Entity shall make Sub-Loans to the Beneficiaries in accordance with eligibility criteria and procedures set out in the Operations Manual.

Sections and Description



(under the CTF-SCF Grant Agreement) The Recipient shall ensure that: the proceeds of the Grant are not utilized for any purchase/acquisition of land; and the following Project expenditures are financed exclusively out of the Recipient’s own resources or the resources of SREDA, and, to this end, the Recipient shall provide, as promptly as needed, the resources required therefor, namely that, (i) all compensation, resettlement and/or rehabilitation payment to Affected Person in accordance with the provision of the RPF and the respective Resettlement Action Plan(s); (ii) Incremental Operating costs including purchase of vehicles subject to the clarification below; (iii) consultancy costs excluding the costs for hiring safeguard consultants, a procurement and technical consultants, and/or financial management consultants; (iv) recurrent expenditures such as salaries, workshop allowances, sitting allowances, cash per diems, honoraria and fuel; (v) import and supplementary duties and value-added taxes on goods at import stage; and (vi) value-added taxes on contracts entered into by the SREDA, other than consulting services, non-consulting services, and Training.

It is clarified that, notwithstanding the provisions of this Agreement, the Incremental Operating Costs of SREDA may, at the discretion of the Association and upon prior consultation and agreement with it, be financed out of the proceeds of the Financing, provided that the allocation by the Recipient towards Incremental Operating Costs have been exhausted and/or is insufficient.

Conditions

Type	Description
Effectiveness	<p>The Additional Conditions of Effectiveness (under the IDA Financing Agreement) consist of the following:</p> <p>(a) The SCF Loan Agreement has been executed and delivered and all conditions precedent to its effectiveness (other than the effectiveness of this Agreement) have been fulfilled.</p> <p>(b) The EGCB Subsidiary Loan Agreement has been executed on behalf of the Recipient and EGCB and all conditions precedent to its effectiveness have been fulfilled.</p>
Effectiveness	<p>The Additional Conditions of Effectiveness (under the CTF-SCF Loan Agreement) consist of the following:</p> <p>(a) The IDA Financing Agreement has been executed and all conditions precedent to its effectiveness have been fulfilled.</p>
Effectiveness	<p>The conditions of effectiveness (under the CTF-SCF Grant Agreement) consist inter alia of the following:</p> <p>(a) The Subsidiary Grant Agreement referred to in Section I.B of Schedule 2 to this Agreement has been executed on behalf of the Recipient and SREDA.</p>
Disbursement	<p>Under the IDA Financing Agreement, no withdrawal shall be made:</p>



	<p>(a) under Category (1) unless and until the Project Implementation Unit for EGCB has been established in a manner satisfactory to the Association.</p> <p>(b) under Category (2) above, until and unless,</p> <p>(i) the Recipient submits evidence satisfactory to the Association showing that the Operations Manual has been submitted by IDCOL in a manner satisfactory to the Association.</p> <p>(ii) The IDCOL Subsidiary Loan Agreement has been executed on behalf of the Recipient and IDCOL and all conditions precedent to its effectiveness or to the right of the IDCOL to make withdrawals under it (other than the effectiveness of this Agreement) have been fulfilled.</p>
Type Disbursement	<p>Description</p> <p>Under the CTF-SCF Loan Agreement, no withdrawal shall be made for payments under Category (1) or (2) unless:</p> <p>(a) the Borrower submits evidence satisfactory to the Association showing that the Operations Manual has been submitted by IDCOL in a manner satisfactory to the Association.</p> <p>(b) The Subsidiary Financing Agreement and the Subsidiary Grant Agreement has been executed on behalf of the Borrower and IDCOL and all conditions precedent to their effectiveness or to the right of the IDCOL to make withdrawals under these agreement/s (other than the effectiveness of this Agreement) have been fulfilled.</p>



BANGLADESH
BANGLADESH SCALING-UP RENEWABLE ENERGY PROJECT

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I. STRATEGIC CONTEXT

A. Country Context

1. Bangladesh is a low-lying country with the highest population density in the world among large countries having population of over 10 million, and high vulnerability to the risk of climate change and natural disasters. About 35 percent of the population is in urban and 65 percent in rural areas. Its per capita income was US\$1,670 (World Bank Atlas method) in 2018, well above the lower middle-income country category threshold which it crossed in Fiscal Year 2014. The poverty incidence has declined from 44.2 percent in 1991 to 14.8 percent in 2016 (latest available poverty data). Bangladesh's performance against most of the Millennium Development Goal indicators is impressive against the South Asia Region average. Driven by manufacturing and services, the Gross Domestic Product (GDP) grew well above the average for developing countries in recent years, averaging 6.5 percent since 2010.

2. The recent sustained growth has created higher demand for electricity, transport, and telecommunication services. This has contributed to widening infrastructure deficits in Bangladesh as demand for infrastructure has risen faster than investments. Public investment in infrastructure is less than 2 percent of GDP in Bangladesh, compared to more than 7 percent in countries like China, Thailand, and Vietnam. Bangladesh was ranked 106th in the 2016-17 Global Competitiveness Index, out of 128 countries, and 110th on quality of electricity supply. In the Doing Business Indicator (2017), Bangladesh was ranked 176 out of 190 economies and in the indicator of 'Getting Electricity', it was ranked the fourth lowest out of 190 economies.¹

B. Sectoral and Institutional Context

3. The power sector in Bangladesh has grown rapidly with maximum generation increased from a little over 4,000 Mega-Watt (MW) in 2009 to more than 9,400 MW in 2017. Bangladesh has also been successful in increasing access to electricity. A decade ago, less than 50 percent of Bangladeshis had access to electricity; today, about 80 percent have access to grid electricity. Furthermore, Bangladesh has implemented one of the most successful off-grid access programs in the world, providing electricity to another 10 percent of the population. It is expected that Bangladesh will achieve universal access to electricity much ahead of the Sustainable Energy for All (SE4ALL) 2030 target.

4. Considerable challenges, however, remain for ensuring uninterrupted electricity supply. Supply still lags peak demand resulting in demand curtailment particularly in the rural areas. Bangladesh's reserves of natural gas are estimated to deplete from 2020 if no new gas reserves are discovered or if technology does not allow a higher rate of extraction. Consequently, the share of coal-based generation is expected to grow. Shortage of gas and growing electricity demand has also resulted in expensive, imported fuel oil-based generation increasing from 5 to 22 percent between 2009 and 2017. This oil-based generation can be cost-effectively replaced by renewable energy.

5. Bangladesh is yet to achieve its potential for renewable energy for electricity generation. The total installed renewable energy generation capacity is currently only 461 MW and the share in grid supply only

¹ Additional country context information can be found in the World Bank Group Country Partnership Framework (CPF) for FY2016-2020.



1.5 percent. Most of the renewable energy generation is coming from a single 230 MW hydropower plant developed in the 1960s. The remaining is mostly from off-grid solar homes (175 MW), two solar PV plants (31 MW), some (15 MW) from urban rooftop solar, and the rest from biogas and biomass plants.

6. The potential for increased renewable energy generation in Bangladesh is significant. Resource assessments in the Bangladesh Climate Investment Funds Scaling Up Renewable Energy Program (CIF-SREP) investment plan indicate an additional 3,666 MW of renewable energy capacity.² To exploit this potential, the Government of Bangladesh has put in place several plans and targets for adding renewable energy capacities, including the 2008 National Renewable Energy Policy (2,000 MW by 2020), the 2016 Renewable Energy Development Targets (2,458 MW by 2021) and the 2016 Power System Master Plan with its emphasis on increasing renewable energy. Bangladesh's Nationally Determined Contribution (NDC) to the Paris Climate Agreement sets a somewhat more conservative objective of adding 1,000 MW of solar PV and 400 MW of wind power generation by 2030. These targets can all be considered ambitious given the limited progress in renewable energy deployment to date. To further promote renewable energy and energy efficiency, the Sustainable and Renewable Energy Development Authority (SREDA) was established in 2014.

7. Despite the Government commitment, progress on increasing the share of renewable energy has been slow. There are number of reasons for this, including:

(i) *Need for project implementation experience and strengthening institutional capacity:* There have been no utility scale wind projects, and only two small to medium size solar projects, implemented in Bangladesh to date³, and the rooftop PV market is nascent. Consequently, the knowledge base and implementation and institutional capacities are low. There is also limited institutional capacity in negotiating power purchase agreements (PPAs) with independent power producers (IPPs). So far, all renewable energy IPP projects have been unsolicited with PPA tariffs determined through bilateral negotiations with private sector developers, who have more information.⁴ No transparent competitive renewable energy tenders have been organized. These factors weaken the Government's ability to implement stated policy goals and move towards sustainable, private sector driven models.

(ii) *Financing Market Challenges:* There is a lack of deep domestic financing market to provide long term financing to projects, lack of due diligence capacity and lack of a functioning syndication market. Other key issues include lack of experience and knowledge of utility scale renewable energy projects, low risk appetite, and very limited foreign currency financing capacity. Institutional investor base is small and capital markets are not sufficiently developed.

² Including solar parks, solar rooftop, solar home systems and irrigation, wind farms, biomass, biogas, waste to energy, small hydropower plants and mini-grids. Considering the prevailing land scarcity in Bangladesh, this estimate excludes arable land needed for agriculture.

³ To date the largest solar PV project is 28 MW in Teknaf in the Cox Bazar region which became operational in September 2018. The project was implemented by a local developer in collaboration with an international EPC partner. The second, smaller project has 3 MW capacity and was constructed through a public-private partnership on a build-own-operate basis on eight acres of land allocated by the Bangladesh Power Development Board (BPDB).

⁴ As a single buyer, BPDB procures electricity supply from independent power producers (IPPs), rental power plants, corporatized generation companies and other publicly-owned power plants based on tariff rates negotiated in PPAs. Tariff rates are negotiated bilaterally between two parties based on financial analysis and projections, which may be affected by asymmetric information.



(iii) *Land constraint:* Land is the major challenge for developing utility-scale RE in Bangladesh. Utility scale solar or wind require large amount of land. Being a densely populated country, land has alternative uses including agriculture, residential and commercial/industrial uses. The land most suitable for renewable energy is government-owned land on river islands and in low-lying areas with seasonal flooding. Such challenging conditions pose additional risks to development of renewable energy.

(iv) *Project Development Challenges:* These barriers include insufficient data on resource availability, lack of technical studies, and inadequate preparation and due diligence of projects, including among private sector project developers and potential commercial financiers.

8. The severity of these barriers is demonstrated by the lack of progress on the unsolicited proposals for grid-tied solar and wind, which range from 5MW to 200MW and total over 1000 MW. PPAs have been signed for about 600 MW of them.⁵ The project sponsors include a mix of domestic and international developers, many with relatively limited previous experience. All but one of the unsolicited proposals are proposed to be implemented on private land, which the developers have difficulty to fully secure. Only one of these projects has progressed to financial closure or implementation due to the reasons above.

9. The Project complements several World Bank Group operations that enhance the country's enabling environment for higher penetration of renewable energy and increase power system capacity to integrate variable renewable energy. Building on these operations, together with efforts of the International Finance Corporation (IFC), the Project significantly strengthens the World Bank Group impact in scaling up renewable energy and expanding opportunities for the private sector in Bangladesh. The Project also complements and has been coordinated with efforts of other development partners.⁶

C. Higher Level Objectives to which the Project Contributes

10. **Country Partnership Strategy.** The Project is consistent with the World Bank Group's Country Partnership Framework (CPF) for Bangladesh (Fiscal Year 2016–2020). Under the Growth and Competitiveness pillar of the CPF, a transformational priority is given to narrowing the growing gap between demand and supply of power, through increased power generation capacity and access to clean energy. The Project is designed to directly contribute to this objective. With the target of adding 300 MW of capacity, the Project would significantly scale-up renewable energy generation capacity in Bangladesh.

11. **Maximizing Finance for Development.** The Project is consistent with and contributes to the World Bank corporate objective of maximizing finance for development. As evidenced by the limited progress on private sector renewable energy projects in Bangladesh, a sustainable private sector driven solution for renewable energy development does not yet exist. Important information, implementation capacity,

⁵ PPAs were signed for 540 MW of solar, and Letters of Intent for another 480 MW. About 270 MW of wind projects have been submitted; a PPA was signed for only one 60MW project. Tariff offered ranged from US¢ 11.95/kWh to US¢ 18.99/kWh for solar and US¢ 12/kWh for wind. Given that the tariffs offered are relatively high compared to international experience, some of the Letters of Intent may not get converted into PPAs. To date two of the signed PPAs have expired.

⁶ World Bank operations include IDA investments in gas power generation, strengthening and optimization of power dispatch, strengthening and expansion of transmission and distribution, and rural access to renewable energy. World Bank technical assistance included analysis of options to increase power generation and integration of renewables. The USAID has supported wind resource measurements and UNDP solar resource measurements. Asian Development Bank is supporting preliminary assessment of potential sites for renewable energy development with the Power Cell. KfW has conducted an assessment on rooftop PV potential and is initiating a project with IDCOL to provide both financing and technical assistance for rooftop PV.



and policy and process gaps persist. There are several barriers and risks that prevent the private sector from entering the market at scale. Accordingly, the Project is designed to address binding constraints critical to unlocking private sector participation and commercial financing to the renewable energy sector, both through investment support and technical assistance and capacity building, as further described under the Project Components section below. The Project is expected to leverage US\$212 million from the private sector, commercial banks, and other sources of financing. This can be achieved through the establishment of a dedicated renewable energy financing facility, providing long term financing to private sector first movers in a market where such financing is not readily available.

12. In addition, the Project preparation explored the possibility to use an IDA guarantee to address risks. As there are currently no private sector projects ready to appraise and in need of a guarantee, the guarantee instrument was decided not to be part of the Project design. Throughout implementation, the Bank will coordinate with IFC and the Multilateral Investment Guarantee Agency (MIGA) to support renewable energy transactions involving private sector participation. The use of the IDA guarantee instrument as well as other World Bank Groups instruments, including IFC financing and MIGA insurance, will be further considered and tailored for specific transactions. These transactions are expected to include the utility scale sub-projects identified under Component 3 and eligible for financing under Component 2. By addressing multiple risks and barriers in the market, the Project contributes to over time bringing in a sustainable private sector solution to renewable energy development.

13. **Climate Change Mitigation.** All of the Project financing contributes to World Bank corporate objectives on climate change mitigation by financing investments in renewable energy. It is estimated to reduce emissions by 377,000 tons of carbon dioxide equivalent (CO₂e) per annum. The Project is also aligned and contributes to the NDC of Bangladesh to the Paris Climate Agreement, which confirms renewable energy development as one of the mitigation programs.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

14. The Project Development Objective is to increase installed generation capacity of, and mobilize financing for, renewable energy in Bangladesh.

B. Project Beneficiaries

15. The Project's direct beneficiaries are: (a) private sector developers of sub-projects, including their employees, supported through the Renewable Energy Financing Facility; (b) industry in terms of reduced technological and integration risks and increased technical capacity; (c) rooftop solar energy end-users through improved reliability and lower price of electricity; and (d) people in selected municipalities benefiting from improved waste management and biogas through the waste-to-energy pilot. In addition, the increased renewable energy generation capacity will benefit people at large in Bangladesh, due to better quality of electricity supply and cleaner air.

C. PDO-Level Results Indicators

16. The PDO level results indicators are: (1) Generation capacity of energy constructed or rehabilitated (MW); and (2) Private capital mobilized (US\$).



III. PROJECT DESCRIPTION

A. Project Components

17. The PDO will be met through a combination of measures that address the barriers and gaps discussed above and engage both the public and private sectors. The Project will increase installed capacity of renewables through piloting and gradually scaling up investments in key market segments. It will mobilize financing through provision of dedicated financing to the private sector, designed to leverage other sources of capital. These outcomes are enabled through technical assistance and institutional capacity building, notably for identification and development of public land sites for competitive tenders to bring in the private sector.

18. The design of the Project therefore considers the strategy of the Government to develop a pilot through a public power generation utility in parallel to development of competitive tenders on public land for private sector IPPs. It also considers the state of the renewable energy project and financing market in Bangladesh, the need to strengthen policy and procedures, the gaps and asymmetries in information and experience, and lessons learned from other countries and operations. Accordingly, the Project consists of three components as described below. Detailed Project component description is provided in Annex 1.

19. **Component 1: Feni Utility-Scale Solar PV (US\$89.17 million total investment cost, including US\$74.15 million IDA credit and US\$15.02 million counterpart funding from Government of Bangladesh and EGCB).** Component 1 supports a first-of-a-kind 50 MW⁷ pilot phase of a renewable energy park developed by the Electricity Generation Company of Bangladesh (EGCB). The pilot is implemented in the Feni district on a site acquired by EGCB for renewable energy development. The Component will be implemented by EGCB on about 170 acres of a larger 999.65-acre land area it has acquired. Once fully developed, the EGCB Feni park can accommodate up to 200 MW of renewable energy. Subsequent phases of development at the Feni site may explore joint venture and other public-private partnership structures that can mobilize commercial finance.

20. The Project will finance the 50 MW pilot solar PV generation plant and the required infrastructure. The infrastructure includes evacuation lines from the site to the nearest grid sub-station, pooling sub-stations, civil engineering structures for mitigating flooding risks, and roads within the project site. EGCB will procure through a competitive bidding procedure an engineering, procurement and construction (EPC) and operation and maintenance (O&M) contract for the solar PV plant, including the power evacuation infrastructure. The O&M arrangement will cover the first three years after commissioning; the cost of the O&M will be covered by EGCB. Besides the EPC contract, Component 1 will finance the costs of transmission bay extension at a sub-station, an owner's engineer, safeguards consultants, and international technical and procurement experts to be included in the bid evaluation committee, as well as some goods. EGCB and the Government of Bangladesh will finance the rest of the cost of Component 1, including but not limited to the O&M contract, import duties and taxes on goods and works, vehicles, salaries and allowances, and other operating costs. In the event Government and EGCB budgets for

⁷ Generation capacity of Component 1 is rated on AC basis.



operating costs are exhausted, some operating cost may be financed by the Bank, upon prior consultation and agreement with the Bank.

21. The Feni pilot project would be the first large-scale grid-tied solar PV project in Bangladesh and a significant milestone in scaling up solar PV in Bangladesh. The pilot allows the country to gain experience in renewable energy project procurement, risk mitigation, implementation, operation and maintenance. It will demonstrate the viability of a solar PV plant on a difficult low-lying land area with seasonal flooding. This provides both the Government and private sector invaluable experience and information as most project sites under consideration are expected to have similar characteristics.⁸ The pilot will also provide a transparent cost breakdown and benchmark. The investment will furthermore test several other parameters on specifications, legal agreements, tender procedure, implementation, operation and maintenance, financial viability, and regulations. It provides the off-taker and the system operator their first experience on PPA and integration of a large scale solar project to the power system. Finally, the reduced asymmetry of information and experience will enhance Government ability to engage with the private sector.

22. Component 1 is therefore addressing the barriers related to lack of implementation experience and institutional capacities. Furthermore, the demonstration and learning effects of the pilot will help de-risk further investment in similar sites and encourage private sector participation, contributing to the expected impacts and outcomes of Components 2 and 3.

23. **Component 2: Renewable Energy Financing Facility (REFF) (US\$108.23 million, including US\$81.85 million IDA credit and US\$26.38 million CIF-SREP loan; US\$212 million of counterpart funding to be leveraged).** Component 2 establishes a dedicated Renewable Energy Financing Facility (REFF), hosted and managed by the Infrastructure Development Company Limited (IDCOL), to provide financing to private sector projects and public-private partnership (PPP) projects, including joint ventures. The Facility will channel IDA and concessional CIF-SREP resources of US\$108.23 million, including US\$81.85 million IDA credit and US\$26.38 million CIF-SREP loan.⁹ It will provide financing for both utility scale renewable energy and rooftop solar PV sub-projects.

24. The REFF provides financing to private sector developers and PPPs for utility-scale solar PV projects, preferably those of competitively tendered projects on public land sites, notably those identified and developed under Component 3. In addition, recognizing the high land scarcity in Bangladesh, the component supports opening and scaling-up the rooftop solar PV market. In both segments, the Facility supports private sector and PPP first movers to create markets and bring in other financiers. It will offer long term financing to private sector and PPP renewable projects, currently not readily available in Bangladesh. The REFF financing will leverage domestic and international private developers and commercial financiers. In case the REFF funding is evenly deployed to utility-scale solar PV and rooftop solar PV, it is expected to leverage US\$212 million from other sources of financing.¹⁰ The sub-project investments will provide the co-financiers an opportunity to understand and reduce their risks and gain experience in the due diligence and financing of such projects. The Project will also build the capacity of

⁸ Given the high population density and the Government policy of not using agriculture land for any other purpose, low-lying uninhabitable lands with seasonal flooding risks can be considered potential sites for solar PV.

⁹ The CIF-SREP funding for the Project was endorsed by the CIF-SREP sub-committee on August 25, 2017.

¹⁰ After the Project closing, IDCOL may utilize the REFF sub-loan reflows to finance further RE projects, thus further increasing the leveraging impact of the Project.



IDCOL as a development finance institution, and its ability to leverage commercial financing, benefiting the private sector project sponsors and commercial financiers as well.

25. Through the above elements, therefore, Component 2 is addressing barriers related to both the under-developed renewable energy financing market as well as institutional capacity and project development challenges. It will benefit from the implementation experience and lessons learned under Component 1. It is also directly linked to Component 3 as REFF financing will be offered to the bidders in the competitive tenders on public land, supported under Component 3.

26. **REFF Technical Scope.** IDCOL will function as a financial intermediary, carrying out due diligence of sub-projects, approving sub-loans, and taking credit risk, as further specified in the Operations Manual. The primary technology focus of REFF will be utility-scale solar PV and rooftop solar PV.¹¹ The Facility will have flexibility to support transactions on a first come first serve basis among the eligible technologies. Indicatively, the Facility can support a total of 260 MW of installed capacity. The installed capacity target will be adjusted during implementation, reflecting market uptake from the two targeted market segments.

27. **REFF Financing Products and Terms.** The Facility will primarily offer senior loans to support a series of sub-projects. Based on market demand and viability, sub-ordinated loans would be available to effectively mobilize financing from other sources through proper risk mitigation. Other financial instruments catalytic to leveraging financing will be further explored under IDCOL's capacity building activities. The REFF will be able to extend long-term loans at a lower end of the market rate range. Pricing of the REFF loans will be determined without subsidization, reflecting actual cost of financing. The REFF financing terms will be reviewed periodically to reflect changing market conditions and project economics. To optimize the use of IDA and CIF-SREP resources and to mobilize commercial financing, the REFF share of financing for each sub-project is capped up to 25 percent of total capital expenditure (CAPEX) of utility-scale sub-projects, and up to 50 percent for rooftop solar PV sub-projects, as specified in the Operations Manual.¹² The rest of the financing of each sub-project would come from commercial banks, other development finance institutions and project sponsors, or from IDCOL's own resources.

28. **IDCOL Capacity Building and Market Development.** IDCOL will receive US\$1.5 million of the CIF-SREP loan from the Ministry of Finance on grant terms for technical assistance and capacity building. This funding will support: (i) Developing new business models and financial instruments (e.g. equity, guarantee and insurance) catalytic to mobilizing financing for renewable energy and strengthening IDCOL financing capacities;¹³ (ii) Strengthening IDCOL capacity for technical due diligence and supervision of utility-scale renewable energy and rooftop solar PV; (iii) Creating a market and developing pipeline of rooftop PV through business development activities; and (iv) Project management costs. These activities will be coordinated with the technical assistance conducted by SREDA under Component 3.¹⁴

¹¹ Individual utility-scale solar PV sub-projects may be about 50 MW, whereas rooftop PV sub-project would typically be less than 1MW.

¹² IDCOL will withdraw proceeds within these financing caps from both the IDA credit and CIF-SREP loan, proportional to their share of the total financing for Component 2 sub-loans.

¹³ These activities can build on a similar exercise planned under the Bank-funded Investment Promotion and Financing Facility II project (P159429) which mainly targets the Bangladesh Infrastructure Finance Fund Limited.

¹⁴ KfW is expected to provide grant funding to support IDCOL's business development as part of a rooftop solar PV project under



29. **Component 3: Technical Assistance (US\$3.64 million total cost, including US\$2.87 million CIF-SREP grant and US\$0.77 million counterpart funding from Government of Bangladesh).** This Component is implemented by SREDA. It will support technical assistance and capacity building activities to improve the enabling environment to scale up renewable energy, and support development of a project pipeline in particular for private sector participation. It will also fund Project management costs, covering the costs of hiring technical consultants and consultants for procurement, financial management and safeguards. SREDA and the Government of Bangladesh will finance the rest of the cost of Component 3, including but not limited to import duties and taxes on goods and works, vehicles, salaries and allowances, and other operating costs. In the event Government budget for operating costs is exhausted, some operating cost may be financed by the Bank, upon prior consultation and agreement with the Bank.

30. The technical assistance activities address the biggest barrier to renewable energy development in Bangladesh – land constraint – through identification of project sites by the public sector. The activities support the preparation of sites for competitive tendering through resource assessment, feasibility study and environmental and social impact assessments, as well as through support to the development of the tendering procedure. Furthermore, it will build institutional capacity through trainings and other form of capacity building to both Government agencies and the market at large. It will also strengthen the enabling environment for rooftop solar PV, including through promotion of the net-metering policy. In addition, this Component will support feasibility assessment and deployment of a small-scale waste-to-energy technology pilot, to inform technical and commercial feasibility of waste-to-energy sub-projects.¹⁵ This component will therefore address institutional capacity, land availability, and project development related barriers (paragraph 7. (i), (iii) and (iv) above), and help develop a pipeline of private sector projects to be financed by Component 2 and other financiers. All SREDA activities will be coordinated with the IDCOL technical assistance to ensure complementarity and to avoid overlaps.

B. Project Cost and Financing

31. In addition to the US\$156 million in IDA funds allocated for the Project, it will be funded by concessional climate finance resources from the CIF-SREP (US\$2.87 million grant and US\$26.38 million loan).¹⁶ The Government of Bangladesh is the borrower, channeling the resources to the implementing agencies. EGCB will enter into a Subsidiary Loan Agreement with the Ministry of Finance to receive US\$74.15 million of IDA credit. IDCOL will sign a Subsidiary Loan Agreement for US\$81.85 million of IDA credit and US\$24.88 million of CIF-SREP loan, and a Subsidiary Grant Agreement for US\$1.5 million of CIF-SREP loan on grant terms. SREDA will have a Subsidiary Grant Agreement with the Ministry of Finance for US\$2.87 million of CIF-SREP grant. Financing terms of the loans to the implementing agencies will be

preparation. The Project activities have been designed in close coordination with the KfW. The coordination of World Bank and KfW activities will be continued during Project implementation.

¹⁵ The implementation of a waste-to-energy pilot is a part of the approved CIF-SREP Investment Plan. The Government of Bangladesh has requested that the pilot be implemented as a part of the proposed Project.

¹⁶ The Government has in cooperation with the World Bank, the International Finance Corporation (IFC), and the Asian Development Bank, developed an Investment Plan to access CIF-SREP resources. The CIF-SREP Investment Plan for Bangladesh was approved by the CIF-SREP Sub-committee in November 2015 for a total of US\$75 million in funding. The Bank agreed to implement the US\$29.25 channeled to this Project to support grid-connected renewable energy and a waste-to-energy pilot. IFC was assigned US\$15 million for supporting utility-scale solar and wind, and rooftop solar, and the Asian Development Bank was assigned US\$29.95 million for supporting off-grid solar (mini-grid and irrigation).



specified in the Subsidiary Loan Agreement between the Government and the implementing agencies, reflecting the actual cost of financing from IDA and CIF-SREP and the expenses of the Government.

32. Under Component 1 the Bank would finance the EPC contract (except for the O&M expenditures), transmission bay extension at a sub-station and a few consultants. EGCB and the Government of Bangladesh would finance all other expenses on parallel basis. Component 1 incremental operating costs may be financed by the Project at the discretion of the Bank, provided that EGCB and Government resources towards such costs have been exhausted and/or are insufficient. Under Component 2 REFF joint co-financing would apply between IDA and SREP; financing would be disbursed against sub-loans extended by IDCOL and the financing percentages would be included in the withdrawal table. In case of the technical assistance to IDCOL under Component 2, all expenditures would be financed under the CTF-SREP loan provided to IDCOL on grant basis. Incremental operating costs under Component 2 can also be financed by the Project. In case of Component 3 the Government of Bangladesh would finance operating costs and all other expenditures would be funded by the CIF-SREP grant on parallel basis. However, Component 3 incremental operating costs may be financed by the Project at the discretion of the Bank, provided that Government resources towards such costs have been exhausted and/or are insufficient.

33. The estimated Project costs to achieve a target capacity of 310 MW (50 MW under Component 1, 150 MW from utility-scale solar PV under Component 2, and 110 MW from rooftop solar PV under Component 2) and the proposed financing structure are shown in Table 1 below.

Table 1. Project Costs and Financing Sources

Project Components	Project cost	IDA Credit	CIF-SREP Trust Fund	Counterpart Funding
1. Feni Utility-Scale Solar PV	89.17	74.15		15.02
2. Renewable Energy Financing Facility (REFF)	320.23*	81.85	26.38**	212.00
3. Technical Assistance	3.64		2.87	0.77
Total Project Costs	413.04	156.00	29.25	227.79

* Total investment costs of sub-projects financed by the REFF; ** Including US\$1.5 million provided to IDCOL on grant terms

34. The indicative financing plan of the REFF is illustrated in Table 2, although the Facility keeps flexibility in supporting different types of sub-projects. The REFF financing is expected to mobilize additional capital of around US\$212 million, of which US\$120 million is estimated to be private capital.



Table 2. Indicative Financing Plan under the REFF (in US\$ million)

	Utility-scale PV	Rooftop solar PV	Total
Target capacity (indicative)	150 MW	110 MW	260 MW
a. Estimated Project Cost (US\$1.4/W for utility-scale PV, including land development; US\$1/W for rooftop)	210	110	320
b. Estimated Private Equity (30 percent; 20 percent)	63	22	85
c. Estimated Debt	147	88	235
d. Commercial borrowing	35	-	35
e. Development Finance Institutions/IDCOL	59	33	92
f. REFF financing and technical assistance (IDA and CIF-SREP)	53	55	108
g. Estimated Private Capital Mobilized (b + d)	98	22	120
h. Estimated Total Capital Mobilized (b + d + e)	157	55	212

35. **Retroactive Financing:** To facilitate a prompt start to Project implementation, retroactive financing is eligible for all three components. It may be utilized by EGCB to finance consultant expenditures, IDCOL to finance consultants or sub-loans for eligible sub-projects, and by SREDA to finance consultants. For the retroactive financing of eligible expenditures, withdrawals may be made for payments made on or after April 1, 2018, and prior to the signing of the Financing Agreement, Loan Agreement or Grant Agreement, for an aggregate amount not exceeding US\$2 million for Component 1, US\$10 million for Component 2, and US\$574,000 for Component 3.

36. **Rationale for Public-Sector Financing.** Public financing under this Project will help remove barriers and reduce the private sector’s risk perception about utility scale and grid-connected solar power. The 50 MW pilot will help build capacity and establish a cost benchmark for future investments. Component 2 (REFF) and the technical assistance activities under Component 3 will mobilize private investment and commercial financing, help set industry standards for risk assessment, and identify public lands on which private sector IPPs can be brought in to develop the generation assets. The Project helps the country integrate renewable energy capacity in its current mix at lower cost and build the foundation for reaching its RE targets by 2030. In the absence of the Project, the country’s renewable sector development would likely remain slow. This would be contributed to by the continued low institutional capacity, and lack of implementation experience and cost transparency. The sector would continue to rely on unsolicited proposals with comparatively high negotiated tariffs and slow implementation. Lack of public land sites identified and developed for renewable energy generation would further aggravate the situation. Commercial financiers would continue to hesitate to enter the sector in the absence of support for scaling up markets for both rooftop PV and utility scale renewable energy projects.

C. Lessons Learned and Reflected in the Project Design

37. **Tailor programs suitable to national circumstances.** The Project draws on relevant experience globally and regionally. For example, India’s success in crowding-in commercial investment to



renewables¹⁷ provides relevant lessons: (a) performance of new solutions within local systems provides a strong demonstration effect and allows regulators and policy makers make informed choices and build the ecosystem (e.g. policies, regulations, incentives), while commercial investors and financiers gain confidence in entering new markets; (b) successful innovation platforms rely on existing institutional arrangements that can implement demonstration projects and provide credible dissemination channels; they are fit-for-purpose, credible and suitable to local conditions, and combine financing with performance monitoring, convening and coordinating capacity, and knowledge sharing; and (c) frequent targeted interactions with market players are needed for successful market facilitation. Test beds for commercially-based operations are successful if they can reduce information asymmetries among stakeholders and receive feedback on barriers to scale up. Policies and programs in India evolved over time to create public-private partnerships, such as the Solar Park Scheme.¹⁸ The Project reflects these lessons in the Project design by: (i) working with a financial intermediary to provide targeted long term, low cost financing to commercial projects that address challenges of securing long term financing and reward first-movers and buy down transaction costs; (ii) working with public owned enterprises identified by the Government to build its first large scale solar PV plant; this will provide design and implementation experience that can inform public-private partnerships and policies supportive of private investment; and (iii) co-investing in these initial investments across several platforms to build capacity and establish channels of knowledge sharing to help tailor policies and programs to evolving markets.

38. **Work towards competitive tendering to lower cost of renewable energy.** In the past, feed-in-tariff mechanisms were the most popular method for procuring electricity from renewable energy. However, adjustments to the feed-in-tariffs often lagged cost reduction in technologies and provided investors an opportunity to reap windfall profits. In recent years, competitive auctions are resulting in lower cost of electricity especially from large scale projects.¹⁹ The repetition of competitive auctions over multiple rounds enables further price reduction through market development and confidence building. Furthermore, as the scale of projects becomes larger, transactions costs as a share of total project costs declines. The World Bank Group Scaling Solar Initiative in several countries has also provided important lessons on organizing competitive auctions for utility-scale solar PV. Lessons from the solar park model, for example from India, may be applied in the Project. In the RE park model the public sector provides land, shared infrastructure and evacuation, and private sector finances, builds and operates the generation facility. This model would allow an effective use of scarce public resources for scaling up renewables in Bangladesh. The Project incorporates these lesson in its support for development of competitive tenders and private sector utility scale sub-projects on government-owned land under Component 3, with financing offered to the sub-project sponsors under Component 2.

39. **Dedicated financing combined with technical assistance can create and scale up the rooftop PV market.** The World Bank Grid-Connected Rooftop Solar Program in India has proven that a well-targeted credit line can unlock rooftop solar PV potential and open the market, even in a relatively short timeframe.

¹⁷ India's installed capacity of non-hydro renewables increased more than five-fold in a decade, from 11 GW in 2008 to 69 GW in 2018. Executive Summary of Power Sector, April 2008 to March 2018, Central Electricity Authority of India

¹⁸ The World Bank has supported India's pragmatic approach with support to India's clean energy programs and the relevant institutions. They include India Renewable Energy Development Agency (IREDA) to foster public-private partnerships, State Bank of India (SBI) to scale up rooftop solar PV and build capacity of stakeholders, and Solar Energy Corporation of India, Ltd. (SECI) to make initial investments in frontier technologies.

¹⁹ Price of Solar PV Electricity in Developing Countries, Global Solutions Group: Clean Energy, The World Bank, November 7, 2016. More recent auctions have continued to lower the cost of electricity.



It has demonstrated that even before a net metering policy is being effectively implemented there is a significant demand on self-consumption or captive generation basis. There is a strong business case when the levelized cost of generation from rooftop PV systems is lower than the electricity retail tariff. Another important lesson is the role of technical assistance in creating demand and developing the project pipeline. Technical assistance can support improving policies and regulations, raising awareness, sharing knowledge and experience, and targeting business development. The Project has incorporated these lessons into Components 2 and 3 and will continue to benefit from the ongoing experience in India and other markets.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

40. **Component 1:** EGCB will be the implementing agency of Component 1. EGCB will implement the first phase of solar PV development at the Feni site. The Ministry of Finance will be the borrower of IDA credit that will be on-lent to EGCB to finance the development as public investment. EGCB has since 2008 been working with the Bank as an implementing agency. EGCB will establish a Project Implementation Unit for the Project, headed by a Project Director reporting to the Executive Director (Engineering).

41. **Component 2:** The REFF will be hosted and operated by IDCOL, a state-owned financial institution. IDCOL will act as the Financial Intermediary of IDA credits and CIF-SREP loans. IDCOL has a demonstrated track record in managing a large volume of donor funding, including the World Bank, through similar financing facilities and in implementing renewable energy programs. The Project will be managed by IDCOL's Renewable Energy Department. The REFF will be operated under the management and supervision of the Head of Renewable Energy Department and IDCOL's top management.

42. **Financial Intermediary Financing.** A Bank review has been conducted to ensure that the Project, particularly Component 2 on establishing the REFF, meets good practices and requirements on financial intermediation. The review confirmed that the Project complies with World Bank requirements for financial intermediary financing. IDCOL is assessed to have adequate capacity to act as a financial intermediary, with technical assistance and capacity building support planned under the Project. Per the recommendation of the review, an intermediate results indicator (ratio of non-performing loans) to monitor the quality of the REFF portfolio has been added to the results framework.

43. **Component 3:** SREDA will be the implementing agency for Component 3 of the Project. As the Government agency with the mandate to promote renewable energy and energy efficiency in Bangladesh, SREDA has the functional authority to coordinate CIF-SREP activities in Bangladesh. As a recently established institution, SREDA has no previous experience in implementing Bank projects. The Project includes technical assistance and capacity building support to further strengthen SREDA's technical capacity. SREDA will establish a Project Implementation Unit, led by a Project Director.

44. **Project Coordination Committee.** A Project Coordination Committee will be established to coordinate Project activities, exchange information and help disseminate the lessons learned among Project Components implemented by the three Implementing Agencies. The Committee will be chaired by the Power Secretary and include EGCB, IDCOL and SREDA. Other Government agencies may be asked to participate on an as-needed basis. See Annex 2 for additional details on implementation arrangements.



B. Results Monitoring and Evaluation

45. EGCB, IDCOL and SREDA will provide the World Bank with bi-annual progress reports and quarterly interim unaudited financial reports, bi-annual information on progress of the key performance indicators for their respective Project components, audited financial statements, and such other information as the World Bank may reasonably require. Monitoring and evaluation will be linked to the Project Development Objective indicators and intermediate indicators, presented in Section VII. The indicators have annual intermediate targets as well as end targets. The intermediate and end targets are measured cumulatively as of January 31 of every year and at the end of the Project, respectively. Approximately three years after effectiveness, EGCB, IDCOL and SREDA will carry out a thorough review of Project implementation and report their findings and conclusions to the World Bank's midterm review.

C. Sustainability

46. The Project is expected to build a track record and help develop a sustainable new market of grid-tied renewable energy which has not existed before in the country. For utility-scale PV, demonstration through a public-sector pilot will establish cost and tariff benchmarks, risk mitigation practices through civil structures, experience on grid integration, and replicable tendering procedures. REFF long-term debt financing will reduce risk and provide experience for commercial banks and the private sector in a nascent market. With the benefit of this experience, they can continue financing and implementing similar projects after the Project closes. Identification of sites on public land and development of competitive tendering procedures would give confidence to the market and eventually reduce the cost of both investment and financing, leading toward a sustainable market-based solution for further development of utility-scale RE.

47. For rooftop solar PV, supporting early stage investment through the REFF is expected to open the market and generate demand. The support to development of the enabling policy and regulatory framework and awareness raising among potential beneficiaries will help sustain the market beyond the Project. As the market grows over time, the cost of generation from rooftop PV systems is expected to fall, while the retail price of electricity is expected to go up (in accordance with the Government's effort to reflect increasing fuel costs in the tariff). Through this process the business case of rooftop solar PV will be strengthened, further ensuring the sustainability of the Project outcomes.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

48. The various risks related to the Project were assessed through the Systematic Operations Risk-Rating Tool. The overall Project risk is assessed to be Substantial. The risks identified with 'substantial' rating include: (i) political and governance, (ii) technical design of project, (iii) institutional capacity for implementation and sustainability, (iv) fiduciary, and (v) environmental and social risks. These key risks to achieving the Project objectives, and pertinent mitigation actions, are described below.

49. **Political and Governance.** There have in the past been governance concerns, substantiated by the Bank, related to contracts supported by other World Bank energy sector projects. The risks identified in those cases point to a need for projects in the energy sector to strengthen due diligence and overall



governance at the project level. As such, the establishment of a dedicated Project Coordination Committee forms a core mitigation measure to address similar risks in this project. The Committee will monitor and coordinate key aspects of the Project. It will be chaired by the Power Secretary and have representatives of the implementing agencies and other relevant stakeholders. The Committee will provide oversight over the whole Project and work to ensure coordination of Project activities and implementing agencies. The Committee will be complemented by activity-level risk mitigation measures related to institutional capacity and fiduciary aspects, as discussed below.

50. **Technical Design.** Although solar is a well-developed technology, the concept of a utility-scale solar and rooftop solar PV is new in Bangladesh. The flood prone nature of the sites that are likely to be available for renewable energy development require specific measures to be incorporated to the technical designs, such as those included in the EGCB Feni pilot. The risks on the Feni pilot is mitigated through a comprehensive feasibility study that included civil engineering structures for mitigating flood risk. Furthermore, there are few local developers with relevant experience, and financial institutions have no or limited exposure to such projects. The Project puts in place a financing mechanism to support both utility-scale and rooftop PV, along with technical assistance to promote markets. Developing a pipeline for the REFF is critical for achieving the Project objectives. For utility-scale RE, a few public land sites are expected to be identified during the early stage of Project implementation and prepared for competitive auctions to bring in experienced private sector project developers.²⁰ In contrast, awareness-raising and business development is key for building rooftop PV pipeline. Component 2 and 3 both include activities aimed at creating a market and building sub-project pipeline. IDCOL has already built up pipeline for the first year of implementation and approved several loans from its own resources.

51. **Institutional Capacity for Implementation and Sustainability.** The Project will involve larger scale RE sub-projects than IDCOL has experience with to date. An Operations Manual will be prepared to guide IDCOL in the operation of the REFF. Also, SREDA capacity needs further strengthening in the renewable energy space, including rooftop solar. For EGCB, solar PV and renewable energy are new technologies with very different operation and maintenance as well as risk and return characteristics. Necessary capacity building support has been provisioned in the Project.

52. **Fiduciary.** The fiduciary risk of the Project has been assessed as “substantial” mainly due to the involvement of multiple implementing agencies and accounting centers, and limited or inexperience of the agencies in conducting IDA funded procurements (EGCB has limited experience from one project, and SREDA no experience). There is capacity constraint in the agencies in conducting procurement and contract management activities that may lead to delay in procurement process, and time and cost over-run during contract implementation. Besides, the agencies are vulnerable with respect to the inappropriate bidding practices undertaken by the bidders. To mitigate the risk, several measures are included in the scope of the Project, including training of procurement and financial management staff at implementing agencies especially on identifying inappropriate bidding practices undertaken by the bidders, recruitment of local procurement consultants, engagement of international procurement and technical consultants in EGCB’s bid/proposal evaluation committee, engagement of supervision

²⁰ Various efforts are under way to identify such lands. SREDA has identified 2-3 potential sites that are currently under further assessment. Power Cell is reviewing multiple sites owned by public utilities to gauge potential of developing large-scale RE. The World Bank will launch a World Bank executed (funded by an ESMAP grant) land bank exercise to identify other public land that can be potentially used for pipeline.



consultant firm by EGCB to closely supervise the contract implementation, frequent reporting requirement including monitoring large value procurement activities against an agreed time-bound action plan, and independent annual audit.

53. **Environmental and Social.** Social safeguards risks associated with Component 1 is assessed as Substantial. Although the land has already been acquired, the Resettlement Action Plan (RAP) compensation mechanism is challenging given the number of absentee owners and long process for validating records and documents under the Deputy Commissioner's (DC) office. The compensation rate established by the DC office is three times higher than the open market or replacement value; therefore, no top-up payments will be required for land. EGCB has deposited the entire amount required for acquisition/compensation with the DC's office. EGCB will compensate sharecroppers, pay vulnerability allowances and conduct a livelihood restoration training program. In addition to these factors, the social safeguards risk is mitigated by quarterly progress reporting by EGCB on the implementation of the RAP and EGCB hiring safeguards consultants to assist in Project implementation. The environmental risks of Component 1 and Component 2 are Moderate, as is the social risk for Component 2. As for component 3, these risks could be assumed moderate as well, but would need to be confirmed once the site for the waste-to-energy biogas pilot is identified during implementation.

VI. APPRAISAL SUMMARY

A. Economic and Financial (if applicable) Analysis

54. **Economic Analysis.** The economic analysis was carried out for three following representative cases: (i) 50 MW utility-scale solar PV at the Feni site under Component 1; (ii) a 50 MW utility-scale independent power producer (IPP) solar PV sub-project to be supported under Component 2; and (iii) a 1 MW industrial rooftop solar PV²¹ sub-project to be financed under Component 2. Annex 3 describes the assumptions on costs and benefits of the representative cases. The economic analysis of the first case shows that the Economic Internal Rate of Return (EIRR) would be 8.3 percent before considering positive environmental externalities. When the environmental benefits²² are included, the EIRR increases to 13.0 percent, higher than the hurdle rate of 10 percent for Bangladesh²³. The Economic Net Present Value (ENPV) is estimated at US\$14.1 million. For the second case, the EIRR is projected to be 12.3 percent without environmental benefits and 17.5 percent with environmental benefits. The Economic Net Present Value (ENPV) is estimated at US\$29.6 million. For the third case, the EIRR is estimated at 28.3 percent without environmental benefits and 36.5 percent with environmental benefits. The ENPV is estimated at US\$1.3 million.

55. **Financial Analysis.** The financial analysis demonstrates that all three representative cases presented above are also financially viable. The first case is projected to have a Financial Internal Rate of Return (FIRR) of 9.3 percent, which is higher than the Weighted Average Cost of Capital (WACC) of 4.2

²¹ IDCOL's current industrial rooftop project proposals are typically sized between 500 kW- 1 MW

²² GHG emission reductions were calculated in a conservative manner using the low estimate of the carbon pricing in accordance with 'Guidance Note on Shadow Price of Carbon in Economic Analysis, World Bank 2017' and 'IFI approach to GHG accounting for renewable energy projects. World Bank 2015'.

²³ Source: Discounting Costs and Benefits in Economic Analysis of World Bank Projects, OPSPQ, 2016



percent, with the PPA tariff assumed at USc 10.2/kWh²⁴. The second case will generate a FIRR of 10.2 percent and an equity IRR of 15 percent, the minimum required return on equity in the market, if the PPA tariff is set at USc 10.9/kWh. It should be noted that for IPP utility-scale renewable energy PPA tariff will be determined upon negotiation with the off-taker or through a competitive tender. The financial benefit for the rooftop comes from the avoided cost of grid electricity, which is assumed to be USc 10.3/kWh²⁵. The 1 MW rooftop PV sub-project is expected to generate a FIRR of 17.3 percent, which is above the estimated WACC of 6.4 percent for rooftop PV sub-projects.

56. **Sensitivity Analysis.** A sensitivity analysis was conducted to calculate the switching values²⁶ for the key cost and benefit drivers in the economic analysis. They are: (i) CAPEX of the utility scale and rooftop systems; and (ii) fuel price of the alternative marginal power generation source (HFO). The analysis indicates that both investments for utility-scale solar PV and rooftop PV are robust in case of potential cost overrun as well as HFO price volatility. A sensitivity analysis conducted on the financial analysis of utility-scale solar PV IPP demonstrates that cost reduction over time would allow more affordable PPA tariffs at the same level of return as the market becomes mature and competition increases. In case the CAPEX decreases to US\$1/W, the PPA tariff could be as low as USc 8.0/kWh with an equity IRR of 15 percent.

57. **REFF Economic and Financial Analysis.** At the Facility level, the REFF is expected to support in total about 260 MW of generation capacity, including 150 MW of utility-scale solar PV and 110 MW of rooftop PV. The total investment portfolio mobilized through the REFF is projected to be both economically and financially viable. The aggregate EIRR is estimated at 16 percent without environmental externalities and 23 percent with environmental benefits, coming from over 6.3 million tons of CO₂ equivalent of GHG emissions reduction over the lifetime of the sub-projects. The financial net present value of the sub-project portfolio is estimated at US\$41 million, and the FIRR at 11.8 percent, exceeding the projected WACC of 9.4 percent for all sub-projects supported by the Facility. The average FIRR to equity holders is expected to be at 20.5 percent, meeting the minimum required return on equity of 15 percent²⁷ in the context of Bangladesh. Furthermore, the Facility would be financially sustainable from IDCOL's perspective based on a cash flow analysis. The net present value of annual net cash flows over the life of the Facility is estimated to be US\$17 million at a discount rate of 6 percent.

58. **Financial sustainability of EGCB.** EGCB is projected to remain financially sustainable with the additional investment under the Project. Since the commissioning of its first power plant in 2012, EGCB has maintained sound liquidity, adequate debt service coverage ratio, proper leverage and operation, and profitability. The Feni solar PV facility will provide additional positive net present value to the company, while maintaining the appropriate level of Debt Service Coverage Ratio over the loan repayment period. Furthermore, it will help diversify the revenue portfolio, which now relies on only three power plants. This will enhance EGCB's resilience to the gas supply problem or any unforeseen issue, improving the financial sustainability of the entity. See Annex 3 for additional details on economic and financial analysis.

²⁴ As indicated in the Feasibility Study Report of the Feni site

²⁵ Industrial retail tariff by Dhaka Electric Supply Company Limited (DESCO)

²⁶ Switching value is the value of the variable at which the EIRR of the sub-project becomes lower than the hurdle rate of 10 percent, making it no longer economically viable.

²⁷ From Feni site Feasibility Study Report and market sounding.



B. Technical

59. **Technology risks.** The technologies supported under the Project are well-tested and proven technologies across the world. However, in Bangladesh these technologies have limited track record, in particular with connection to the grid at large scale. The Project will factor in international experience and good practices related to: (a) technical standards and specifications; (b) grid integration; (c) regulatory framework; and (d) relevant business models. The Project will support sub-projects making use of technically proven and commercially viable solutions. The technical qualification criteria will be in line with international standards and account for local regulatory, technical, and climatic conditions.

60. **Grid integration of renewable energy.** A Bank analysis on the ability of Bangladesh grid to absorb variable renewable energy concluded that, in the near term, the grid system in the Feni region can integrate over 300 MW of solar PV and wind generation capacity. The planned additions of substation and transmission capacity will facilitate deployment of even more and larger scale renewable energy. In the longer term, the grid integration of large-scale renewables in Bangladesh is potentially feasible given the planned generation capacity increases and network expansion. With generation capacities expected to increase from the current 13 GW to 21 GW by 2025, the increased spinning reserve capacity would facilitate integration of up to 4.2 GW of solar and 500 MW wind capacity.

61. **Climate and Disaster Risk.** The Project was screened for short and long-term climate change and disaster risks. Ground mounted solar sub-projects supported under the Project are expected to be highly exposed to extreme precipitation and flooding risk. As the country sits on the flood plains of several major rivers, seasonal flooding is a hazard. Going forward, some utility-scale RE sub-projects may be further exposed to sea level rise and storm surge risks, estimated to be adversely impacted by climate change. Climate and disaster risks at the Feni site were assessed through the feasibility study report, which provides guidance on proper structures and civil works to address them. In addition, most of the potential land areas that can be available for utility-scale RE are in low-lying land with seasonal flooding risk, and sometimes even adjacent to coastal areas. As a part of its sub-project due diligence, IDCOL will be required to review how the sub-project sponsors have considered climate and disaster risks in the sub-project design. The feasibility studies conducted under Component 3 will also consider climate and disaster risks.

C. Financial Management

62. **FM Assessment.** A financial management assessment for the Project indicates a 'substantial' risk in financial management (FM). Review of financial management and accountability arrangements of the three implementing agencies (EGCB, IDCOL, and SREDA) found that EGCB and IDCOL have institutionalized certain fundamental principles commensurate with other public-sector undertakings in Bangladesh. These include budgeting, internal controls, accounting, reporting and auditing. The financial management systems of EGCB are acceptable to IDA as it has gained adequate experience in Bank project implementation. IDCOL has acquired substantial experience in IDA financial management procedures and requirements through implementing the off-grid renewable energy program. There are no outstanding audit reports under any of the Implementing Agencies. For SREDA, as a relatively new organization with limited operational experience, there may be deficiencies in financial management capacity. However, SREDA is expected to manage only a small TA fund, and adequate training will be provided to SREDA to build up its FM capacity.



63. **FM Arrangement.** IDA funds will be channeled through three separate Designated Accounts operated by each agency. Each agency will submit audited annual financial statements and quarterly interim unaudited financial reports for their specific Project responsibilities to IDA. The ceiling of the Designated Accounts would be mentioned in the Disbursement and Financial Information Letter (DFIL). Statement of expenditures attached to the DFIL would be used to report expenditures. The option of use of other disbursement methods, like reimbursement, direct payment and special commitment, would also be available under the Project. Details will be included in the DFIL. The Project's financial statements for each of the implementing agencies will be audited by the Independent Auditor and must be submitted to the Bank no later than 6 months (December 31) after the end of a Fiscal Year. The structure and mechanism of the REFF, a financial intermediary lending, have been reviewed to ensure its compliance with Bank's requirements on financial intermediation. It was concluded that the IDCOL has sufficient capacity to implement the financial intermediary lending under Component 2. There would be reporting of expenditures by the sub-project developers to IDCOL before reporting of expenditures by IDCOL to IDA.

D. Procurement

64. **Procurement Arrangement:** All implementing agencies (EGCB, IDCOL, and SREDA) will conduct procurements for their parts of the Project. Total procurement expenditure of the Project is about US\$79 million. This will mainly involve a 50 MW solar power plant contract of EGCB with an estimated cost of about US\$67 million, and several consultancy services contracts by all three agencies. All goods, works, non-consulting services and consulting services required for the Project and to be financed out of the proceeds of the financing shall be procured in accordance with the requirements set forth or referred to in the World Bank's "Procurement Regulations for Borrowers under Investment Project Financing", dated July 1, 2016 (Revised November 2017). The Procurement Regulations does not apply to the procurements conducted by the private sector developers receiving sub-loans under the Component 2 of the Project, as the Procurement Regulations is not applicable for loans made by eligible financial intermediaries to the private borrowers. They will conduct their own procurements following established commercial practices.

65. **Procurement Risks and Mitigation Measures:** Procurement risk of the Project has been assessed as "Substantial". The main drivers of the risk are capacity constraint in the agencies in performing procurement and contract management related activities that may lead to delay in procurement process, and time and cost over-run during contract implementation, non-familiarity of the organizations with Bank financed procurements, and vulnerability of the agencies with respect to the inappropriate bidding practices undertaken by the bidders. Some of the key risk mitigation measures that will be put in place to mitigate procurement risks are – (i) using Systematic Tracking of Exchanges in Procurement (STEP) system of the Bank to manage and monitor procurement activities against agreed time-line; (ii) training relevant Project officials on procurement, contract management, and fiduciary due-diligence considering applicable Bank's regulations and procedures; (iii) recruiting one local procurement consultant by SREDA to conduct/support procurement activities under the Project; (iv) engaging one international technical consultant (solar power plant expert) and one international procurement consultant by EGCB in their bid/proposal evaluation committee for the procurements of solar power plant and supervision consultant/owner's engineer; (v) forming, in concurrence with the Bank, the bid/proposal evaluation committees (BEC/PEC) for the Project's procurement activities; (vi) conduct extra due diligence on the



local agent of the international bidders; and (vi) engagement a supervision consultant firm (owner's engineer) by EGCB to closely supervise the contract implementation.

66. **Procurement Strategy:** A Project Procurement Strategy for Development (PPSD) is developed by the Implementing Agencies, in agreement with the Bank, taking into account the nature of the procurement activity, capacity of the procuring organization, prevailing market conditions, activity level risks etc. The PPSD document spelled out the detailed procurement arrangements (e.g., procurement packaging strategy, method, bid evaluation methodology of the major packages, timeline for the procurement activities, contracting arrangement etc.) for the Project including the risk mitigation measures. PPSD is a live document and it is to be updated at least annually. As an output of the PPSD exercise, initial Procurement Plans for the implementing agencies have also been prepared. Procurement Plan contains the procurement activities to be financed under the Project, the different selection methods for procurement, market approach, the need for pre-qualification, contracting arrangement, estimated costs, Bank's prior review requirements, time line of the procurement activities, and other conditions related to procurement. PPSD also stated detailed procurement strategy of the EGCB's 50MW Feni solar power plant contract. There will be a single procurement package for the design, supply, installation, and three years operations and maintenance of the solar power plant including all civil works. It will follow the Request for Bids method of procurement with open, international, single stage-two envelope market approach. It will be preferably an output and performance-based contract with a provision of staggered lump-sum payments throughout the O&M period.

E. Social (including Safeguards)

67. **Component 1:** The proposed 165.5-acre Feni site under Component 1 is a one-crop, low-lying land in a remote part of the country. It remains inundated for major part of the year. Small-scale seasonal farming, fishing and grazing can be observed in the area. There are no structures or settlements on the land. A detailed Environmental and Social Impact Assessment (ESIA) has been carried out, including consultations (Focus Groups and door to door) in surrounding villages to understand the socio-economic baseline and Project related impacts. The land has been acquired and transferred to EGCB. The process of identifying legal lease owners, validating their papers and compensating them is still on-going at the DC's office.

68. A Resettlement Action Plan (RAP) has been prepared to put in place a process for ensuring that all identified affected people are compensated according to national laws and Bank policies. The client will compensate sharecroppers and pay vulnerability allowances as well as conduct a livelihood restoration training program. It also lays out a process for on-going consultation with the local communities and for monitoring the status of future claimants (who must be validated and compensated by the DC's office). A Grievance Redress Mechanism (GRM) is incorporated in the RAP. The client will submit Quarterly Progress Reports on all aspects of RAP implementation. The RAP has been disclosed following Bank procedures. Civil works can start once the identified households have either been compensated or their claim has been rejected by the DC, and after EGCB has compensated all identified and validated sharecroppers and paid vulnerability allowances to those identified in the RAP.

69. EGCB has also prepared an Environment and Social Management Framework (ESMF) and a Resettlement Policy Framework (RPF) for the transmission route to evacuate the power from the project. All other infrastructure (flood protection infrastructure, dikes, roads within the project area) will be built within the 165.5 acres. A road adjacent to the site may be upgraded in the future under either Local



Government Engineering Department or the Bangladesh Water Development Board. The upgradation of the road is not in the plans for either agency at this point. The construction or operation of the solar park is not dependent on the road upgradation works, and the road is therefore not an associated facility. For the transmission route, a RAP will be prepared based on the ESMF; the RAP will be disclosed and implemented before the start of civil works pertaining to the route.

70. **Component 2:** The location and degree of impact of the potential sub-projects are not yet known, but based on the nature of sub-projects to be implemented (roof-top solar PVs and ground mounted solar PVs sub-projects of small to medium scale) the impacts are expected to be moderate. IDCOL has prepared an Environmental and Social Management Systems (ESMS) (given that it is a financial intermediary) and disclosed it following Bank procedures. All identified gaps will be mitigated by putting frameworks in place to comply with Bank standards. Appropriate assessments and plans (ESIAs, ESMPs and RAPs) will be prepared and implemented by the private entities who use Bank funds provided via IDCOL.

71. **Component 3:** SREDA will implement the TA portion of the Project, using grant money to:

a) Develop a waste to energy pilot. While it is likely that SREDA will establish such a facility within government land designated by a municipal corporation in Rajshahi, possibility may arise that other land may have to be acquired. An Environmental and Social Management Framework (ESMF) was prepared by SREDA, including a RPF, and was disclosed following Bank procedures.

b) Conduct feasibility studies to assess potential sites for solar and wind parks. SREDA will use these assessments to identify lands and either purchase them directly, lease or acquire these sites using government funds only. Although the lands will not be bought/leased/acquired through the Bank provided credit or grant, SREDA has prepared a RPF, and a Tribal Peoples Framework. This is based on the consideration that applying the Bank's safeguards standards will make any tender on such sites stronger, opening the field for private entities to access donor funding more easily. The ESMF prepared for the waste to energy pilot also assesses gender and inclusion aspects and provides guidance on actions to incorporate these aspects within the project design and service delivery.

72. For the transmission route, a RAP will be prepared based on the ESMF; the RAP will be disclosed and implemented before the start of civil works pertaining to the route.

73. **Grievance Redress Mechanism of the Implementing Agencies:** EGCB, IDCOL and SREDA will each develop a fully operational Grievance Redress Mechanism and staff their PIUs with adequate and qualified environmental and social specialists to oversee preparation, implantation and monitoring of the above-mentioned plans, including conducting requisite consultation and communication.

74. **Citizen Engagement.** After a portfolio of rooftop PV sub-projects have been implemented, IDCOL will do end-user satisfaction surveys to get feedback from the Rooftop PV sub-project stakeholders. The survey results will inform further Project implementation. The related beneficiary feedback indicator is the share of end-users expressing satisfaction with rooftop PV systems due to the improvement in the quality and cost of electricity service. Relevant Project-related information, including mechanisms for receiving citizen's feedback, will be made available on the websites of all implementing agencies and the sub-project sites. These measures together will ensure citizens' engagement.

75. **Gender.** IDCOL has a corporate gender policy and EGCB is planning to develop and adopt such a policy during the Project period. A gender-responsive social assessment was completed. The major identified gender gaps and activities to mitigate them are: (i) Livelihood gap –EGCB and its EPC contractor



will seek to provide employment opportunities to Project affected women, who lack alternatives to agriculture. The indicator is number of women employed in the Project by EGCB and its EPC contractor. (ii) Endowment gap – IDCOL market development and outreach activities will target women entrepreneurs and women-owned companies. SREDA will ensure female participation in its capacity building activities. The related indicators are share of women participating in IDCOL and SREDA outreach and capacity building activities, respectively. See Annex 4 for additional details on social safeguards, citizen engagement and gender.

F. Environment (including Safeguards)

76. The Project covers three main activities, which were assessed based on OP 4.01 and were found to be of moderate risks that can be mitigated. These activities include: (i) the development of 50 MW Solar PV facility at the EGCB Feni site including transmission line to transfer the generated power to the national grid and associated substations planned under Component 1; (ii) the development of approximately 260 MW of rooftop and ground-mounted solar PV under the Component 2 REFF; and (iii) the development of waste to energy pilot planned under Component 3. The potential impacts of the above-mentioned activities were identified to include: land-use change, loss of cultivable land, changes in natural drainage patterns through the canals originated from the Choto Feni River and small ditches inside the Feni project site, surface water pollution, solid waste (including hazardous materials), dust and odor generation and exhaust emission, increased traffic and transport activities, and visual and noise pollution, among other occupational health and safety issues.

77. In addition to OP 4.01, OP 4.04 (Natural Habitats) was also triggered as a precautionary approach, as some sub-projects, particularly the ground-mounted solar PVs, may be in areas that may contain sensitive / critical natural habitats and could be affected due to Project activities. Furthermore, as the Feni project lies in a coastal region and is prone to extreme weather events and flooding, OP 4.37 on Safety of Dams has also triggered to account for construction of dikes and elevated structures to protect the PV panels from flooding.

78. All required safeguards documents were prepared and disclosed both in the country and at the Bank Portal. These documents included an ESIA and an ESMP to support the project developer compliance with national regulatory frameworks and Bank safeguards policies with regard to the mitigation and monitoring of the impacts associated with the development of the 50 MW PV facilities. The documents also included an ESMF to guide the implementation of the transmission and associated substations at Feni site, the ESMS of IDCOL (as an FI) which provide clear policy and procedures for social and environmental screening and assessment, review, approval, implementation and monitoring of sub-projects to be financed under the REFF, as well as an ESMF for the screening, assessment, and risk mitigation measures for the potential impacts of the subprojects of the waste to energy pilot.

79. To ensure the adequate management of the risks, the capacity of the three implementing entities (EGCB, IDCOL and SREDA) was assessed and measures to fill any gaps including E&S capacity building plans and budget were incorporated in the safeguards instrument. See Annex 4 for additional details on environment safeguards.



G. World Bank Grievance Redress

80. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.



VII. RESULTS FRAMEWORK AND MONITORING



Results Framework
COUNTRY: Bangladesh
Bangladesh Scaling-up Renewable Energy Project

Project Development Objective(s)

The Project Development Objective is to increase installed generation capacity of, and mobilize financing for, renewable energy in Bangladesh.

Project Development Objective Indicators

Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Increased installed capacity of renewable energy							
Generation capacity of energy constructed or rehabilitated (CRI, Megawatt)		0.00	10.00	25.00	95.00	195.00	310.00
Renewable energy generation capacity (other than hydropower) constructed under the project (CRI, Megawatt)		0.00	10.00	25.00	95.00	195.00	310.00
Financing mobilized for renewable energy							



Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Private capital mobilized (US\$) (Amount(USD))		0.00	2,000,000.00	5,000,000.00	9,000,000.00	64,000,000.00	120,000,000.00

Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Feni Utility-Scale Solar PV							
Net greenhouse gas emissions (CRI, Tones/year)		0.00	0.00	0.00	58,000.00	58,000.00	58,000.00
Number of women employed in the Project by EGCB and its EPC contractor (Number)		0.00	5.00	10.00	30.00	35.00	40.00
Renewable Energy Financing Facility							
Net greenhouse gas emissions (CRI, Tones/year)		0.00	12,000.00	32,000.00	58,000.00	179,000.00	319,000.00
Investment mobilized for renewable energy generation capacity (US\$) (Amount(USD))		0.00	5,000,000.00	12,000,000.00	22,000,000.00	114,000,000.00	212,000,000.00
REFF portfolio at risk (Percentage)		0.00	4.00	4.00	4.00	4.00	4.00
Share of end-users expressing satisfaction with rooftop PV systems due to the improvement in electricity service (Percentage)		0.00	0.00	0.00	75.00	75.00	75.00
Share of women benefiting		0.00	10.00	12.00	14.00	16.00	20.00



Indicator Name	DLI	Baseline	Intermediate Targets				End Target
			1	2	3	4	
from outreach initiatives by IDCOL (Percentage)							
Technical Assistance							
Waste-to-energy pilot construction completed (Yes/No)		No	No	No	Yes	Yes	Yes
Share of women benefiting from capacity building by SREDA (Percentage)		0.00	25.00	25.00	25.00	30.00	30.00

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Generation capacity of energy constructed or rehabilitated		Bi-annual for REFF portfolio, once for EGCB Feni project upon completion of construction.	IDCOL REFF portfolio data. EGCB Feni project installed capacity. Solar PV installed capacity in MWpeak.	IDCOL and EGCB progress reports submitted to the Bank. For IDCOL portfolio information is obtained by IDCOL from the sub-project developers.	IDCOL, EGCB



Renewable energy generation capacity (other than hydropower) constructed under the project		Bi-annual for REFF portfolio, once for EGCB Feni project upon completion of construction.	IDCOL REFF portfolio data. EGCB Feni project installed capacity. Solar PV installed capacity in MWpeak.	IDCOL and EGCB progress reports submitted to the Bank. For IDCOL portfolio information is obtained by IDCOL from the sub-project developers.	IDCOL, EGCB.
Private capital mobilized (US\$)	This indicator measures the amount of private finance leveraged by the REFF.	Bi-annual	IDCOL REFF portfolio data.	IDCOL obtains the information from sub-project developers.	IDCOL

Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Net greenhouse gas emissions		Bi-annual	Calculated by EGCB based on the generation data of Feni 50MW solar PV project at the time of the sub-project	EGCB obtains the generation data from its own operational data.	EGCB



			commissioning, in accordance with the World Bank carbon accounting methodology.		
Number of women employed in the Project by EGCB and its EPC contractor	This indicator measures the number of women employed in the Project by EGCB and its EPC contractor, including women from the local communities that are thus gaining alternative livelihood.	Bi-annual	EGCB and its EPC contractor.	EGCB utilizes its own operational data and collects additional data as needed from the EPC contractor.	EGCB
Net greenhouse gas emissions		Bi-annual	IDCOL portfolio data, collected from sub-project developers.	Calculated by IDCOL based on the generation data of each sub-project at the time of the sub-project commissioning, in accordance with the World Bank carbon accounting methodology.	IDCOL
Investment mobilized for renewable energy generation capacity (US\$)	This indicator measures the investment mobilized by the REFF from other sources for renewable	Bi-annual	IDCOL REFF portfolio data	IDCOL obtains the information from the sub-project developers.	IDCOL



	energy generation capacity (US\$)				
REFF portfolio at risk	Percentage of non-performing loans in the IDCOL managed REFF sub-project portfolio.	Bi-annual	IDCOL REFF sub-project portfolio data	IDCOL non-performing loan data.	IDCOL
Share of end-users expressing satisfaction with rooftop PV systems due to the improvement in electricity service	The indicator measures the share of REFF rooftop PV sub-project end-users expressing satisfaction with rooftop PV systems, due to the improvement in electricity service in terms of quality (e.g. interruptions/unavailability) and cost of electricity.	Annual	IDCOL end-user surveys of REFF rooftop PV sub-project beneficiaries.	IDCOL collects the data through end-user surveys of REFF rooftop PV sub-project beneficiaries.	IDCOL
Share of women benefiting from outreach initiatives by IDCOL	This indicator measures the share of women benefiting from outreach activities by IDCOL. This includes women participating in marketing, training, capacity building, outreach, awareness raising etc. activities of IDCOL.	Bi-annual	IDCOL outreach activity data.	IDCOL collates the data from each outreach activity as they are implemented.	IDCOL
Waste-to-energy pilot construction completed	This indicator monitors whether the waste-to-energy pilot supported by Component 3 has been completed.	Annual	Relevant municipality and/or sub-project owner.	SREDA's monitoring and reporting activities.	SREDA



Share of women benefiting from capacity building by SREDA	This indicator measures the share of women benefiting from capacity building by SREDA. This includes women participating in training, capacity building, outreach, awareness raising etc. activities of SREDA.	Bi-annual	SREDA activity results reporting.	SREDA collates the data from each capacity building activity as they are implemented.	SREDA
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ANNEX I: DETAILED PROJECT COMPONENT DESCRIPTION

1. **Component 1: Feni Utility-Scale Solar PV (US\$89.17 million total investment cost, including US\$74.15 million IDA credit and US\$15.02 million counterpart funding from Government of Bangladesh and EGCB).** Component 1 supports a first-of a kind 50 MW²⁸ pilot phase of a renewable energy park developed by the Electricity Generation Company of Bangladesh (EGCB). The pilot is implemented in the Feni district on a site acquired by EGCB for renewable energy development. The Component will be implemented by EGCB on about 170 acres of a larger 999.65-acre land area it has acquired. Once fully developed, the EGCB Feni park can accommodate up to 200 MW of renewable energy.

2. The Feni pilot project would be the first large-scale grid-tied solar PV project in Bangladesh and a significant milestone in scaling up solar PV in Bangladesh. The pilot allows the country to gain experience in renewable energy project procurement, risk mitigation, implementation, operation and maintenance. It will demonstrate to the market the viability of a solar PV plant on a difficult low-lying land area with annual seasonal flooding. This provides both the Government and private sector project developers invaluable experience and information as most sites under consideration for developing utility-scale solar PV are expected to have similar characteristics.²⁹ The pilot will also provide the market a transparent cost breakdown and benchmark for large-scale solar PV, including on the flood mitigation infrastructure specific to the country's geography. The investment will furthermore test several other parameters for competitive tendering of further capacity. They include technical specifications, legal agreements, effectiveness of the tender procedure, solutions to implementation, operation and maintenance (O&M) challenges, demonstration of financial viability, and the regulatory framework. It provides the off-taker, BPDB, and the system operator, Power Grid Company of Bangladesh (PGCB), their first experience in implementing power purchase agreement and integration of a large scale solar project to the national power system. Finally, the reduced asymmetry of information and experience will enhance Government ability to engage with the private sector going forward. Component 1 is therefore addressing the barriers related to lack of implementation experience and institutional capacities. Furthermore, the demonstration and learning effects of the pilot will help de-risk further investment in similar sites and encourage private sector participation, contributing to the expected impacts and outcomes of Components 2 and 3.

3. The Project will finance the 50 MW pilot solar PV generation plant and the required infrastructure. The infrastructure includes evacuation lines from the site to the nearest grid sub-station, pooling sub-stations, civil engineering structures for mitigating flooding risks, and roads within the project site. EGCB will procure through a competitive bidding procedure an engineering, procurement and construction (EPC) and operation and maintenance (O&M) contract for the solar PV plant, including the power evacuation infrastructure. The O&M arrangement will cover the first three years after commissioning; the cost of the O&M will be covered by EGCB. Besides the EPC contract, Component 1 will finance the costs of transmission bay extension at a sub-station, an owner's engineer, safeguards consultants, and

²⁸ Generation capacity of Component 1 is rated on AC basis.

²⁹ Given the high population density and the Government policy of not using agriculture land for any other purpose, low-lying uninhabitable lands with seasonal flooding risks can be considered potential sites for solar PV.



international technical and procurement experts to be included in the bid evaluation committee, as well as some goods.

4. A feasibility study has been completed by the Power Cell and EGCB with assistance from international consultants for the Feni site to inform technical, economic and financial feasibility and environmental and social safeguard issues of the solar PV plant. As the site seasonally inundates during the monsoons³⁰, the flooding risks and mitigation measures were carefully analyzed. The project design will include protection against the flooding through a combination of a dike, elevation structures for the PV panels, and water pumping for drainage inside the dike.³¹ Based on available satellite irradiation data, the site is one of the promising available sites in Bangladesh. To complement the feasibility study, ground-based solar and wind resource assessment at the site commenced in June 2017.³² The ground measurement data is expected to be made available in the EPC procurement process to help bidders optimize the technical specifications of the solar PV systems offered. The results of wind resource assessment will inform the viability of wind generation at the site.

5. **Component 2: Renewable Energy Financing Facility (REFF) (US\$108.23 million, including US\$81.85 million IDA credit and US\$26.38 million CIF-SREP loan; US\$212 million of counterpart funding to be leveraged).** Component 2 establishes a dedicated Renewable Energy Financing Facility (REFF), hosted and managed by IDCOL, to provide financing to private sector projects and public-private partnership (PPP) projects, including joint ventures. The Facility will channel IDA and concessional CIF-SREP resources of US\$108.23 million, including US\$81.85 million IDA credit and US\$26.38 million CIF-SREP loan.³³ It will provide financing for both utility scale renewable energy and rooftop solar PV sub-projects.

6. The REFF provides financing to private sector developers and PPPs of competitively tendered utility scale projects on public land sites, notably those identified and developed under Component 3. In addition, recognizing the high land scarcity in Bangladesh, the component supports opening and scaling-up the rooftop solar PV market, building on the recent experience in India and other countries. In both segments, the Facility supports private sector and PPP first movers to create markets and bring in other financiers. It will offer long term financing to private sector and PPP renewable projects, currently not readily available in the Bangladesh financing market. The REFF financing will leverage domestic and international private developers and commercial financiers; in case the REFF funding is evenly deployed to utility-scale renewable energy and rooftop solar PV, it is expected to leverage US\$212 million from other sources of financing.³⁴ The co-financing of sub-project investments will provide commercial financiers an opportunity to understand and reduce their risks, and gain experience in the due diligence and financing of such sub-projects. The Project will also build the capacity of IDCOL as a development finance institution, and its ability to leverage commercial financing. These activities include development

³⁰ Meteorological data shows that the highest flooding ever recorded was over five meters above the site level (16.33m above the sea level)

³¹ The feasibility study also assessed options for establishing fisheries within the Feni site to promote economic activity in the Feni district. EGCB has yet to decide whether and how the fisheries would be implemented so it is not included in the scope of the proposed Project.

³² As a separate Bank-executed activity supported by the Asia Sustainable and Alternative Energy Program (ASTAE) and the Energy Sector Management Assistance Program (ESMAP)

³³ The CIF-SREP funding for the Project was endorsed by the CIF-SREP sub-committee on August 25, 2017.

³⁴ After the Project closing, IDCOL may utilize the REFF sub-loan reflows to finance further RE projects, thus further increasing the leveraging impact of the Project.



of innovative financing products that IDCOL could offer to the market. Other activities include promotion of the rooftop PV market and strengthening IDCOL's technical due diligence capacity for both utility scale and rooftop PV, benefiting the private sector project sponsors and commercial financiers as well.

7. Through the above elements, therefore, Component 2 is addressing barriers related to both the under-developed renewable energy financing market as well as institutional capacity and project development challenges. It will benefit from the implementation experience and lessons learned under Component 1, and is directly linked to Component 3 as REFF financing will be offered to the bidders participating in the competitive tenders on public land, supported under Component 3.

8. **REFF Technical Scope.** IDCOL will function as a financial intermediary, carrying out due diligence of sub-projects, approving sub-loans, and taking credit risk, as further specified in the Operations Manual. The primary technology focus of REFF will be utility-scale solar PV and rooftop solar PV.³⁵ The Facility will have flexibility to support transactions on a first come first serve basis among the eligible technologies. Indicatively, the Facility can support a total of 260 MW of installed capacity. The installed capacity target will be adjusted during implementation, reflecting market uptake from the two targeted market segments.

9. For utility-scale solar PV, the REFF will focus on providing debt financing to private sector developers and PPPs that participate in competitive auctions on government-owned land, including those identified under Component 3. Unsolicited proposals from private sector developers will be considered on an exceptional basis, subject to further detailed due diligence. The Facility will support grid-connected utility-scale solar PV for an initial target of 150 MW at different locations.³⁶

10. For rooftop solar PV, the Project will initially be focused on industrial rooftops, targeting 110 MW of installed capacity in aggregate. For example, there are about 7,000 garment factories in Bangladesh, many of which are larger buildings with extended rooftops well-suited for solar PV. Solar PV on industrial rooftops is also economically more feasible due to the higher industrial electricity tariff than the ones paid by residential and commercial consumers. Government and institutional rooftops, such as public universities, are also promising sub-project candidates as some of them are advanced in preparation. Various business models will be explored by IDCOL during implementation to find the most suitable rooftop PV implementation models for Bangladesh. This will be supported by the technical assistance to IDCOL. The models to be explored include rooftop owner's CAPEX model³⁷, renewable energy service company (RESCO) model under which a third-party service company leases rooftop space to generate and provide electricity to the rooftop owner, aggregation of rooftops by RESCOs to minimize transactions costs, etc. The adoption of a net metering policy incentivizes surplus electricity generation from rooftop PV systems, contributing to the scale up of individual systems and market demand.³⁸

11. **REFF Financing Products and Terms.** The Facility will primarily offer senior loans to support a series of sub-projects. Based on market demand and viability, sub-ordinated loans would be made available to effectively mobilize financing from other sources through proper risk mitigation. Sub-

³⁵ Individual utility-scale solar PV sub-projects may be about 50 MW of capacity, whereas the rooftop PV sub-project would typically be less than 1MW in size.

³⁶ Potential sites are being considered by the Government in several districts in various regions of the country.

³⁷ In this model the owner of the rooftop invests in and owns the rooftop PV assets.

³⁸ A net metering policy has been recently approved by the Government.



ordinated loans and other financial instruments that are catalytic to leveraging financing, e.g. equity, guarantee and insurance, will be explored and developed through technical assistance support during implementation.

12. For utility scale projects, the Facility will provide standard financing products to bidders participating in RE tenders. Under this arrangement, a standard set of financing options can be offered by IDCOL to private sector participants in an auction process. The bidders may choose a combination of financing products for each sub-project as part of their bid. The selected bidder may also apply for REFF financing ex-post the auction. For rooftop PV, REFF financing will be offered on terms that can make the levelized cost of electricity from rooftop systems slightly lower than the retail price of electricity.³⁹ This will provide an incentive both for generating electricity for self-consumption and supplying to the grid as the net metering policy has been recently adopted.

13. To optimize the use of IDA and CIF-SREP resources and to mobilize commercial financing, the REFF share of financing for each sub-project is capped. For utility scale sub-projects, the REFF can finance only up to 25 percent of total capital expenditure (CAPEX) of utility-scale sub-projects, as specified in the Operations Manual. The rest of the financing of each sub-project would come from commercial banks, other development finance institutions and project sponsors, or from IDCOL's own resources.⁴⁰ For rooftop PV sub-projects, the REFF can support up to 50 percent of CAPEX, as specified in the Operations Manual.⁴¹ For each sub-project, the private sector sponsors and PPPs, rooftop owners or RESCOs contribute 20 percent as equity, and IDCOL will finance the rest from its own resources or through loan syndication with commercial financiers.

14. The REFF will be able to extend long-term loans at a lower end of the market rate range. Pricing of the REFF loans will be determined without subsidization, reflecting actual cost of financing which includes, at a minimum, (i) the cost of the funds to IDCOL, (ii) IDCOL operating costs, (iii) a credit risk margin, and (iv) contribution to loan loss reserves. Considering the different natures, viability and risks between utility-scale solar PV sub-projects and rooftop solar PV sub-projects, financing terms will be differentiated. At the beginning of implementation, the REFF is expected to offer senior loans in local currency to utility-scale renewable energy sub-projects for up to 15 years with up to 3 years of grace period. For rooftop solar PV, senior loans will be offered for up to 10 years with a 1-year grace period. Loans that might be offered on different terms would be assessed case by case on an exceptional basis. The REFF financing terms will be reviewed and revisited after 2 years of implementation and thereafter periodically, as defined in the Operations Manual, to reflect changing market conditions and project economics, which are expected to improve over time with the expansion of the market.

15. **IDCOL Capacity Building and Market Development.** IDCOL will receive US\$1.5 million of the CIF-SREP loan from the Ministry of Finance on grant terms for technical assistance and capacity building. This funding will support: (i) Developing new business models and financing instruments catalytic to mobilizing financing for renewable energy and strengthening IDCOL financing capacities. Support to development of

³⁹ The tariffs can be as high as BDT 9.24/kWh (US\$ 11.8/kWh) at peak for industrial consumers.

⁴⁰ IFC may participate in development finance institution financing both on its own and using IFC managed CIF-SREP funds to finance winning bidders.

⁴¹ IDCOL will withdraw proceeds within these financing caps from both the IDA credit and CIF-SREP loan, proportional to their share of the total financing for Component 2 sub-loans.



new instruments will be provided in the form of external advisory assistance, training and knowledge sharing;⁴² (ii) Strengthening IDCOL capacity for technical due diligence and supervision of utility-scale renewable energy and rooftop solar PV. IDCOL has been building its capacity in due diligence of rooftop solar PV through its recently approved loans for six rooftop PV projects with 4 MW capacity in aggregate. The Project will further enhance IDCOL's capacity to appraise both rooftop PV and utility scale sub-projects; (iii) Creating a market and developing pipeline of rooftop PV. To build a strong sub-project pipeline and create market demand, IDCOL will conduct business development activities which include marketing, region- and sector-specific consultations, workshops and knowledge exchanges among customers, as well as media campaigns and outreach; and (iv) Project management costs. These activities will be coordinated with the technical assistance for rooftop PV enabling environment conducted by SREDA under Component 3.⁴³

16. **Component 3: Technical Assistance (US\$3.64 million total cost, including US\$2.87 million CIF-SREP grant and US\$0.77 million counterpart funding from Government of Bangladesh).** This component is implemented by SREDA. It will support technical assistance and capacity building activities to improve the enabling environment to scale up renewable energy, and support development of a project pipeline in particular for private sector participation.

17. The technical assistance activities address the biggest barrier to renewable energy development in Bangladesh – land constraint – through identification of project sites by the public sector. The activities support the preparation of sites for competitive tendering through resource assessment, feasibility and impact assessments, as well as through support to the development of the tendering procedure. Furthermore, it will build institutional capacity through trainings and other form of capacity building to both Government agencies and the market at large. Finally, it will strengthen the enabling environment for rooftop solar PV, including through promotion of the net-metering policy. This component will therefore address institutional capacity, land availability, and project development related barriers, and help develop a pipeline of private sector projects to be financed by Component 2 and other financiers. All SREDA activities will be coordinated with the IDCOL technical assistance to ensure complementarity and to avoid overlaps.

18. The planned activities are as follows:

- a) Resource Assessment. These activities will contribute to ground-measured data collection and validation which will refine the existing satellite-based resource data and inform policy makers and potential solar and wind developers. Given other planned or ongoing wind and solar resource assessment activities in the country⁴⁴ and rapidly improving global resource atlases, the Project will specifically focus on solar or wind resource measurement on public land sites identified for development of utility-scale RE parks. Such site-specific measurement provides more accurate information on resource potential to de-risk private sector investment. Bank-executed ASTAE-

⁴² These activities can build on a similar exercise planned under the Bank-funded Investment Promotion and Financing Facility II project (P159429) which mainly targets the Bangladesh Infrastructure Finance Fund Limited.

⁴³ KfW is expected to provide grant funding to support IDCOL's business development as part of a rooftop solar PV project under preparation. The Project activities have been designed in close coordination with the KfW. The coordination of World Bank and KfW activities will be continued during Project implementation.

⁴⁴ USAID has supported ground-based wind resource measurement at nine locations and the UNDP is expected to support ten solar measurement stations.



ESMAP support will complement the validation exercise to supplement existing global atlases. The outputs will be freely and widely accessible following open data principles.

- b) Site identification and development. These activities will support preparatory activities for upcoming utility-scale renewable energy parks for IPPs on public land, which will be further identified during implementation. Alternative options to develop utility-scale solar PV, such as floating solar PV, use of canals, or idle land at other facilities (e.g. airports, railways, etc.), will also be explored during Project implementation. The scope of activities will include pre-feasibility and feasibility studies, grid integration and load flow studies, environmental, and social and disaster impact assessments. The activities will also include capacity building to SREDA and other entities on design of a competitive tender procedure.⁴⁵
- c) Rooftop PV enabling environment. These activities will include technical assistance activities for creating and scaling up a rooftop solar PV market. SREDA will work on formulation and promotion of an enabling policy and regulatory framework for rooftop solar PV. Planned activities include raising awareness of rooftop solar PV and the net metering policy, strengthening relevant policies and regulations as needed, and supporting distribution utilities in the implementation of the net metering policy.
- d) Capacity building and training. Capacity building will be provided to relevant government agencies to enhance their capacity on renewable energy development and maximize the benefit of the finalized resource assessments. Activities will include training and workshops for renewable energy development, maintaining and further updating resource assessment data, and integrating geospatial information and tools into national renewable energy development planning.
- e) Waste-to-energy technology pilot. This activity will support feasibility assessment and deployment of a small-scale waste-to-energy technology pilot.⁴⁶ The pilot will be developed in collaboration with city corporations that manage municipal waste collection. One of the potential candidate is the Rajshahi City Corporation for an installation of a biogas plant to utilize slaughterhouse waste. The City Corporation will provide the land required and GIZ will provide technical support for the small-scale pilot. The pilot is expected to inform technical and commercial feasibility of waste-to-energy sub-projects. It will also indirectly help establish waste collection practices and government schemes to support waste-to-energy in municipalities. Subject to funds availability, other small-scale pilots of renewable energy technologies could also be supported.

19. Project management. This includes SREDA staff costs, office and logistics costs funded by the Government, related to the management of the activities under Component 3. In addition, this includes the costs of hiring consultants for procurement, financial management and safeguards, and some goods, funded by the Project. Incremental operating costs may be financed by the Project at the discretion of the

⁴⁵ In addition, the Government will need to engage a transaction advisor at the advanced stages of preparing for an auction procedure. A Bank-executed ESMAP grant may also provide support to these activities at the early stages of Project implementation.

⁴⁶ The implementation of a waste-to-energy pilot is a part of the approved CIF-SREP Investment Plan. The Government of Bangladesh has requested that the pilot be implemented as a part of the proposed Project.



Bank, provided that Government resources towards such costs have been exhausted and/or are insufficient.



ANNEX 2: IMPLEMENTATION ARRANGEMENTS AND SUPPORT PLAN

- Component 1:** EGCB will be the implementing agency of Component 1. EGCB will implement the first phase of solar PV development at the Feni site. The Ministry of Finance will be the borrower of IDA credit that will be on-lent to EGCB to finance the development as public investment.
- EGCB has since 2008 been working with the Bank as an implementing agency of the Siddhirganj Power Project that supports the construction of a gas-fired combined cycle power plant as public investment. Throughout the project EGCB has been following and applying Bank's policies and procedures that are applicable to an EPC contract-based investment. However, this Project supports the first utility-scale solar PV investment by EGCB. It needs to gain experience in operation and maintenance of a solar PV plant after commissioning. This is ensured by including an O&M contract for three years in the procurement of the EPC contract and by transitioning of O&M skills and responsibility to EGCB staff during the period.
- EGCB will establish a Project Implementation Unit for the Project, headed by a Project Director reporting to the Executive Director (Engineering) of the EGCB. The Project Director would be appointed before disbursement for Component 1 starts. The team is comprised of six officers, including a Deputy Project Director and engineering, finance and accounting personnel of EGCB. Procurement will be managed by the EGCB corporate procurement team. The Project Implementation Unit will be supported by an owner's engineer, funded by the Project, that will assist in all aspects of design, tendering, negotiation, and implementation of the EPC and O&M contract. EGCB will also hire, funded by the Project, safeguards consultants to support the PIU in the management and implementation of the safeguards instruments. EGCB will furthermore contract an international procurement specialist and an international technical specialist to be part of the EPC bid evaluation committee. EGCB would contract the procurement and technical specialists as early as possible and in any event no later than three months after Project effectiveness. A technical project management team will also be placed at the Feni site.
- Component 2:** The REFF will be hosted and operated by IDCOL, a state-owned financial institution. IDCOL will act as the Financial Intermediary of IDA credits and CIF-SREP loans. IDCOL will be responsible for day-to-day management of the Facility following Bank's safeguards policies and fiduciary guidelines and procedures. It will also be responsible for monitoring of the Component 2 activities and results, and submission of quarterly/semi-annual reports to the Bank.
- IDCOL has a demonstrated track record in managing a large volume of donor funding through similar financing facilities and in implementing renewable energy programs. It has managed the successful World Bank Rural Electrification and Renewable Energy Development Projects (RERED and RERED II), which includes the flagship solar home system program. IDCOL has been replicating the public-private partnership arrangement of the solar home system program for renewable energy based mini-grids, solar irrigation pumps, improved cook stoves, and biogas digesters for cooking. IDCOL has also gained experience in financing large scale IPPs and other infrastructure projects in the private sector through a Bank-financed Private Sector Infrastructure Development Project, and more recently through a similar Asian Development Bank financed project. Hosting and operating the REFF as a financial intermediary will require additional capacity, particularly for assessing utility-scale RE and rooftop PV sub-projects where IDCOL has limited experience. Necessary capacity building support has been provisioned by the Project.



6. The Project will be managed by IDCOL's Renewable Energy Department. The REFF will be operated as one of the business lines under the management and supervision of the Head of Renewable Energy Department and IDCOL's top management. A team of at least five staff will manage the REFF. The team will be supported by IDCOL's renewable energy safeguards specialist and procurement and financial management teams. In addition, IDCOL may hire additional technical consultants as needed, using Project funds. Following its internal procedure, IDCOL's Board of Directors approves the funding proposals under the REFF.

7. **Financial Intermediary Financing.** A Bank review has been conducted to ensure that the Project, particularly Component 2 on establishing the REFF, meets good practices and requirements on financial intermediation. The review confirmed that the Project complies with World Bank requirements for financial intermediary financing, and that the REFF and its flow of funds is designed properly to address existing barriers in the local financial sector for utility-scale renewable energy and large-scale rooftop solar PV. IDCOL is assessed to have adequate capacity to act as a financial intermediary, with technical assistance and capacity building support planned under the Project. Per the recommendation of the review, an intermediate results indicator (ratio of non-performing loans) to monitor the quality of the REFF portfolio has been added to the results framework.

8. **Component 3:** SREDA will be the implementing agency for Component 3 of the Project. SREDA is responsible for the coordination of Bangladesh's CIF-SREP program. As the Government agency with the mandate to promote renewable energy and energy efficiency in Bangladesh, SREDA has the functional authority to coordinate CIF-SREP activities in Bangladesh. Established in 2014 under the Power Division of the Ministry of Power, Energy and Mineral Resources, SREDA is best positioned to coordinate between ministries and departments and facilitate enabling environment for renewable energy, such as laws, policies and regulations.

9. SREDA has recently strengthened its capacity with an increased number of staff. The Project will include technical assistance and capacity building support to further strengthen SREDA's technical capacity on RE. As a recently established institution, SREDA has no previous experience in implementing Bank projects. Capacity strengthening needs to implement Component 3 have been identified through Bank's fiduciary and safeguards capacity assessment. The Bank will provide financial management and procurement training to SREDA staff. SREDA will also hire a procurement consultant for the initial stages of the Project.

10. SREDA will establish a Project Implementation Unit, led by a Project Director and consisting of five staff. The Project Director would be appointed before disbursement of Component 3 starts. The Project Director would report to SREDA Board Members and SREDA Chairman. SREDA will also hire, from Project funds, technical consultants, consultants for financial management, safeguards and procurement and to assist SREDA staff. The consultants for financial management, safeguards and procurement would be contracted by SREDA as early as possible and in any event no later than three months after Project effectiveness.

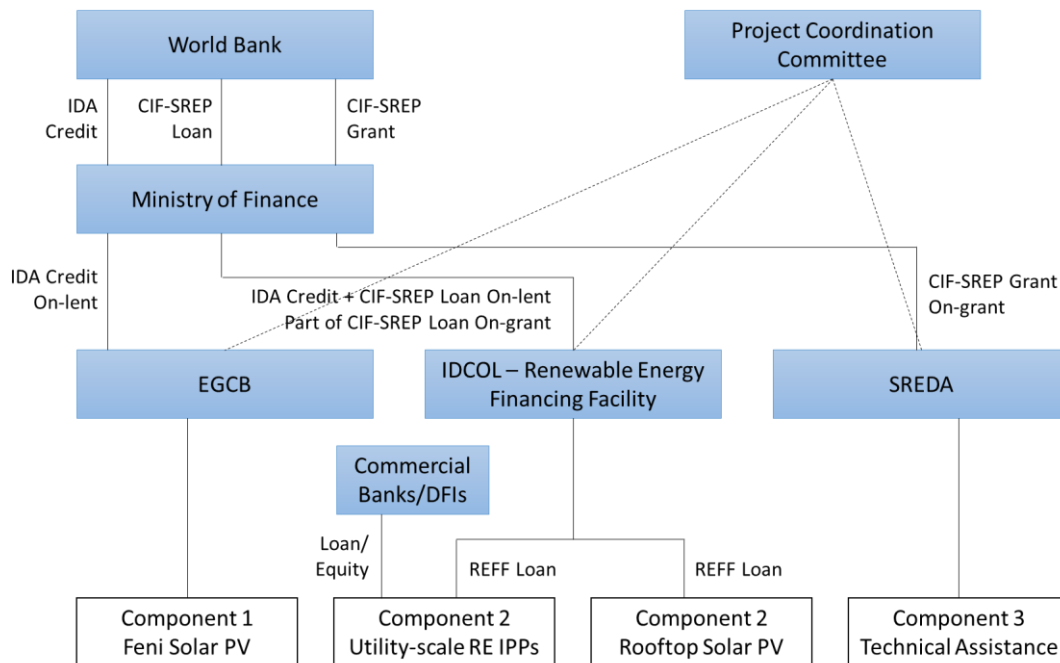
11. **Project Coordination Committee.** A Project Coordination Committee will be established to coordinate Project activities, exchange information and help disseminate the lessons learned among Project Components implemented by the three Implementing Agencies. The Committee will be chaired by the Power Secretary and include EGCB, IDCOL and SREDA. Other Government agencies may be asked



to participate on an as-needed basis. The Committee will have a meeting at least twice a year, and facilitate information sharing across Implementing Agencies and coordination of activities as relevant.

12. **Overall Structure of Financial Flows:** The Ministry of Finance will be the borrower of IDA credit and CIF-SREP loan that will be on-lent to EGCB and IDCOL. The IDA and CIF-SREP financing will be on-lent to IDCOL by the Ministry of Finance as loan and grant; US\$1.5 million of the CIF-SREP loan will be provided as grant to support IDCOL capacity building and market development, as described above in Section III A. CIF-SREP grant will be provided to SREDA under a Grant Agreement between the Government and the Bank. The overall structure of implementation arrangement and fund flow is illustrated in Figure A.1.

Figure A.1. Overall Structure of Implementation Arrangement and Fund Flow



13. **Strategy and Approach for Implementation Support.** The development of the Project strategy for implementation support is based on the nature of Project activities and their commensurate risk profile. The Implementation Support Plan, described below, will be a live document to be regularly reviewed and revised as and when required during implementation.

14. **Technical Support.** The Bank will provide the required technical support through sector specialists. The implementation support will include at least two missions per year, along with continuous exchange of correspondence and regular communication.

15. **Financial Management.** Implementation support will review the Project’s FM system, including, but not limited to, accounting, reporting, and internal controls. Support will be provided through regular interactions, half-yearly implementation support missions, and thematic implementation support missions, if required.



16. **Procurement.** Bank's support will take into account the fiduciary and governance risks by (i) regular monitoring of procurement progress against the detailed time-bound action plan and Procurement Plans; (ii) regular monitoring of contract implementation of the large contracts against major milestones; (iii) review of procurement documents and provision of timely no-objection; (iv) detailed guidance to Implementing Agencies' staff on the Bank's Procurement Regulations and identifying inappropriate bidding practices undertaken by the bidders; and (v) identification of capacity-building and training needs of Implementing Agencies' staff and officials on procurement processing and provision of training, if required. The support will be provided through regular interactions, half-yearly implementation support missions, and thematic implementation support missions, if required.

17. **Environmental and Social Safeguards.** The safeguards specialists on the Bank's Project team will supervise various activities to ensure full compliance with the Bank's operational policies and procedures and the agreed criteria for sub-projects on environmental and social safeguards. Implementation support will be provided through regular interactions, half-yearly implementation support missions, and thematic review missions, if required.

18. **Implementation support will begin as early as possible to prepare the Government and the implementing agencies ahead of the first disbursement.** The team will consist of a mix of headquarters and country-office specialists in the areas of technical, procurement, FM, and safeguards. Several WB team members for energy, procurement, FM, and social safeguards will be based in Dhaka to ensure timely support to the client. Formal supervision and field visits will be carried out at least twice a year. Project implementation and supervision will be conducted through the following:

- a) At least two regular implementation support missions per year over the Project duration;
- b) Intermediate technical missions by specialists, as needed, e.g. upon key milestones in the implementation of Component 1, identification of new sub-projects under Component 2, or commencements of sub-component activities under Component 3.
- c) Bi-annual implementation progress reports and quarterly unaudited financial reports prepared by the Implementing Agencies; quarterly RAP implementation progress reports prepared by EGCB;
- d) A Mid-Term Review (MTR) about half way through implementation period to review the Project's progress and assess the need for any mid-course corrections; and
- e) An Implementation Completion and Results (ICR) report at the end of the Project to assess achievement of the PDO and lessons learned.



Table A.3: Details the Implementation Support Plan and WB resourcing requirements

Time	Focus	Skills needed	Resource estimate
Up to Project effectiveness and throughout implementation	<ul style="list-style-type: none"> • Build capacity for project management in the three implementing agencies • Build capacity for procurement, FM, and safeguards 	<ul style="list-style-type: none"> • Project management • Energy expert • Procurement • Economic and financial analysis • Financial management • Social and environment safeguards 	Approximately US\$160,000/year

Table A.4: Summary of WB Skills Mix Requirement

Skills needed	Number of staff weeks per year	Number of missions/trips per year
Task Team Leader (TTL)	15	2
Co-TTL	15	2
Operations Advisor	2	1
Energy Expert	8	2
Financial Management	4	2
Procurement	4	2
Environmental Safeguards	4	2
Social Safeguards	4	2



ANNEX 3: ECONOMIC AND FINANCIAL ANALYSIS

1. **Economic Analysis.** The economic analysis was carried out for (i) 50 MW utility-scale solar PV, which is consistent with the Feni solar PV under Component 1; (ii) a representative case of 50 MW utility-scale independent power producer (IPP) solar PV sub-project to be supported under Component 2; and (iii) 1 MW industrial rooftop solar PV⁴⁷, a representative case of rooftop sub-projects to be financed under Component 2. The counterfactual scenario for all investments is the current marginal generation source in Bangladesh, heavy fuel oil (HFO). For this analysis, it is assumed that the CAPEX for the HFO plant replaced is US\$1/W and the fuel cost is US\$0.45/liter. The CAPEX for 50 MW solar PV plant under Component 1 is assumed to be \$1.8/W⁴⁸ and for the utility scale IPP sub-projects under Component 2 the CAPEX is assumed to be \$1.4/W⁴⁹. The rooftop system is modeled as captive generation system meaning that the energy produced will be consumed by the building. The CAPEX for the rooftop system is assumed at US\$1/W based on the project costs in IDCOL's current pipeline.

2. The economic analysis of the 50 MW EPC plant under Component 1 shows that the Economic Internal Rate of Return (EIRR) would be 8.3 percent before considering positive environmental externalities. As the investment has substantial environmental benefits⁵⁰, when the environmental benefits are included, the EIRR increases to 13.0 percent, which is higher than the hurdle rate of 10 percent for Bangladesh⁵¹. The Economic Net Present Value (ENPV) is estimated at US\$14.1 million. Furthermore, as the estimated CAPEX includes high capacity transmission lines that can evacuate power from not only this 50 MW solar PV but also other power plants to be developed at the Feni site, its EIRR would become higher if this is factored in. For the IPP sub-project, the EIRR is projected to be 12.3 percent without environmental benefits and 17.5 percent with environmental benefits. The Economic Net Present Value (ENPV) is estimated at US\$29.6 million. For the rooftop sub-projects, the EIRR is estimated at 28.3 percent without environmental benefits and 36.5 percent with environmental benefits. The ENPV is estimated at US\$1.3 million. The EIRR is expected to be higher for rooftop PV than for utility-scale solar PV despite the same counterfactual because of: (i) higher CAPEX estimates for utility-scale solar PV; and (ii) higher efficiency and limited technical losses of electricity in case of self-consumption from rooftop PV.

3. **Financial Analysis.** The financial analysis also demonstrates that the IDA financed EPC project under Component 1 and the representative sub-projects under Component 2 are financially viable. The Feni project under Component 1 is projected to have a Financial Internal Rate of Return (FIRR) of 9.3

⁴⁷ IDCOL's current industrial rooftop project proposals are typically sized between 500 kW- 1 MW

⁴⁸ Project Cost as per the EGCB Development Project Proforma (DPP), which in addition to the costs in the Feni Feasibility Study costs include, inter alia, applicable custom duties and taxes, maintenance and operation buildings, transmission bay extension at a sub-station, and contingencies.

⁴⁹ Project Cost as per the Feni site Feasibility Study Report, which include the solar PV generation system, power evacuation infrastructure, flood mitigation and land development cost (dike, pumping, internal roads etc.)

⁵⁰ GHG emission reductions were calculated in a conservative manner using the low estimate of the carbon pricing in accordance with 'Guidance Note on Shadow Price of Carbon in Economic Analysis, World Bank 2017' and 'IFI approach to GHG accounting for renewable energy projects. World Bank 2015'.

⁵¹ Source: Discounting Costs and Benefits in Economic Analysis of World Bank Projects, OPSPQ, 2016



percent, which is higher than the Weighted Average Cost of Capital (WACC)⁵² of 4.2 percent, with the PPA tariff assumed at USc 10.2/kWh⁵³. The final tariff of Component 1 will be determined upon negotiation between EGCB and BPDB, the single buyer of electricity, based on actual project cost, cost of financing and a reasonable profit margin. Depending on the level of the final tariff, FIRR might change but would remain profitable to EGCB. The representative 50 MW solar PV IPP sub-project will generate a FIRR of 10.2 percent and an equity IRR of 15 percent, the minimum required return on equity in the market, if the tariff under a PPA with BPDB is set at USc 10.9/kWh. It should be noted that for IPP utility-scale renewable energy PPA tariff will be determined upon negotiation with the off-taker or through a competitive tender. The financial results of investments will change subject to the tariff level. The financial benefit for the rooftop comes from the avoided cost of grid electricity, which is assumed to be USc 10.3/kWh⁵⁴. The 1 MW rooftop PV sub-project is expected to generate a FIRR of 17.3 percent, which is above the estimated WACC of 6.4 percent for rooftop PV sub-projects.

4. **Sensitivity Analysis.** A sensitivity analysis was conducted to calculate the switching values⁵⁵ for the key cost and benefit drivers in the economic analysis. They are: i) CAPEX of the utility scale and rooftop systems under Component 2; and ii) fuel price of the alternative marginal power generation source (HFO), displaced by the electricity generated by the solar PV plants. The sensitivity analysis indicates that the CAPEX has a switching value of US\$1.97/W and US\$2.21/W for the 50 MW utility-scale solar PV and the model rooftop PV project, respectively. Both investments are therefore robust in case of potential cost overrun. Moreover, the sensitivity analysis indicates that the utility scale solar PV ceases to be economically viable if the estimated HFO price drops by 40 percent from base value of \$0.45/liter to \$0.27/liter. In case of rooftop solar PV, the switching value of the HFO price is even lower at \$0.17/liter. This indicates that the investment would remain economically viable unless a very significant decrease in HFO price takes place.

Table A.5: Sensitivity Analysis Results

Input	Unit	Baseline Value	Switching Value
Utility-scale renewable energy CAPEX	US\$/W	1.40	1.97
Rooftop solar PV CAPEX	US\$/W	1.00	2.26
Fuel Price of HFO plant (for utility-scale PV)	US\$/liter	0.45	0.27
Fuel Price of HFO plant (for rooftop PV)	US\$/liter	0.45	0.17

5. A sensitivity analysis conducted on the financial analysis of utility-scale solar PV IPP demonstrates the sensitivity of the tariff to CAPEX with all other variables being equal. In the financial analysis, the CAPEX for the IPP sub-project was assumed to be US\$1.4/W as per the feasibility study report of the representative Feni site. This cost reflects high cost of solar PV equipment in Bangladesh due to the nascent nature of the market, as well as cost of land development and additional civil structures needed to mitigate risk from seasonal flooding. The cost of solar PV equipment is expected to decrease as the

⁵² Weighted Average Cost of Capital (WACC) is derived from interest rates of debt financing, including IDA on-lending, expected return on equity, and effective tax rate.

⁵³ As indicated in the Feasibility Study Report of the Feni site

⁵⁴ Industrial retail tariff by Dhaka Electric Supply Company Limited (DESCO)

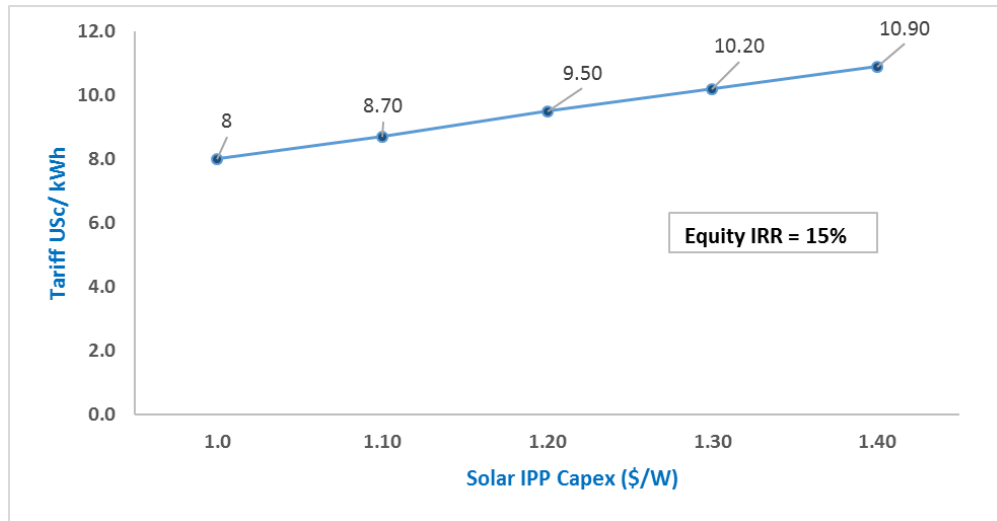
⁵⁵ Switching value is the value of the variable at which the EIRR of the sub-project becomes lower than the hurdle rate of 10 percent, making it no longer economically viable.



market is growing. The cost of flood prevention is site dependent, though it is expected that many of the sites available for such investments would have similar risk. Over time as the market becomes mature and competition increases, the CAPEX for utility-scale solar PV would decrease, allowing a lower level of tariff at the same level of return.

6. Figure A.2 indicates the level of tariff which provides an equity IRR of 15 percent for different levels of CAPEX for solar IPP.

Figure A.2: Changes in Tariff with CAPEX for Solar IPP



7. **REFF-supported Portfolio Economic Analysis.** The REFF is expected to support in total about 260 MW of generation capacity, including 150 MW of utility-scale solar PV and 110 MW of rooftop PV. The total investment portfolio mobilized through the REFF is economically feasible. The aggregate EIRR is estimated at 16 percent, with net economic benefit of US\$160 million. The portfolio supported by the REFF will reduce over 6.3 million tons of CO₂ equivalent of GHG emissions over the lifetime of the sub-projects. When considering the positive environmental externalities through GHG emission reduction, the EIRR will increase to 23 percent, strengthening the economic case of the Project.

8. **REFF-supported Portfolio Financial Analysis.** The investment portfolio supported by the REFF is financially viable. The financial net present value of the sub-project portfolio is estimated at US\$41 million, and the FIRR at 11.8 percent, exceeding the projected WACC of 9.4 percent for all sub-projects supported by the Facility. The average FIRR to equity holders is expected to be at 20.5 percent, meeting the minimum required return on equity of 15 percent⁵⁶ in the context of Bangladesh.

9. **REFF Cash Flow Analysis.** A cash flow analysis was conducted to assess cash inflows and outflows of the REFF and to ensure the financial sustainability of the REFF. It considered: (i) principal and interest repayments of sub-loans made from the REFF to IPPs and rooftop PV developers; (ii) principal and interest repayment from IDCOL to Government of Bangladesh; (iii) IDCOL operating cost of 2 percent of outstanding loan portfolio; and (iv) non-performing loan (NPL) rate of 4 percent as set in the Results

⁵⁶ From Feni site Feasibility Study Report and market sounding.



Framework. The net present value of annual net cash flows over the life of the Facility is estimated to be US\$17 million at a discount rate of 6 percent, as IDCOL is expected to generate at least 6 percent of return on the free cash flows in the market, e.g. investment similar to REFF sub-loans, deposit at commercial banks, etc. The REFF is financially sustainable from IDCOL's perspective.

10. **Financial sustainability of EGCB.** EGCB is projected to remain financially sustainable with the additional investment under the Project. Since the commissioning of the first power plant in 2012, the EGCB has maintained sound liquidity, adequate debt service coverage ratio, proper leverage and operation, and profitability. Financial Year 2016 was the only exception for profitability, due to repair of a gas turbine for nearly 8 months and gas supply shortage to one of EGCB's two thermal power plants. EGCB has returned to profitability in Financial Year 2017 with a net profit of US\$7.13 million. The solar PV generation facility at the Feni site will provide additional net present value to the company, while maintaining the appropriate level of Debt Service Coverage Ratio over the loan repayment period. Furthermore, it will help diversify the revenue portfolio, which relies on only three power plants now. This will enhance EGCB's resilience to the gas supply problem or any unforeseen issue, improving the financial sustainability of the entity.



ANNEX 4: SAFEGUARDS, CITIZEN ENGAGEMENT, GENDER

Social (including Safeguards)

1. **Component 1:** Land acquisition may be a significant issue when large utility scale solar farms are developed and when these facilities are in sensitive areas. The proposed 165.5-acre Feni site under Component 1 is one-crop, low-lying land in a remote part of the country. It remains inundated for major part of the year. Small-scale seasonal farming, fishing and grazing can be observed in the area. There are no structures or settlements on the land. A detailed Environmental and Social Impact Assessment (ESIA) has been carried out, including consultations (Focus Groups and door to door) in surrounding villages to understand the socio-economic baseline and Project related impacts. Portions of the land at the project site was given to local people by the government as part of a “land for the poor and homeless” (in the form of small plots) program under varying lease terms. The process of identifying legal lease owners, validating their papers and compensating them is still on-going at the Deputy Commissioner’s (DC) office.
2. There are 139 sub-plots observed within the 165.5 acres. It was noted that large numbers of original lease-owners have sold the lands and left the area altogether. Official records of owners exist for 61 households, i.e. approximately 50 percent of the owners. Out of these, 11 owners have been identified at this stage, out of whom 2 are deceased, leaving behind 9 successors. There are 22 share-croppers whose livelihoods will be directly impacted. The land has already been acquired as of August 2017; few people who had received notification for acquisition from the DC’s office were consulted and they confirmed that the rate of compensation assessed for the acquisition was fair and is higher than the open market value. However, none of the identified owners or share-croppers in the 165.5 acres have received compensation yet. A Resettlement Action Plan (RAP) has been prepared to put in place a process for ensuring that all identified affected people are compensated according to national laws and Bank policies. The client will compensate sharecroppers and pay vulnerability allowances as well as conduct a livelihood restoration training program. It also lays out a process for on-going consultation with the local communities and for monitoring the status of future claimants (who must be validated and compensated by the DC’s office). A Grievance Redress Mechanism (GRM) is incorporated in the RAP. The client will submit Quarterly Progress Reports pertaining to identification of owners/claimants, their status as adjudged by the DC’s office and the compensation made, verification and compensation made to sharecroppers and vulnerable households affected by the project, progress of the livelihood training, establishment of GRM, etc. The RAP has been disclosed following Bank procedures.
3. Civil works can start once: (i) Each individual household among the 18 identified households has either (a) been found by the DC to have a valid claim and been compensated by the DC, or (b) their claim has been rejected by the DC. In the latter case the HH may access GRM or seek legal recourse. If the DC finds an owner to be eligible, but the latter cannot be traced (absentee) then the compensation amount will be kept in DC’s account for the remainder of the Project, or until he/she is traced; (ii) EGCB has compensated all 22 identified sharecroppers after re-validating them; (iii) EGCB has paid vulnerability allowances to those identified in the RAP (11 HHs); (iv) EGCB has submitted a progress report to the Bank confirming points (i) to (iii) above, and the Bank has accepted it.
4. EGCB has also prepared an Environment and Social Management Framework (ESMF) and a Resettlement Policy Framework (RPF) for the transmission route to evacuate the power from the project. All other infrastructure (flood protection infrastructure, dikes, roads within the project area) will be built



within the 165.5 acres. A road which is adjacent to the site may be upgraded in the future under either Local Government Engineering Department or the Bangladesh Water Development Board. The upgradation of the road is not in the plans for either agency at this point. The construction or operation of the solar park is not dependent on the road upgradation works, and the road is therefore not an associated facility.

5. For the transmission route, a RAP will be prepared based on the ESMF; the RAP will be disclosed and implemented before the start of civil works pertaining to the route.

6. **Component 2:** The location and degree of impact of the potential sub-projects are not yet known, but based on the nature of sub-projects to be implemented (roof-top solar PVs, ground mounted solar PV sub-projects of small to medium scale) the impacts are expected to be moderate. IDCOL has prepared an Environmental and Social Management Systems (ESMS) (given that it is a financial intermediary) and disclosed it on its website on 16 August 2018. All identified gaps will be mitigated by putting appropriate frameworks in place to comply with Bank standards. Appropriate plans (ESIAs, ESMPs and RAPs) will have to be prepared and implemented by the private entities who use Bank funds provided via IDCOL.

7. **Component 3:** SREDA will implement the TA portion of the Project, using grant money to:

a) Develop a waste to energy pilot. While it is likely that SREDA will establish such a facility within government land designated by a municipal corporation in Rajshahi, possibility may arise that other land may have to be acquired to facilitate accessibility to a larger number of butchers and meat vendors (instead of catering to a bazaar or market place). An Environmental and Social Management Framework (ESMF) was prepared by SREDA, including a RPF and was disclosed on its website on 1 October 2018.

b) Conduct feasibility studies to assess potential sites for solar and wind parks. SREDA will use these assessments to identify lands and either purchase them directly, lease or acquire these sites (in that order of preference) using government funds only. The construction and operation of RE projects on such sites would then be auctioned to private bidders; they may or may not avail of Bank funding channeled through the IDCOL component for this purpose. Although the lands will not be bought/leased/acquired through the Bank provided credit or grant, SREDA has prepared a Resettlement Policy Framework, and a Tribal Peoples Framework. This is based on the consideration that applying the Bank's safeguards standards will make any auction stronger, opening the field for private entities to access donor funding more easily. The documents have been developed by SREDA. The ESMF prepared for the waste to energy pilot also assesses gender and inclusion aspects and provides guidance on actions to incorporate these aspects within the project design and service delivery.

8. **Grievance Redress Mechanism of the Implementing Agencies:** EGCB, IDCOL and SREDA will each develop a fully operational Grievance Redress Mechanism and staff their PIUs with adequate and qualified environmental and social specialists to oversee preparation, implantation and monitoring of the above-mentioned plans, including conducting requisite consultation and communication.

9. **Citizen Engagement.** The Project will seek feedback from the Rooftop PV sub-project stakeholders who are the most discrete and the largest group of direct beneficiaries of the Project. IDCOL will be responsible for collecting the stakeholder feedback as part of its rooftop PV market development and marketing efforts, helping it refine outreach and support to sub-project developers. After a portfolio of rooftop PV sub-projects have been implemented, IDCOL will start carrying out end-user satisfaction surveys of the rooftop solar PV sub-project developers and other relevant stakeholders. The results of the



surveys will be used to further adjust Project implementation (including as part of the mid-term review). The arrangement will be further specified in the IDCOL Project OM. The related beneficiary feedback indicator included in the results framework is the share of end-users expressing satisfaction with rooftop PV systems due to the improvement in the quality and cost of electricity service. The data for the indicator will be collected as part of the end user satisfaction surveys. Relevant Project-related information will be made available on the websites of all implementing agencies and as well as on the sub-project sites through proper media (e.g. signboards). The web pages will also contain mechanisms for receiving citizens' feedback. At the sub-project sites, the implementing agencies will make arrangements to receive feedback from stakeholders, advertised on the site-located signboards. All these measures together with the Project level web-based and on-site platforms, will ensure citizens' engagement.

10. **Gender.** IDCOL has in place a corporate gender policy and EGCB is planning to develop and adopt such a policy during the Project period. A gender-responsive social assessment was undertaken as part of Project preparation. Among the major gender gaps identified were: (i) Livelihood gap for women in Feni, who lack alternatives to agriculture. In the project area women are typically paid half their male counterparts for the same work. If there is no work in the agricultural sector, women are likely to remain unemployed. All the identified 18 impacted households are male headed households, consisting of 103 project affected people. Of these, 43 are women – mainly housewives. Majority (78 percent) of the households have agriculture as their primary source of income (RAP); (ii) Endowment gap – restricted flow of information and lack of women-centric training opportunities contribute to low awareness of financing opportunities among women entrepreneurs who could benefit from loan programs such as the REFF. These initiatives are especially rare outside of the big cities. Consequently, the current number of female entrepreneurs/companies participating IDCOL and SREDA outreach and capacity building programs is low. This impacts their awareness and participation in the RE financing.

11. The following activities have been agreed to help address the gender gaps: (i) Livelihood gap – at the project level, EGCB and its EPC contractor will seek to provide employment opportunities to project affected women, including those in the local communities at Feni. During construction, women workers will be targeted through proactive hiring policies (such as equal pay and women friendly facilities i.e. separate toilets). EGCB will also offer longer term employment opportunities for women in operation and maintenance, such as cleaning the solar panels, and service jobs at the local EGCB office. At the community level, EGCB will provide livelihood training for the affected women - such as for fishing and productive uses of electricity. This will encourage more sustainable livelihood opportunities for women who may not want to join construction related jobs. The Bank gender expert will support EGCB implement measures to engage with the local households and encourage women to take advantage of these income and training opportunities. (ii) Endowment gap – IDCOL market development and outreach activities will target women entrepreneurs and women-owned companies. SREDA will also ensure female participation in its training and capacity building activities. To achieve this, the Bank will help IDCOL and SREDA identify, target and develop specific training and capacity building activities for women. Relevant indicators in the results framework include (i) Livelihood gap – number of women employed in the Project by EGCB and its EPC contractor; and (ii) Endowment gap – share of women participating in IDCOL and SREDA outreach and capacity building activities, respectively.

Environment (including Safeguards)



12. **Component 1:** The key environmental impacts associated with the development of the 50 MW Solar PV at the EGCB Feni site under Component 1 include: land-use change, loss of cultivable land, changes in natural drainage patterns, surface water pollution, solid waste (including hazardous materials that could be released when a panel is damaged or disposed of improperly), dust generation and exhaust emission, increased traffic and transport activities, visual and noise pollution, and occupational health and safety issues. The above impacts have been assessed and found to be of medium scale which can be mitigated. As the project site is in the coastal region, it is highly prone to extreme weather events including floods, cyclones and tidal surges.

13. A detailed Environment and Social Impact Assessment (ESIA) as well as an Environment and Social Management Plan (ESMP) were prepared by EGCB for the entire acquired 999.65-acre area. The ESMP describes the mitigation measures for the project specific impacts and outlines the implementation mechanism including the monitoring plan. The implementation of ESMP will support the project developer comply with the national regulatory framework as well as the Bank safeguards policies. In addition, a disaster impact assessment was undertaken by EGCB, including the potential natural and man-made disasters, in the proposed project site. It also includes emergency preparedness plans and mitigation measures to minimize the impacts of potential disasters, if any. Accordingly, the project design will include protection measures against the flooding risks, for example dike and elevation structures for the PV panels as well as water pumping for drainage inside the dikes, among others.

14. EGCB will also undertake the construction of the transmission lines to evacuate the power generated from the proposed 50 MW power plant in the national grid. The route and exact length of the line(s) is not known at this stage. However, EGCB has prepared an ESMF to address this matter. As noted above, the construction or operation of the solar park is not dependent on the access road upgradation works, and the road is therefore not an associated facility.

15. **Component 2:** The impacts associated with the development of the sub-projects planned under Component 2, REFF, are expected also to be moderate, as about 50 percent of the sub-projects is in the form of rooftop solar PV of less than 5 MW each (expected to be less than 1 MW in most cases), and the other 50 percent includes ground-mounted solar PV sub-projects of about 50 MW each. The associated impacts of all the above sub-projects will be identified and assessed using the ESMS once their type and locations are identified during implementation. Accordingly, IDCOL has prepared ESMS that provide clear policy and procedures for social and environmental screening and assessment, review, approval, and implementation of sub-projects to be financed under the REFF.

16. **Component 3:** The development of waste to energy pilot planned under Component 3 is also expected to result in some moderate impacts (need to be confirmed once the site for biogas pilot is identified during implementation). These impacts are mainly attributed to the emissions, odor, waste water, feedstock residual-waste associated with the use of slaughterhouse waste, and health and safety issues. There are also potential sites for biogas production from slaughterhouse wastes in urban centers of Bangladesh. While it is likely that SREDA will establish such a facility within government land designated by a municipal corporation in Rajshahi, possibility may arise that other land may have to be acquired to facilitate accessibility to a larger number of butchers and meat vendors (instead of catering to a bazaar or market place). As the location has not yet been selected, SREDA has prepared an ESMF to ensure that the environmental issues associated with this pilot are adequately assessed through screening and are effectively mitigated and monitored. Bank's safeguards policies will apply to E&S assessments for the pilot.



17. **Applicable Environmental Category and Safeguard Polices.** The Project safeguard category is classified as ‘B’, as the type of interventions foreseen will not have major impacts and associated impacts can be managed by applying appropriate mitigation measures. The safeguard policies which are triggered in this case include: Environmental Assessment OP/BP4.01; Natural Habitats OP/BP4.04; Safety of Dams OP/BP 4.37; Indigenous Peoples OP/BP 4.10, and Involuntary Resettlement OP/BP4.12. Furthermore, the World Bank Group General Environmental, Health and Safety (EHS) Guidelines and the Electric Transmission and Distribution EHS Guidelines are also applicable. All the above-mentioned instruments/safeguards documents will be prepared and disclosed before appraisal.

18. **Borrower’s capacity on environmental safeguard.** IDCOL has been implementing Bank-financed projects for years and has adequate knowledge of Bank safeguards policies. IDCOL has two full-time environment and social specialist, both of which were trained adequately on Bank safeguards policies. IDCOL has demonstrated its capacity to ensure compliance of Bank safeguards policies in sub-projects through its implementation of Bank-financed projects in renewable energy. To substantiate IDCOL’s capacity, specific training programs were identified and included in their ESMS. EGCB has also implemented the Bank-financed project “Siddhirganj Power Plant” and thus has some experience in Bank safeguard policy. EGCB has an environment cell staffed by one Deputy General Manager (DGM), one Manager. To support EGCB capacity, specific programs were identified and included in the ESMP and the ESMF for the development of the Feni utility project. Being a relatively new agency, SREDA is yet to acquire full knowledge of Bank safeguards policies. The capacity gap will be addressed by specific training identified in the ESMF which will be implemented for the waste to energy pilot.

CONSULTATION AND DISCLOSURE

19. The ESIA and RAP documents for Feni grid-tied solar PV power plant have been prepared in close consultation with the key stakeholders and local communities. The ESIA and RAP documents were disclosed on EGCB website on 9 October 2018 and 7 October 2018, respectively. An ESMF (including RPF) was also prepared by EGCB for the power transmission line and associated substations. The document was disclosed on EGCB website on 7 October 2018. IDCOL has also prepared an ESMS for sub-projects to be financed under the REFF. The ESMS was disclosed by IDCOL on its website on 16 August 2018. SREDA has prepared an ESMF (including a RPF and an IPF) for the waste-to-energy pilot which was disclosed on its website on 1 October 2018. All above safeguards documents have also been disclosed on the Bank website. Hardcopies of the same will be made available at the respective agencies headquarters.