



## 1. Project Data

**Project ID**

P161869

**Project Name**

BD: Scaling-up Renewable Energy

**Country**

Bangladesh

**Practice Area(Lead)**

Energy & Extractives

**L/C/TF Number(s)**

IDA-63630,WBTF-A7640,WBTF-A9036

**Closing Date (Original)**

31-Jan-2024

**Total Project Cost (USD)**

160,768,942.46

**Bank Approval Date**

01-Mar-2019

**Closing Date (Actual)**

31-Jul-2025

**IBRD/IDA (USD)**

**Grants (USD)**

Original Commitment

156,000,000.00

29,250,000.00

Revised Commitment

148,045,271.99

29,250,000.00

Actual

134,348,070.27

25,765,929.81

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## 2. Project Objectives and Components

### a. Objectives

According to the International Development Association (IDA) Financing Agreement (p.5) dated August 29, 2019, and the Project Appraisal Document (p.4), the project objective was “to increase installed generation capacity of, and mobilize financing for, renewable energy in Bangladesh.”

This review will assess the project’s performance by parsing the project objective into its two outcome areas as the following:



Objective 1: To increase installed generation capacity of renewable energy; and  
Objective 2: To mobilize financing for renewable energy.

**b. Were the project objectives/key associated outcome targets revised during implementation?**

No

**c. Will a split evaluation be undertaken?**

No

**d. Components**

The project consisted of three components:

**A. Feni Utility-Scale Solar Photovoltaic (PV).** (*Appraisal cost: US\$89.17 million; actual cost: US\$75.70 million*)

This component was to finance the development of a utility-scale, grid-connected 50 megawatt (MW) solar PV power plant in the Feni District to be implemented by the Electricity Generation Company of Bangladesh Limited (EGCB). It aimed to pilot the first large, public-sector solar PV facility in Bangladesh, demonstrate the technical feasibility of utility-scale solar generation on low-lying, flood-prone public land, and build EGCB's technical and procurement capacity.

**B. Renewable Energy Financing Facility (REFF).** (*Appraisal cost: US\$320.23 million; actual cost: US\$288.58 million*)

This component was to establish a Renewable Energy Financing Facility (REFF) to be managed by the Infrastructure Development Company Limited (IDCOL) to support the development of renewable energy projects by the private sector. It aimed to provide long-term financing to utility-scale and rooftop solar PV investments, and to mobilize commercial financing by reducing barriers to entry for private developers.

**C. Technical Assistance.** (*Appraisal cost: US\$3.64 million; actual cost: US\$3.09 million*)

This component was to provide technical assistance and capacity building to strengthen the enabling environment for scaling up renewable energy in Bangladesh. It aimed to support the Sustainable and Renewable Energy Development Authority (SREDA) and other sector institutions in sector planning, project identification and preparation, and policy and regulatory development for renewable energy. The component was designed to address key barriers (such as land constraints, limited project preparation capacity, and gaps in technical knowledge) to renewable energy development by supporting studies, feasibility assessments, and institutional strengthening activities.

**e. Comments on Project Cost, Financing, Borrower Contribution, and Dates**

**Project Cost:** At appraisal, the total project cost was estimated at US\$413.04 million. At project closing, total actual project cost stood at US\$367.37 million, reflecting cost reductions across major components. Under the utility-scale solar component, total costs were lower than estimated at appraisal primarily due to



lower-than-anticipated engineering, procurement, and construction costs. Under the REFF component, total costs were also below appraisal estimates because of slower-than-expected uptake of eligible subprojects.

**Financing:** At appraisal, the project's total financing was estimated at US\$185.25 million, comprising an IDA credit of US\$156.0 million (Components 1 and 2), a Climate Investment Funds Scaling-up Renewable Energy Program (CIF-SREP) loan of US\$26.38 million (Component 2), and a CIF-SREP grant of US\$2.87 million (Component 3). The project disbursed US\$134.35 million under the IDA credit, US\$22.86 million under the CIF-SREP loan, and US\$2.53 million under the CIF-SREP grant. Undisbursed balances under the IDA and CIF-SREP loan were canceled toward the end of the project period following the completion of key activities, and all project funds were accounted for by project closing.

**Borrower's contribution:** At appraisal, the borrower's direct contribution was estimated at US\$15.02 million for Component 1 and US\$0.77 million for Component 3. In addition, under the REFF component (Component 2), the project was expected to mobilize US\$212.0 million from private sponsors and commercial sources to support renewable energy investments. The ICR (p. ii) reports that the borrower's total actual contribution at project closing amounted to US\$10.57 million, and REFF-supported subprojects mobilized a total of approximately US\$181.37 million in investment.

**Project Restructuring:** While the project retained its original three-component structure throughout implementation, four restructurings adjusted component scope, eligibility criteria, and financing parameters to respond to implementation delays and evolving market and macroeconomic conditions.

- **First Project Restructuring (November 11, 2022 – Level 2):** The first restructuring expanded the planned capacity of the Feni utility-scale solar PV plant from 50 MW to 75 MW, using project savings arising from lower-than-anticipated costs. To allow time for completion of the expanded power plant scope, the restructuring also approved an 18-month extension of the project closing date, from January 31, 2024 to July 31, 2025. The extension further provided additional time to complete delayed activities under Components 2 and 3. Implementation of the REFF under Component 2 had slowed during the COVID-19 period due to a downturn in the renewable energy market, resulting in delays and cancellations of planned subprojects, while progress under Component 3 lagged due to delays in effectiveness, staffing changes within the implementing agency, and broader pandemic-related disruptions.
- **Second Project Restructuring (April 25, 2024 – Level 2):** The second restructuring focused on reviving demand and improving utilization of the REFF in response to persistently low disbursement levels. The restructuring expanded the scope of eligible subprojects beyond rooftop and utility-scale solar PV investments to include utility-scale wind projects and renewable energy mini-grids (solar and wind), reflecting government priorities to electrify remote and off-grid areas. It also increased the maximum share of total project cost financed by the REFF from up to 50 percent to 80 percent for rooftop solar and mini-grid subprojects, to address financing gaps and improve project viability, particularly for investments involving battery energy storage systems with higher upfront costs.
- **Third Project Restructuring (October 9, 2024 – Level 2):** The third restructuring was undertaken to address constraints related to foreign exchange shortages and the timing of newly eligible subprojects affecting the utilization of the REFF. The restructuring introduced US-dollar-denominated on-lending, enabling IDCOL to provide sub-loans in foreign currency to selected utility-scale renewable energy projects, in response to sponsors' difficulties in financing imported equipment amid a national foreign currency shortfall. It also introduced a retrospective eligibility provision for renewable energy mini-grid subprojects, allowing financing to cover eligible



expenditures incurred prior to this restructuring, notably for the Monpura solar PV mini-grid independent power producer (IPP) project.

- **Fourth Project Restructuring (December 30, 2024 – Level 2):** The fourth restructuring canceled US\$6.14 million equivalent of unutilized IDA credit, reflecting cost savings realized following completion of the 75 MW Feni utility-scale solar PV plant.

**Dates:** The project was approved on March 1, 2019, and the IDA credit became effective on December 8, 2019, reflecting a delay of about nine months after approval, largely because of delays in the approval of the technical assistance arrangements and staffing of implementing agencies. A Mid-Term Review was conducted in April 2022. The original closing date of January 31, 2024, was extended by 18 months, to July 31, 2025, to allow time for completion of the expanded scope of the Feni utility-scale solar power plant and to address implementation delays under the REFF and the technical assistance component. The project closed on July 31, 2025.

### 3. Relevance of Objectives

#### Rationale

At project closing, the project objectives remained highly aligned with the World Bank Group's Country Partnership Framework (CPF) for FY2023–27. The project sought to address the development problem of Bangladesh's persistent dependence on fossil fuels for power generation, limited penetration of renewable energy, and weak mobilization of private capital for clean energy investments. The project addressed these constraints through demonstration of utility-scale solar generation, expansion of long-term financing for private renewable energy investments, and technical assistance to strengthen the enabling environment. The objectives corresponded to CPF Pillar 1 (Increased Private Sector Jobs) and supported the achievement of Objective 2: Strengthened financial intermediation to support long-term growth and resilience, by crowding in private investment via the REFF. They also corresponded to CPF Pillar 3 (Enhanced Climate and Environmental Resilience) and supported the achievement of Objective 8: Enhanced sustainability and productivity in the use of natural capital for climate-smart green growth, which explicitly targets the energy transition and expansion of renewable energy to support mitigation and green growth.

The project objectives were also highly relevant to Bangladesh's country context at closing. Bangladesh's power generation mix remained overwhelmingly fossil-fuel-based, with renewable energy accounting for about 1 percent of total generation, hydropower contributing around 0.86 percent, and the remainder dominated by gas, coal, oil, and imported power. This structure exposed the economy to fuel supply disruptions and balance-of-payments pressures, underscored during recent foreign exchange shortages. At the same time, Bangladesh had adopted ambitious medium- and long-term commitments to scale up renewables, including targets to generate 20 percent of electricity from renewable sources by 2030 and 30 percent by 2040. In this context, the the project objectives remained appropriately focused, realistic, and outcome-oriented; increasing renewable capacity and mobilizing finance directly addressed binding constraints in generation diversification and private investment, while remaining well matched to the country's institutional capacity and implementation horizon.

Finally, the relevance of the objectives was reinforced by the World Bank's prior experience in Bangladesh's energy sector, particularly its long-standing engagement in renewable energy financing and



market development. The project built on lessons from earlier operations (most notably the Rural Electrification and Renewable Energy Development programs), which demonstrated the effectiveness of combining concessional finance, an experienced financial intermediary, and targeted technical assistance to scale clean energy investments. Consistent with this experience, the project adopted a pragmatic approach centered on demonstration effects, financial intermediation through IDCOL, and gradual market creation rather than comprehensive sector reform. This continuity with proven engagement models strengthened the relevance of the objectives by anchoring it in what the Bank had learned about addressing renewable energy and financing constraints in Bangladesh’s policy, institutional, and market context.

Overall, the Relevance of Objectives is rated High.

**Rating**

High

**4. Achievement of Objectives (Efficacy)**

**OBJECTIVE 1**

**Objective**

To increase generation capacity of renewable energy.

**Rationale**

**Theory of Change for Objective 1**

Project inputs (i.e., IDA credit, trust fund funding, and technical assistance) were to finance the construction of a utility-scale solar PV plant, establish REFF to support private renewable energy subprojects, and support project preparation, site identification, and environmental and social due diligence. These activities were expected to generate outputs such as new grid-connected renewable generation capacity installed, sub-loans extended to renewable energy developers, feasibility studies and technical assessments completed, and demonstration of engineering solutions for utility-scale renewable energy deployment in challenging geographic conditions.

The ToC assumed that these outputs would translate into project’s outcomes of increased operational renewable energy capacity and replication by public and private sponsors. Demonstration effects from the utility-scale solar plant were expected to reduce perceived technical and commercial risks, while REFF aimed to ease financing constraints limiting medium- to large-scale renewable investments. Technical assistance was to improve upstream project readiness and accelerate investment execution beyond the project period.

The ToC rested on assumptions related to land availability, grid readiness and off-taker commitment, implementing agency capacity, and sustained private sector interest under stable macro-financial conditions. In practice, while the causal links were technically sound and valid, the ToC underestimated upstream constraint (such as land acquisition challenges, limited institutional capacity under the technical assistance component, and macroeconomic and market shocks) which slowed and weakened the full achievement of



outcomes. Overall, the theory of change was coherent and relevant but overly optimistic regarding the pace and scale of capacity expansion achievable within the project timeframe.

## Outputs

- **Utility-scale renewable energy generation capacity installed.** The project supported the construction and commissioning of a 75 MW grid-connected solar PV plant at Feni, meeting the revised implementation scope that increased the plant capacity from 50 MW to 75 MW.
- **Transmission and evacuation infrastructure constructed.** Associated evacuation infrastructure, including a 230/33 kV substation and a 13.33 km 230 kV transmission line, was completed to enable grid integration of the Feni solar PV plant. These outputs were not tracked in the results framework but were critical for operationalizing the installed generation capacity.
- **Renewable energy capacity installed through REFF-supported projects.** At appraisal, the REFF was expected to support up to 260 MW of installed renewable energy capacity, comprising 150 MW of utility-scale solar PV and 110 MW of rooftop solar PV. By project closing, REFF-financed subprojects supported 263.15 MW of renewable energy capacity in total, exceeding the aggregate target. This included 132.55 MW of utility-scale solar PV, which fell short of the utility-scale sub-target, and 130.6 MW of rooftop solar PV, which exceeded the rooftop target. The shortfall in utility-scale capacity was attributable to delayed financial closure and non-realization of planned subprojects. Initially slower but stronger-than-expected uptake of rooftop solar, which accelerated towards the end of project implementation, partly offset the shortfall in utility-scale capacity. These implementation details, particularly the composition of capacity by technology, were not captured in the project's results framework but are documented and discussed in the ICR.

## Outcomes

- **Renewable energy generation capacity (other than hydropower) constructed under the project.** In total, the project installed 338.15 MW of solar PV capacity against the original appraisal target of 310 MW, noting that the results framework end target was not updated following the increase in the Feni plant capacity from 50 MW to 75 MW.
- **GW of renewable energy capacity enabled (Gigawatt).** As a result of the installed solar PV capacity, the project enabled 0.34 GW of renewable generation, exceeding the target of 0.31 GW.
- **Performance and availability of Feni solar PV plant.** The project team in their email dated May 4, 2026 stated that since its commissioning in April 2024, the plant has achieved an 86 percent performance ratio and a 99 percent availability factor. Sector averages for modern, well-maintained solar PV plants are 75-85 percent and 98-99 percent, respectively. These results classify the power plant as a high performing solar PV plant.
- **Total net greenhouse gas emissions reduced.** The project contributed to an estimated annual reduction of approximately 412,000 tCO<sub>2</sub>e, combining net emissions reductions of about 90,000 tCO<sub>2</sub>e per year from the Feni utility-scale solar PV plant and approximately 322,000 tCO<sub>2</sub>e per year from REFF-financed rooftop and utility-scale solar PV subprojects.
- **System-level and demonstration effects.** Beyond the quantitative increase in installed capacity, the project generated important system-level effects that reinforced achievement of Objective 1. The Feni utility-scale solar PV plant supplied power to the grid from early 2024 and, together with its associated substation and transmission infrastructure, improved local grid reliability, voltage stability, and power quality in the Mirsharai–Shilpa Nagar area (ICR, p.6). The evacuation infrastructure was sized to accommodate additional generation, creating spare capacity for future plants and enhancing the



productivity of network investments. The project also demonstrated the technical and commercial feasibility of deploying utility-scale solar PV on low-lying, seasonally flooded land through flood-resilient engineering solutions, reducing perceived implementation risk and supporting replication by public and private sponsors (ICR, p.7).

- **Market-level effects and differential performance across segments.** Under the REFF, project-supported investments accounted for over 50 percent of Bangladesh’s installed rooftop solar PV and approximately 22 percent of utility-scale solar PV capacity, contributing substantially to market expansion. While performance varied across segments (particularly with the non-materialization of utility-scale wind and limited progress on mini-grid subprojects) the strong uptake of rooftop solar PV reflected declining technology costs, targeted technical assistance, and improved project readiness among industrial consumers.

Overall, the project achieved its objective of increasing installed renewable energy generation capacity to a high degree, consistent with its theory of change. The combination of direct public investment and financial intermediation effectively addressed key technical, financial, and market barriers to renewable energy deployment, resulting in installed capacity that exceeded appraisal targets. While some envisaged pathways (most notably utility-scale wind and mini-grid development) did not fully materialize, stronger-than-anticipated performance in solar PV, particularly through rooftop installations, more than compensated for these shortfalls. The causal links between project activities, outputs, and the intended outcome of increased renewable generation capacity remained largely intact and are supported by credible outcome and impact evidence. Accordingly, the project’s efficacy in achieving Objective 1 is rated High.

**Rating**  
High

## **OBJECTIVE 2**

### **Objective**

To mobilize financing for renewable energy.

### **Rationale**

#### **Theory of Change for Objective 2**

To mobilize financing for renewable energy, the project was designed to address key financial and market constraints that limited private investment in Bangladesh’s renewable energy sector, including the lack of long-tenor financing, high perceived risks, and limited lender experience with renewable energy projects. The project’s main inputs under this objective were the establishment of the REFF within IDCOL using IDA and concessional CIF-SREP resources, combined with technical assistance to strengthen IDCOL’s appraisal, supervision, and market-development capacity.

These inputs were expected to generate outputs such as sub-loans extended to renewable energy developers, co-financing structures with private sponsors, and improved due-diligence and risk-management systems. By providing financing on terms not readily available in the domestic market, the REFF was intended to lower entry barriers for first movers, demonstrate bankable project structures in rooftop and utility-scale solar PV and crowd in private capital through sponsor equity and parallel financing.



The expected outcome was increased private capital mobilization for renewable energy investments and strengthened confidence among investors and financiers, supporting the gradual development of a renewable energy financing ecosystem. The theory of change assumed sufficient private sector demand if financing constraints were eased, IDCOL's ability to adapt REFF products to market conditions, and a reasonably stable macroeconomic environment. The ToC appropriately emphasized demonstration and incremental market development rather than rapid, large-scale private capital mobilization. However, while the causal logic was direct and valid, the ToC underestimated the time required to build a robust project pipeline and the sensitivity of private investment to macroeconomic and foreign-exchange shocks.

## Outputs

- **REFF sub-loans extended to private renewable energy projects.** At appraisal, the REFF was allocated US\$108.23 million, comprising US\$81.85 million from the IDA credit and US\$26.38 million from the CIF-SREP concessional loan, to on-lend to private renewable energy developers. While the ICR does not report a component-level disbursement figure for the REFF, it indicates substantial utilization of the facility. According to supplementary information provided by the project team (email dated May 4, 2026), the project extended a total of US\$97.06 million in sub-loans under Component 2 (US\$74.13 million from IDA resources and US\$22.93 million from CIF-SREP) representing high utilization of available financing. These financing outputs were substantial relative to allocations but were not explicitly captured in the project's results framework.
- **Renewable energy projects implemented.** Through the REFF, IDCOL provided long-term financing to 46 private sector subprojects, comprising 44 rooftop solar PV installations and two utility-scale solar PV plants. These sub-loans supported first-mover private investments in market segments where access to long-tenor financing had previously been limited, particularly for industrial rooftop solar. Although no appraisal-stage targets were set for the number or type of subprojects, the breadth of supported investments indicates a meaningful contribution to private sector participation in renewable energy development.

## Outcomes

- **Private capital mobilized for renewable energy.** At appraisal, the project targeted US\$120 million in private capital mobilization consisting of sponsor equity and commercial debt. By project closing, total private capital mobilized reached US\$101 million, achieving 84 percent of the target. The shortfall reflected slower-than-anticipated uptake of REFF financing in the early years of implementation and underperformance in utility-scale projects.
- **Investment mobilized for renewable energy generation capacity.** The project targeted US\$212 million in total investment mobilized for renewable energy generation capacity through the REFF. Actual investment mobilized amounted to US\$181.37 million, or 86 percent of the target, reflecting strong performance in rooftop solar PV investments partially offset by underperformance in utility-scale projects.
- **Financial performance of the REFF portfolio.** The project targeted a portfolio-at-risk cap of 4 percent for REFF sub-loans. At project closing, the REFF portfolio recorded 0 percent non-performing loans, indicating strong credit quality and effective risk appraisal and supervision by IDCOL.
- **Institutional capacity as an enabler of financing outcomes.** Progress in mobilizing renewable energy financing was supported by strengthened institutional capacity, particularly within IDCOL. The project enhanced IDCOL's ability to appraise, structure, and supervise renewable energy subprojects,



contributing to strong portfolio performance and a zero non-performing loan ratio at closing. Improved due-diligence practices, monitoring tools, and market-development activities helped reduce perceived risk among sponsors and supported the scaling-up of rooftop solar PV investments. While capacity-building activities implemented by SREDA contributed to broader sector knowledge and enabling conditions, their role in developing a direct pipeline for REFF financing was limited. Overall, institutional strengthening under the project functioned as a supporting mechanism that reinforced, but did not substitute for, the core financial intermediation channel underpinning Objective 2.

Overall, the project substantially achieved its objective of mobilizing financing for renewable energy, consistent with its theory of change. Through the establishment and operation of the REFF within IDCOL, the project helped lower financing barriers and supported the mobilization of significant private and parallel investment, particularly in the rooftop solar PV segment. Although early implementation delays, macroeconomic constraints, and the non-realization of some planned market segments limited achievement of appraisal-level targets, adaptive measures introduced through project restructurings contributed to improved uptake and portfolio performance toward project closing. The causal links from concessional financing and institutional strengthening to increased renewable energy investment were largely intact, though uneven across sub-sectors. Therefore, the project’s efficacy in achieving Objective 2 is rated Substantial.

**Rating**

Substantial

**OVERALL EFFICACY**

**Rationale**

Overall, the project achieved its development objectives to a substantial degree. The project was highly effective in increasing installed renewable energy generation capacity, exceeding appraisal targets through a combination of direct public investment and REFF-supported private sector projects, thereby demonstrating and scaling viable solar PV solutions in a challenging market context. Progress in mobilizing financing for renewable energy was also substantial, with the REFF helping to crowd in significant private and parallel investment and strengthen financing capacity, albeit with uneven performance across market segments and some shortfalls relative to appraisal targets. The evidence indicates that the project’s main causal pathways functioned largely as intended, even if with variation in timing and depth of outcomes. Accordingly, overall efficacy of the project in achieving the project objectives is rated Substantial.

**Overall Efficacy Rating**

Substantial

**5. Efficiency**



## Economic Analysis

At appraisal, the project's economic justification was assessed through a cost–benefit analysis covering the utility-scale solar PV investment and representative REFF-supported subprojects (utility-scale and rooftop solar), using heavy fuel oil generation as the counterfactual. The analysis estimated positive but varied returns across components, reflecting the nascent state of Bangladesh's grid-connected solar market and higher assumed capital costs. The expected economic internal rates of return (EIRRs) were 8.3 percent for the 50 MW Feni utility-scale solar PV plant (13.0 percent with environmental externalities), 12.3 percent for a representative utility-scale IPP subproject (17.5 percent with externalities), and 28.3 percent for rooftop solar PV (36.5 percent with externalities). At the portfolio level, REFF-supported investments were expected to yield an aggregate EIRR of 16.0 percent (23.0 percent with externalities), exceeding the opportunity cost of capital, and an economic net present value (ENPV) of about US\$160 million,

After project completion, the ICR re-estimated the economic analysis using actual investment data and the same methodological framework, covering Components 1 and 2. The ex-post analysis shows a marked improvement in economic performance relative to appraisal estimates. The expanded 75 MW Feni solar PV plant achieved an ex-post EIRR of 34.0 percent (42.8 percent with externalities), with an ENPV of approximately US\$66 million, reflecting lower-than-expected construction costs and the capacity increase achieved within the original budget envelope. REFF-supported subprojects also generated strong returns: the representative utility-scale IPP subproject recorded an EIRR of 15.7 percent (20.5 percent with externalities), while rooftop solar PV systems yielded an EIRR of 38.7 percent (47.6 percent with externalities). At the REFF portfolio level, investments achieved an aggregate EIRR of about 24.9 percent (29.4 percent with externalities) and an ENPV of approximately US\$142 million.

Comparing appraisal and completion results, economic returns improved substantially across all major investment categories, despite implementation delays that reduced the timeliness of some benefits. The higher-than-expected EIRRs at closing were driven primarily by capital cost reductions, especially for the Feni solar PV plant, scale efficiencies from the capacity increase, and strong performance of rooftop solar PV, which exceeded appraisal expectations. Although the REFF portfolio ENPV at closing was somewhat lower than at appraisal (reflecting delayed disbursements and later realization of benefits), the ex-post EIRRs remained well above appraisal estimates and the opportunity cost of capital. Overall, the comparison indicates that the project's investments were economically sound at appraisal and performed more strongly than anticipated at completion, even after accounting for implementation delays.

## Implementation and Administrative Efficiency

Implementation and administrative efficiency were shaped by the project's complex design and multi-agency institutional arrangements, involving three implementing agencies (EGCB, IDCOL, and SREDA) with distinct mandates, capacities, and implementation modalities. While this structure was appropriate to address different market segments and policy constraints, it increased coordination demands and administrative complexity, particularly for Component 3 and in linking technical assistance to REFF pipeline development. The absence of effective cross-agency coordination mechanisms (most notably the Project Coordination Committee, which was never convened) reduced implementation efficiency by limiting learning, sequencing, and alignment across components.

Early implementation was further affected by delays in effectiveness, slow staffing decisions, and capacity constraints, particularly within SREDA. Prolonged delays in approval and extension of SREDA's Technical Assistance Project Proposal (TAPP), combined with frequent turnover of project leadership, resulted in extended



periods of inactivity under Component 3 and reduced the timeliness of intended upstream support for market development. Procurement of consulting services under this component was also delayed, reflecting limited project implementation unit procurement capacity, which led to several contracts being awarded late in the project cycle and constrained their impact. Under the REFF, complex procedures and limited initial market readiness led to slow disbursement during the first several years of implementation, reducing benefit timeliness and the pace of capital mobilization. These factors point to moderate administrative inefficiencies during the early and middle phases of the project. Furthermore, while parallel development partner financing (including from Kreditanstalt für Wiederaufbau-KfW) expanded the overall pool of long-term financing for rooftop solar PV, the available evidence is insufficient to assess whether IDCOL’s sequencing or internal prioritization across financing lines affected the slow pace of early disbursements under the World Bank–supported facility.

At the same time, the project demonstrated strong operational efficiency gains over time, particularly under Components 1 and 2. The Feni utility-scale solar PV plant was delivered below appraisal cost, enabling a capacity increase from 50 MW to 75 MW without additional financing and allowing cancellation of unutilized IDA funds, reflecting efficient procurement and cost control. Adaptive measures introduced through multiple restructurings (such as expanded REFF eligibility, increased financing shares for rooftop solar, and introduction of U.S.-dollar-denominated sub-loans) partially helped address earlier bottlenecks and contributed to accelerated REFF utilization toward project closing. Portfolio performance, including a zero non-performing loan ratio under the REFF, also indicates IDCOL’s effective financial management and supervision once implementation momentum improved.

Overall, the project demonstrated substantial efficiency in achieving the project objectives. Although early implementation delays reduced the timeliness of some benefits, the project ultimately delivered strong value for money. Ex-post economic analysis shows returns well above the opportunity cost of capital, driven by lower-than-expected costs, scale efficiencies, and strong performance of rooftop and utility-scale solar investments. These gains, together with effective cost control, adaptive restructuring, and sound financial management, outweighed earlier operational inefficiencies. Accordingly, the project’s efficiency in achieving the project objectives is rated Substantial.

## Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	16.00	77.00 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	24.90	78.00 <input type="checkbox"/> Not Applicable

\* Refers to percent of total project cost for which ERR/FRR was calculated.



## 6. Outcome

The project's development objectives remained highly relevant at closing and addressed key constraints in Bangladesh's energy sector. The project achieved its objectives to a substantial degree, with strong results in increasing installed renewable energy generation capacity and meaningful, though uneven, progress in mobilizing financing for renewable energy. Efficiency was substantial, with ex-post economic analysis showing returns well above the opportunity cost of capital, supported by cost savings, scale efficiencies, and adaptive course correction despite early implementation delays. Overall, the project delivered results consistent with its objectives, with moderate but manageable shortcomings that did not outweigh overall achievements. The project's outcome is rated Satisfactory.

### a. Outcome Rating

Satisfactory

## 7. Risk to Development Outcome

**Technical and Economic Sustainability.** From a technical and economic perspective, risks to development outcomes are relatively low. The utility-scale and rooftop solar PV assets supported by the project are operational, economically viable, and based on mature technologies. The Feni solar PV plant incorporated flood-resilient design and spare evacuation capacity, while REFF-financed subprojects demonstrated strong operational performance and portfolio quality, including a zero non-performing loan ratio at closing.

**Financial and Sector Policy Risks.** These risks remain significant. The ICR (p.15) highlights ongoing exposure to electricity off-taker risk, reflecting weaknesses in the state-owned utility's financial position and broader pressures in the power sector. Removal of sovereign guarantees and changes to standard power purchase arrangements in 2024 may increase investor risk perceptions and financing costs, potentially affecting the long-term viability and scale-up of private renewable energy investments. In addition, persistent foreign-exchange constraints and currency volatility continue to pose risks to debt servicing and refinancing for projects with foreign-currency exposure.

**Institutional and Coordination Risks.** IDCOL demonstrated strong capacity and is well positioned to sustain renewable energy financing activities beyond the project. However, weaknesses in cross-agency coordination and in upstream pipeline development could constrain the pace and breadth of future renewable energy investments. Delays in completing some technical assistance outputs limited their immediate market-development impact, although planned follow-on programs and sustained government commitment to renewable energy targets partially mitigate these risks.

**Concentration of Financing Capacity.** The renewable energy financing ecosystem remains highly dependent on a single financial intermediary, IDCOL. While IDCOL's capacity and performance are strengths, limited participation by other financial institutions reduces system resilience and competition. A lack of diversification could constrain future scale-up if institutional priorities, risk appetite, or resource availability at IDCOL were to change.



**Climate and Extreme-Weather Risk Beyond Design Assumptions.** Although the Feni solar PV plant incorporated flood-resilient engineering, intensifying climate variability and extreme weather events may pose broader risks to renewable energy assets developed on low-lying or climate-exposed land. If similar resilience measures are not consistently adopted across future projects, physical risks could increase over time.

## 8. Assessment of Bank Performance

### a. Quality-at-Entry

Quality at entry benefited from strong strategic relevance, a technically coherent project concept, and sound economic justification, particularly for the utility-scale solar demonstration and the use of IDCOL as a financial intermediary. The project design built effectively on prior sector experience, combining a first-of-its-kind public utility-scale solar plant with long-tenor financing to address key constraints to renewable energy scale-up, including limited public-sector experience, high perceived investor risk, and lack of suitable financing instruments. Preparation appropriately considered site-specific technical challenges for the utility-scale plant, applied standard economic analysis demonstrating returns above the opportunity cost of capital, and incorporated safeguard screening and mitigation measures commensurate with anticipated environmental and social risks, supporting implementation readiness for physical investments.

At the same time, there were moderate but material shortcomings at entry. The project overestimated institutional and market readiness, especially for upstream technical assistance and REFF pipeline development, and underappreciated macroeconomic and foreign-exchange risks that later constrained private investment. Coordination arrangements across multiple implementing agencies were ambitious relative to capacity, and weaknesses in M&E design, such as the limited articulation of Component 3's contribution to the achievement of project objectives along with the absence of indicators in fully capturing project's outputs, reduced implementation preparedness. These issues contributed to early delays and necessitated multiple restructurings.

Overall, while the project was well conceived and justified, shortcomings in risk calibration and implementation readiness at entry were more than minor, but not severe enough to outweigh the strengths. Accordingly, Quality at Entry is rated Moderately Satisfactory.

### Quality-at-Entry Rating

Moderately Satisfactory

### b. Quality of supervision

Bank supervision was proactive, adaptive, and focused on preserving development impact, particularly as implementation challenges and external shocks emerged. The supervision team maintained continuity for most of the project period with only one Task Team Leader change and engaged regularly with the implementing agencies through supervision missions, structured follow-up, and ongoing dialogue, most



notably frequent engagement with IDCOL to track REFF pipeline development and disbursements. Supervision increasingly emphasized achievement of objective-relevant outcomes, including completion of the utility-scale solar plant and acceleration of REFF-supported investments, rather than narrow disbursement targets.

A major strength of supervision was the Bank's use of restructuring as a corrective instrument to protect core outcomes, although late in project implementation. In response to clearly identified constraints such as slow REFF uptake, pandemic-related delays, foreign-exchange shortages, and changing market conditions, the Bank supported four restructurings that adjusted eligibility criteria, financing terms, currency denomination of sub-loans, and the project closing date. These actions were well grounded in implementation realities and contributed to improved performance toward the end of the project period, particularly in rooftop solar deployment and completion of the expanded 75 MW Feni solar PV plant.

Supervision quality, however, was uneven across components and over time. While oversight of EGCB and IDCOL was strong supporting effective procurement, financial management, safeguard compliance, and results acceleration, long-standing capacity and coordination problems under the technical assistance component persisted. As noted in the ICR (p.15), some restructuring measures and design adjustments were introduced late in the project cycle, limiting their influence on outcomes, particularly under Component 3 and for newly eligible wind and mini-grid subprojects. Supervision identified these issues early and documented them candidly in Implementation Status and Results Reports and aide-memoires, but corrective actions did not fully resolve them before project closing.

Overall, supervision demonstrated strong focus on development impact, adaptive problem-solving through restructuring, continuity of engagement, and candid reporting. While supervision was less effective in overcoming persistent weaknesses under the technical assistance component and some corrective measures came late, these shortcomings were limited in scope and did not outweigh the Bank's overall effectiveness in steering the project toward achieving its main outcomes. Hence, the Quality of Supervision is rated Satisfactory.

### **Note on Overall Bank Performance**

Overall Bank performance is rated Satisfactory, reflecting an effective balance between strong supervision during implementation and moderate shortcomings at entry. The stronger performance during supervision outweighed the moderate weaknesses at entry, and Bank actions during implementation, with minor shortcomings, were instrumental in achieving the project's development outcomes.

#### **Quality of Supervision Rating**

Satisfactory

#### **Overall Bank Performance Rating**

Satisfactory

## **9. M&E Design, Implementation, & Utilization**



### **a. M&E Design**

The project's M&E design benefited from clear, outcome-focused objectives and relevant outcome-level indicators that enabled monitoring of main outcomes related to renewable energy capacity expansion and financing mobilization. However, gaps in the results framework limited its effectiveness in capturing how results were achieved. In particular, the absence of indicators measuring the amount of funds the REFF disbursed, differentiating between public and private contributions to installed renewable capacity, and capturing the contribution of technical assistance activities to the achievement of the project objectives reduced the framework's ability to trace causal links in the theory of change. Consequently, important contribution pathways, such as demonstration effects, grid-level impacts, and institutional capacity gains, were assessed primarily through qualitative evidence at completion rather than systematic indicator-based tracking. Moreover, M&E responsibilities were embedded within individual implementing agencies (most notably IDCOL, which had established systems for portfolio reporting), but the lack of an integrated, project-wide monitoring approach constrained aggregation, sequencing, and learning. Overall, the M&E design was adequate for monitoring core outputs and objective-level outcomes, but less effective in capturing enabling effects and causal pathways, pointing to moderate design limitations.

### **b. M&E Implementation**

M&E implementation followed the formal arrangements established at appraisal, including biannual progress reports and regular Bank supervision, complemented by a mid-term review in April 2022. It supported credible assessment of core technical and financial results, particularly for the utility-scale solar plant and REFF-financed investments. Outcome indicators related to installed capacity and financing mobilization were tracked throughout implementation, drawing on established reporting systems within EGCB and IDCOL, and data quality for these indicators was generally reliable. However, M&E implementation remained constrained by design-stage limitations that were not corrected during the project, including indicator misalignment, lack of systematic tracking of REFF disbursements, and weak monitoring of technical assistance and social indicators. In addition, revisions to project scope and incentives introduced through major restructurings (such as the increase in solar capacity and changes to REFF financing shares) were not reflected in the results framework, reducing the relevance and usefulness of indicator-based monitoring during later stages of implementation.

### **c. M&E Utilization**

M&E data were used effectively in identifying implementation constraints and documenting achievement at completion. Regular reporting and supervision processes enabled early identification of slow REFF uptake, which eventually informed corrective actions through project restructurings aimed at improving financing utilization. However, these corrective measures were introduced in 2024, late in the project lifecycle, limiting the extent to which M&E-informed adjustments could influence implementation outcomes in earlier years. At completion, M&E data were used primarily to substantiate achieved project outcomes, while assessment of enabling effects and causal pathways (i.e., intermediate outcomes) relied heavily on qualitative evidence due to gaps in the M&E design that were not addressed during implementation. The available evidence is insufficient to conclude that M&E findings are expected to directly inform subsequent interventions. Rather, the project's influence on future renewable energy development is more likely to derive from practical implementation experience and demonstration



effects, particularly the successful deployment of utility-scale and rooftop solar PV, subject to evolving policy, financial, and institutional conditions beyond the project's scope.

Overall, the M&E quality is rated Modest, but this does not undermine the credibility of the Satisfactory rating for Outcome. Core project outcomes of installed renewable energy capacity and financing mobilization were observable, technically verifiable, and supported by reliable engineering, financial, and portfolio data reported in the ICR. M&E limitations primarily affected the tracking of intermediate causal pathways through the results framework, which was supplemented by qualitative evidence presented in the ICR. Accordingly, a Satisfactory outcome rating is warranted despite modest M&E quality.

### **M&E Quality Rating**

Modest

## **10. Other Issues**

### **a. Safeguards**

At appraisal, the project was classified as Category B under Environmental Assessment (OP/BP 4.01) and triggered Natural Habitats (OP/BP 4.04), Indigenous Peoples (OP/BP 4.10), Involuntary Resettlement (OP/BP 4.12), and Safety of Dams (OP/BP 4.37) safeguard policies.

**Environmental Assessment (OP/BP 4.01):** The project was classified as Category B, reflecting anticipated site-specific, moderate, and reversible environmental impacts associated with renewable energy investments. Key risks included localized land-use change, drainage modification in flood-prone areas, construction-related pollution, waste management, traffic and noise, and occupational health and safety. To address these risks, the project prepared and disclosed an ESIA and ESMP for the Feni solar PV plant, an ESMF for transmission works and the waste-to-energy pilot, and an ESMS for REFF-financed subprojects, all disclosed in-country and on the World Bank portal.

During implementation, environmental requirements were incorporated into procurement and contracts and monitored through supervision. The ICR (p. 13) reports that Environmental Assessment requirements were implemented in line with approved instruments, with no significant environmental incidents and compliance maintained through project closing.

**Natural Habitats (OP/BP 4.04):** The policy was triggered at appraisal on a precautionary basis, reflecting the potential for ground-mounted solar PV investments under the REFF to be located in areas with modified or ecologically sensitive habitats. However, project documentation indicated that no loss, conversion, or degradation of natural habitats was expected. During implementation, site screening and supervision confirmed that project activities, including the Feni solar PV plant, did not affect critical natural habitats, and the ICR does not report any significant adverse impacts on natural habitats.

**Indigenous Peoples (OP/BP 4.10).** The project triggered this policy as a precautionary measure because potential future renewable energy subprojects could have taken place in areas where Indigenous Peoples/Tribal Peoples were present. To address this risk, the project prepared and disclosed a Tribal



Peoples Framework, setting out screening, consultation, and mitigation procedures should indigenous peoples be identified during implementation. The ICR does not report any implementation issues or impacts under this safeguard policy.

**Involuntary Resettlement (OP/BP 4.12).** The policy was triggered because land acquisition was required for the construction of the Feni utility-scale solar PV plant and associated infrastructure. To address this, the project prepared and disclosed Resettlement Action Plans (RAPs), supported by a Resettlement Policy Framework (RPF), which defined compensation, livelihood restoration measures, and grievance redress arrangements. The ICR (p.13) reports that all project-affected households were compensated, livelihood restoration measures were implemented for 22 households, and no resettlement-related implementation issues were reported at project closing.

**Safety of Dams (OP/BP 4.37).** The policy was triggered at appraisal on a precautionary basis due to the project's location in a low-lying, flood-prone area and the planned construction of a protective dike around the Feni utility-scale solar PV site for flood protection purposes. No dams were constructed under the project, and the protective dike did not involve dam-safety risks or result in impacts on people. Consistent with appraisal expectations, implementation did not raise dam-safety concerns, and the policy did not require substantive application beyond precautionary screening.

## **b. Fiduciary Compliance**

### **Financial Management**

At appraisal, the project's financial management (FM) risk was rated Substantial, reflecting the involvement of multiple implementing agencies (EGCB, IDCOL, and SREDA) with differing levels of experience in managing Bank-financed operations. The PAD assessed EGCB and IDCOL as having established FM systems, including budgeting, accounting, internal controls, financial reporting, and external audit arrangements, while identifying capacity constraints within SREDA, a relatively new institution with no prior experience in Bank operations.

During implementation, the project followed agreed FM arrangements, including regular submission of quarterly Interim Unaudited Financial Reports (IUFRs), and preparation of annual audited financial statements. Audit reports were generally received on time and carried unqualified opinions, with only minor issues of an administrative nature. There were no reports of misuse of funds or significant internal control weaknesses.

The ICR (pp. 11 and 13) notes that budget release delays and institutional capacity constraints at SREDA affected the pace of implementation under the technical assistance component, but these issues did not compromise fiduciary controls or the integrity of project financial management. The ICR (p.13) assessed IDCOL's management of the REFF, including on-lending and financial reporting as a financial intermediary, as satisfactory, with expenditures adequately documented and accounted for. At project closing, FM arrangements remained acceptable and consistent with World Bank requirements, with all project funds properly accounted for.

### **Procurement**



At appraisal, procurement risk was rated Substantial. Risk mitigation measures were embedded in project design, including enhanced Bank supervision and the use of international technical and procurement advisors for complex contracts.

During implementation, procurement was carried out in accordance with the World Bank Procurement Regulations for Investment Project Financing. EGCB implemented the largest and most complex package—the engineering, procurement, and construction (EPC) contract for the Feni utility-scale solar PV plant. Although procurement preparation and evaluation under Component 1 took longer than anticipated due to initial capacity constraints, the EPC contract was awarded through competitive procedures and implemented without major procurement issues, supported by international consultants and an Owner’s Engineer.

Procurement under Component 2, managed by IDCOL, consisted largely of smaller-value goods and consulting services and benefited from the agency’s prior experience with World Bank–financed operations. In contrast, procurement under Component 3, implemented by SREDA, experienced significant delays, driven by limited institutional capacity, frequent staff turnover, delayed approval of the TAPP, and late initiation of procurement actions. These delays resulted in several consulting contracts being awarded late in the project cycle, constraining completion of planned feasibility studies and preparatory work for public-sector renewable energy sites and studies related to renewable energy resource assessment and aspects of the waste-to-energy pilot.

**c. Unintended impacts (Positive or Negative)**

None.

**d. Other**

None.

**11. Ratings**

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Satisfactory	
Bank Performance	Satisfactory	Satisfactory	
Quality of M&E	Modest	Modest	
Quality of ICR	---	Substantial	

**12. Lessons**



This review has drawn three lessons based on the information in the ICR.

**The timeliness and coordination of technical assistance, as well as the institutional capacity of implementing agencies, can critically affect investment readiness and market development.** The project's design appropriately emphasized upstream technical assistance to strengthen project readiness and pipeline development. However, delays in implementation, institutional capacity constraints (particularly within SREDA) and weak coordination across agencies reduced its effectiveness and limited the timely development of a bankable pipeline for REFF financing. Frequent leadership changes and implementation bottlenecks under the technical assistance component further constrained the translation of analytical work into investment-ready projects. As a result, the intended link between preparation support and downstream investment did not fully materialize. This experience shows that technical assistance can contribute to market development only when it is delivered in a timely manner, supported by adequate institutional capacity, and closely aligned with financing mechanisms and implementation responsibilities.

**Adaptive restructuring can address emerging constraints, but its impact depends on the timing relative to the implementation cycle.** Multiple restructurings helped expand REFF eligibility, adjust financing terms, and respond to macroeconomic and market constraints, contributing to improved utilization toward project closing. These adjustments were important in removing barriers to investment and enabling greater participation, particularly in rooftop solar. However, changes introducing new technology segments, such as wind and mini-grids, were introduced late in the project period, leaving insufficient time for pipeline formation and implementation. As a result, their influence on realized outcomes was limited. The project illustrates that while adaptability is an important feature of complex operations, the effectiveness of restructuring depends on how early emerging constraints are identified and addressed within the implementation cycle.

**Weaknesses in M&E system can limit evaluability of project performance and require supplementary evidence to fully assess the achievement of project's results.** The project's results framework focused primarily on high-level physical outputs, such as installed capacity, but did not adequately capture key dimensions of performance related to financial intermediation, including the volume of financing delivered, the number and type of subprojects supported, and the project's contribution to private sector participation and market expansion. As a result, important achievements, particularly under the REFF and technical assistance component, were not fully reflected in results reporting, and additional information from the project team was required to assess financing outputs and market-level effects. This limited the ability to comprehensively evaluate the project's effectiveness using the results framework alone.

### 13. Assessment Recommended?

No

### 14. Comments on Quality of ICR



The ICR provides a candid, clear, structured, and largely evidence-based account of project design, implementation, and results. It presents a credible and sufficiently robust evidence base, drawing on project data and implementation experience. The report makes a notable effort to compensate for gaps in the results framework by incorporating additional information particularly on financing outputs and market-level contributions under the REFF. This enhances the evaluability of the project and aligns evidence reasonably well with the project's theory of change.

The quality of analysis is sound but uneven, with strong explanations in areas such as implementation delays, restructuring, and differences in performance across components. The ICR establishes plausible links between evidence and findings and engages with key assumptions underlying the project design. However, some sections remain more descriptive than fully analytical, and the linkage between outputs, outcomes, and higher-level market effects is not always fully developed or consistently anchored in the theory of change.

The ICR is results-oriented and internally coherent, with lessons that are broadly grounded in project experience and responsive to operational challenges. It adheres well to reporting guidelines and provides a balanced discussion of achievements and constraints. At the same time, greater analytical depth, sharper causal reasoning, and more consistent integration of findings across components would have strengthened the report further. Overall, the quality of the ICR is rated Substantial.

**a. Quality of ICR Rating**  
Substantial