

EXPRESSION OF INTEREST ***(PHASE – II)***

INFORMATION BROCHURE

EXPRESSION OF INTEREST FOR DEVELOPMENT OF SOLAR POWER, HYDRO POWER, WIND POWER & BIOMASS POWER IN THE STATE THROUGH PARTICIPATION OF PRIVATE SECTORS



West Bengal Green Energy Development Corporation Ltd.
Bikalpa Shakti Bhavan, Plot No. J1/10,
EP & GP Block, Salt Lake Electronics Complex,
Kolkata 700 091
Phone: (033) 2357 5347/5348, Fax : (033) 2357 5347
Website: www.wbgedcl.com
e-mail: [wbgedcl @ rediffmail.com](mailto:wbgedcl@rediffmail.com)

:CONTENTS:

- 1) Introduction
- 2) Renewable Energy Based Power Generation Scenario in West Bengal.
- 3) About West Bengal Green Energy Development Corporation Ltd.
- 4) Renewable Energy Power Generation Technologies
 - A. Solar Photovoltaic Power Generation
 - B. Small & Mini Hydro Power
 - C. Biomass Based Power Generation
 - D. Wind Power
- 5) Prospective Location /Districts where Solar /Hydro/Biomass/ Wind farm could be set up
- 6) Renewable Energy Based Functional Demonstration projects in the State.
- 7) Facilities / Incentives Available.
- 8) Selection Procedure in General.
- 9) Last Date of Submission of Application.
- 10) Formalities to be observed after provisional allocation of the site(s).
- 11) Expression of Interest – Application Form.
- 12) Names & Addresses of Consultants (Tentative)
- 13) Names & Addresses of Manufacturers (Tentative)

1. INTRODUCTION:

The State of West Bengal is blessed with abundant source of Renewable Energy in the form of Solar, Wind, Biomass, Hydro etc. This perennial and eternal source of energy has a vital role in the socio – economic development of the country. In addition, owing to environmental compulsions and the fast depleting finite fossil fuels, Renewable Energy Sources like Solar, Wind, Biomass, Hydro etc. have started occupying a central position in the area of Global Energy generation and supply. The spread of various Renewable Energy technologies has been added by a variety of policy and support measures. A whole range of institutional arrangement has been evolved in the state for these programmes. Financial Institutions are coming forward to finance Renewable Energy based Power Projects. The estimated Renewable Energy potential of the state of West Bengal is more than 1000 MW other than solar power, which is almost limitless. In the area of power generation from Renewable sources, over 80 MW of power generating capacity based on Renewable Energy sources has already been installed in the state. Under Private Sector about 50 MW, Renewable Energy power projects are under implementation now. The total investment shall be Rs.600.00 crores. This figure however, does not include large Hydro Power. Obviously, a vast potential of Renewable Energy Sources remained untapped. The present estimated potentials (already identified) of Renewable Energy Sources other than solar energy are as follows:

➤ Solar Photovoltaic	: 1600 MW
➤ Small and Mini Hydel	: 250 MW
➤ Biomass	: 250 MW
➤ Wind Power	: 450 MW
➤ Energy from Municipal Solid Waste	: 150 MW
➤ Biogas based Power Generation	: 10 MW
➤ Biomass (non grid connected type in Sundarbans)	: 5 MW

Promoting of Renewable Energy seems to be strategically an important issue keeping in view energy security and sustainable development while encouraging clean technology for this purpose. Generally the Renewable Energy Power Generation Projects are eligible for CDM benefits. In addition Renewable Energy Projects are also eligible for various financial incentives. It is in this context, West Bengal Green

Energy Development Corporation Limited (WBGEDCL), a Government of West Bengal Company invites Expression of Interest for promotion of Renewable Energy Projects through involvement of the Business Community in promoting Green Power in large measures resulting in benign environment for the future generation.

2. RENEWABLE ENERGY BASED POWER GENERATION SCENERIO IN WEST BENGAL:

The state of West Bengal has done significant work in the sector of Renewable Energy sources. However, most of the Renewable Energy systems are off grid type. Only in the recent past grid connected Renewable Energy project activities have been started in the state. At present following grid connected Renewable Energy Projects are under operation in the state. Some are likely to be commissioned shortly:

- 1) 2 MW Wind Farm project at Freserganj.
- 2) 6.5 MW Rice Husk based Biomass project at Raina, Burdwan.
- 3) 10 MW Rice Husk based Biomass project at Bankati, Bankura.
- 4) 3 MW Small Hydro project at Lodhama.
- 5) 3 MW Small Hydro project at Neora.
- 6) 2 MW Solar PV project at Jamuria, Asansol.

In addition about 80 MW Renewable Energy grid connected projects are being installed in the state by different private parties. The projects are in different level of implementation.

This booklet will provide the information to the prospective investors in regard to the procedures to be followed for investment of private sectors / corporate body / institutions etc. for investment in Solar Energy, Small Hydro, Biomass, Wind Power Projects in the green power generation sectors.

3. WEST BENGAL GREEN ENERGY DEVELOPMENT CORPORATION LIMITED:

West Bengal green Energy Development Corporation Ltd has been created by the Govt. of West Bengal to promote Private Sector participation in the Renewable Energy. The objectives of the Company to promote investment in grid connected

renewable energy projects and various green energy sources and develop and execute special renewable energy projects on commercial/demonstration basis. The Corporation will also assist the Developers in respect of getting different incentives in regard to implementation of Renewable Energy Projects. The Corporation will also assist the private Developers in regard to coordination with various line departments.

4. RENEWABLE ENERGY POWER GENERATION TECHNOLOGIES:

A) Solar Photovoltaic Power Generation:

Many parts of West Bengal are endowed with abundant amount of Solar Radiation, which can be directly converted into grid quality power. This is done by use of Solar Photovoltaic cells, which directly convert the visible spectrum of incoming Solar Radiation onto them and directly fed to grid after reconditioning the power. The potential of such power generation in West Bengal is estimated to be 16000 MW though it is not possible to tap all of it but a substantial amount of it can be tapped depending upon the availability of sufficient land and some other factors such as availability of optimum solar radiation, sufficient sunshine hours, availability of grid etc. The most promising sites are in the district of Purulia, Bankura, Burdwan, Birbhum etc. The main advantages of producing power through Solar Photovoltaics are eternal source, clean & ecofriendly due to no carbon generation, low maintenance. Land requirement for such power generation systems is generally of the order of 3 to 4 acres per MW and approximate cost at present is about Rs. 20 crore per MW.

The basic system components of a typical Grid connected Solar Photovoltaic (SPV) Power Plant are:

- ◆ SPV Arrays consisting of SPV modules
- ◆ Module Interconnection arrangement
- ◆ Power Conditioning Units
- ◆ Suitable control systems with metering
- ◆ Power transformers

◆ Power evacuation arrangement

Generation Based Incentive from Ministry of New and Renewable Energy, Govt. of India is available for such generation and sale to the grids of the Power Utilities subjected to certain conditions. Besides this in West Bengal separate feed-in tariff is also available for such generation and sale to grid. The tariff order of West Bengal State Electricity Regulatory Commission is annexed at Annexure – I.

B) Small & Mini Hydro Power:

Small & Mini Hydro Power harnesses small rivers and streams, typically with plants less than 10 MW in size. In the State of West Bengal the potential of Small Hydel Power is estimated to be 250 MW. Most of the sites are located in the hilly areas of Darjeeling District. There are some canal drop hydro potential sites in the District of Birbhum, Bankura and Burdwan. Most of the sites in Darjeeling Districts are suitable for high and medium head turbines. The sites are generally located at a distance of 2 – 5 km from the motorable road.

A typical lay out of small hydro power stations comprises of:

- ✓ Diversion Weir / Barrage
- ✓ Power Channel
- ✓ De-Sitting Devices
- ✓ Fore Bay Tank / Balancing Reservoir
- ✓ Penstock
- ✓ Bypass Arrangement / Spill Ways
- ✓ Power Plant Building
- ✓ Equipment
- ✓ Power Evacuation Arrangement

The per MW cost of Small / Mini Hydel Station generally varies from Rs.6.00 crore to Rs.7.00 crore depending on the location of the site, head and discharge. Carrying out of survey & investigation (S&I) is must before executing any small hydro project. WBGEDCL has already carried out the Primary Survey and Investigation work for

most of the prospective sites. The reports are available with WBGEDCL. There are many consultants in the country who prepare the Detailed Project Report (DPR) for Small and Mini Hydel Station. Name and address of few such Consultants could be seen from the booklet. The financial institutions will ask for DPR before funding any project. In order to utilize the power either as captive or buy back arrangement with state utilities the developer will be required to execute an agreement in the form of PPA which shall also be required by the FI.

Presently some subsidy is available for Small and Mini-Micro Hydro Power Projects.

C) Biomass Based Power Generation:

All the earth's living matter together is termed as Biomass. This Biomass is a source of energy fixed from the energy of the Sun. Among the various Renewable Energy alternatives the extraction of energy from biomass is one area, which holds considerable promise for the developing countries such as India, and it is receiving increasing attention. In Rural India Biomass provides about 90% of the total energy need because of non-availability of cheaper commercial fuel. Burning of cattle dung-cake, wood and agricultural residues has been a traditional practice in India. However, at present, technology is available to generate electricity from the Biomass, both woody and agricultural residue. The State of West Bengal is one of the leading States in the country in respect of rice production. As such huge rice husk is available in the state, which could be gainfully utilize for production of electrical power either through Gasifier route or through combustion route. Generally in Gasifier route up to 1 MW power could be generated through a single unit and in combustion route of size of the plant varies from 200 KW to 6 MW. In direct combustion route biomass (Rice Husk / Woody) is burnt directly to raise heat in boiler plant to supply process heat or to raise steam in order to generate electricity using standard steam turbine plant. In gasification process biomass is partially oxidize at temperature of around 800 to 900°C to produce a combustible gas. The gas is cleaned to remove tar and other contaminants, such as particular and alkali metals before being fed to a gas engine. There are a wide variety of gasification reactor concepts available including updraft, down draft and fluidize designs. In combustion route Biomass based power plant up to 10 MW may be considered. This power shall generally be fed into the grid.

Generally 1.0 kg of dry rice husk or woody biomass is required to generate 1 kWh of electricity. For setting up of any biomass based Power Plant availability of rice husk or other woody biomass is very important. Cost of setting up of 1 MW of rice husk based power plant (Combustion Route) varies from Rs.4.00 crore to Rs. 5.00 crore depending on the technology. The cost of generation varies from Rs.2.00 to Rs.3.00 per kWh. In Gasifier mode both 100% producer gas based engine and dual fuel engine could be run. Woody biomass based Gasifier generally run from Biomass available from Energy Plantation. The Biomass gasifier which recess with 100% produces gas is generally expensive and cost varies from Rs. 6.0 crores to Rs. 7.0 crores per MW.

Presently some subsidy is available for Biomass Gasifier Project. Level of Subsidy varies according to system.

D) Wind Power:

The power of wind is a force to be reckoned with and one that is increasingly recognized as a part of the solution to both the energy and climate change facing the world today. Modern Wind Turbines harness the energy present in the wind and convert it into electricity providing a secure supply without harmful waste products or emissions, from the source that is free and eminently sustainable. The wind power technology is matured now. Single machine of capacity ranging from 250 kW to 1.5 MW are available in Indian Market. Three things are very important in respect of harnessing wind power: -

- a) Adequate wind speed (generally not less than 18 kmph annual average at 25 m height).
- b) Adequate land (generally minimum 10 acres / MW)
- c) Stable grid supply.

Some of coastal areas of West Bengal fulfil the above conditions. However, annual wind speed of the coastal areas of West Bengal is just slightly above than the minimum requirement. As such Plant Load Factor (PLF) of wind farm in West Bengal is comparatively low. According to estimate of WBGEDCL, from a 1 MW Wind

Farm in West Bengal maximum of 15.0 lac unit of electricity could be generated annually with present level of technology. The cost per MW works out to be slightly more than Rs.4.0 crores. The Unit cost works out to be in the range of Rs.3.00 to Rs.4.0 per kWh. However, large size machines could give better results. While wind turbines are most commonly classified by their rated power at a certain rated wind speed, annual energy output is actually a more important measure for evaluating a wind turbine valued at a given site. Wind turbine operators don't get paid for producing a large amount of power for a few minutes. They get paid by the number of kilo Watt hours (kWh) their turbines produce in a given time period.

5. Prospective Location /Districts where Solar /Hydro/Biomass/ Wind farm could be set up:

A. Solar Photovoltaic Power Plant: The entire districts of Purulia and Bankura and some part of Burdwan and Birbhum districts are suitable for Solar Photovoltaic Power Plant with annual generation in the range of 1.5 million units per MW.

B. Small and Mini Hydel Project available for development (Private Sector) (all in Darjeeling District)

Sl. No.	Location	Capacity (kW)
1	Balason Stage – I I	4500 (DSI Report N.A)
2	Any other location as identified by the Entrepreneur shall also be considered other than the listed locations indicated in Annexure – II.	Capacity – to be shown by the Developers.

C. Name of Districts where Rice Husk based Biomass Project could be set up (Private Project) Grid Connected.

Sl. No.	District	Capacity (MW)	Remarks
1	Hooghly	20	Biomass Resources Survey Report available for Dhaniakhali and Pandua Blocks.
2	Birbhum	10	Biomass Resources Survey Report available for Dubrajpur and Sainthia Blocks.
3	Midnapore (East & West)	10	Biomass Resources Survey Report available for Jhargram, Salboni and

			Sutahata – I & II Blocks.
4	Mushidabad	10	Biomass Resources Survey Report available

D. List of Prospective Wind Farm sites (Private Sector Project)

Sl. No.	Locations	Block & District	Capacity	Remarks
1	Bakkhali & Freserganj	Namkhana, South 24 Parganas	20 MW	GRID Connected
2	Sagar Island	Sagar, South 24 Parganas	2 MW	Grid is likely to be available in next 1 year.
3	Coastal Belt of East Midnapore District	East Midnapore District	15 MW	Wind data indicate possibility if setting up of large size wind farm project in that area.

6. NAMES AND ADDRESSES OF DIFFERENT RENEWABLE ENERGY BASED FUNCTIONAL DEMONSTRATION PROJECTS IN THE STATE OF WEST BENGAL.

A. Name and Address of demonstration projects on Solar PV Power Plant, Small & Mini Hydel Plant, Rice Husk based Biomass Plant, Wind Plant.

Sl. No.	Demonstration project	Address	Capacity
1.	Solar PV Grid Connected Project at Jamuria, Asansol	West Bengal Green Energy Development Corporation Ltd. Bikalpa Shakti Bhavan, Plot No. J-1/10, EP & GP Block, Salt Lake Electronics Complex, Kolkata – 700 091	2 MW
2.	Small & Mini Hydel Plant	i) Mungpoo-Kalikhola Hydro Electric project, Village – Mungpoo, P.S.- Kalimpong, Dist.-Darjeeling. ii) Lodhama Small Hydro project, Darjrling ii) Neroa Hydel project, Darjeeling	3 MW 3 MW 3 MW
3.	Rice Husk based Biomass	There are more than 50 Rice	500 kW

	Plant	Mills in Burdwan District which generate power from Rice Husk through gasification route.	(Individual capacity)
4.	Rice Husk based Biomass Plant (Combustion route)	Kamhali Jute Mill, Raina, Burdwan.	6 MW
5.	Rice Husk based Biomass Plant (Combustion route)	Amrit Bio Energy , Bankati, Bankura	10 MW
6.	Wind Farm (Grid connected)	Wind Farm project at Freserganj, Namkhana, South 24 Parganas.	2 MW

There are many such type of projects now. DPR for the above mentioned Power Plants are available to the prospective developers.

7. FACILITIES / INCENTIVES LIKELY TO BE AVAILABLE:

A. Solar PV Power Plants:

- i) Standard DPR with technical specification (Both for Rooftop and Ground based)
- ii) Information about land in Purulia and Bankura districts.
- iii) Standard Power Purchase Agreement.
- iv) Feed in tariff.
- v) Incentives from the govt. of India, if any

B. Small & Mini Hydel:

- i) Site Details (Provisional).
- ii) Survey & Investigation Report, if any.
- iii) Buy back arrangement of Power (Model – PPA)
- iv) Captive facility with wheeling (Wheeling charge to be decided by SERC).
- v) Assistance for Statutory Clearance.
- vi) Assistance in securing Loan from Financial Institutions.
- vii) Copies of Standard DPR.
- viii) Assistance in getting MNES incentive, if any.
- ix) Assurance regarding purchase of power.
- x) Assistance in getting CDM facility.

C. Rice Husk based Biomass Plant / Woody Biomass:

- i) Site Details (Provisional).
- ii) Rice Husk availability data for selected blocks.
- iii) Buy back arrangement of Power (Model – PPA)
- iv) Captive facility with wheeling.
- v) Assistance for Statutory Clearance.
- vi) Assistance in securing Loan from Financial Institutions.
- vii) Assistance in getting CDM facility.
- viii) Assistance in getting grant from Govt. of India in respect of Biomass Gasifier, if any.
- ix) Copies of Standard DPR at concessional rate.
- x) Assurance regarding purchase of power.
- xi) General Assistance.

D. Wind Farm:

- i) Prospective Site Details.
- ii) Wind resources data, if any.
- iii) Buy back arrangement of Power (Model – PPA)
- iv) Captive facility with wheeling (Wheeling charge to be decided by SERC).
- v) Assistance for Statutory Clearance.
- vi) Assistance in securing Loan from Financial Institutions.
- vii) Assistance in getting CDM facility.
- viii) Assistance in getting MNES incentive, if any.
- ix) Copies of Standard DPR at concessional rate.
- x) Assurance regarding purchase of power.

8. SELECTION PROCEDURE:

Selection will be made by a committee mainly on the basis of experience, expertise, financial solvency, past performances, infrastructure availability etc. of the applicant. However, the following issues will be considered while evaluating the application:

- a) Experience in Renewable Energy Project implementation (not essential condition)

- b) Expertise in Renewable Energy Sector.
- c) Implementation time of the project after allotment.
- d) Past track record of the Company.
- e) Financial strength of the Company.
- f) Priority will be given to those developers who will set up power plant both in Off Grid and Grid Connected Area.
- g) In case of captive generation, the sector in which captive power will be utilized shall be looked into.
- h) Priority will be given to those developers who will opt for availing of CDM facility in association with WBGEDCL.
- i) Investor in the Wind Power Sector will get priority getting allotment of site for other sectors.

9. LAST DATE OF SUBMISSION OF APPLICATION FORM WITH DOCUMENTS:

Last date for submission of Application: 17th August 2009.

Processing Fees: Rs. 3.0 lac/MW with maximum Rs. 20.0 Lac (Rupees Twenty lac only) upto 10 MW range. Processing fees shall be refunded to the Developers if not allotted with any site. The processing fee is to be deposited in favour of West Bengal Green Energy Development Corporation Ltd. Through A/C payee Demand Draft/ Banker's Cheque payable in Kolkata for getting all assistance from WBGEDCL as mentioned in the documents. Maximum capacity of any projects should not be more than 10 MW. EOI submitted without processing fees shall not be considered.

10. FORMALITIES TO BE OBSERVED AFTER PROVISIONAL ALLOCATION OF THE SITE (S).

- 1) Before execution of the project, statutory clearances should be obtained from:
 - a) West Bengal Pollution Control Board.
 - b) Local Bodies/ Authorities.

- c) District Collector regarding Government Land and Deptt. of Forest, Govt. of West Bengal for Forest Land.
 - d) Irrigation and Water Ways Deptt., Govt. of West Bengal for the use of River Water / State Water Investigation Directorate, Govt. of West Bengal for the use of ground water.
 - e) West Bengal Electricity Regulatory Commission (WBERC) in respect of Tariff including wheeling charges etc.
 - f) West Bengal Fire and Emergency Services, Govt. of West Bengal.
- 2) Arrangement of Private Land shall be the responsibility of the developer.
 - 3) Arrangement with utility / distribution company regarding buy back arrangement of wheeling or Power Purchase Agreement (PPA)
 - 4) Preparation of Detailed Project Report (DPR) and its clearance from WBGEDCL.
 - 5) Acceptance for electrification of at least one remote village through any renewable Energy route from resources, as may be specified by WBGEDCL.
 - 6) Finalization of technical issues regarding evacuation of power from the power plant to the nearest grid sub-station in consultation with West Bengal State Electricity Transmission Company Ltd. or other Power Utility.

The Principal Applicant may opt for Partner in due course. But WBGEDCL will make all correspondences with the Principal Applicant only.

EXPRESSION OF INTEREST

APPLICATION FORM

Number:

(Allotment will be given to only the Principal Applicant)

1. Name of the Promoter / Investor / Developer :

2. Registered Office Address :
Telephone No. :
Fax No. :
E – Mail ID :
Postal Address :

3. Area of Interest : Biogas Power Project

4. Name of the specific project(s) to be undertaken :
along with location of the propose project(s)
[Site visit is a must before showing interest
for any project(s)]

5. Whether a new company shall be promoted to : Yes / No.
develop the power project. If yes, name of the
new company & its status.

6. Name of the Financial Institutions likely to :
fund the project(s)
(In principal approval letter to be enclosed)

7. Means of Financing (Project – wise) :
a) Promoter / Investor / Developer direct equity :
b) Loan details from Financial Institution(s) :
c) From other sources (specify) :

8. Utilisation pattern of the power to be generated :
- (To be specified for each project)
- i) Captive : Yes / No.
- ii) Captive through wheel : Yes / No.
- If yes,
- a) Name of the Owner of the transmission network through which wheeling will be done, is to be indicated.
- b) Give full detail with name of place where power will be consumed.
- iii) Any other mode like feed in to the grid or off grid utilisation (specify).
9. Pre feasibility report of the project(s) proposed to be undertaken to be enclosed (only concept note)
10. Details of permanent manpower engaged in the Organisation.
- i) Degree Holder Engineer
- ii) Diploma Holder Engineer
- iii) Other Technicians (specify)
- iv) Management Staff.
11. Proposed Project Completion Period :
(To be indicated for each project separately)
12. Experience of the Company in implementation :
of Renewable Energy Project either as a Developer or as a Consultant or as a Contractor
(Specify area wise to be enclosed)
13. Details of infrastructures available with the company :
14. Preference of the site(s) areas(s) of the proposed project(s) :
15. Expected time required to start execution of physical project work from the date of allotment of site(s) :
16. Solvency certificate from Banker(s) to be enclosed :
17. An undertaking duly signed is to be enclosed as per enclosed format in respect of commencement of the project work.

18. Following documents are to be enclosed with the application format:-

- i) Registration Certificate :
- a. Latest Sales Tax Clearance Certificate :
- b. Latest Annual Report and Statement of Accounts :
- c. Permanent Account Number (PAN) :
- d. Latest Income Tax Certificate :
- e. Availability of Grid Sub Station in nearby areas : Yes / No
(If yes, details there of)

19. Type of Company, Partnership / Joint venture / Pvt. :
Ltd. / Public Sector / Other (specify).

(No change in the name of the company will be allowed subsequently to allotment of site without valid legal documents)

20. Types of activities so far undertaken by the company :
Indicating annual turnover.

21(a). Technology to be adopted for generation of Biogas:

(b). Technology to be adopted for generation of electricity from Biogas:

22. Revenue likely to be shared:

Certified that the above information given by me on behalf of my organisation is correct in all respect and no factual information has been suppressed.

(Signature of the Applicant)

With Seal

(Only authorized signatory should sign.)

UNDERTAKING

I on behalf of my organisation (Name & Address)

.....

.....

.....do hereby assure that we will implement the Project(s) allocated to us by the concerned authority within the time frame as indicated in the Application Form. Failing this assurance, we are liable to abide by the penalties to be imposed on us by the Authority as deemed fit.

(Signature with seal)