



# Technical Assistance Report

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Project Number: 48432-001  
Capacity Development Technical Assistance (CDTA)  
July 2015

## People's Republic of Bangladesh: Enabling Poor Women's Benefits from Enhanced Access to Energy in Hatiya Island (Financed by the Republic of Korea e-Asia and Knowledge Partnership Fund)

This document is being disclosed to the public in accordance with ADB's Public Communications Policy 2011.

Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 30 June 2015)

Currency unit	–	taka (TK)
TK1.00	=	\$0.013
\$1.00	=	TK77.18

## ABBREVIATIONS

ADB	–	Asian Development Bank
BPDB	–	Bangladesh Power Development Board
BPL	–	below the poverty line
GAP	–	gender action plan
TA	–	technical assistance

## NOTE

In this report, "\$" refers to US dollars.

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## CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

<b>1. Basic Data</b>		<b>Project Number: 48432-001</b>	
<b>Project Name</b>	Enabling Poor Women's Benefits from Enhanced Access to Energy in Hatiya Island	<b>Department /Division</b>	SARD/SAEN
<b>Country Borrower</b>	Bangladesh Not applicable	<b>Executing Agency</b>	Power Div-Min of Power, Energy & Mineral Resources
<b>2. Sector</b>		<b>Financing (\$ million)</b>	
✓ Energy	Energy efficiency and conservation		0.10
	Energy sector development and institutional reform		0.15
	Energy utility services		0.10
	Renewable energy generation - solar		0.15
<b>Total</b>			<b>0.50</b>
<b>3. Strategic Agenda</b>		<b>Climate Change Information</b>	
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	Mitigation (\$ million)	0.02
Environmentally sustainable growth (ESG)	Eco-efficiency Global and regional transboundary environmental concerns Natural resources conservation	CO <sub>2</sub> reduction (tons per annum)	1
		Climate Change impact on the Project	Medium
<b>4. Drivers of Change</b>		<b>Gender Equity and Mainstreaming</b>	
Governance and capacity development (GCD)	Institutional systems and political economy	Effective gender mainstreaming (EGM)	✓
Knowledge solutions (KNS)	Organizational development Application and use of new knowledge solutions in key operational areas Pilot-testing innovation and learning		
Partnerships (PAR)	Civil society organizations Foundations Implementation		
<b>5. Poverty Targeting</b>		<b>Location Impact</b>	
Project directly targets poverty	Yes	Not Applicable	
Household targeting (TI-H)	Yes		
<b>6. TA Category:</b>		B	
<b>7. Safeguard Categorization</b>		Not Applicable	
<b>8. Financing</b>			
<b>Modality and Sources</b>		<b>Amount (\$ million)</b>	
<b>ADB</b>		<b>0.00</b>	
None		0.00	
<b>Cofinancing</b>		<b>0.50</b>	
e-Asia and Knowledge Partnership Fund		0.50	
<b>Counterpart</b>		<b>0.03</b>	
Government		0.03	
<b>Total</b>		<b>0.53</b>	
<b>9. Effective Development Cooperation</b>			
Use of country procurement systems		No	
Use of country public financial management systems		No	

## I. INTRODUCTION

1. The Government of Bangladesh is working to eliminate acute power shortages and load shedding within the country, and to electrify all rural villages by 2020. Following the government's request, on 4 January 2012 the Asian Development Bank (ADB) approved the Power System Efficiency Improvement Project, which aims to address two key areas in electricity supply: improving thermal power plants and expanding the penetration of renewable energy in the country.<sup>1</sup>

2. As part of the government's commitment to integrate gender and social considerations in the energy sector and identify entry points to address gender and social inclusion issues related to the power subsector, ADB was asked in September 2014 to assist in developing a strategy to expand the integration of gender-related activities into the ongoing Power System Efficiency Improvement Project. The goal is to increase gender equality results by using new off-grid renewable energy options to maximize the hybrid power system in Hatiya Island.

3. The scope of the technical assistance (TA) includes (i) increasing women's participation in energy-related employment and energy-based livelihood opportunities resulting from the ongoing project; (ii) providing technical training for women to enable them to maximize opportunities; and (iii) providing a gender-sensitive user education program module to improve household energy efficiency, targeting poor households headed by women on the safe and efficient use of electricity; and (iv) elaborating a customized dissemination and user-friendly educational campaign on the efficient management of services provided by the new hybrid power technologies.<sup>2</sup> The gender action plan will continue to be implemented using proceeds from the loan under the ongoing project (footnote 1).<sup>3</sup>

4. The TA is in line with ADB's country operations business plan, 2015–2017 for Bangladesh, which prioritizes energy as a key area of support, with a primary goal to reduce dependency on imported fossil fuels by implementing energy efficiency and conservation, including power generation from indigenous renewable energy sources.<sup>4</sup> Gender equity is one of ADB's five drivers of change within its overarching goal of poverty reduction.

## II. ISSUES

5. Lack of access to modern energy services is an important indicator of poverty and the state of social development. Regional demand for electricity in South Asia is steadily rising with continued economic development and is expected to increase, with households and industry as the main consumers. According to ADB's *Energy Outlook*, South Asia will register the fastest annual growth rate in Asia and the Pacific for electricity demand at 5.3%, a more than threefold increase (from 2010) to 2,761.6 terawatt-hours by 2035.<sup>5</sup> The key challenge remains the sector's sustainable development to provide secure and high-quality electricity services for all.

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<sup>1</sup> ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for the Power System Efficiency Improvement Project*. Manila (Loan 2769-BAN, Part B[iii]), Hatiya Solar Photovoltaic-Wind-Diesel Hybrid System (comprising 2.2-megawatt peak photovoltaic power, 2 megawatts diesel power, 0.8 megawatts wind power, and 5 megawatt-hours energy storage).

<sup>2</sup> The TA first appeared in the business opportunities section of ADB's website on 8 December 2014.

<sup>3</sup> The TA builds on activities included in the (original) gender action plan, and develops it by including support to women-friendly renewable energy technologies and user education programs.

<sup>4</sup> ADB. 2014. *Country Operations Business Plan: Bangladesh, 2015–2017*. Manila.

<sup>5</sup> ADB. 2013. *Energy Outlook*. Manila.

6. In Bangladesh, energy shortage is considered the most critical constraint to economic development, livelihoods, and quality of life, especially in rural areas. A gender-oriented and properly engineered, improved, and reliable power supply will enhance women's energy-related livelihood opportunities and reduce their household drudgery, while supporting environmental sustainability.

### III. THE CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE

#### A. Impact and Outcome

7. The impact will be increased employment and livelihood opportunities in Hatiya Island for women living below the poverty line (BPL) and vulnerable women. The outcome will be more efficient, gender- and socially-inclusive access to energy resources and services.

#### B. Methodology and Key Activities

8. Improving coverage by expanding and strengthening transmission and distribution systems is essential. Thus, poor beneficiaries can benefit significantly from (i) access to quality energy services for domestic consumption and increased leisure; (ii) time-saving through improved efficiency of work; (iii) use of labor-saving appliances for homes, industry, and agricultural production; and (iv) related employment generation and livelihoods. Other benefits include information and communication, pumped water, improved health, and other basic services obtained through improved power infrastructure.<sup>6</sup>

9. The TA will specifically target BPL women and households headed by women for the safe and efficient use of electricity, and make available a customized dissemination and user-friendly educational campaign for the efficient management of electricity services provided by power technologies, such as photovoltaic, wind, battery storage, and diesel generation. The TA will have four outputs.

10. **Output 1.** Local power infrastructure improved to maximize benefits for BPL women and households headed by women. This includes community-based solar irrigation pumping systems for effective agriculture, photovoltaic street lighting in selected areas, nano-grid cluster grid to connect households located far from the main grid, community-based photovoltaic refrigerators for preserving fish catch, and internet access provided through one community e-center for increased information dissemination and learning.

11. **Output 2.** Women's participation as entrepreneurs and service providers increased. Skills and technical training will be provided to enhance women's energy-based alternative livelihood opportunities through local power infrastructure development, and implementation of electrical connections and electricity billing within the output-based aid program (the grant-financed electrical connection from households to the distribution grid).

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<sup>6</sup> Safeguards related to infrastructure construction footprint (panels, batteries, pumps, reservoir, and irrigation channels of community-based solar irrigation pumping systems; street lighting; grid poles (nano-grid); and community e-center will have no indigenous peoples, resettlement, or land acquisition issues, or any loss of access issues. The Bangladesh Power Development Board (BPDB) will provide public land. The infrastructure will create new livelihoods. Minor environmental impacts originating from the construction and disposal of waste materials and batteries will be addressed through the environmental management system implemented by BPDB for the ongoing Power System Efficiency Improvement Project. Appropriate assessments are being conducted to assess environment impact

12. **Output 3.** Gender-sensitive user education program developed and implemented. Awareness-raising materials will be prepared and a user education program implemented on the safe and efficient use of electricity targeting poor households headed by women.

13. **Output 4.** BPDB capacity in gender- and socially-inclusive community outreach and engagement developed. This will increase BPDB sensitivity for gender- and socially-inclusive community involvement in project activities.

14. The main assumptions are (i) macroeconomic and political stability exists in the country; (ii) project ownership by BPDB and key stakeholders is strong; (iii) local government supports local infrastructure development, despite changes in the national political landscape; (iv) project ownership by the government, local communities, and target beneficiaries is strong; and (v) BPDB accepts the need to address gender issues in a sustained manner. The only foreseeable risk is the possibility of rapid staff turnover in BPDB.

### C. Cost and Financing

15. The TA is estimated to cost \$530,000, of which \$500,000 will be financed on a grant basis by the Republic of Korea e-Asia and Knowledge Partnership Fund and administered by ADB. The government will provide counterpart support in the form of counterpart staff, office space, transportation and accommodation (project site visits, support for workshops and conferences, office supplies, secretariat assistance, domestic transportation), and other in-kind contributions.

### D. Implementation Arrangements

16. The executing agency will be BPDB, within the Power Division of the Ministry of Power, Energy and Mineral Resources. BPDB and ADB will monitor the TA outcome through consultant reports, periodic consultations, and review missions. BPDB will provide additional field-related technical expertise as needed.

17. The TA will require 9 person-months of international and 11 person-months of national consulting inputs, and 4 person-months of non-key experts (community development support staff and facilitators). ADB will hire a consulting firm in accordance with its Guidelines on the Use of Consultants (2013, as amended from time to time). Goods, including all equipment, will be procured by ADB in accordance with ADB's Procurement Guidelines (2015, as amended from time to time).<sup>7</sup> The team of experts will (i) support turnkey implementation of equipment; (ii) provide technical knowledge transfer to beneficiaries; and (iii) prepare scaling up of the pilot equipment in other projects of the 2015–2017 power portfolio (i.e., ADB's ongoing Power System Efficiency Improvement Project, part B; Photovoltaic Pumps for Agricultural Irrigation Project; and project preparatory TA project<sup>8</sup> for Rural Hybrid Power Systems Project).

18. At the end of TA implementation, through capacity building and training, women beneficiaries in Hatiya are expected to be organized into electricity committees, which together with BPDB will support operation and maintenance of the pilot equipment and sale of electricity

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<sup>7</sup> Funding for equipment is administered by ADB and will not be included as part of the technical and financial proposal of the consulting services. After TA completion, the ownership of the equipment will be turned over to the BPDB. The disposal arrangements of the equipment upon TA completion will be done by BPDB.

<sup>8</sup> ADB. 2015. *Technical Assistance to People's Republic of Bangladesh for Rural Hybrid Power Systems*. Manila.

services (i.e., through prepaid meters). In addition, they will be responsible for livelihood promotion in Hatiya Island and work in the same manner as cooperative associations.

19. The consulting firm will be engaged through the fixed-budget selection method, using a simplified technical proposal and output-based contract. The TA proceeds will be disbursed in line with ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time). The project is expected to start in August 2015 and be completed in December 2016. ADB's Bangladesh Resident Mission, in coordination with the South Asia Energy Division and BPDB, will administer the TA. The terms of reference are in Appendix 3.

#### **IV. THE PRESIDENT'S DECISION**

20. The President, acting under the authority delegated by the Board, has approved ADB administering technical assistance not exceeding the equivalent of \$500,000 to the Government of Bangladesh to be financed on a grant basis by the Republic of Korea e-Asia and Knowledge Partnership Fund for Enabling Poor Women's Benefits from Enhanced Access to Energy in Hatiya Island, and hereby reports this action to the Board.



## DESIGN AND MONITORING FRAMEWORK

**Impacts the Project is aligned with:**  
Increased employment and livelihood opportunities in Hatiya Island for women living below the poverty line (BPL) and vulnerable women

Project Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting <sup>1</sup>	Risks
<p><b>Outcome</b> More efficient, gender- and socially-inclusive access to energy resources and services</p>	<p>By 2017:</p> <ul style="list-style-type: none"> <li>• All BPL and vulnerable households headed by women (FHHs) in project sites included in and benefit from at least one of the outputs and activities<sup>a</sup></li> <li>• The GAP for ADB's Power System Efficiency Improvement Project enhanced and implemented<sup>b</sup></li> </ul>	<p>Project progress reports GAP quarterly progress reports Final project report</p>	<p>No ownership of the gendered aspects of the Project by BPDB officials</p>
<p><b>Outputs</b> 1. Local power infrastructure improved to maximize benefits for BPL women and FHHs<sup>c</sup></p>	<p>By 2017:</p> <p>1a. 20 community-based solar irrigation pumping systems for effective agriculture built (Target: 100 FHHs)</p> <p>1b. 10 photovoltaic street lights in selected areas built to improve community safety</p> <p>1c. One nano-grid cluster established to connect HHs located away from main grid (Target: 10 FHHs)</p> <p>1d. Two community-based photovoltaic refrigerators installed for preserving fish catch (Target: 20 FHHs)</p> <p>1e. Internet access provided through one community E-center to increase information dissemination and learning</p>	<p>1a-e Project progress reports GAP quarterly progress reports Final project report</p>	<p>Changes in national political landscape affect local government ability to pursue infrastructure development</p>
<p>2. Women's participation as entrepreneurs and service providers increased</p>	<p>By 2017:</p> <p>2a. Additional 400 BPL women have energy-based alternative livelihood opportunities through local power infrastructure development (Baseline: 400)<sup>d</sup></p> <p>2b. Electrical connections (Target: 500 HHs), and electricity billing (Target: 200 women) (Baseline: 0) implemented within the output based aid program (the grant finances the electrical connection from HHs to the distribution grid)</p>	<p>2a-b Project progress reports GAP quarterly progress reports Final project report Pre- and post-skills and technical training assessment reports</p>	<p>Lack of commitment to women-targeted interventions by local government officials and stakeholders</p>

<sup>1</sup> Data in all reports shall be sex-disaggregated.

Project Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting <sup>1</sup>	Risks
3. Gender-sensitive user education program developed and implemented  4. BPDB capacity in gender- and socially-inclusive community outreach and engagement developed	3a. User education program on safe and efficient use of electricity implemented targeting poor HHs, including FHHs (Target: 1,500 new HH consumers, at least 50% women's participation) (Baseline: 2,400 HHs) <sup>e</sup>  4a. Five workshops conducted for BPDB to be more sensitized in gender-, socially-inclusive and community-based, consultative, and participatory approaches (Baseline: 0) <sup>f</sup>	Project progress reports GAP quarterly progress reports Final project report  Project progress reports GAP quarterly progress reports Final project report	BPDB rapid staff turnover
<p><b>Key activities with Milestones</b></p> <p><b>Project start-up activities</b></p> <ul style="list-style-type: none"> <li>Recruit consultants, by month 2 from start of project.</li> <li>Mobilize and orient local communities on loan and TA project activities, by months 2–3 and then every month thereafter.</li> </ul> <p><b>Output 1: Local power infrastructure improved to maximize benefits for BPL women and FHHs</b></p> <p>1.1 Install solar technology equipment and systems by month 6.</p> <p><b>Output 2: Women's participation as entrepreneurs and service providers increased</b></p> <p>2.1 Start first session of skills training for energy-related livelihoods by month 3 and regular training activities thereafter.</p> <p>2.2 Start first session of technical training of service providers by month 6 and regular training activities thereafter.</p> <p><b>Output 3: Gender-sensitive user education program developed and implemented</b></p> <p>3.1 Develop and implement user education program and modules by months 6–12.</p> <p><b>Output 4: BPDB capacity in gender- and socially-inclusive community outreach and engagement developed</b></p> <p>4.1 Conduct capacity development activities for BPDB by month 6.</p>			
<p><b>Inputs</b></p> <p>TA: Republic of Korea e-Asia Knowledge and Partnership Fund: \$0.5 million</p> <p>The government will provide counterpart support in the form of counterpart staff, office space, transportation and accommodation (project site visits, support for workshops and conferences, office supplies, secretariat assistance, domestic transportation) and other in-kind contributions. Communities will also provide counterpart in terms of funds, time and other in-kind contributions. The value of the government's in-kind contribution is estimated to account for 6% of the total TA cost.</p>			

ADB = Asian Development Bank, BPDB = Bangladesh Power Development Board, BPL = below poverty line, FHH= female headed households; GAP = gender action plan, HH= households; TA = technical assistance.

<sup>a</sup> The project preparatory TA (2011) baselines established under the loan estimate that up to 9% of households are households headed by women.

<sup>b</sup> ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for the Power System Efficiency Improvement Project*. Manila (Loan 2769-BAN).

<sup>c</sup> A target group of 400 BPL women and households headed by women was identified.

<sup>d</sup> Four hundred women had participated in livelihoods skills training as of April 2014.

<sup>e</sup> User education programs were conducted in 2,400 households as of April 2014.

<sup>f</sup> Five workshops were conducted as of April 2014.

Source: Asian Development Bank.

**COST ESTIMATES AND FINANCING PLAN**  
(\$'000)

Item	Amount (\$ '000)
<b>Republic of Korea e-Asia and Knowledge Partnership Fund<sup>a</sup></b>	
1. Consultants	
a. Remuneration and per diem <sup>b</sup>	
i. International consultants (9 person-months) <sup>c</sup>	165.00
ii. National consultants (11 person-months)	44.00
iii. Non-key experts team (4 person-months)	18.00
b. International and local travel <sup>d</sup>	23.00
2. Technology and equipment <sup>e</sup>	150.00
a. Solar water pumps with remote mobile data control and prepayment (20 units)	
b. Solar light-emitting diode street lighting (10 units)	
c. Solar refrigeration with remote data-control and communication (2 units)	
d. Solar nano-grid cluster with remote intelligent protection-control monitoring and power storage (1 unit)	
e. Solar-based internet e-center with vendor facility equipment (1 unit)	
3. Training, seminars, and workshops <sup>f</sup>	
a. Skills and technical training <sup>g</sup>	30.00
b. Gender-sensitive user education program	25.00
c. Executing agency sensitized in gender-inclusive, community-based driven consultation and participation approaches (four workshops)	25.00
4. Provisional sum	20.00
<b>Total</b>	<b>500.00</b>

Note: The technical assistance (TA) is estimated to cost \$530,000, of which the contribution from the Republic of Korea e-Asia and Knowledge Partnership Fund is presented in the table above. The government will provide counterpart support in the form of counterpart staff, office space, transportation and accommodation (project site visits), support for workshops and conferences, office supplies, secretariat assistance, domestic transportation, and other in-kind contributions. The value of the government's in-kind contribution is estimated to account for 6% of the total TA cost.

<sup>a</sup> Administered by the Asian Development Bank (ADB).

<sup>b</sup> Output-based lump-sum contract.

<sup>c</sup> Recruitment of five international experts.

<sup>d</sup> Lump-sum international and national travel international consultants: \$20,000. Lump-sum national travel national consultants: \$5,000.

<sup>e</sup> Turnkey on-site pilot equipment installation. Includes support for preparing related technical preparation and simulation studies for pilot equipment and case studies. ADB. 2013. Administering Grant-Financed Technical Assistance Projects. *Project Administration Instructions*. PAI 5.09. Manila requires at least three quotations for procuring equipment for a TA.

<sup>f</sup> This item will cover all the costs associated with implementing training activities described in the preliminary design and monitoring framework including (i) training materials, equipment, and transport hire; (ii) trainer fees, travel, and per diem; (iii) the publishing of learning modules; and (iv) TA funds that can be used for business travel; per-diem and accommodation costs of ADB staff serving as resource persons (i.e., facilitators, speakers, and panelists) in meetings, seminars, training courses, conferences, technical exhibitions, and workshops, including to those involving members and nonmembers of ADB.

<sup>g</sup> Target 200 women.

Source: Asian Development Bank estimates.

## OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The Asian Development Bank (ADB) will hire a firm from an ADB member country, with demonstrated experience in developing renewable energy-related projects in rural and remote areas, including marine island environments. Knowledge of the power subsector, rural power, and social aspects of Bangladesh is highly desirable and an asset. The technical assistance (TA) will require a team of consultants and non-key experts (community development support staff facilitators to deliver the four outputs:

- (i) Output 1: Local power infrastructure improved to maximize benefits for women living below the poverty line (BPL) and households headed by women.
- (ii) Output 2: Women's participation as entrepreneurs and service providers increased.
- (iii) Output 3: Gender-sensitive user education program developed and implemented.
- (iv) Output 4: Capacity of Bangladesh Power Development Board (BPDB) for gender-inclusive community engagement developed.

**Table A3: Summary of Consulting Services Requirement**

International		National	
Positions	Person-Months	Positions	Person-Months
Electrical power specialist and team leader	3.0	Social specialist deputy team leader	6.0
Photovoltaic power and mini-grid specialist	2.5	Social development and gender specialist	3.0
Pumping specialist (electrical)	1.0	Project accountant	2.0
Financial specialist (power)	1.5	Non-key experts: Community development support staff facilitators	4.0
Business development	1.0		
<b>Total</b>	<b>9.0</b>	<b>Total</b>	<b>15.0</b>

Source: Asian Development Bank estimates.

### A. International Experts

2. **Electrical power specialist and team leader** (international, 3 person-months). The specialist should have at least a bachelor's degree in a relevant discipline (e.g., electrical or electromechanical engineering), and at least 10 years of experience, preferably in the area of solar engineering, middle- and low-voltage switchgear, and mini-grids. The specialist will demonstrate substantial experience developing solar power projects (on- and off-grid-connected), within the context of remote areas and have the following responsibilities:

- (i) Complete a desk review of existing materials and reports related to the hybrid solar–diesel small wind-battery storage project in Hatiya (Power System Efficiency Improvement Project).<sup>1</sup>
- (ii) Implement output 1 (para. 1). This will include 20 community-based solar irrigation pumping systems for effective agriculture (target: 100 households); 10 photovoltaic street lighting systems in selected areas to ensure community safety; one nano-grid cluster grid for connecting households located far away from the main grid (target: 10 households); two community-based photovoltaic refrigerators for preserving fish catch (target: 20 households); internet access

<sup>1</sup> ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of Bangladesh for the Power System Efficiency Improvement Project*. Manila (Loan 2769-BAN, Part B[iii]).

provision through one community e-center for increased information dissemination and learning.

- (iii) Implement output 2 (para. 1). Provide skills and technical training to enhance women's energy-based alternative livelihood opportunities through local power infrastructure development; implementation of electrical connections, and provision of electricity billing within the output-based aid program (the grant finances electrical connection from households to the distribution grid) (target: 200 women). Conduct a renewable energy resource assessment, propose and select project sites, and prepare a short project manual containing key information on how to implement the project. Conduct system simulations as needed. Lead consultation workshops with government and nongovernment stakeholders to assess system issues and discuss the project.

3. **Photovoltaic power and mini-grid specialist** (international, 2.5 person-months). The specialist should have at least a bachelor's degree in a relevant discipline (e.g., electrical or electromechanical engineering), and at least 5 years of experience, with substantial experience in electric systems and expertise in designing, implementing, and commissioning cluster or nano-distribution networks, small power substations, photovoltaic pumping systems, photovoltaic refrigeration, and other photovoltaic-based equipment. The specialist will carry out preliminary resource assessments using satellite data and model expected outputs; conduct system simulations and design all solar generators, including configuration of power electronics and balance of the plant and system; elaborate technical calculations; with the rest of the team prepare and confirm detailed cost estimates; and assist the team leader in drafting all deliverables and conducting workshops.

4. **Pumping specialist (electrical)** (international, 1 person-month). The specialist should have at least a bachelor's degree in a major relevant discipline (e.g., electrical, electromechanical, or mechanical engineering), and at least 5 years of experience, preferably including expertise in electrical pumping and irrigation systems and design of low-voltage switchgear. The specialist will carry out related projections, elaborate technical calculations, supervise implementation of the solar pumping system with the photovoltaic specialist, and assist the project team leader in drafting all deliverables and conducting workshops.

5. **Financial specialist (power)** (international, 1.5 person-months). The specialist should have at least a bachelor's degree in a relevant discipline (e.g., engineering in lieu of a business-related postqualification), and at least 5 years of experience, preferably in the financial appraisal and modeling of solar power and conventional power generation. The specialist will prepare cost estimates for the solar power schemes, including power demand; least-cost, sensitivity, and risk analysis; economic internal rate of return; financial internal rate of return; and weighted average cost of capital; and calculate the levelized cost of electricity, including operation and maintenance and equipment replacement parts for the project lifecycle.

6. **Business development specialist (entrepreneurship)** (international, 1.0 person-months). The specialist should have at least a bachelor's degree in a relevant discipline (e.g., engineering or business), and at least 5 years of experience, preferably in the area of business and enterprises. The specialist will assess the entrepreneurial and economic benefits of the capacity development TA; identify risks and undertake sensitivity analysis; develop and oversee capacity development training programs for beneficiaries covering managerial, community development, technical, institutional (governance), and procurement aspects.

7. **Deliverables.** The international specialists will complete the following for output 1 (para. 1): (i) the inception report; (ii) an equipment rapid technical study; and (iii) an equipment implementation report, including testing. For output 2 (para. 1), they will prepare (i) a design

report on the skills and technical training program for energy-based livelihoods, and (ii) a report on the design for implementing electrical connections and collection of electricity billing within the output-based aid program. The firm will provide methodology proposals for both outputs, including a time schedule.

## **B. National Specialists and Non-Key Experts**

8. **Social specialist and deputy team leader** (national, 6 person-months). The specialist should have at least a bachelor's degree in a relevant discipline (e.g., social sciences), and at least 5 years of experience, preferably including experience in the area of capacity building. The specialist should have a strong background in social and possibly gender-related analysis, and be responsible for the following:

- (i) Collect additional sex-disaggregated baseline data and carry out further gender-based needs assessments, as needed, to firm up the design and monitoring framework gender targets and indicators (through surveys, focus group discussions, and key informant interviews with community leaders, elderly, disabled, and women).
- (ii) Support implementation of social safeguards of the capacity development TA linked with ADB's Power System Efficiency Improvement Project, part B (ii); and prepare a poverty profile and safeguard corrective action plan.
- (iii) Conduct a social compliance audit for the existing facilities to identify past or present concerns related to impacts on land acquisition and/or resettlement or indigenous peoples in accordance with ADB's Safeguard Policy Statement (2009).
- (iv) Conduct poverty analysis and pro-poor impacts within the project area, and present findings in the summary poverty reduction and social strategy template.
- (v) Identify gender issues, suggest remediation measures, and incorporate them into the project design.
- (vi) Following ADB's Safeguard Policy Statement, investigate land acquisition, use, and access, and natural resources; undertake necessary due diligence and/or assessment and follow up on the resettlement plan based on a census of affected and/or displaced people; conduct an inventory of losses and a socioeconomic survey of development partners; and review the country safeguard systems and identify necessary measures in accordance with ADB's Safeguard Policy Statement.

9. The contents of the resettlement plan should follow the outline in ADB's Safeguard Policy Statement, Appendix 2. In coordination with the team, the specialist will provide the following deliverables: (i) implement output 2 (para. 1); (ii) implement output 3 (para. 1); (iii) prepare awareness-raising materials and implement a user education program on safe and efficient use of electricity targeting poor households, including households headed by women (target: 1,500 new household consumers, at least 50% women's participation); and (iv) implement output 4 (para. 1). BPDB will be sensitized to gender-inclusive community involvement in project activities.

10. **Social development and gender specialist** (national, 3 person-months). The specialist should have a bachelor's degree in social sciences and prior experience of at least 5 years in gender mainstreaming across sectors and, preferably, in energy and renewable energy sectors, with demonstrated ability to engage in and implement community-driven and community-based approaches. The specialist will (i) identify issues related to pro-poor and gender-inclusive access to energy resources and services; (ii) document promising and/or emerging practices in Bangladesh for possible incorporation in the project; and (iii) identify modalities through which the project can effectively promote greater access of the poor, vulnerable groups, and women to

energy resources, services, and opportunities. The specialist will prepare a gender action plan (GAP) for the project. The specialist will support GAP implementation, and support the team leader and the deputy team leader in implementing all gender-related project activities, including guiding the relevant orientation and training for further development of the project gender design features and the GAP to support effective implementation.

11. **Non-key experts: community development facilitators** (national, total of 4 person-months).<sup>3</sup> The team of nonexperts may be comprised ideally (but not mandatory) of men and women. The team will work with local communities, project design and implementation teams, and other relevant stakeholders to facilitate community engagement in project planning, and assist in strengthening the community's overall capacity to ensure sustainable development of the rural electrification subprojects. Based on solid prior understanding of gender practices, preferably in the project area, they will facilitate project planning through group meetings and organized working groups. Opportunities to attract women candidates will be proactively pursued. The team will work with local communities, project design and implementation teams, and other relevant stakeholders to facilitate community engagement in project planning and assist in strengthening the community's overall capacity to ensure sustainable development of the rural electrification subprojects, while undertaking the following:

- (i) Assist the project team in gathering existing background data and reports.
- (ii) Assist the project team in (a) arranging travel logistics, (b) arranging meetings and workshops, (c) maintaining contacts with stakeholders, (d) obtaining relevant country background data, and (e) obtaining follow-up technical data.
- (iii) Support the government in coordinating and implementing TA activities.
- (iv) As community facilitator, during communication and consultations between team, government, and community, prepare technical specifications and feasibility studies; and implement workshops and dissemination activities.

12. **Project accountant** (national, 2 person-months). The accountant should have a bachelor's degree in business or accountancy, and at least 5 years of experience in accountancy-related practices, with a background in implementing projects or businesses. The accountant will work with the team, provide costing, keep the project books, and facilitate financial assessment of the project.

13. **Deliverables.** For output 2 (para. 1), report on women's participation training as entrepreneurs and service providers, the firm will propose a methodology proposal on how it will implement the output in coordination with the engineering firm, including a time schedule. For output 3, report on the gender-sensitive user education program, and output 4, capacity of BPDB for gender-inclusive community engagement developed, the firm will propose methodology proposals, including time schedules.