

SCALING UP RENEWABLE ENERGY IN LOW INCOME COUNTRIES (SREP)



Investment Plan for Bangladesh

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Bangladesh Key Data

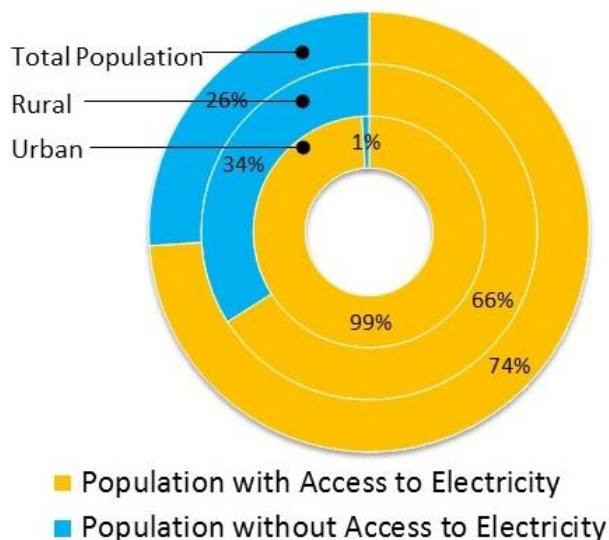
| | |
|--------------------------------|-------------------------|
| Total Population (2011) | 144 million (2011) |
| Total Land Area | 147,500 km ² |
| Population Density (2011) | 976/km ² |
| Urban/Rural Pop. Rates (2011) | 77%/23% |
| GDP (2014-2015) | US\$ 196.6 billion |
| Incidence of Poverty (2015) | 25% |
| Electricity Access Rate (2015) | 74% |

Climate Change in Bangladesh

About 75% of Bangladesh is less than 10m above sea level, making Bangladesh one of the world's most vulnerable countries to climate change, and Dhaka one of the five most vulnerable cities in the world. The country is particularly vulnerable to flooding from monsoons and sea-level rise. Rising temperatures have already begun to reduce crop yields. These threats could increase poverty and the incidence of waterborne diseases, and reduce the availability of clean water supply and sanitation.

Challenge 1: Rural Access to Electricity

- Nationally, 99 percent of the urban population has access to electricity, but only 66 percent of the rural population does.

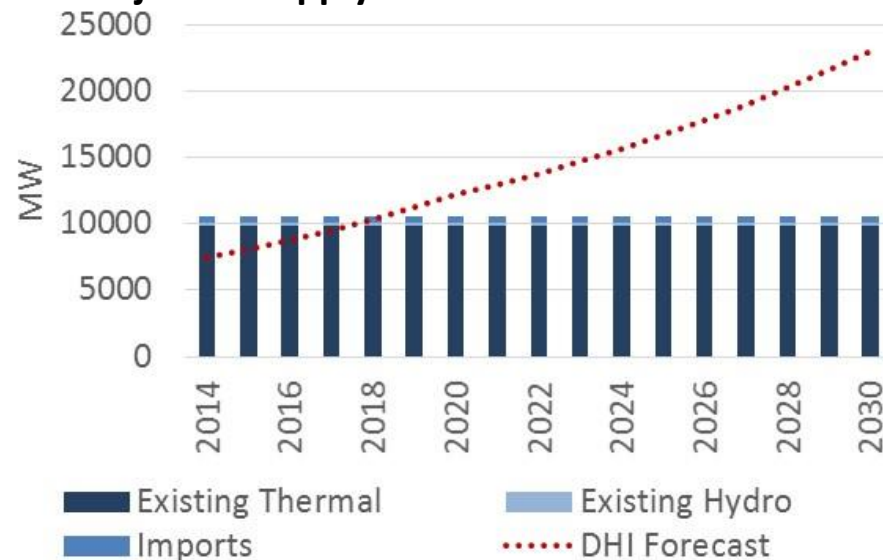


- While these rates have improved in recent years, lack of service has economic consequences for the poorest areas of the country.
- Barisal and Rangpur divisions have very low rural access rates: 32 and 24 percent, respectively.

Challenge 2: Energy Security

- Energy security in Bangladesh is threatened by shortages in generation supply...

Projected Supply-Demand Balance to 2030



- ...and limited availability of natural resources.
- These problems have led to load shedding and increased reliance on oil-fired rental power producers, raising fuel cost per kWh from USD 0.014 to 0.04 between 2009 and 2015.

- Considerable renewable energy potential
 - Resource assessments indicate that Bangladesh could realize over 6,000 GWh of generation from renewable technologies annually
- Significant past experience developing RE projects
 - 4 million solar home systems have been installed since 2003
 - 1.5 million improved biomass cookstoves installed since 1989
- Very active private sector
 - Domestic commercial banks on-lent US\$ 287.57 million to finance RE projects in 2014
 - IDCOL and NGO partner organizations have installed more than 4 million solar home systems and 35,000 domestic biogas plants

| Program | Program start year | No. of partner organizations (2014) | Achievements to date (2014) | Energy/fuel savings | Savings in Million US\$ |
|-----------------|--------------------|-------------------------------------|-----------------------------|--|-------------------------|
| SHS | 2003 | 47 | 4 million systems installed | 228 kilotons of kerosene | 285 |
| Domestic Biogas | 2006 | 24 | 35,000 biogas plants | 28 kilotons chemical fertilizer; 1,000 kiloton of kerosene | 20 |

- Each of the potential renewable energy resources were evaluated against five criteria, and prioritized accordingly. The criteria considered were:
 - **Scalability.** The amount of developable resources potential relative to the other technologies, as measured by production potential (GWh). Resources with higher production potential were given a higher priority.
 - **Availability of sites.** Availability of land is an important barrier to the development of renewable energy in Bangladesh. Land suitable for the development of utility-scale plants is scarce because of seasonal variations in water levels and the longer-term effects of climate change.
 - **Unexploited market potential.** The extent to which the technology is used or the resource is already exploited in Bangladesh. Resources or technologies which already have financing available through IFI programs or through the private sector were given lower priority.
 - **Readiness for implementation.** Technologies were ranked higher if there was reasonably good data on resource availability and potential sites or projects.
 - **Financial viability.** Technologies were ranked higher if they were determined to be close to being cost-competitive with diesel generation and therefore less dependent on subsidies.

Investment Projects co-financed by SREP

1

**Grid-connected
renewable energy**

Utility-scale solar PV
Solar rooftop
Utility-scale wind

Executed by: World Bank
and IFC

Funded by:
--SREP: US\$ 44.45 million
--GoB: US\$ 69.45 million
--MDBs: US\$ 230 million
--Private sector: US\$ 190
million
TOTAL: US\$ 533.9 million

2

Off-grid solar PV

Solar irrigation
Solar minigrids

Executed by: ADB

Funded by:
--SREP: US\$ 29.95 million
--GoB: US\$ 25.35 million
--MDBs: US\$ 140 million
TOTAL: US\$ 195.3 million

3

**Waste-to-Energy
Advisory Support**

Waste-to-Energy
advisory support

Executed by: World Bank

Funded by:
--SREP: US\$ 0.30 million
TOTAL: US\$ 0.30 million

- Grid-connected RE: 200 MW of utility-scale solar or rooftop solar in major urban areas
 - **Utility-scale solar PV**, financed through a PPP modality and tendered through a reverse auction
 - **Priority activities:** resource assessment, investment in project(s), advisory assistance, and partial risk guarantees
 - **Grid-connected rooftop solar**, which can be privately owned/operated (through feed-in tariffs or competitive tender for concession areas) or publicly owned/operated (through installations on public buildings)
 - **Priority activities:** resource assessment, transaction advisory, investment in projects
 - **Utility-scale wind**, if wind mapping exercise shows a sufficient resource and there is private sector interest
 - **Priority activities:** investment in projects



Image source: Black & Veatch



20.16 kWp PV Solar Power System at Honorable Prime Minister's Office, Dhaka

- SREP grant funding to leverage concessional financing from the MDBs to support the scale-up of solar irrigation technologies and solar minigrids
 - **Financing** would be on-lent through the Ministry of Finance and/or Bangladesh Bank to a financial intermediary for grant funding or low-cost financing to investors, developers, or end-users
 - **Priority activities:**
 - **Investments in solar irrigation or solar minigrids.** About 25 MW of new minigrid and 13 MW of solar PV pump capacity would be installed.
 - **Technical assistance in minigrid business models and regulation.** SREP funding would be used to fund a study to identify the problems in planning, regulating, and operating minigrids in Bangladesh, as well as possible improvements to the regulatory environment or possible alternative business models.

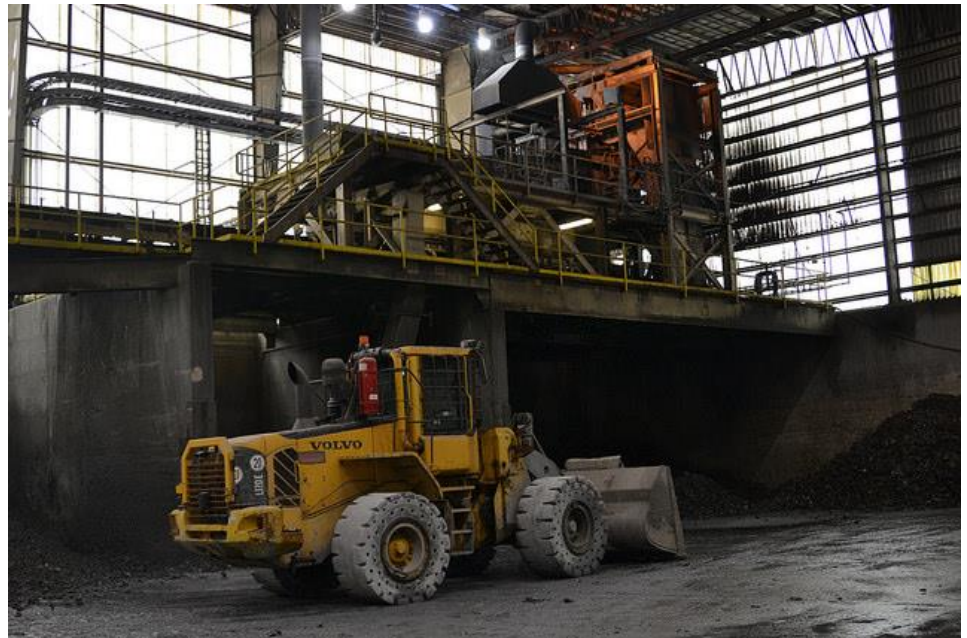


Source: GPOBA



100 kW solar PV minigrid on Sandwip Island
Source: Prokaushali Sangsad Ltd.

- SREP funding would be used to support the development of a municipal waste-to-energy (WtE) project for Bangladesh
 - **Priority activities:**
 - **Advisory support.** SREP advisory support would identify the technical and commercial options for developing a WtE plant. This would include the development of a feasibility study and business case to consider options for ownership and operation. Such options would include a purely public arrangement and various types of PPP arrangements. Support could be provided by the World Bank.

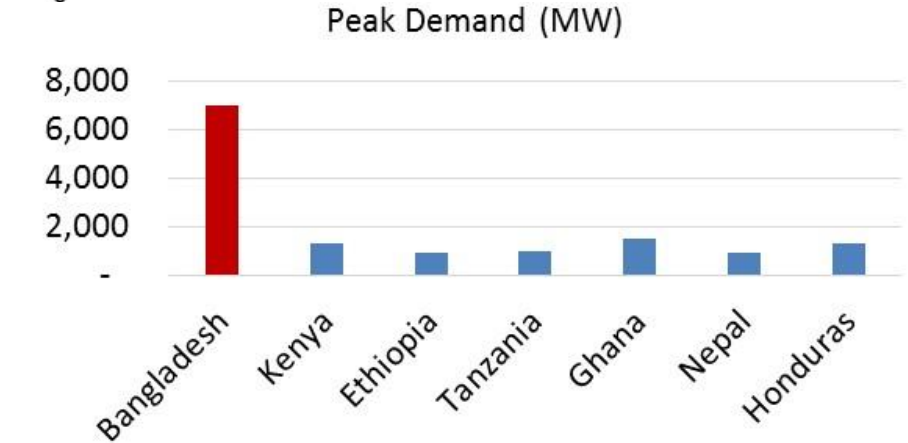
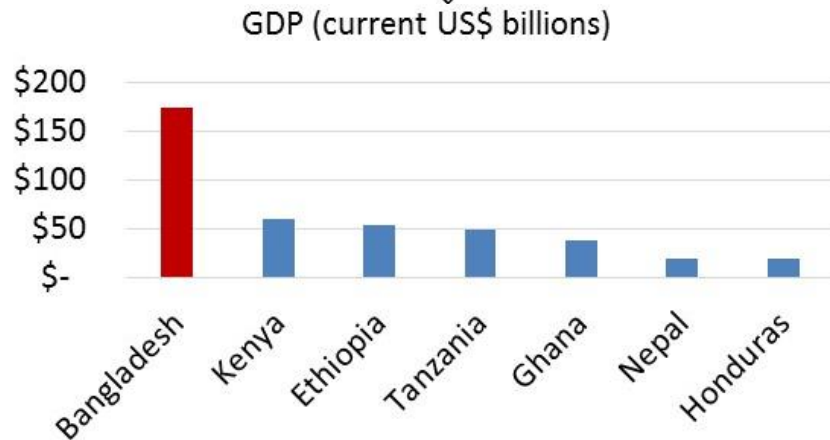
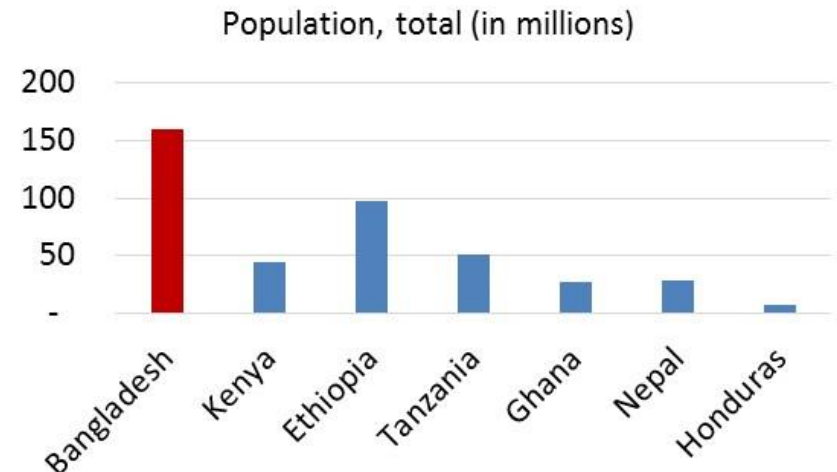
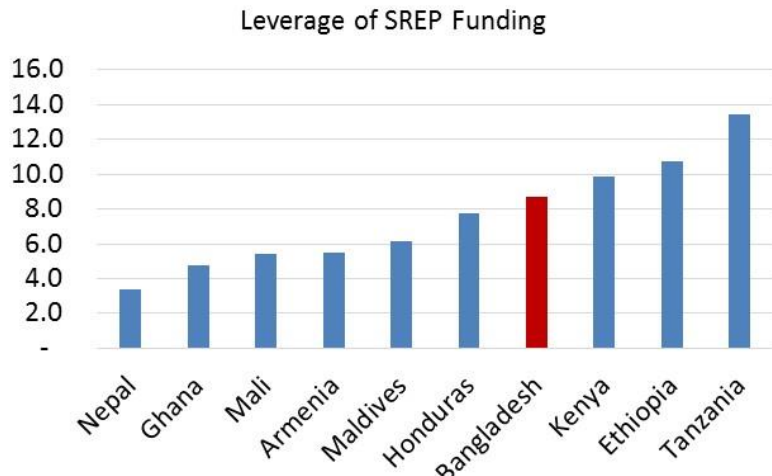


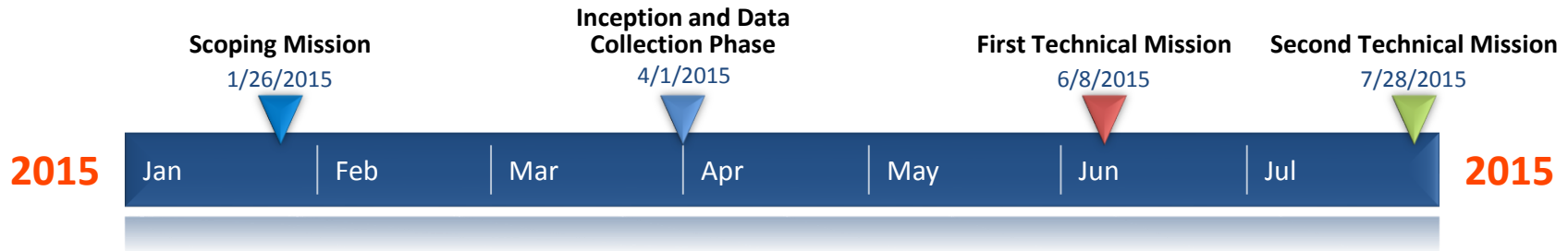
Source: Solid Waste Association of North America (SWANA)

10 Financing Plan

| <u>SREP Project</u> | SREP | MDB Responsible | Government of Bangladesh | MDBs | Private Sector (Equity or Debt) | Total |
|---|----------------|-----------------|--------------------------|---------|---------------------------------|--------|
| Grid-Connected Renewables | (Million US\$) | | | | | |
| Investment in utility-scale solar and wind, and rooftop solar | 28.00 | WB | 49.20 | 200.00* | 100.00 | 377.20 |
| Investment in utility-scale solar and wind, and rooftop solar | 15.00 | IFC | 20.25 | 30.00 | 90.00 | 155.25 |
| Resource assessment | 0.95 | WB | | | | 0.95 |
| Technical assistance or transaction advisory | 0.50 | IFC | | | | 0.50 |
| Subtotal: Grid-connected renewables | 44.45 | | 69.45 | 230.00 | 190.00 | 533.90 |
| Off-grid solar PV | (Million US\$) | | | | | |
| Investment in mini-grids | 5.00 | ADB | 18.75 | 120.00 | | 143.75 |
| Investment in solar irrigation | 24.00 | | 6.60 | 20.00 | | 50.60 |
| Project preparation | 0.95 | | | | | 0.95 |
| Subtotal: Off-grid solar PV | 29.95 | | 25.35 | 140.00 | 0.00 | 195.30 |
| Development support for Waste-to-Energy | (Million US\$) | | | | | |
| Assessment of technical and commercial feasibility for WtE plant | 0.30 | WB | | | | 0.30 |
| Subtotal: Development support for Waste-to-Energy | 0.30 | | 0.00 | 0.00 | 0.00 | 0.30 |
| Investment Plan Preparation Grant | 0.30 | | | | | 0.30 |
| Grand Total | 75.00 | | 94.80 | 370.00 | 190.00 | 729.80 |
| SREP Leverage | 8.7 | | | | | |

- The US\$ 75 million in SREP funding for Bangladesh would be the highest amount to date, but is expected to leverage 8.7 times that amount
- In terms of population, GDP, and peak demand, Bangladesh is also the largest country to receive SREP funding





- Stakeholders provided input throughout the IP preparation process:
 - As part of the **scoping mission** GoB and MDBs met to develop a plan for the preparation of the IP
 - The details on renewable energy potential and projects used in the **technical assessment** were collected from government agencies, utility companies, financial institutions, private companies, universities, MDBs and bilateral agencies
 - Representatives from the GoB, utility companies, financial institutions, private companies, civil society organizations, academic researchers, MDBs, and bilateral agencies were invited to a workshop given to present **preliminary results** on technical potential and costs and gather feedback on **prioritization criteria**
 - Separate presentations on the **draft investment plan** were given to (1) MDBs and bilateral agencies and a (2) group of private investors, academic researchers, and civil society organizations
 - SREDA posted the draft IP online and gathered public comments that were incorporated into the **final investment plan**

আপনাকে ধন্যবাদ

(Thank you)