



# 500 MW Solar Programme

2012-16

An initiative to promote renewable energy programme in Bangladesh



## Power Division

Ministry of Power, Energy and Mineral Resources  
Government of the Peoples Republic of Bangladesh

May, 2013

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# Message



**Secretary**  
Power Division  
Ministry of Power  
Energy & Mineral Resources

I am happy to know that Power Division is going to publish a booklet on the 500 MW Solar program. Through this publication Power Division has moved one step ahead and made a firm commitment for the implementation of this very vital and ambitious renewable energy program

As per government's Renewable Energy Policy 5% electricity would be generated by 2015 and 10% would be generated by 2020 from renewable energy sources which amounts to 800 MW and 2000 MW respectively. Through the implementation of this program a substantial portion of this target will be met.

It is also encouraging to know that in this program, the private sector has been identified as a vital partner. This 500 MW program will be implemented in two ways one is under commercial type and the other is under social type. The commercial type will be in the form of solar park, solar mini grid, solar water pump etc while social type will be implemented in community health centre, union information centre, religious installation, railway station etc. I would like to invite the development partners to come forward for implementing this very innovative venture of the government.

Besides this 500 MW solar program the government has taken various measures to scale up the contribution of renewable energy considering its environmental friendliness. Government has also decided that all public buildings should have solar power to complement its energy supply. Installation of IPPs based on solar and wind power have been put up for bid. Pilot projects of solar powered irrigation pumps are in operation. Commercial projects for solar irrigation and solar park are being implemented very soon. Solar mini grid projects are also being developed to take care of off grid areas.

I hope that this program will be another success story of the government through the concerted efforts of Government, private sector and development partners.

**Monowar Islam, ndc**  
Secretary



# Foreword



The Government of Bangladesh has prioritized power sector as per pledge of election manifesto. The vision of the government is to provide electricity to all citizens by 2016. Electricity is the engine of growth. With that in mind government is striving hard for power sector development. In spite of endeavor to increase electricity access, only 60% population (including RE) of the country has coverage. It is absolutely essential to integrate all the people of the country to maintain sustainable growth. However the reality is that only through grid power expansion the whole country can't be brought under electrification. Now time has come to explore all options of energy resources for sustainable development. It has been studied and found that Bangladesh is a good recipient of solar energy. The huge solar potential can be harnessed to supplement growing demands of electricity.

Government has approved Renewable Energy Policy in 2008. It has set a target to generate 5% electricity by 2015 and 10% by 2020 from renewable energy sources. It may be mentioned that Asian Development Bank has declared its vision "Asia Energy Solar Initiative" to develop 3,000 MW solar power in Asia and Pacific Region by 2013. ADB together with its partners have introduced Asia Solar Energy Forum (ASEF) as part of broader initiative to accelerate development of solar energy. Forum meeting was held in Manila on 5-6 July 2010. Hon'ble Adviser to the Prime Minister of Bangladesh Dr. Taufiq-e-Elahi Chowdhury BB envisioned achieving 500 MW solar power development in Bangladesh through the initiative of ASEF. The vision will be achieved through a concerted effort of Ministries and its agencies.

In this paper Government intends to figure out different options of solar power development projects under this programme. To implement the programme necessary guidelines have been prepared. This will facilitate to attract the prospective investors in this field. The strategy of the mission is to embrace 500 MW solar power by 2017. In order to implement this programme Government has also approved Remote Area Power Supply System (RAPSS) guidelines in 2007 for establishing power generation, distribution and supply of electricity in remote and isolated areas through private sector. Government has enacted an Act in the Parliament in December 2012 to establish Sustainable and Renewable Energy Development Authority (SREDA) which will be responsible to promote renewable energy, energy efficiency and energy conservation.

This paper has been prepared in order to accelerate the pace of solar power development in collaboration with Government, development partners, Donor Agencies and Private Sector. It will show the road of investment opportunities in private sector.

**Tapos Kumar Roy**  
Additional Secretary  
Power Division



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## Introduction

To achieve high economic growth as envisaged in the sixth five year plan, Government of Bangladesh has prioritized power sector development in a sustained manner. Equally it is realized that energy is the most key ingredient to alleviate poverty and to improve socio-economic development and uplift human life style. To achieve the target growth rate of GDP, it is absolutely essential that the minimum electricity growth rate is maintained at a factor of 1.5 GDP growth.

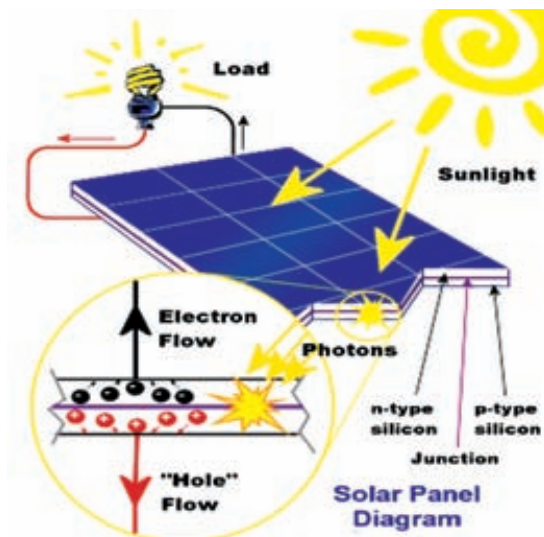
There is no denying that access to commercial energy is an essential building block for a modern economy. Bangladesh, an emerging economy in South Asia, is one of the energy starved countries in the world. Per capita electricity generation including captive power is 292 kWh which is one of the lowest in the world. In spite of continuous efforts to increase coverage, including solar power only 60% of its population has access to electricity. Present power generation capacity excluding 1500 MW of captive generation is 8,537 MW (12 May, 2013) of which private sector generation is mostly half to public sector generation. Presently the country faces a peak load shortage in hot summer of about 800-1000 MW.

Once power generation of Bangladesh was dominated by indigenous natural gas which was 90% during FY2010. Share of natural gas for power generation is 80.37% during FY2012 which is declined by 9.63%. It is estimated that the share of natural gas for power generation will be reduced by 52% and 20% during FY2016 and FY2030 respectively. Depletion of gas reserve has forced to shift primary fuel option from natural gas to liquid fuel and coal. Bangladesh is trying to reduce its more dependency on natural gas by diversifying sources of primary fuel. At present average cost of power generation is Tk 6.02/kWh while cost of diesel based generation is Tk 15.80 /kWh. Yet the cost of renewable energy is expensive compare to conventional energy but the difference is decreasing day by day.

Government has a vision to provide electricity to

all citizens by 2021 at a reasonable and affordable price. But it is fact that grid power will not be available in some remote and isolated areas for the next 20 years. As a result depend on conventional grid electricity expansion it is well understood that a large number of people will live without electricity for a long time. To improve Bangladesh's energy security and to establish a sustainable energy regime alongside of on grid energy sources, Government is placing its top most priority on developing off grid electrification programme from renewable energy resources in private sector. Government's target 2021 is very unreachable by grid power only because rest 40% people of the country live in remote areas which are far away from existing grid line and sometime isolated from main land.

Bangladesh is a recipient of sufficient sunshine round the year. Solar energy can be produced in all parts of the country. By this time solar technology is convenient, proven and well accepted in Bangladesh. It is environment friendly and price of solar panel is decreasing day by day. Natural gas reserve in the country is gradually depleting and price of liquid fuel rising beyond of control which is also same in case of coal market. Under the circumstances, Bangladesh Government has undertaken 500 MW solar mission. Government will provide legal and policy support and fiscal incentives.





## 2. Government Initiative on Renewable Energy Development

Government has approved Renewable Energy Policy in 2008 which became effective from 2009. The objectives of the policy are to harness the potential of renewable energy resources and disseminate it to the people and enable, encourage and facilitate both public and private sector investment. In this policy government set a target to generate 5% of their total electricity from renewable energy sources by 2015 and 10% by 2020. Government has also approved Remote Area Power Supply System (RAPSS) guidelines in 2007 for establishing power generation, distribution and supply of electricity in remote and isolated areas.

Immediate after renewable energy policy has been passed government initiated Solar Home System (SHS) dissemination programme with financial assistance of development partners. Capital buy down grant and concessionary loan has been line up through Infrastructure Development Company limited (IDCOL) a government owned financial institution to promote this initiative. As a result up to April 2013 about 2 million solar home systems (capacity is 85 MW) has been installed. The capacity addition from different sources are 100 MW from solar home system, 7 MW from photo voltaic solution and 332 MW from wind hydro and biomass. In

total 330 MW of power is now being generated from Renewable energy. About 8.0 million people are getting electricity and about 30,000 green jobs have been created under solar facilities. IDCOL implementing that programme through their Partner Organizations (PO). A selection committee enlisted POs on the basis of their past experience, institutional and financial capability. Solar panel and other ancillary equipment and appliances used by the POs have to certify by the technical committee of IDCOL.

Steps have been taken to establish solar mini grid and grid tied solar park in different locations. 52 solar irrigation pumps have been set up in rural areas to facilitate farmers to get water for cultivation in an affordable price. In order to harness wind energy wind mapping is going on in public and private sector. Also steps have been taken to identify other sources to harness renewable energy.

It is noteworthy that Solar Home System of Bangladesh is one of the fastest growing solar power promotion programme in the world. On average 2000 solar home systems are installed every day. Private sector has been identified as the most prospective partner in this mission. They are the project developer, technology supplier and in most cases O&M manager.





### 3. Institutional Framework for Renewable Energy Development

Government has enacted legislation in the Parliament in December 2012 for establishment of Sustainable and Renewable Energy Development Authority (SREDA). The objectives of SREDA will be to promote develop and co-ordinate renewable energy and energy efficiency programme in the country. This institution will also prepare short, mid and long term plan to meet the target set by the government. In the meantime renewable energy wings have been set up at different organizations to assist and implement renewable energy programmes and activities. Government has taken necessary initiatives to establish SREDA immediately. Two separate rules i.e. Renewable Energy Rule and Energy Efficiency and Conservation Rule have already been drafted under SREDA Act. Steps have been taken to operationalize SREDA.

### 4. 500 MW Solar programme Development Strategy

This is the largest ever Solar Power Development Mission in Bangladesh which is adopted in 2012 in accordance with vision of RE Policy. This mission will be implemented with active collaboration of a number of government ministries and their affiliated agencies hosted by Power Division. The mission is expected to be completed by 2016. The mission aims at strong involvement of private sector participation for project implementation. It is also under plan to harness CDM benefits from the programme as applicable.



### 5. Objectives of 500 MW Solar programme

Government has set a target to generate 5% electricity by 2015 and 10% by 2020 from renewable sources which is in terms of capacity are 800 MW and 2000 MW respectively. Government has undertaken various activities to promote renewable energy from different sources like solar, wind, biomass, bio-gas, hydro, tidal and wave to achieve the target. Among those, government has identified solar power as one of the most potential sources for sustainable energy development. The strategy of the mission is to embrace 500 MW solar power by 2016 as part of the policy at affordable price. To this end Government will encourage private sector involvement in this mission. The mission will be implemented in public and private sector. Major portion of this mission which is equivalent to 340 MW will be implemented by the private sector. To ensure competitive advantage it is also undertake a plan to harness CDM or similar type of benefits from the programme as applicable.



## 6. Types of Projects under this programme

Considering project financing, implementation approach and modus operandi, projects are categorized in two types: Commercial Projects and Social Sector Projects. Commercial projects will be implemented, operated and maintained by the private sector. While public sector projects will be implemented by the different ministries and agencies as a part of social responsibilities of the government. Share of commercial and social projects are:



Type of projects	Capacity addition in MW
Commercial Solar Power Projects	340
Social Sector Solar Power Projects	160
<b>Total (MW)</b>	<b>500</b>

Commercial type projects are again categorized into different options on the basis of initial potentiality.

SL	Type of Projects	Capacity addition in MW	
1	Solar Irrigation	150	
2	Solar Mini Grid	25	
3	Solar Park	135	
4	Solar Roof-top	Residential and Commercial Building	10
		Industrial Building	20
<b>Total</b>		<b>340</b>	

Only half of our total populations are covered by the grid electricity. Rest half are out of grid yet and most of them are leaving in rural villages. Considering the quality lighting need for the rural community government intended to disseminate solar power systems in rural areas.

SI	Type of Project	Capacity Addition in MW
1	Solar electrification in Health Centers	50
2	Solar electrification in Remote Educational Institutions	40
3	Solar electrification at Union e-Centers	7
4	Solar electrification in Religious Establishment	12
5	Solar electrification at Remote Railway Stations	10
6	Solar PV System in Government and Semi-Government Offices	41
<b>Total</b>		<b>160</b>



## 6.1. Commercial Solar Power Projects

Commercial project will be build, owned and operate by the private business houses. Government will facilitate private sector with fiscal and financial assistance as well as with investor friendly policy and capacity building support.



### 6.1.1 Replacement of Diesel Irrigation Pumps with Solar Power

Bangladesh predominantly an agrarian country having 14.76 million hectares of total land of which 8.3 million hectares are net cultivable and 7.56 million hectares are irrigable. Irrigation is considered as a necessary precondition to enhance agricultural production. There is abundant water in rainy season but limited water in Boro season (January -April) when plenty of water is needed for irrigation. According to Bangladesh Agricultural Development Corporation the history of the development of irrigation system in the country is of 52 years. During this period different types of equipments were introduced distributing irrigation water to the cultivated land.

Agriculture played a dominant role in the growth and stability of the economy of Bangladesh. Energy, Water and Agriculture together form a formidable synergy, which when appropriately utilized and managed, can drive a nation way forward - whether developing or developed. In the FY 2011-12, the agriculture sector of Bangladesh contributed 19.29% to the GDP which was 20.01% and 20.16% in FY 2010-2011 and 2009-10 respectively (Bangladesh Economic Review-2012). Around 60~70% of the population relies heavily on agriculture for their livelihood and it contributes greatly towards food self-sufficiency objectives of the country.

Country's agricultural sector has long tradition of being dependent on rain water for irrigation. However, mechanized irrigation took ground during early seventies with a view to increase agricultural productivity to meet the demand of growing population. Since electrification is still a challenge, majority of the irrigation pumps were diesel-driven. Irrigation pump has been considered as a major intervention in ensuring food security.

According to the Minor irrigation survey report 2011-2012 conducted by Bangladesh Agricultural Development Corporation (BADC) there are about 1.42 million diesel operated irrigation pumps operating in the country. This pumps requiring about 1 million MT imported diesel per year. Considering the energy crisis of the country and increasing price of petroleum products across the world, it is important to explore alternative energy sources for irrigation





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to ensure food and energy security as well as climate change mitigation. In this context, the application of solar irrigation pump has tremendous potential. Considering the scarcity of land to set up solar panels two tire solar irrigation for cultivation is under examination.

Solar powered irrigation system is an innovative, economic and environment friendly solution for the agro-based economy of Bangladesh. This system mainly consists of solar panels & solar power operated pump. Primarily diesel operated Shallow and Low lift pumps preferably using in triple crop areas were targeted to replace by the solar irrigation pumps. Average capacity of each solar pump will be 8 kWp with Head of 12-15 meters. Area coverage will be on average 13 hectares of paddy fields per pump. It is estimated that 18,700 diesel based irrigation pumps will be replaced by solar power under this programme.

### Implementation Arrangement

The project will be finance, monitor and supervise through Infrastructure Development Company Limited (IDCOL), a government owned financial institution under the Ministry of Finance. IDCOL will select NGOs, MFIs or private entities (called 'Partner Organization' or PO) to implement the programme on the basis of management capacity, financial strength and relevant experience. IDCOL will provide grant and concessionary loan and necessary technical and promotional support to the POs for successful implementation of the programme. POs will be responsible for selection of areas and target customers. They will install pumps including O&M operation and deliver water to the farmers. The farmers will form a "Farmers Group" to facilitate community based management of water supply. The Farmers Group will pay water tariff to the POs. POs will repay loan to IDCOL.

### Benifits :

**Oil market** is very volatile. Every drops of Diesel is imported in the country. Government has to provide subsidy to keep the Diesel price affordable to the farmers as well as other consumers. Transportation of Diesel from port city Chittagong to in country oil depots and further to remote villages is also a challenge and costly.

However Bangladesh is blessed with abounded of sunshine. Solar irrigation can be a suitable alternative to avoid those limitations significantly. Total solar power capacity in this option will be 150 MW. Under this program if we can set up around 19000 systems with average capacity of 8 kW pick each will reduce 95000 liter diesel and significant amount of CO2 emission every day.



### 6.1.2. Solar Mini Grid Power System at Remote villages

Bangladesh predominantly is a rural based agrarian society. Access to energy services for cooking and lighting in off-grid villages of Bangladesh is limited - most rural households have to rely on kerosene lamps for lighting requirements and traditional stoves for cooking. Government has initiated different programmes and has given enormous efforts to bring mobility in rural economy. To energise the rural economy commercial model has been initially identified under the Rural Area Power Supply System (RAPSS) guideline to implement mini grid project through private sector in remote off grid areas. Gradually government has realize that Solar power especially SHS technology has accepted by the rural people as an affordable solution to meet their lighting need. To make this technology more useful and to reduce the dependency on conventional fossil fuel based electricity generation government identify solar mini grid as an appropriate solution to meet the lighting need of rural community. . With some modification of RAPPSS model an implementation arrangement has been developed where projects will be implemented under distributed generation integrating solar based generation & distribution management. In present arrangement, government will provide necessary fiscal and financial support to buy down initial investment cost through IDCOL to make electricity tariff affordable to the consumers.

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Initially 30 remote areas have been identified under this programme where grid expansion is not planned for next 15-20 years. Additional new areas will be identified to develop solar mini grid system on the basis of successful implementation. Total solar power capacity addition from this component will be 25 MW.

## Implementation Arrangement

The Operator will be franchised a particular area for 15-20 years through competitive bidding. SREDA/Power Cell will coordinate detail feasibility study, monitoring and supervision activities of mini grid projects. Necessary grant and concessionary loan will be provided through IDCOL. A Steering Committee will be constituted headed by Power Division official comprising members from the Power Cell, REB and IDCOL to monitor and supervise the implementation of the project including distribution, O&M and tariff realization. Project developer will own, operate and manage the project. If government within project period extends the grid electricity to the project area then owner will be allowed to feed the electricity into the grid for rest of the project period in a negotiated price.

## Benefits :

The project will ensure access to the quality electricity services to the remote villages that might not get access through conventional grid in next 15-20 years. Solar mini grid will help the villagers to have better income and livelihood practices which will in turn lift them from poverty line. Better health and education services and empowerment take place as supplementary effect.



## 6.1.3. Solar Park

Government has taken initiatives to reduce dependency on fossil fuel based electricity generation by developing grid tied Solar Park projects in government owned non-agricultural lands. Other than government khas land Bangladesh Railway has good amount of unutilized land and open spaces. Considering the future prospect of those lands can also be utilize by setting up solar park. Private owned uncultivable land will also be allowed to set up solar park. The power generated from the Solar Park will directly be feed into the grid on commercial basis. No Battery back-up will be required in this option. Primarily few potential sites have been identified under two categories. More exploration is underway. Estimated solar power capacity addition from this project will be 135 MW. Government will give assurances of buying the electricity generated from the system.





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## Implementation Arrangement

Solar Park will be implemented on Build-Own-Operate (BOO) basis. Project developer will be selected on solicitation process following IPP model. Pre qualification document will be prepared to select the qualified bidder among interested parties and only qualified are allowed to participate in the bid. Request for proposal will be issued in favour of pre qualified bidder. Bidding document will be processed in two envelop system one for technical detail and another for financial offer. The project contract period will be 20-25 years. Most of them will be in mega watt scale. Project with a capacity of 10 MW or more can be tied with national grid and less than 10 MW capacity can be feed into 11 or 33 kv line according to the availability of existing facilities..

Respective ministry/ division or any other organization under them shall coordinate detail feasibility assessment and initiate necessary processing for selection of generator. Location of the project, nature and types of land, size of land, communication, estimated capacity of the project and power evacuation facilities will be considered during feasibility study. BPDB or relevant distribution entity will buy power from the generator through a long term power purchase agreement. Land will be leased to BPDB or relevant distribution entity which would subsequently to have land lease Agreement (LLA) with the operator.

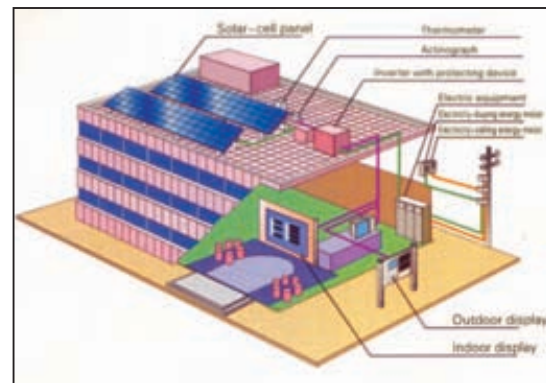
### Benifits :

Grid tie solar park based electricity generation will help to diversify the primary fuel mix in power generation and mitigate carbon emission. Success of the program may lead to low carbon development path and shall contribute ensuring energy security of the country.

## 6.1.4. Roof-top Solar Power Solution for Commercial and Residential Buildings

It appears that most of the roof tops in commercial and residential buildings are lying vacant either fully or partially. Government identifies this one as the potential side to install solar power and has issued directives as a pre-condition to get new electricity connection to

install solar panel by the consumers to meet their certain percentage of load. Aggregated capacity of about 4 MWp solar panel has been installed throughout the country under the government directive till December 2012. But many of those are failed to meet the desire expectation of the government due to lack of knowledge to harness maximum benefit from the systems. Most of those solar systems are now using to charge the battery used in IPS/UPS as a back up support to supply electricity during load shed.



## Implementation Arrangement

Solar power system will meet certain percentage of lighting and fan load demand from which building owner as well as government can be benefited. In this 500 MW solar programme building owner or developer in consultation with flat owner will identify the prospect of setting roof top solar system. Capacity of those systems may vary but not less than a kilo watt pick. Systems preferably tied with internal grid and use of battery will be discouraged. Energy Services Company (ESCO's) from private sector are allowed to participate in this operation. This project aims to extend credit facilities to the consumer as an incentive to install solar power solutions. Estimated solar power capacity addition from this project is 10 MW.

### Benifits :

Roof top solar power will reduce demand on grid electricity and encourage consumers to use at least a portion of their electricity uses from green and clean energy sources.



## 6.1.5. Installation of Roof Top Solar Solutions at Industries

Large numbers of roof top in industrial buildings are remaining unutilized for years together. Owners can benefited by putting solar photo voltaic system over those roof tops. Government is trying to encourage Industries to install solar panel to meet certain percentage of their demand from solar power. Solar power system will meet certain percentage of lighting and fan load demand. This Project aims to extend concessionary credit facility to the industries as an incentive. At initial stage 400 industries have been targeted. Estimated solar power capacity addition from this project will be 20 MW.

### Implementation Arrangement

Solar roof top system following IPP model on BOO basis can be developed in government and semi government buildings. Any individual or ESCOs may develop these projects. SREDA will extend their assistance to identify and design the project and select the investor. Project Company will identify through competitive bidding process. Capacity of each system will not be less than 10 watt pick. ESCO's will procure license from BERC before start business. Electricity generated from these systems may used by building owner for own consumption or may sale to the respective distribution companies. In case of selling electricity to the distribution companies prior consents need to be taken by the ESCOs from distribution companies. Tariff for these stations will be determined by the BERC considering the tariff estimation made and forwarded by SREDA.

### Benifits :

Primary objective of industry based roof-top solar power project is to reduce demand on grid electricity and to encourage industry owners using part of electricity from clean energy. In turn this will build awareness and create favourable attitude among industry communities regarding renewable energy and energy efficiency.

## 6.2. Social Sector Solar Projects

Social sector power projects will contribute to facilitate information access, enhance health services and ensure better livelihood for the rural communities. It is expected that proper implementation of the project will bring remarkable changes in the society. The total allocation for social project is 160 MW. As social commitment of the government different category of projects will be implemented by different ministries and departments under this programme. Projects will be finance through government allocation under revenue budget or development budget as part of Annual Development programme. Power Division or SREDA will provide technical support to identify and design those projects. It is expected that these projects will bring qualitative change to the society.



### 6.2.1. Solar Electrification in Health Centers

It is estimated that there are 18,000 Rural Community Clinics in remote villages. Many health units do not have either dependable supply or electricity facilities. Electricity is required for operation of health units, small/minor surgery and preservation of vaccinations and medicines. The solar electrification project would thus facilitate



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Under this project, to ensure the quality medical facility for the community and to encourage health worker to stay in the centre. Estimated solar power capacity addition from this project is 50 MW.

### Benifits :

This project is part of government's vision to ensure quality medical services to all. Improved access to medical services shall reduce mortality rate more specifically of the vulnerable woman and children. Timely and appropriate treatment could be extended to pregnancy related causes and elderly diseases.



### 6.2.2. Solar Electrification in Remote Educational Institutions

Government plans to introduce multimedia classroom facility in each school as a part of modernization of education system and to make IT facilities available before students. But many remote schools do not have stand by generators or electric facilities. This project aims to provide solar power systems to remote government and non-government educational institutions. The project would ensure power to run multimedia systems and computers which ultimately ensure quality education services to the rural people. Total solar power capacity addition from this project is 40 MW.

### Benifits :

Government declares their vision to ensure quality education to all. Electricity access and reliable supply shall facilitate better educational facility and learning environment for the students. More village children will be encouraged to have education. As a result, literacy rate shall increase and human

development index of the people will be upgraded. Educated people will be able to contribute to more productive businesses and thereby shall increase national GDP.

### 6.2.3. Solar Electrification at Union e-Centers

Government has taken revolutionary steps by setting up about 4501 Information Service Centers at union level. The Information Service Centers have been set up in order to ensure access to information to all citizens of Bangladesh. The project is being implemented by the Access to Information (A2I) programme administered by the Prime Minister's Office.

Since many of the unions do not have reliable electricity during day time, it would be sensible to install solar PV systems at the Union Information Service Centers so that the remote villagers do not suffer for electricity outage. 1013 e-Centers already have solar PV system. Among other appliances, the solar PV will run one/two computers, one laptop, one printer, one scanner and lights and fans at each Information Service Center. Total solar power capacity addition from this project is 7 MW.

### Benifits :

This project is part of government's vision to ensure access to information to all. Reliable electricity supply shall facilitate better and timely delivery of information to the villagers. Most important benefit of this intervention is the boosting up agricultural production through improved access to seeds and fertilizer and through immediate information on remedy of crop diseases. Specialized medical consultation is also possible to provide better treatment of patients. Apart from those facilities people can collect information on education, commerce, communication and they can also exchange information using e-mail which may develop their livelihood. Such contributions would definitely influence rural economy.



## 6.2.4. Installation of Solar Home System in Religious Establishments

Most of the religious establishments like mosques, temples, pagodas are operated through government and public support. Those establishments have occasional electricity usage time throughout the day on prayer times. Many remote areas establishments have no grid electricity. Solar electrification for these religious establishments would not only reduce pressure on grid electricity but would also ensure fulfillment of government's social commitment. Total solar power capacity addition from this project is 12 MW.



### Benefits :

Electricity access and reliable supply shall provide physical and social comfort to the religious community. Moreover it would displace same amount grid electricity and would reduce burden of costly expansion of grid.

## 6.4.5. Solar Electrification at Remote Railway Stations

Bangladesh Railway has so far 450 Railway stations. Many stations are at remote locations. In remote Railway Stations either do not have electricity access or reliable supply system. Passengers travel at night face lot of difficulties including security problem. Usually those stations have large roof top and also vacant land. Solar PV with battery back-up supply will ensure reliable electricity access to those Railway Stations. Total estimated solar power capacity addition from this project is 10 MW.

### Benefits :

Reliable Electricity access through solar power system shall ensure smooth operation of the railway stations and security of the railway equipment and accessories. It will also provide security and comfort to the railway passengers. Usually each railway station is surrounded by a growth center. This project will facilitate further development of those growth centers within its scope. Economic activities will expand due to reliable electricity supply. Subsequently human development will be ensured.

## 6.4.6. Solar PV System in Government and Semi- Government Offices

Government has a directive to install solar panel at government & semi-government offices by next three years to meet certain percentage of lighting and fan load demand. Capacity will vary depending on load demand and site condition. Battery back-up support shall be for 2 hours. Estimated solar power capacity addition from this project is 41 MW. Public Works Department will implement 25 MW project at Government Offices and 16 MW will be implemented by Semi-Government Offices.

### Benefits :

Objective of this initiative is to reduce demand on grid electricity and to encourage government and semi-government offices to use solar power as certain portion of their electricity demand. Options are also under consideration to use grid tied inverter and to deliver power to the grid as well.



### 7. Investment Requirement for programme Implementation

Financing is the most important key factor to implement 500 MW solar programs. It is estimated that 2.76 billion USD will be required to implement the programme. Out of which 1.77 b USD will be required for commercial projects. Financial support is expected from Development Partners in the form of grant 1.38 b USD and low interest credit 0.85 b USD. Remaining financing shall be arranged from government and private sector.

### 8. Fiscal incentives under the Policy

Several fiscal incentives have been declared for Renewable Energy project developers and investors. Dedicated funding support has also been extended through government financial institutions like Bangladesh Bank and IDCOL as well as through private commercial banks. Moreover, government has extended fiscal incentives including duty exemption on certain renewable energy products e.g. solar panel, solar panel manufacturing accessories, LED light, solar operated light and wind power plant.

### 9. Capacity Development

The ambitious vision for implementing 500 MW solar power programme requires institutional capacity building support both in public and private sector. Strong R&D support is needed. An integrated capacity development project on concession project agreement design, project financing, public-private-partnership infrastructure building, renewable energy

technology, CDM project preparation and to the extent of testing, labeling and standardization of the electrical equipment will be undertaken.

### 10. International Support

Government is firmly committed to achieve this landmark solar mission project. It will seek financial support from the Development Partners and donor agencies. The objective is to give grant and low interest credit support to the sponsor in order to buy down initial capital investment which will in turn provide lower tariff for the consumers. It is expected that all DPs will extend technical and financial support to facilitate implementation of the mission.