PROJECT IDENTIFICATION FORM (PIF) [1]

PROJECT TYPE: Full-sized Project
TYPE OF TRUST FUND: GEF Trust Fund

PART I: PROJECT IDENTIFICATION

Project Title:	Development of Sustainable Renewable Energy Power Generation		
Country(ies):	Bangladesh	GEF Project ID:[2]	4459
GEF Agency(ies):	UNDP	GEF Agency Project ID:	3948
Other Executing Partner(s):	Sustainable Energy Development Authority (SEDA), Ministry of Power, Energy and Mineral Resources	Submission Date:	26 September 2011
GEF Focal Area (s):	Climate Change	Project Duration (Months)	72
Name of parent program (if applicable): ➢ For SFM/REDD+ ☐	n/a	Agency Fee ($):	407,727

A. FOCAL AREA STRATEGY FRAMEWORK[3]:

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Indicative Grant Amount ($)	Indicative Co-financing ($)
CCM-3 (select)	3.1 Favorable policy and regulatory environment created for renewable energy investments	3.1 Renewable energy policy and regulation in place	GEFTF	400,000	1,700,000
CCM-3 (select)	3.2 Investment in renewable energy technologies increased	3.2 Renewable energy capacity installed	GEFTF	2,083,116	18,608,000
CCM-3 (select)	3.3 GHG emissions avoided	3.3 Electricity and heat produced from renewable sources	GEFTF	1,400,000	8,680,000
		Sub-Total		3,883,116	28,988,000
		Project Management Cost[4]	GEFTF	**194,156**	762,000
		Total Project Cost		4,077,272	29,750,000

B. PROJECT FRAMEWORK

Project Objective: Reduction in the annual growth rate of GHG emissions from fossil fuel-fired power generation through the exploitation of Bangladesh's renewable energy resources for electricity generation.

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount ($)	Indicative Cofinancing ($)
1. RE policy and regulatory support program	TA	• SEDA evolves into a strong project facilitation center for supporting private sector development efforts for commercial RE projects • Increased understanding of the	• Completed training workshops on wind, solar and biomass energy system design and applications • Completed policy/tariff study that recommends useful inputs for the formulation of RE policy, in general, and wind, solar and	GEFTF	200,000	830,000

[1] It is very important to consult the PIF preparation guidelines when completing this template.
[2] Project ID number will be assigned by GEFSEC.
[3] Refer to the reference attached on the Focal Area Results Framework when filling up the table in item A.
[4] GEF will finance management cost that is solely linked to GEF financing of the project.

		RE market that will enable regulators to determine fair but flexible tariff structures • Increased confidence of private investors in developing RE projects due to government clarity on policy and tariffs • Increased number of approved RE power projects that benefit from favorable RE electricity pricing structure	biomass energy development and utilization, in particular • Completed grid integration study that addresses operational parameters for solar, wind and biomass power plants, interconnections with national (HV) grid and distribution network (LV); and optimum dispatch and scheduling of REPPs; • Favorable policies supportive of wind, solar and biomass energy production, along with the relevant implementing rules and regulations approved, set and enforced by the GOB. • Favorable RE electricity tariffs approved, set and enforced by the GOB			
2. Renewable energy resource assessment program	TA	• Increased availability of reliable and accessible renewable energy resource data, especially for wind energy • Increased capacities and confidence of the Sustainable Energy Development Authority (under the Ministry of Power) and the Hydromet Institute to generate and process reliable wind data • Increased capacity of SEDA to obtain, process and disseminate reliable data on renewable energy resources such as wind, solar insolation, and biomass for use by the GOB and potential project developers and investors	• Published renewable energy resource data together with a dynamic RE resource information system, available on request and online (SEDA sources and website) • Official compilation of wind maps from potential wind resource-rich areas in the country • Compilation of RE resource data for specific sites designated for RE-based energy system applications under the project • Completed assessment of biomass resource data related to specific concerns such as seasonal availability, geographic distribution and needs for replenishment of agricultural soils • Established and operational framework and	GEFTF	200,000	870,000

			system for gathering and updating RE resource data			
3. Dissemination of solar LED lanterns to low-income enterprises and households	Inv	• Financing mechanism that includes credit scheme and buy-downs • Increased affordability of solar LED lanterns for low income enterprises and families • Capacity of MFIs is strengthened to support increased number of loans and credit collection activities • Favorable regulatory regime created for the import of solar LED lanterns into Bangladesh that meet international standards	• Credit schemes and buy-downs for low income enterprises and families to increase affordability of solar LED lantern purchase • Delivery modality that provides necessary outreach for product support and credit collection • Certification procedures for the import of LED lanterns that meet international standards for functionality and durability • 150,000 - 200,000 solar LED lanterns disseminated to rural households and enterprises	GEFTF	1,534,086	7,430,000
4. Renewable energy investment scale-up	Inv	• SEDA fund established and operational • SEDA demonstrated capacity to effectively manage the SEDA fund and to direct financial support to leverage commercial financing of RE power projects • Increased number of financial closures on wind, solar and biomass energy projects • Renewable energy accounts for an increased share of Bangladesh's power generation mix	• Plans, installation and operation of renewable energy power generation projects to include at least: - 3 MW of operational wind power generation - 3 MW of solar power for grid connection, agricultural pumping, or mini-grids, and - 4 MW using surplus agricultural residues, such as rice husks, sugar cane, animal manure, and other biomass as feedstock	GEFTF	1,949,030	19,858,000
				Sub-Total		3,883,116	28,988,000
				Project Management Cost[5]	GEFTF	194,156	762,000
				Total Project Costs		4,077,272	29,750,000

[5] Same as footnote #3.

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, ($)

Sources of Cofinancing	Name of Cofinancier	Type of Cofinancing	Amount ($)
National Government	Government of Bangladesh, Bangladesh Power Development Board	In-kind	1,450,000
National Government	Infrastructure Development Company Limited (IDCOL)	Soft loan	3,900,000
GEF Agency	UNDP Bangladesh	Grant	5,000,000
Other Multilateral Agency (ies)	World Bank	Grant	200,000
Bilateral Aid Agency (ies)	GIZ	Grant	900,000
Private Sector	Clean Energy Alternatives (CEA) and project developers	Unknown at this stage	18,300,000
Total Cofinancing			29,750,000

D. GEF/LDCF/SCCF RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY[1]

n/a

PART II: PROJECT JUSTIFICATION

A. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

A.1.1 the GEF focal area/LDCF/SCCF strategies:

The project fits the climate change focal area strategic objective CCM-3, which is on the promotion of investment in renewable energy (RE) technologies, with a focus on barrier removal activities that will create favorable investment conditions to attract developers and investors to RE power projects, substitution of diesel and kerosene with renewable energy in off-grid applications, and the purchase of RE electricity by utilities.

A.2. national strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NIPs, PRSPs, NPFE, etc.:

The GoB attaches one of its highest priorities to climate change in view of the country's high vulnerability to the rise in sea levels, floods, droughts, and desertification and their resultant impact on agriculture, food security, water resources, health, and infrastructure amongst other things. In the GoB's "Initial National Communication" to the UNFCCC in October 2002, GHG inventories and adaptation, mitigation and climate change response strategies are documented. Bangladesh also has a National Adaptation Plan of Action (NAPA) from November 2005 that articulates the country's response to climate change related impacts on water resources, agriculture, forest and biodiversity, coastal resources, health and infrastructure. Climate change mitigation and low carbon development forms one of the six thematic areas of Bangladesh's Climate Change Strategy and Action Plan. Wind energy is specifically mentioned as a possible mitigation option in the action plan.

GoB's commitment to energy security is elaborated in a vision paper entitled "Energy for All by 2020". Bangladesh also has references to renewable energy in the "Energy Policy of Bangladesh" (2004). Presently, the GoB with assistance from UNDP and former GTZ has prepared an updated version of the National Energy Policy (NEP) by harmonizing all the energy policies into a single document. The draft NEP has identified renewable energy as one of the four pillars of energy development in Bangladesh. As a signatory to the Millennium Declaration, Bangladesh is committed to halving its poverty level by 2015, in part through providing affordable power for its population. In parallel, the GoB's Poverty Reduction Strategy (PRS) recommends the establishment of a "Renewable Energy Trust Fund to finance renewable energy projects and Research and Development activities." The Renewable Energy Policy of Bangladesh, finalized in 2008, formally commits to the establishment of the Sustainable Energy Development Agency (subsequently changed to Authority) (SEDA), and implementation of institutional, financial and regulatory changes needed to promote renewable energy development.

B. PROJECT OVERVIEW:

B.1. Describe the baseline project and the problem that it seeks to address:

Peak electricity demand in Bangladesh is on the order of 5,500 MW. Maximum generation is around 4,300 MW creating a gap of 1200MW (or 28%) between demand and supply. The Government of Bangladesh (GoB) is seeking the means to reduce the demand-supply gaps through conventional and non-conventional energy projects. The substitution of non-conventional energy is a focus of government policy due to the decline in conventional primary energy fossil fuel availability, price volatility in the international market for fossil fuels, and the need for energy security of the country. One major area of interest is promotion of renewable energy technologies for power generation. The use of renewable energy technologies (RETs) is also crucial to the GoB's plans to extend access to electricity to rural areas that currently do not enjoy power from the grid. This includes wind, solar and biomass energy for power generation.

All of these technologies have significant potential for clean and GHG-free electricity generation that is largely untapped.

The government's announced targets are for capacity additions of 9,000 MW (nearly a tripling of current capacity) by 2015. The plan calls for 5% of new capacity, or 450 MW to be renewable energy. By 2020, the targets are for 16,000 MW of new capacity and 10% or 1,600 MW of renewable energy capacity. These are ambitious targets and would contribute a great deal to development and to GHG mitigation in the country if they can be achieved. The objectives of the 2008 Renewable Energy policy are to harness the potential of RE, dissemination of RE technologies, facilitate both public and private investment in this sector, and increase energy supplies to substitute indigenous non-renewable energy. While specific budgeted plans have not been firmed up, provision of feed-in tariff is included in the Renewable Energy Policy. There is considerable awareness among experts and policy makers on the need for feed-in tariffs to encourage renewable energy use both among the urban and rural population. National policy makers also express the need for two-way meters so that solar power can be supplied to the national grid at government prescribed rates when not required by the user.

As shown in the table below, Bangladesh's current renewable energy based power capacity is approximately 50 MW.

Bangladesh's RE based power capacity

RE Technology	**Current Capacity**
Solar home systems	45 MW
Other solar PV applications including solar irrigation	1 MW
Wind energy	2 MW
Biomass based electricity	< 1 MW
Biogas based electricity	1 MW
Total	**50 MW**

Source: Ministry of Power, Energy and Mineral Resources, June 2011

In the area of renewable energy, the main baseline activity to date has been the installation of 900,000 solar home systems in rural areas. There have been a few other baseline activities. The Bangladesh Power Development Board (BPDB) has set up pilot wind power plants at Muhuri Dam, Feni (0.9 MW) and Kutubdia Island (1.0 MW). In terms of biomass, a 250 KW demonstration biomass plant has been installed and IDCOL recently signed a financing agreement for a 400 KW rice husk gasification-based power generation plant. Despite excellent potential for biogas generation in Bangladesh based on its large agricultural sector and large quantities of animal and municipal wastes, there are only an estimated 50,000 biogas plants serving 75,000 households throughout the country.

While the Government has set targets and has plans to invest in renewable energy projects, there are still a number of hurdles and gaps to address. Recent consultations with a wide range of government and development partners have reaffirmed that there is a need for a comprehensive wind energy resource assessment to facilitate private sector investment in this area. The discussions also confirmed that there has been very limited support up until now for biomass power projects and that solar lanterns and household biogas show considerable potential. Furthermore, before SEDA can play its envisioned role as the nodal agency for renewable energy in Bangladesh, its institutional capacity will have to be strengthened. These are all areas where GEF support will be essential.

The barrier removal activities that are envisioned for this proposed GEF project are designed to create the favorable climate that will attract private investors, both local and foreign to develop and implement renewable energy for electricity generation projects in an efficient, technically sound and sustainable manner. With the GEF project in place, the GoB is far more likely to meet its renewable energy goals, or at least be much closer to meeting them. The barriers include:

i) Lack of accessible and complete RE resource data.

There is considerable renewable energy resource data available for Bangladesh, but this data is incomplete in some critical areas, especially for wind resources. There are some biomass resource questions that require further data collection in specific areas. Solar data is considered to be adequate for current purposes. For all resource data, access through a consistent, quality assured and user friendly data system would enhance the potential for development of investment projects.

It is known that there are strong winds during the monsoon season along the coastline of Bangladesh, and some wind data has been collected. This has been incorporated into the country report produced by the UNEP/GEF Solar and Wind Energy Resource Assessment (SWERA) project in 2007. The SWERA report provided wind resource maps based on well documented computer models and calibrated to available measurement data. This model-generated maps show wind speeds at the requisite height over a significant area of the southern coast of Bangladesh, but this is not sufficient to meet the needs of project developers, investors and financing institutions. The report indicates that measurements of wind in strategically selected locations, at a height of 50 meters or above and over significant periods of time are needed to verify these estimates. A full year of continuous measurements at a specific site, and at the appropriate height, is required to justify investment in large grid connected wind power development. In regards to other RE resources in the country, even where data exists, these are often not compiled in a usable format and accessible to developers and other stakeholders. Renewable energy resource assessment has been largely donor driven in the past. There have been some efforts to enhance capacity in the Meteorological bureau for wind and solar resource assessment and data management but these have not achieved the necessary capacity. With the establishment of SEDA there will be an institution within government that will be focused on this issue and will work with the Met bureau and other organizations in Bangladesh to ensure that the capacity developed in this project will have a long term institutional home and will be maintained and expanded as needed by RE development in the country.

ii) Lack of appropriate policy and regulatory framework for RE power investment.

The Government of Bangladesh has virtually no experience with grid-connected renewable energy power projects and lacks the regulatory frameworks and capacity necessary for approving renewable energy projects. The appropriate government bodies do not yet have the technical expertise and information needed to determine appropriate tariffs for the unique nature of each renewable energy generation technology. In addition, existing regulatory frameworks do not incorporate issues related to grid integration with variability of generation, land acquisition, and impact statements related to environmental impacts, and socio-economic benefits.

iii) Lack of capacity to develop financing packages for RE projects.

There are currently no power purchase agreements specific for renewable energy projects in Bangladesh. Policy makers have identified the need for a tendering process for selecting renewable energy developers for future RE-based power generation projects in the country, which would include procedures for site selection, tendering of bids, bidding protocols and bid evaluation. The commercial financing sector can also benefit from capacity building to assess and address risks of renewable energy projects. Capacity of government and private partners to access CDM or other carbon markets as a supplemental source of finance is almost non-existent.

iv) General lack of knowledge of designing, implementing, operating and maintaining RE power projects.

Currently, there is inadequate local technical and engineering capacity to develop, design, implement, operate and maintain RE-based power generation projects in Bangladesh. There are also no accredited academic and vocational institutes that provide courses in RET applications and engineering, as well as specific courses on RE policy making/formulation, energy economics, policy impact analyses, and environmental and socio-economic impact assessments of RE projects.

v) Insufficient demonstrations to establish the feasibility of developing RE-based power generation projects in Bangladesh.

The previously failed demonstrations only reinforce the perception that some renewable energy technologies cannot be developed as an efficient and profitable venture. A reversal of this perception can only take place with well-planned and executed projects.

B. 2. incremental /Additional cost reasoning: describe the incremental (GEF Trust Fund) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the project:

The objective of this project is to promote long-term reductions in the growth rate of GHG emissions from fossil-fuel fired power generation by replacing it with renewable energy power generation. In order to achieve sustainable growth in the renewable energy share of power generation, a strong and capable organization is needed to be the driving force to ensure that necessary policies, programmes and incentives are carried forward to realize the benefits (national and global) from the utilization of renewable energy resources for meeting the country's energy requirements. A central approach of this project will, therefore, be to strengthen the new Sustainable Energy Development Authority (SEDA) as the nodal institution for renewable energy development in Bangladesh, and work through SEDA to address the full range of barriers. In order to assure rapid and effective implementation of key components of this project, specific sub-implementing organizations to support SEDA's programmes may be pre-selected and identified in the project document and transfer to SEDA, specialized expertise in RETs and associated policies programs and financing mechanisms. Supporting organizations will be selected based on ability to provide technical assistance, training and programme implementation support necessary to rapidly carry out the needed programmes and policy development activities.

Component 1: RE policy and regulatory support program

This component is intended to support the Government in developing an appropriate regulatory environment and favorable RE electricity pricing structure that will encourage the rapid increase in the number of approved RE power projects in Bangladesh. It will address the policy/regulatory barriers to the development and implementation of renewable energy power projects in Bangladesh. Under this component, work will be carried out with the Government to finalize a revised Renewable Energy Policy that will clarify roles and responsibilities and will provide a framework for a range of programs in Bangladesh. Support for specific analysis and policy development activities by SEDA and other experts to develop and assist in implementation of new policies and regulations such as feed-in-tariffs (FIT), power purchase agreements, and permitting procedures, necessary to expand the role of RETs in power generation will be provided.

This project component is expected to result in the following outcomes: (a) SEDA evolves into a strong project facilitation center for supporting private sector development efforts for commercial RE projects; (b) Increased understanding of the RET market that will enable regulators to determine fair but flexible tariff structures; (c) Increased confidence of private investors in

developing RET projects due to government clarity on policy and tariffs; and, (d) Increased number of renewable energy technology project approvals utilizing a tariff structure that is more supportive of renewable energy development.

The activities that will be carried out under this project component include: (a) training workshops on wind, solar, and biomass energy system design and applications, (b) a policy/tariff study that recommends useful inputs for the formulation of RE policy; (c) a grid integration study that addresses operational parameters for renewable energy power plants (REPPs), interconnections with national (HV) grid and distribution networks (LV), and optimum dispatch and scheduling of various types of renewable energy capacity; (d) assisting the Government to implement favorable policies supportive of renewable energy power production, along with the relevant implementing rules and regulations approved, set and enforced by the GOB; and, (e) setting and enforcement of favorable tariff prices by the GOB.

Component 2: Resource assessment support program

This component is intended to address the barriers associated with the lack of reliable RE resource data that can be used by prospective RE-based energy system project developers and investors.

Wind: A major element of this project component is the gathering of wind data at 50 meter elevations and above in strategic locations that can be used to calibrate existing mapping data and to provide more detailed data in specific locations that may be prime sites for wind development[6]. Prospective RE-based power generation project developers will be assisted in obtaining very fine scale site specific data needed to support feasibility studies and bankable investment projects. For wind resources this component is expected to produce the following outcomes: (a) Increased availability of reliable wind data, including measured data at critical heights of 50 meters and above; and, (b) Increased technical capacities of the Sustainable Energy Development Authority and the Hydromet Institute to generate and process reliable wind data for use by the GOB and potential wind power project developers and investors.

To realize such outcomes, the envisioned activities that will be carried out under this component will deliver the following outputs: (a) Published wind maps together with a dynamic information setup, available on request and online (SEDA sources and website); (b) Official compilation of updated wind data and wind maps from all potential wind resource-rich areas in the country (inclusive of those areas where previous mappings have been done); and, (c) Compilation of incremental wind resource data in the specific sites designated for wind energy system application under the project.

[6] A number of efforts have been undertaken over the past decade to improve understanding of wind energy resources in Bangladesh. No data has been collected at a height of 50 meters, normally the minimum design height for large scale wind farms. The UNEP/GEF Solar and Wind Resource Assessment (SWERA) project attempted to rectify this information gap. This project used remote sensing and modeled data, calibrated with existing measurements at ground level up to 20 meters to estimate wind speeds at the required height. Detailed SWERA estimates were that the wind speeds in the coastal areas are up to 5.8m/s. But as there is a strong seasonal and diurnal variation in Bangladesh, wind power density is higher than for most locations having the same annual wind speed. It may be noted that some of the locations have wind power density above 150 W/m2 and there should be a good potential for wind generation. An independent assessment by Risoe National Laboratory also found significant wind potential in the coastal areas. Wind energy density predicted by the RISOE model show locations with power density above 200W/m2 over 2000km2 which is highly encouraging. Both of these results are, however, based on model extrapolations. Actual experimental measurements at 50 meters or above over extended periods of time are required to justify investments in large scale applications of wind energy.

Solar: Within this project component, available solar data will be compiled and organized in user friendly formats and make these easily available to all potential users notably through a publicly accessible website[7].

Biomass: Significant biomass resource data collection is not envisioned in this project[8]. Nonetheless, considering the possibility of significant uncertainties about the total amounts of various types of biomass resources, analyses and collection of selected sampling data to address such specific issues as seasonality of biomass resources will be carried out. These include evaluation of the economically and technically feasible transport distances for various types of resources, and percent of crop residues available consistent with good agricultural practices that require a portion of residues to be returned to the soil.

The overall outcome of this component will be a compilation and organization of available data and disseminating information on RE power projects to potential project developers and other users. This will include the best and most up-to-date information on wind, solar and biomass resources in specific locations in Bangladesh and in formats that can facilitate project design and feasibility assessment.

Component 3: Dissemination of solar LED lanterns to low-income enterprises and households

This component intends to make available a specially designed, high quality photovoltaic-powered solar lantern (PVSL) in a financial package that will put modern lighting energy within the financial reach of poor rural households. Solar lanterns, which offer a practical low cost alternative to solar home systems, can be regarded as the first step up the modern lighting ladder: even the simplest units will supply superior lighting compared to those from candles, kerosene lamps, and even electric lamps operated by car batteries. Since the target beneficiaries of this component are mainly vulnerable low income groups, PVSL affordability is a major barrier. Therefore, this component concentrates on issues relating to PVSL affordability. To this end, a combination of subsidies and credit financing schemes are proposed to reduce transactions costs to the end consumers.

Under this component, a financial mechanism will be established that includes a credit scheme and buy-down grants designed to increase the affordability of solar LED lanterns for low-income enterprises and families. Currently, solar lanterns range in price from $38-$55 per unit. The project will provide a $10 buy down on a declining scale as the market matures. The capacity of

[7] The solar energy resource in Bangladesh is abundant plentiful and well documented. Lack of resource data is not considered to be a barrier to solar energy utilization in the country. The SWERA report of 2007 provides information from two modeled data bases – one compiled by the National Renewable Energy Laboratory in the US and the other from DLR Laboratories in Germany. Both these data bases were calibrated to measured data in Bangladesh collected by the Renewable Energy Research Center at Dhaka University. Both sets of results are available online at the SWERA website. The report noted that "variations between maps of NREL and DLR are not large and global horizontal irradiance (GHI) values are within 2%." The SWERA data archive includes monthly and annual maps prepared for diffuse and direct normal radiation. The solar radiation availability is high all over Bangladesh, in the range of 4.0-4.5kWh/m2/day and the report recommends that "PV should play a vital role in providing electricity to all in rural Bangladesh." It also notes that resources are sufficient for solar thermal technologies.

[8] The biomass resources in Bangladesh are also fairly well understood. The total supply of biomass for energy, from agricultural residues, forests and livestock and poultry waste, was estimated in 2001-2002 at 56.38 million tons. Crop residues include rice straw, husk and bran from rice plants, tails, roots and bagasse from sugarcane, wheat straw, and jute residue. The trees as well as twigs and leaves are used as fuel. Forest biomass is available on a sustainable basis from designated forest areas (Bangladesh has a small area of land under true forest coverage), homestead and road side trees, and other social forests. Cattle dung is an important source of biomass fuel in Bangladesh. There are about 22 million cattle in Bangladesh, which produce about 0.22 million tons of wet dung daily. There were about 130 thousand poultry farms with over190 million birds reported in the country in 2005-2006, producing an estimated 0.018 – 0.020 million tons of litter of daily. (LGED-FAO 2006, Zaman and Sarkar, 2008) According to Infrastructure Development Company Limited (IDCOL) sources quoted in 2010, Bangladesh has now has 215,000 poultry farms and 15,000 cattle farms where electricity could be generated by establishing biogas plants (Al-muyeed and Shadullah, 2010).

microfinance institutions (MFIs) will be strengthened to support lending to rural low-income households and businesses for the purchase of solar lanterns. Traditionally MFIs in Bangladesh have targeted income generating activities whereas this project focuses on consumer type products. This is where capacity building is needed in MFIs to extend credit. At the same time, the capacity of community-level enterprises will be strengthened so that they can disseminate the lanterns to their communities. Another important expected outcome is the creation of a favorable regulatory regime for the import of solar LED lanterns into Bangladesh that meet international standards.

The project will work with government agencies to create the appropriate regulatory regime that will include certification procedures for solar LED lanterns entering the program (for minimum durability, longevity and luminosity standards), lower taxes and reduced delays in permitting and licensing for the import of solar LED lanterns into Bangladesh. This intervention will protect a vulnerable population from the vagaries of substandard products and remove doubts regarding the long term reliability of project PVSLs.

With regard to delivery modality, the project will employ a "dealer sales" models where a dealer purchases complete systems or components from manufacturers or importers and sells them directly to households. The dealer sales model is being successfully implemented, amongst others, in Bangladesh. Delivery of solar LED lanterns will involve established business outlets such as small electrical shops and hardware stores in small towns along with a network of rural agents in addition to NGOs; this will introduce a market approach to the delivery modality and contribute to the program's long term sustainability by lowering risk profiles associated with lending to rural customers. GEF assistance will be critical for the continuation of support for buy-down grants and market development of solar LED lanterns towards full commercialization.

Under this component, 150,000 to 200,000 lanterns will be disseminated to rural households and enterprises. Each lantern offsets 4 liters of kerosene per household per month, which translates into a reduction of 100 kilograms of CO_2 per household per year, leading to a total reduction of 177,000 tonnes of CO_2 by the end of the project and 820,000 tonnes of CO_2 by 2020.

Component 4: Renewable energy investment scale-up

This component is expected to result in four outcomes: (a) the establishment and operation of the SEDA fund; (b) demonstrated capacity on the part of SEDA to manage the SEDA fund effectively and to direct financial support to leverage commercial financing of RE projects; (c) an increased number of financial closures on wind, solar and biomass energy projects; and (d) an increased share of renewable energy in Bangladesh's power generation mix. Support will be provided to assist SEDA in initiating and managing the Sustainable Energy Development Authority Fund to support RET application projects and other activities of the Authority. The SEDA Fund is included in pending legislation that indicates that it may be used to support programs, incentives, innovative financing mechanisms and other activities required to fulfill the objectives of this Act. The GEF project will provide both seed capital for the SEDA fund as well as technical assistance in designing programs and incentives that address financial barriers to RE power generation projects.

The SEDA fund will finance the design, engineering, installation, operation and maintenance of a number of renewable energy power generation projects. This will include wind power generation, solar mini-grids, solar irrigation pumps, and biomass power generation through technologies such as biomass gasification and commercial biogas plants. This program will facilitate the commercial development of at least 10 MW of generation capacity that could include grid-connected, mini-grid, agricultural pumping, and other applications. Based on the review of the Feni wind project, the refurbishment and operation of this wind project may be carried out if found feasible during the project design stage. Given current constraints and the low baseline level, a 10 MW target is deemed realistically achievable within the project timeframe. However, as the governance

environment improves in Bangladesh, the project will seek to scale up the SEDA fund by mobilizing public and private funding for subsequent large-scale investments in RE technology.

The outputs from the activities that will be carried out under this component include: (a) Completed engineering and implementation plans for the installation of operational projects of 10 MW or more of renewable energy power projects; (b) Commissioned and operational renewable power projects including at least: 3 MW of wind power generation, 3 MW of solar power generation, and 4 MW of biomass power generation capacity; (c) Performance reports on the operation of the projects; and (d) Approved plans for additional RE projects for implementation as a replication of, or influenced by, the investments supported directly by this program. SEDA will work closely with private entrepreneurs, community organizations and other NGOs as well as relevant government agencies to realize these projects.

Without these planned interventions and successfully developed and implemented renewable energy-based power generation projects, it is difficult to see how RE will contribute significantly to Bangladesh's national energy mix. It will be difficult to attract independent renewable energy power producers. Without the removal of the identified barriers, the grid-connected renewable electricity market will be slow to develop, if it develops at all. The goal of the project is the reduction of the annual growth rate of GHG emissions from fossil fuel-fired power generation. To contribute to the achievement of this goal the project will create investment friendly conditions by removing a range of knowledge, policy and regulatory, institutional and financial barriers. This includes developing 10 MW of power generation with renewable energy technology and to facilitate the formation of public-private partnerships for future renewable energy technology development. The global environmental benefits from the RE projects will be achieved by displacing diesel fueled power generation, from the on-grid marginal generation capacity and off-grid diesel power generators in some cases, and also by removing methane emissions from baseline animal manure management practices, reducing GHG emissions by over 35,000 tonnes CO_{2e} per year.[9] Over an estimated 20 year life of these projects the cumulative reduction would be at least 700,000 tonnes CO_{2e}. When taking into account the solar lanterns component, total direct GHG emission reductions will be 212,000 tonnes of CO_{2e} during the project lifetime and 1,520,000 tonnes of CO_{2e} over 20 years.

B.3. Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF). As a background information, read Mainstreaming Gender at the GEF.":

At the national level, the project can provide broad benefits in terms of promoting general economic growth. It has been estimated that economic growth could be 2% higher if power shortages could be eliminated (Rahman, 2010). Faster economic growth will promote growth in jobs and incomes with a range of related socio-economic benefits. Renewable energy projects and subsequent market development will contribute to this. Renewable energy resources will also provide power without the damage to the environment that currently results from fossil fuel based power generation. Damage to the environment falls unevenly on the poorest of the poor, disproportionately women and children, who often rely on natural resources for livelihoods or live in locations most heavily exposed to pollution.

[9] The numbers are from anticipated minimum solar, wind and biomass projects facilitated by this project that would not be successfully implemented without it. The specific numbers are available for review.

B.4 Indicate risks, including climate change risks that might prevent the project objectives from being achieved, and if possible, propose measures that address these risks to be further developed during the project design:

Risk Description	Mitigation Measure	Level of Risk
Terms and conditions for replication phase are not sufficiently attractive for private investors (IPPs)	The project will be designed to minimize the risk profile of RET projects in Bangladesh. Elements that may influence risk to the investor as well as to the utility (the buyer) will be minimized because issues related to resource availability, tariffs, intermittent generation, off-take and payment guarantees will be adequately addressed through the components of the project that strengthen capacity, improve resource assessment information, support improvements in the policy and regulatory environment and improve the financial climate for RE projects. The success of these activities in mitigating risk factors will be highlighted through the experiences that will be drawn from the successful completion of RE projects. Project activities will be implemented in partnership between the party investing in the project and the government so that both perspectives, that of the potential private investors and the government will be reflected in the final policy documents. The GEF project will concentrate resources and attention on the relatively modest RE projects in order to increase the potential for replication.	Substantial
Delays due to lack of government capacity	The project will be designed for implementation by a nodal agency, SEDA, whose mandate is to develop renewable energy projects.	Modest
Wind development will be in coastal areas susceptible to sea level rise, storm surges and high winds from more frequent and severe storms. Agricultural production could be affected and availability of waste as feedstock for power projects could be at risk.	As a part of the technical assistance and capacity building, and in the RE projects, these risks will be evaluated and the appropriate mitigation actions planned for. There is already some experience with measures to prevent storm damage to coastal wind projects. Biomass projects will be designed to use only part of the available excess waste material, with a safety margin for lower production years.	Modest over the long-term

B.5. Identify key stakeholders involved in the project including the private sector, civil society organizations, local and indigenous communities, and their respective roles, as applicable:

Stakeholder	Role
Sustainable Energy	(SEDA) will have primary coordination responsibility for

Development Authority (SEDA)	development of renewable energy technologies (RETs) under this project and ultimately in Bangladesh. It will develop and recommend policies, regulations, tariffs and incentives; implement incentive education, capacity building, technical assistance and other programmes approved by the Government; develop, maintain and disseminate knowledge resources; and monitor implementation of programmes, compliance with policies and regulations, and results of RET activities. It will recommend to the Government actions to correct problems with compliance or other results. SEDA will work with the following stakeholders to support their roles and responsibilities.
Government	Policy makers, officials and technical staff in the Power Division of MPEMR, the Bangladesh Energy Regulatory Commission, and other Government organizations are responsible for policy and regulatory actions to promote RETs for power generation.
Semi-governmental organizations	The Bangladesh Power Development Board, the Rural Electrification Board, and other power distribution organizations are responsible for developing technical arrangements for purchase of power from RET projects and integrating this power into the operation of the grid.
Private sector organizations	Project developers, technology manufacturers, fabricators and installers, engineering services and other technical organizations must provide the technology, materials, and technical expertise to construct install operate and maintain RET power generation projects.
Trade associations	Trade associations can play a very effective role in disseminating information, organizing training, and otherwise encouraging members to engage in RET power generation projects wherever warranted. Commercial financial institutions can provide financing on terms that will be attractive to developers and will facilitate the rapid development of renewable power generation in Bangladesh They must be assisted to develop better understanding of the risks and economic benefits of RETs.
Civil society organizations	Civil society organizations, non-profit environmental and public interest organizations, community organizations, can in some cases function as project developers to facilitate projects that are particularly oriented toward specific development or other local community benefits. These organizations also play an active role in advocating for project designs, technologies and financial arrangements that reduce unwanted impacts and provide net positive benefits for local communities, the environment and specific target groups, such as women and children.
Development partners	Development partners, particularly development banks, can provide guarantees, co-financing or other incentives and technical capacity to commercial banks to encourage financing of RETs.

B.6. Outline the coordination with other related initiatives:

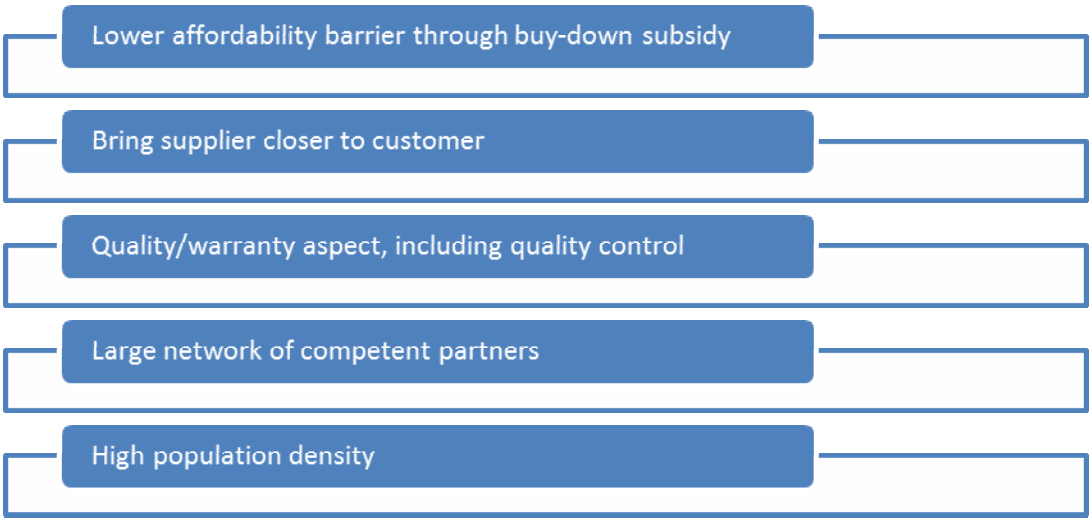
GoB is in the process of implementing the existing “Renewable Energy Policy” to create a more investor friendly environment, creating an “Energy Conservation Act”, and gearing the Ministry of Power towards a more focused approach to application of RETs. Development partners (i.e. World Bank, UNDP and GIZ) are involved with these activities. GIZ has joined with this proposed project as a co-financer and will be working with the project team to ensure that the

components funded by each organization fit into the overall strategy. All donors active in RE power generation will be invited[10] to participate in the Project Board.

The Ministry of Power, Energy and Mineral Resources has announced plans to tender for independent power projects to generate 200-300 MW of wind energy, as well as significant solar power generation, with the help of development partners. This project would provide essential impetus to this long-term plan. A national Project Board will be formulated to ensure proper coordination and oversight of the preparatory activities. Through workshops and interviews and follow up involvement the project will work closely with the implementers and owners of the previous renewable energy projects in the country in order to draw lessons from those projects and incorporate those lessons into the design of this proposed initiative.

The biggest and most successful RE initiative to date has been the SHS program, which involves an extensive network of development partners and NGOs, most notably IDCOL, GIZ, KfW, World Bank, ADB, Islamic Development Bank, Grameen Shakti, and BRAC. The figure below highlights some of the key success factors of the SHS program.

Success Factors of GEF/WB Solar Home Systems Project



Source: Meeting with GIZ on 25 May 2011.

The GEF project will not invest in SHS as it is already a relatively mature technology in Bangladesh and has already received wide-ranging support over a number of years. Based on the successful model established under the SHS initiative, the GEF project will support the market development of promising RE technologies such as household bio-digesters and solar LED lanterns. In this respect, the GEF project will work closely with GIZ and IDCOL in particular to identify areas where GEF funding can add the most value. UNDP Bangladesh has a long-standing relationship with GIZ and will leverage that partnership as much as possible. GIZ will be an important co-financier and partner in the GEF RE program.

On solar irrigation pumps and solar mini-grids, the project will coordinate closely with the Power Division, Ministry of Power, Energy and Mineral Resources and IDCOL to identify gaps

[10] There are relatively few donors actively involved in promoting RE power projects. The resources are limited and should be coordinated as effectively as possible. To the extent that this GEF project can facilitate cooperation and dissemination of lessons learned to all active donors, this increases the probability that share of RE in power generation will increase rapidly and the Governments ambitious goals will be achieved. Including these donors in the steering committee will encourage better cooperation and information sharing.

that GEF can fill. IDCOL will also be an important partner for the installation of biomass power plants, along with the private sector.

C. DESCRIBE THE GEF AGENCY'S COMPARATIVE ADVANTAGE TO IMPLEMENT THIS PROJECT:

For over 20 years UNDP has been involved in providing technical assistance for renewable energy development to developing countries with a focus on poverty alleviation and energy security. Over 2,000 such UNDP projects have been implemented, including but not limited to a number of GEF-funded projects on the promotion of renewable energy. Moreover, UNDP has assisted developing countries to attract and use aid effectively and also develops local capacity. UNDP works with multiple stakeholders from public and private sectors, technical experts, civil society, and grassroots level organizations and stakeholders. The multi-dimensional development perspective, cross-sectoral working ability and inclusiveness in constituency building are UNDP's greatest strengths as a partner and define its development niche in Bangladesh.

C.1 Indicate the co-financing amount the GEF agency is bringing to the project:

UNDP Bangladesh will contribute $5,000,000 in grant financing to this project from its Green Development Program.

C.2 How does the project fit into the GEF agency's program (reflected in documents such as UNDAF, CAS, etc.) and staff capacity in the country to follow up project implementation:

The proposed project forms an integral part of UNDP Bangladesh's Green Development Program, which is currently under development. The Green Development Program, which will guide UNDP's environment and energy work in Bangladesh over the next five years, will be approximately a $30-40 million program, with renewable energy constituting a large component along with institutional capacity building of SEDA. Furthermore, the UNDAF for the period 2011-2015 includes the outcome: **Low-carbon green growth and enabling environment for pro-poor access to clean energy promoted.** Outputs to achieve this include one to strengthen capacity to promote rapid deployment of energy efficient and renewable energy technologies. This project is in line with the UNDP's effort (as stipulated in the abovementioned UNDAF outcome and output) to promote deployment of renewable energy technologies in Bangladesh.

This project is directly responsive to the Country Programme Action Plan (CPAP) 2006-2010, **Expected Outcome 2.1** "Increased access to sustainable energy services resulting in human and income poverty reduction" and **output 2.1.3**: Equitable access to appropriate, reliable and affordable sustainable energy services enhanced, creating positive impacts on socio-economic indicators including poverty reduction section, **Proposed Programme narrative sections 4.9**: "UNDP will assist the Power Division of the Ministry of Power, Energy and Mineral Resources to establish a solid foundation for sustainable energy development." **and, section 4.13**: "UNDP will support the Power Divisions of the Ministry of Power, Energy and Mineral Resources for review and formulation of appropriate policies for sustainable energy in the country."

UNDP Bangladesh has a long history of successful cooperation with the Government, private sector and other stakeholders to promote clean technology and environmental benefits. It has also supported capacity development and policy and programme implementation including the Renewable Energy Policy of 2008, and the draft Energy Conservation Act under review by the Government. UNDP Bangladesh will build on this experience in management of this project and will also draw on the technical experts available in the UNDP Asia-Pacific Regional Centre in Bangkok to advise and assist the project.

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter(s) with this template. For SGP, use this OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE *(MM/dd/yyyy)*
Mesbah Ul Alam	Secretary	MINISTRY OF ENVIRONMENT AND FOREST	**03/31/2011**

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF policies and procedures and meets the GEF/LDCF/SCCF criteria for project identification and preparation.					
Agency Coordinator, Agency name	**Signature**	**DATE** *(MM/dd/yyyy)*	**Project Contact Person**	**Telephone**	**Email Address**
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