# National Electric Power Regulatory Authority
## Islamic Republic of Pakistan

**Registrar**

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
Ph:+92-51-9206500, Fax: +92-51-2600026
Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/R/DL/LAG-293/ 9843-49

June 30, 2015

Mr. Zhu Hui
Authorized Representative
Best Green Energy Pakistan Limited
House No. 29-B, Tech Society,
Canal Bank, New Campus,
Lahore

Subject: **Generation Licence No. SPGL/13/2015**
**Licence Application No. LAG-293**
**Best Green Energy Pakistan Limited (BGEPL)**

*Reference: Your letter No. nil, dated March 16, 2015.*

Enclosed please find herewith Determination of the Authority in the matter of Generation Licence Application of BGEPL along with Generation Licence No. SPGL/13/2015 annexed to this determination granted by the National Electric Power Regulatory Authority to BGEPL for its 100.00 MW Solar Generation Facility located at Quaid-e-Azam Solar Park, Lal Sohanra in Cholistan, District Bahawalpur, Punjab, pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).

2. Please quote above mentioned Generation Licence No. for future correspondence.

Enclosure: **Generation Licence (SPGL/13/2015)**

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30.06.15

**(Syed Safeer Hussain)**

Copy to:

1) Chief Executive Officer, Alternative Energy Development Board, 2nd Floor, OPF Building, G-5/2, Islamabad
2) Managing Director, Punjab Power Development Board (PPDB), Central Design Building, Irrigation Secretariat, Old Anarkali, Lahore
3) Chief Executive Officer, NTDC, 414-WAPDA House, Lahore
4) Chief Executive Officer, CPPA, 106-WAPDA House, Lahore
5) Chief Executive Officer, Lahore Electric Supply Company, 22-A, Queens Road, Lahore
6) Director General, Environmental Protection Department, Government of Punjab, National Hockey Stadium, Ferozepur Road, Lahore

# National Electric Power Regulatory Authority (NEPRA)

## Determination of the Authority in the Matter of Application of Best Green Energy Pakistan Limited for the Grant of Generation Licence

**June 29, 2015**
**Case No. LAG-293**

## (A). Background

**(i).** The Electric Power Sector of the country is experiencing a Supply-Demand gap. In order to bridge the said deficit, all efforts are being made to set up generation facilities using indigenous resources. The efforts include projects by the Federal as well as Provincial Governments.

**(ii).** Govt. of Punjab (GoPb) through Punjab Power Development Board (PPDB) issued a Letter of Intent (LoI) to Zonergy Company Limited of the People Republic of China/the Sponsors for setting up a 900.00 MW Photo Voltaic (PV) Power Generation Project [in terms of the provisions of the Punjab Power Generation Policy-2006 subsequently Revised in 2009 (The Punjab Power Policy)], to be located at Quaid-e-Azam Solar Park District Bahawalpur in the Province of Punjab. In order to implement the project, the sponsors incorporated nine (09) different Special Purpose Vehicles in Pakistan under the Companies Ordinance 1984 including Best Green Energy Pakistan Limited (BGEPL).

**(iii).** According to the terms and conditions of the LoI, the sponsors carried out detailed Feasibility Study (FS) for the project including detailed design of the Generation Facility/Solar Power Plant/Solar Farm and decided to approach the Authority for the grant of Generation Licence.

## (B). Filing of the Application

**(i).** In accordance with Section-15 of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the NEPRA Act), BGEPL

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filed/submitted an application on March 16, 2015 requesting for the grant of Generation Licence.

**(ii).** The Registrar examined the submitted application to confirm its compliance with the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 (the "Regulations"). The Registrar observed that the application lacked some of required information/documentation as stipulated in the Regulations. Accordingly, BGEPL was directed for submitting the missing information/documentation. BGEPL completed the missing information/ documentation on March 30, 2015. The Authority considered the matter in its Regulatory Meeting (RM-15-270), held on April 14, 2015 and found the form and content of the application in substantial compliance with Regulation-3 of the Regulations. Accordingly, the Authority admitted the application for consideration of the grant of the Generation Licence as stipulated in Regulation-7 of the Regulations. The Authority approved the advertisement [containing (a). the prospectus; (b). a notice to the general public about the admission of the application of BGEPL], inviting the general public for submitting their comments in the matter as stipulated in Regulation-8 of the Regulations. Further, the Authority also approved the list of the relevant stakeholders for informing about the admission of the application of BGEPL and for providing their comments to assist the Authority in the matter. Accordingly, the advertisement was published in one Urdu and one English National Newspaper on April 17 & 18, 2015.

**(iii).** Apart from the above, separate letters were also sent to Government Ministries, their Attached Departments, Representative Organizations and Individual Experts etc. on April 22, 2015. The said stakeholders were directed for submitting their views/comments for the assistance of the Authority.

## (C). Comments of Stakeholders

**(i).** In response to the above, the Authority received comments from three (03) stakeholders. These included Mr. Anwar Kamal of Anwar Kamal Law Associates (AKLA), Pakistan Council of Renewable Energy Technologies (PCoRET) of Ministry of Science and Technology Government of Pakistan (MoS&T)

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and Central Power Purchasing Agency (CPPA) of National Transmission and Despatch Company Limited (NTDC). The comments of stakeholders are summarized below:-

**(a).** AKLA stated that solar power should only be inducted in the Power Sector of the country after ensuring its economic viability. The Authority by admitting the application has acted against its stated policy statement given in its Annual Report 2012-13 wherein it had warned the Federal Govt. of the consequences of the induction of Renewable Energy (RE) based projects of wind and solar. Contrary to its earlier position, the Authority is now allowing sizeable capacity of wind and solar power plants to be inducted in the national grid system. The proposed solar plant of BGEPL will supply electricity to the Power Purchaser at around Rs. 25/kWh. When the high cost Transmission Tariff is included, the unit cost from such solar power plants will not be less than Rs. 30/kWh. In view of the said, such power plants are not affordable at all. The plant will be executing a long term "Energy Purchase Agreement" with the Power Purchaser for a period of 20 to 25 years. This means that consumers will be compelled to buy electricity from such costlier RE Power Plants for the next 25 years, even if these are not in merit order. Apart from the said, AKLA highlighted that the sponsors had been granted various concessions for the development of the project including allocation of land on concessional rates at the expense of the tax payer's money. If the said cost is also included the unit cost of the electricity from the power plant of BGEPL will be to the tune of Rs. 40.00/kwh which is very exorbitant. AKLA stated that under the circumstances, it may not be wise and prudent to allow such RE Power Plants to be inducted in the system. AKLA stressed that the Authority must ensure that the licence is granted if the Project falls in the Least Cost Generation Plan and does not result in increase in the basket price of the CPPA

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so that the target of the lowering of the basket price as stated in the National Power Policy 2013 is achieved. AKLA requested that a Public Hearing in the matter may be arranged (preferably in Lahore) to deliberate the above highlighted issues;

**(b).** PCoRET communicated its No Objection regarding grant of Generation Licence to BGEPL. However, PCoRET stated that it cannot comment on the financial or other related matters of the project; and

**(c).** CPPA commented that uptill now the project company has not provided the technical details relating to the project. Therefore, CPPA is not in a position to offer any comments in the matter.

**(ii).** The Authority examined the above comments of the stakeholders and decided seeking perspective of BGEPL on the observations of AKLA and CPPA in terms of Regulation 9(2) of the Regulations. In its reply to the observations of AKLA, the company/BGEPL submitted that commentator had opposed the issuance of the Generation Licence on the presumption that the tariff for the project would be very high. The tariff for the project will actually be the Up-Front Tariff determined by the Authority and the same is applicable for all solar projects being developed in the country except for those opting for the cost plus regime. Rather than raising any project specific objections, AKLA has specifically requested for a public hearing on the tariff issue. It is of utmost importance to highlight that there have been three (3) public hearings in relation to the Up-Front Tariff. Mr. Anwar Kamal on behalf of AKLA intervened in two (2) of those public hearings with arguments similar to those expressed now (i.e. solar power plants are not being economically viable). The Authority in arriving at the Up-Front Tariff duly considered the comments of AKLA at that time. Therefore, BGEPL considers that the objections raised may be rejected and the Generation Licence may be issued at the earliest without conducting a public hearing in the matter. This will avoid unnecessary delay in the implementation of this priority project of the China Pakistan Economic Corridor. BGEPL also contested the figures of Rs. 30/kWh (total aggregate of the generation

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tariff and the transmission tariff) and Rs. 40/kWh (total aggregate of the generation tariff, the transmission tariff and costs of land and development at the site) as the minimum unit cost of electricity from the project. BGEPL stated that it is not clear what is the basis of the said figures and how AKLA has arrived at these numbers? BGEPL stated that the Up-Front Tariff determined by the Authority which it is going to accept, is totally different from figures quoted by AKLA. Further, BGEPL rebutted the claim of AKLA that the land for the project is being provided at concessional rates. BGEPL elaborated that the land for the project is being acquired on lease from Energy Department, Board of Revenue or Cholistan Development Authority Government of Punjab on standard terms and conditions by making proper payments.

**(iii).** On the observations of CPPA, the company/BGEPL clarified that the letter of CPPA is not based on facts as all necessary details pertaining to the type and technology of the PV cells and associated equipment had already been provided to all the relevant departments/office of NTDC including CPPA. The sponsors stated that NTDC has already given its consent and confirmation that the induction of the project will not have any adverse impact on its network and the power from the project will be absorbed without any problem.

**(iv).** The Authority considered the submissions of BGEPL and considered it appropriate to process the application for the consideration of the grant of Generation Licence as stipulated in the Regulations and NEPRA Licensing (Generation) Rules, 2000 (the Rules).

## (D). Analysis of the Authority

**(i).** The key features of the application under consideration are that BGEPL is planning setting up New Solar Generation Facility/Solar Power Plant/Solar Farm at Quaid-e-Azam Solar Park, Located at Lal Sohanra in Cholistan, District Bahawalpur in the Province of Punjab. In this regard, BGEPL has approached the Authority for the grant of Generation Licence for its above mentioned Generation Facility/Solar Power Plant/ Solar Farm.

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**(ii).** The Authority has examined the entire case in details including the information provided by BGEPL with its application for Generation Licence (which included the LoI, the FS, the Interconnection and Dispersal Arrangement Studies), the comments of the stakeholders, the rejoinders of BGEPL on the comments of the stakeholders and other related documents including the NEPRA Act, relevant Rules and Regulations.

**(iii).** In this regard, the Authority has observed that stakeholders have raised concerns about (a). Induction of Solar Power Plant of BGEPL; (b). Higher Generation Tariff for Solar Power Plant of BGEPL; and (c). Holding a Public Hearing in the matter/case of BGEPL. The findings of the Authority on the said observations are elaborated in the subsequent paragraphs.

**(iv).** Induction of Solar Power Plant of BGEPL; The Authority has considered the case in light of the provisions of the "Policy for Development of Renewable Energy for Power Generation 2006 ("the RE Policy"). In the said policy, the Govt. of Pakistan has paid special attention to develop the RE sources. Further, the Section 8.2.1 of the RE Policy has made it obligatory for the utilities to buy all the offered electric power by the RE Projects. The Authority is well aware that RE projects of solar and wind generate electric power which is intermittent in nature. Therefore, the induction of such kind of electric power in the system may have some negative impacts on the electric power system. In this regard, the Authority has exercised abundant caution and directed NTDC to confirm whether its system will be able to absorb the offered electric power from the project of BGEPL or otherwise? In this regard, NTDC through its letter dated May 13, 2015 has categorically confirmed that its system will be able to absorb the offered electric power from BGEPL without causing any adverse impact on the reliability and stability of its system. In view of the said, the Authority considers that project of BGEPL is feasible.

**(v).** Higher Generation Tariff for Solar Power Project of BGEPL; The Authority announced an Up-Front Tariff for PV based Solar Projects through its Determination No. NEPRA/UTS-01/905-907, dated January 22, 2015. In this

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regard, BGEPL approached the Authority for unconditionally accepting the said tariff for its proposed project. The Authority through its determination No. NEPRA/TRF-317/BGEPL-2015/8068, dated May 26, 2015 has granted BGEPL the required tariff that it will be charging from the Power Purchaser. According to the said, determination the levelized Tariff of BGEPL will be U.S. ¢ 14.1516/kwh (Pak Rs. 14.8591/kwh). The Authority considers the said tariff to be competitive considering the fact that energy produced by the project will be free from any environmental hazards and concerns.

**(vi).** Holding a Public Hearing in the matter/case of BGEPL; In terms of Rules 3(4) of the Rules, the Authority may order a public hearing to be held on any application for a Generation Licence. The plain reading of the said provisions reveals that the Authority is not obligated to conduct a public hearing in such cases. Without prejudice to the said, the Authority has considered the request of AKLA for holding a public hearing in the matter of BGEPL. The Authority is of the considered view that previously it had already held two public hearings at the time of determination of Up-Front Tariff for Solar Power Projects. AKLA actively participated in the said hearings and the objections raised were also suitably addressed in the Determination of the Authority for Up-Front Tariff dated January 22, 2015. Therefore, there is no need to hold another public hearing on the same issue.

**(vii).** In light of the explanation given above, the Authority is of the considered view that issues arising out of the comments of AKLA on the application of BGEPL for the grant of Generation Licence stand resolved. Therefore, the Authority considers that the case of BGEPL for the grant of Generation Licence merits consideration in terms of the provisions of the NEPRA Act, the Rules and Regulations.

## (E). Grant of Generation Licence

**(i).** Energy is fundamental input to economic activity, and thus to human welfare and progress. The importance of electricity in the development of the economy of any country is beyond any doubt. The economic growth of any country

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is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. In view of the said reasons, the Authority is of the considered opinion that for sustainable development all indigenous resources of power generation must be developed on priority basis in the public and private sector, including Coal, Hydel, Wind, Solar and RE.

**(ii).** The existing energy mix of the country is heavily skewed towards the thermal power plants, mainly operating on imported fuel (i.e. furnace oil). The import of fuel for electric power generation not only creates a pressure on the precious foreign exchange reserves of the country but is also an environmental concern. Therefore, in order to achieve sustainable development it is imperative that indigenous RE resources are given priority for power generation and their development is encouraged. The Energy Security Action Plan 2005 (ESAP) approved by the Government of Pakistan, duly recognizes this very aspect of power generation through RE and envisages that at least 5% of total national power generation capacity (i.e. 9700 MW) is to be met through RE resources by 2030. The Authority considers that the proposed project of BGEPL is consistent with the provisions of ESAP. The project will help in diversifying the energy portfolio of the country. Further, the project will not only enhance the energy security of the country by reducing the dependence on imported oil but will also help in reducing carbon emission by generating clean electricity, thus improving the environment.

**(iii).** The term of a Generation Licence under the Rule-5 of the Rules, is to be commensurate with the maximum expected useful life of the units comprised in a Generating Facility/Solar Power Plant/SolarFarm. The Authority considers that as per the International benchmarks available, the useful life of a typical PV based Generation Facility/Solar Power Plant/Solar Farm is taken as twenty five (25) years from its operation. Therefore, the Authority fixes the term of the proposed Generation Licence of BGEPL to twenty five (25) years from its Commercial Operation Date (COD).

**(iv).** Regarding the Tariff, it is hereby clarified that under Section-7(3)(a) of the NEPRA Act, the determining of tariff, rate and charges etc. is the sole prerogative of the Authority. As explained at Para D(v) above, the Authority through

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its determination No. NEPRA/TRF-317/BGEPL-2015/8068, dated May 26, 2015 has granted BGEPL an Up-front Tariff for its Project. The Authority directs BGEPL to follow the terms and conditions of the Up-Front Tariff granted to it in letter and spirit without any exception. Further, the Authority directs BGEPL to charge only such tariff which has been determined, approved or specified by it as stipulated in Article-6 of its proposed Generation Licence.

**(v).** The proposed Generation Facility/Solar Power Plant/Solar Farm of BGEPL will be using RE Resource for Generation of electric Power. Therefore, the project may qualify for the Carbon Credit under the Kyoto Protocol (for RE projects coming into operation upto 2020). In view of the said, the Authority directs BGEPL to initiate the process for obtaining Carbon Credits at the earliest so that the proceeds of the same are materialized without any delay. Further, BGEPL shall be required to share the proceeds of the Carbon Credits with the Power Purchaser as stipulated in Article-14 of its proposed Generation Licence.

**(vi).** The proposed Generation Facility/Solar Power Plant/Solar Farm of BGEPL for which Generation Licence has been sought, is based on PV Cells using solar radiation for generation of electric power. Solar radiation is a RE source which does not cause pollution however, the operation of the Generation Facility may cause some other type of pollution including soil pollution, water pollution and noise pollution etc. during construction of the Project. The Authority has considered these aspects and has made BGEPL obligatory to comply with the environmental rules and regulations. Further, the Authority directs BGEPL to submit a report on a bi-annual basis confirming that its Generation Facility is operating in compliance with required Environmental Standards of the Environmental Protection Agency of GoPb.

**(vii).** In view of the above, the Authority hereby decides to approve the grant of Generation Licence to BGEPL on the terms and conditions as set out in the Generation Licence annexed to this determination. The grant of Generation Licence will be subject to the provisions contained in the NEPRA Act, relevant rules, regulations framed thereunder and the applicable documents.

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## Authority

Syed Masood-ul-Hassan Naqvi
(Member)

Himayat Ullah Khan
(Member)

Khawaja Muhammad Naeem
(Member)

Maj. (R) Haroon Rashid
(Member)/(Vice Chairman)

Brig. (R) Tariq Saddozai
(Chairman)

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30.06.15

# National Electric Power Regulatory Authority
# (NEPRA)
# Islamabad – Pakistan

## GENERATION LICENCE

## No. SPGL/13/2015

In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby grants a Generation Licence to:

**BEST GREEN ENERGY PAKISTAN LIMITED**

Incorporated under the Companies Ordinance, 1984 having Corporate Universal Identification No. 0090592, Dated November 13, 2014

for its Solar Generation Facility/Solar Power Plant/Solar Farm Located at Quaid-e-Azam Solar Park, Lal Sohanra in Cholistan, District Bahawalpur in the Province of Punjab

(Installed Capacity: ≈100.00 MW Gross)

to engage in generation business subject to and in accordance with the Articles of this Licence.

Given under my hand this 30th day of June Two Thousand & Fifteen and expires on 30th day of December Two Thousand & Forty.

Registrar

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## Article-1
## Definitions

1.1 In this Licence

(a). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997";

(b). "Authority" means "the National Electric Power Regulatory Authority constituted under Section-3 of the Act";

(c). "Bus Bar" means a system of conductors in the generation facility/Solar Farm of the Licensee on which the electric power of all the photovoltaic cells is collected for supplying to the Power Purchaser;

(d). "Carbon Credits" mean the amount of Carbon Dioxide ($CO_2$) and other greenhouse gases not produced as a result of generation of energy by the generation facility/Solar Farm and other environmental air quality credits and related emissions reduction credits or benefits (economic or otherwise) related to the generation of energy by the generation facility/Solar Farm, which are available or can be obtained in relation to the generation facility/Solar Farm after the COD;

(e). "Commercial Operations Date (COD)" means the Day immediately following the date on which the generation facility/Solar Farm of the Licensee is Commissioned;

(f). "CPPA-G" means "Central Power Purchasing Agency (Guarantee) Limited" or any other entity created for the like purpose;

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(g). "Energy Purchase Agreement" means the energy purchase agreement, entered or to be entered into by and between the Power Purchaser and the Licensee, for the purchase and sale of electric energy generated by the generation facility/Solar Farm, as may be amended by the parties thereto from time to time;

(h). "Grid Code" means the grid code prepared by NTDC and approved by the Authority, as it may be revised from time to time by NTDC with any necessary approval by the Authority;

(i). "IEC" means "International Electrotechnical Commission" or any other entity created for the like purpose and its successors or permitted assigns;

(j). "IEEE" means the "Institute of Electrical and Electronics Engineers" and its successors or permitted assigns;

(k). "Licensee" means "**Best Green Energy Pakistan Limited**" and its successors or permitted assigns;

(l). "MEPCO" means "Multan Electric Power Company Limited" and its successors or permitted assigns;

(m). "NTDC" means National Transmission and Despatch Company Limited and its successors or permitted assigns;

(n). "Policy" means "The Policy for Development of Renewable Energy for Power Generation, 2006 of Government of Pakistan" as amended from time to time;

(o). "Power Purchaser" means the CPPA-G purchasing power on behalf of XW-DISCOs;

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(p). "Regulations" mean "the Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time";

(q). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000";

(r). "Solar Farm" means "a cluster of photovoltaic cells in the same location used for production of electric power";

(s). "XW DISCO" means "an Ex-WAPDA distribution company engaged in the distribution of electric power".

1.2 Words and expressions used but not defined herein bear the meaning given thereto in the Act or in the Rules.

## Article-2
## Application of Rules

This Licence is issued subject to the provisions of the Rules, as amended or replaced from time to time.

## Article-3
## Generation Facilities

3.1 The location, size (capacity in MW), technology, interconnection arrangements, technical limits, technical and functional specifications and other details specific to the generation facility/Solar Farm of the Licensee are set out in Schedule-I to this Licence.

3.2 The net capacity of the generation facility/Solar Farm of the Licensee is set out in Schedule-II hereto.

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3.3 The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility/Solar Farm before its commissioning.

## Article-4
## Term of Licence

4.1 This Licence is granted for a term of twenty five (25) years from the COD of the generation facility/Solar Farm.

4.2 Unless suspended or revoked earlier, the Licensee may apply for renewal of the Licence within ninety (90) days prior to the expiry of the term of the Licence, as stipulated in the Regulations.

## Article-5
## Licence fee

After the grant of the Generation Licence, the Licensee shall pay to the Authority the Licence fee, in the amount and manner and at the time set out in the National Electric Power Regulatory Authority (Fees) Rules, 2002.

## Article-6
## Tariff

The Licensee shall charge only such tariff which has been determined, approved or specified by the Authority in terms of Rule-6 of the Rules.

## Article-7
## Competitive Trading Arrangement

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement. The Licensee shall in good faith work towards implementation and operation of the aforesaid Competitive Trading Arrangement in the manner and time period specified by the Authority. Provided that any such participation shall be subject to any contract entered into between the Licensee and another party with the approval of the Authority.

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7.2 Any variation or modification in the above-mentioned contracts for allowing the parties thereto to participate wholly or partially in the Competitive Trading Arrangement shall be subject to mutual agreement of the parties thereto and such terms and conditions as may be approved by the Authority.

## Article-8
## Maintenance of Records

For the purpose of sub-rule (1) of Rule-19 of the Rules, copies of records and data shall be retained in standard and electronic form and all such records and data shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

## Article-9
## Compliance with Performance Standards

The Licensee shall comply with the relevant provisions of the National Electric Power Regulatory Authority Performance Standards (Generation) Rules 2009 as amended from time to time.

## Article-10
## Compliance with Environmental Standards

The Licensee shall comply with the environmental standards as may be prescribed by the relevant competent authority from time to time.

## Article-11
## Power off take Point and Voltage

The Licensee shall deliver power to the Power Purchaser at the outgoing bus bar of its 132 KV grid station. The up-gradation (step up) of generation voltage up to 132 KV will be the responsibility of the Licensee.

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## Article-12
## Performance Data of Generation Facility/Solar Farm

The Licensee shall install properly calibrated automatic computerized solar radiation recording device(s) and a compatible communication/SCADA system both at its generation facility/Solar Farm and control room of the Power Purchaser for transmission of solar radiation data and power output data to the control room of the Power Purchaser for recording of data.

## Article-13
## Provision of Information

13.1 The obligation of the Licensee to provide information to the Authority shall be in accordance with Section-44 of the Act.

13.2 In addition to 13.1 above, the Licensee shall supply information to the Power Purchaser regarding solar data specific to the generation facility of the Licensee and other related information on a regular basis and in a manner required by the Power Purchaser.

13.3 The Licensee shall be subject to such penalties as may be specified in the relevant rules made by the Authority for failure to furnish such information as may be required from time to time by the Authority and which is or ought to be or has been in the control or possession of the Licensee.

## Article-14
## Emissions Trading /Carbon Credits

The Licensee shall process and obtain emissions/Carbon Credits expeditiously and credit the proceeds to the Power Purchaser as per the Policy.

## Article-15
## Design & Manufacturing Standards

Solar photovoltaic cells shall be designed, manufactured and tested according to the latest IEC, IEEE or any other equivalent standards. All plant and equipment shall be unused and brand new.

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## Article-16
## Power Curve

The power curve for the individual solar photovoltaic cell provided by the manufacturer and as mentioned in this Generation Licence shall form the basis in determining the cumulative power curve of generation facility/Solar Farm.

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# SCHEDULE-I

The Location, Size (i.e. Capacity in MW), Type of Technology, Interconnection Arrangements, Technical Limits, Technical/Functional Specifications and other details specific to the Generation Facilities of the Licensee are described in this Schedule.

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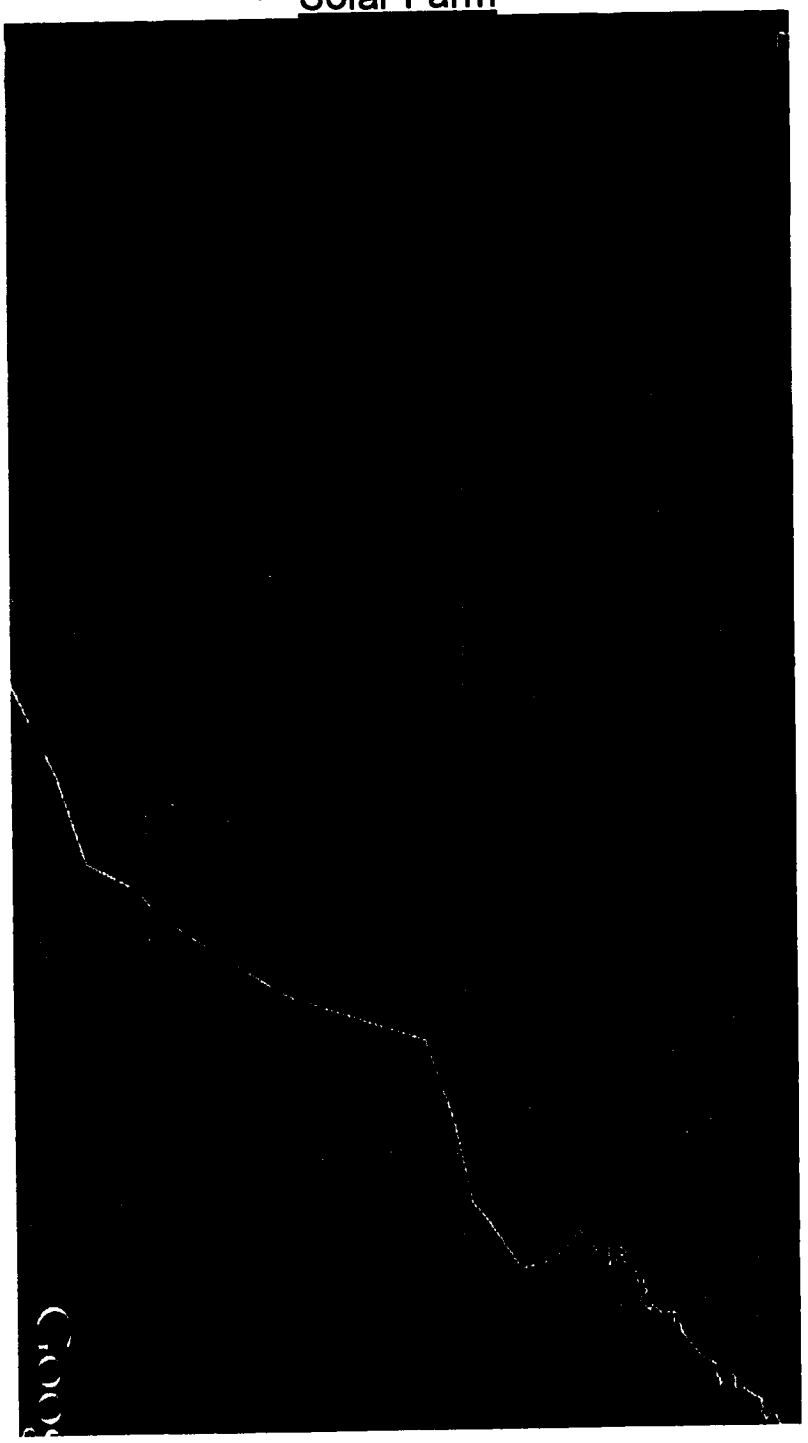
# Location of the Generation Facility/Solar Power Plant/ Solar Farm



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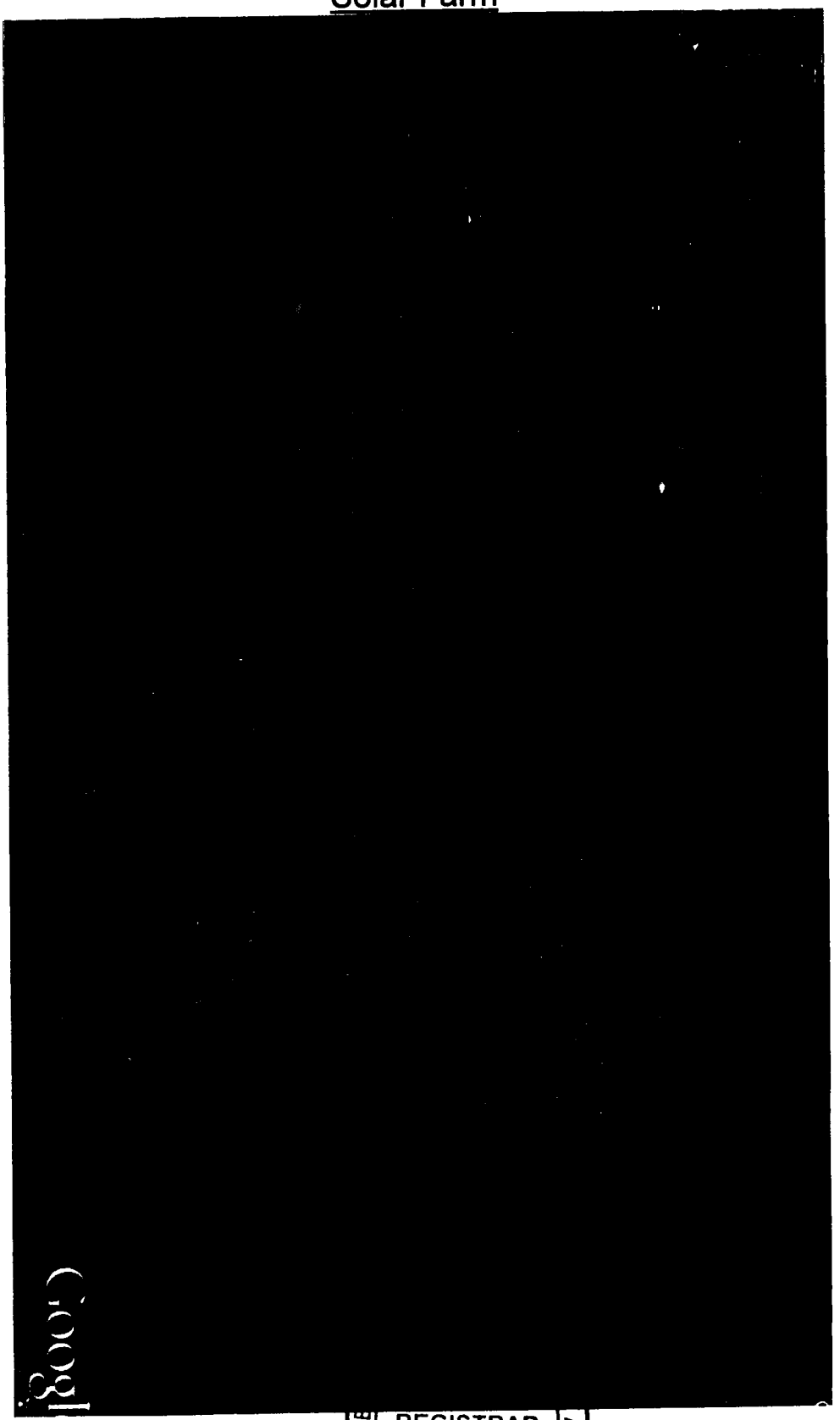
# Location of the Generation Facility/Solar Power Plant/ Solar Farm



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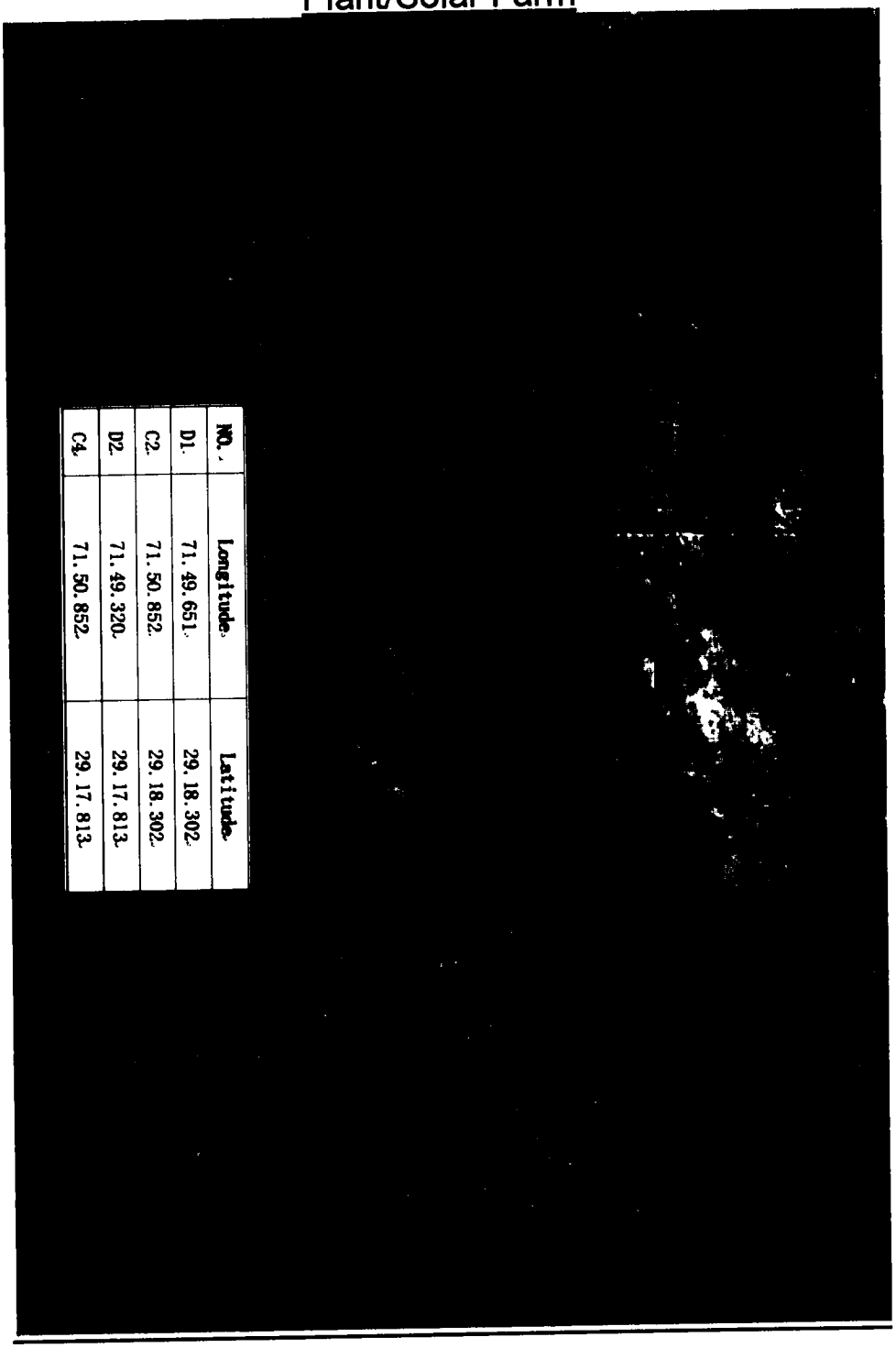
# Location Coordinates of the Generation Facility/Solar Power Plant/Solar Farm



| NO. | Longitude | Latitude |
|---|---|---|
| D1. | 71. 49. 651. | 29. 18. 302. |
| C2. | 71. 50. 852. | 29. 18. 302. |
| D2. | 71. 49. 320. | 29. 17. 813. |
| C4. | 71. 50. 852. | 29. 17. 813. |

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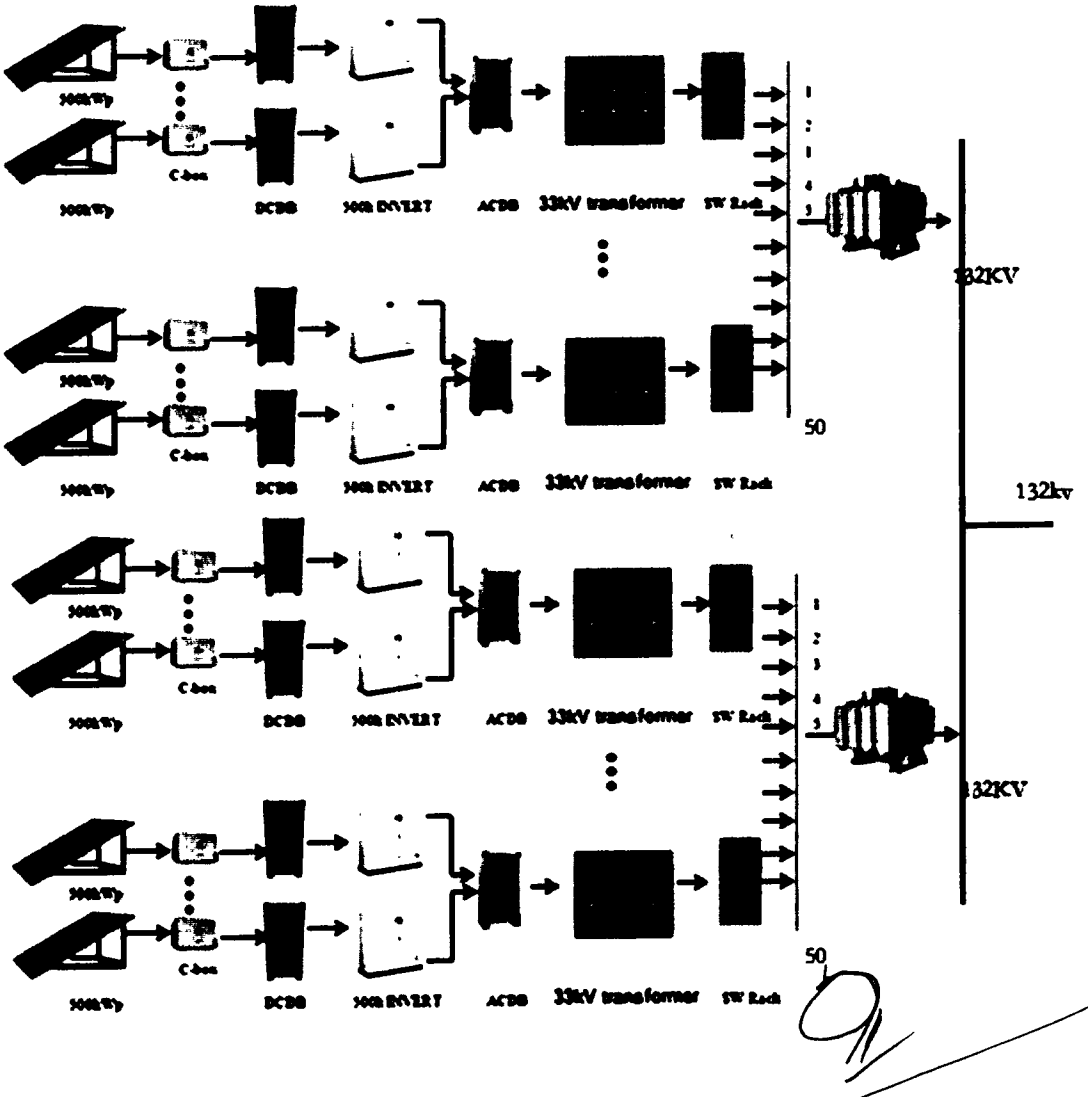
# Process Flow Diagram of the Generation Facility/ Solar Power Plant/Solar Farm

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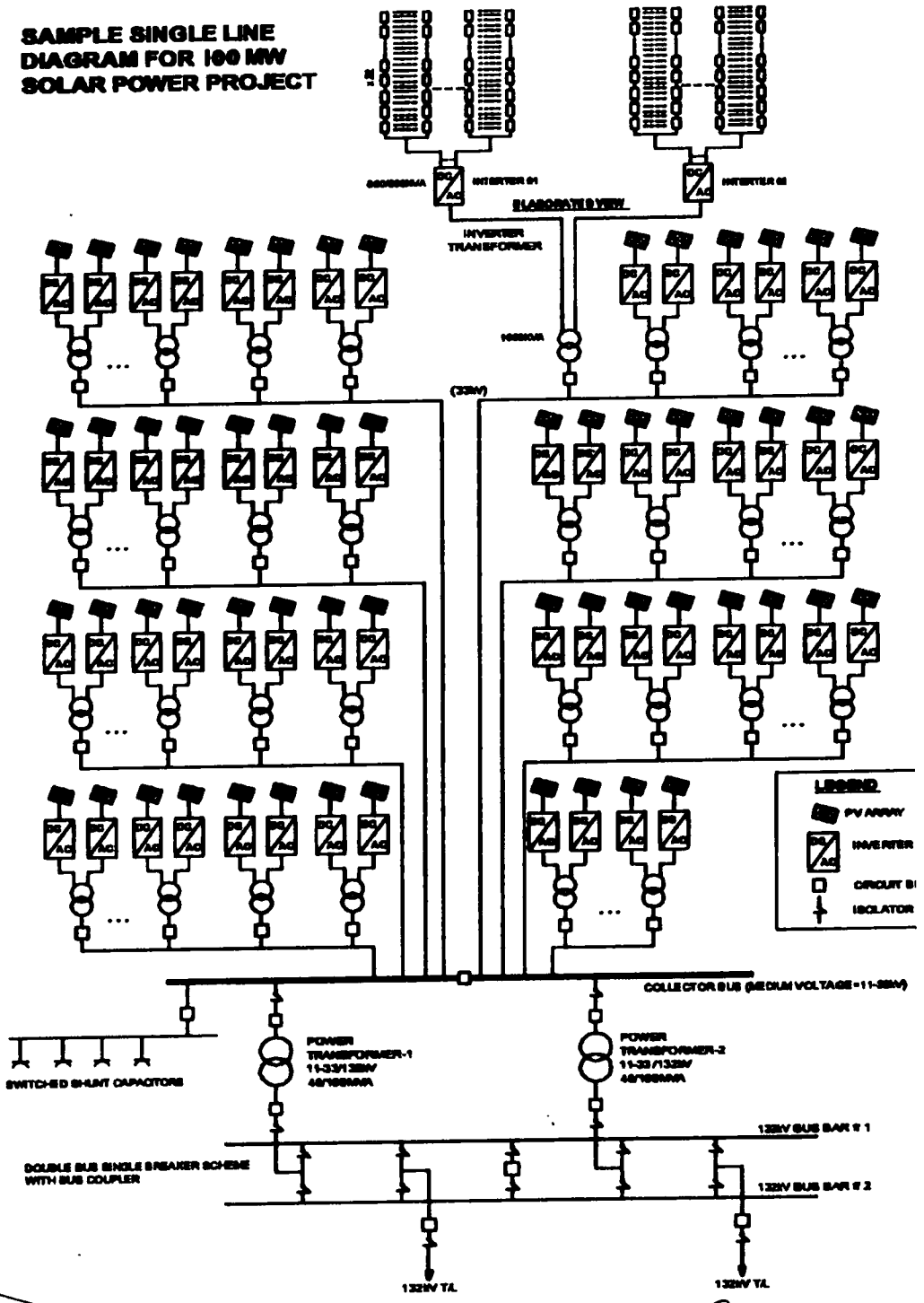
# Single Line Diagram of the Generation Facility/ Solar Power Plant/Solar Farm

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# Interconnection Arrangement/Transmission Facilities for Dispersal of Power from the Generation Facility/Solar Power Plant /Solar Farm of the Licensee

The power generated from the Generation Facility/Solar Power Plant/Solar Farm of the Licensee/Best Green Energy Pakistan Limited (BGEPL) shall be dispersed to the load center of MEPCO.

(2). The proposed Interconnection Arrangement/Transmission Facility for dispersal of electric power for the Generation Facility/Solar Power Plant/Solar Farm will be consisting of following:-

(a). 132 KV Double Circuit (D/C) Transmission Line on ACSR RAIL Conductor for Making an IN-OUT of one circuit of 132 KV D/C of 220 KV New Bhawalpur New Grid Station and Lal Sohanra Grid Station Transmission Line at the Generation Facility/Solar Power Plant/Solar Farm of BGEPL.

(3). Any change in the above Interconnection Arrangement/Transmission Facility duly agreed by Licensee/BGEPL, NTDC and MEPCO, shall be communicated to the Authority in due course of time.

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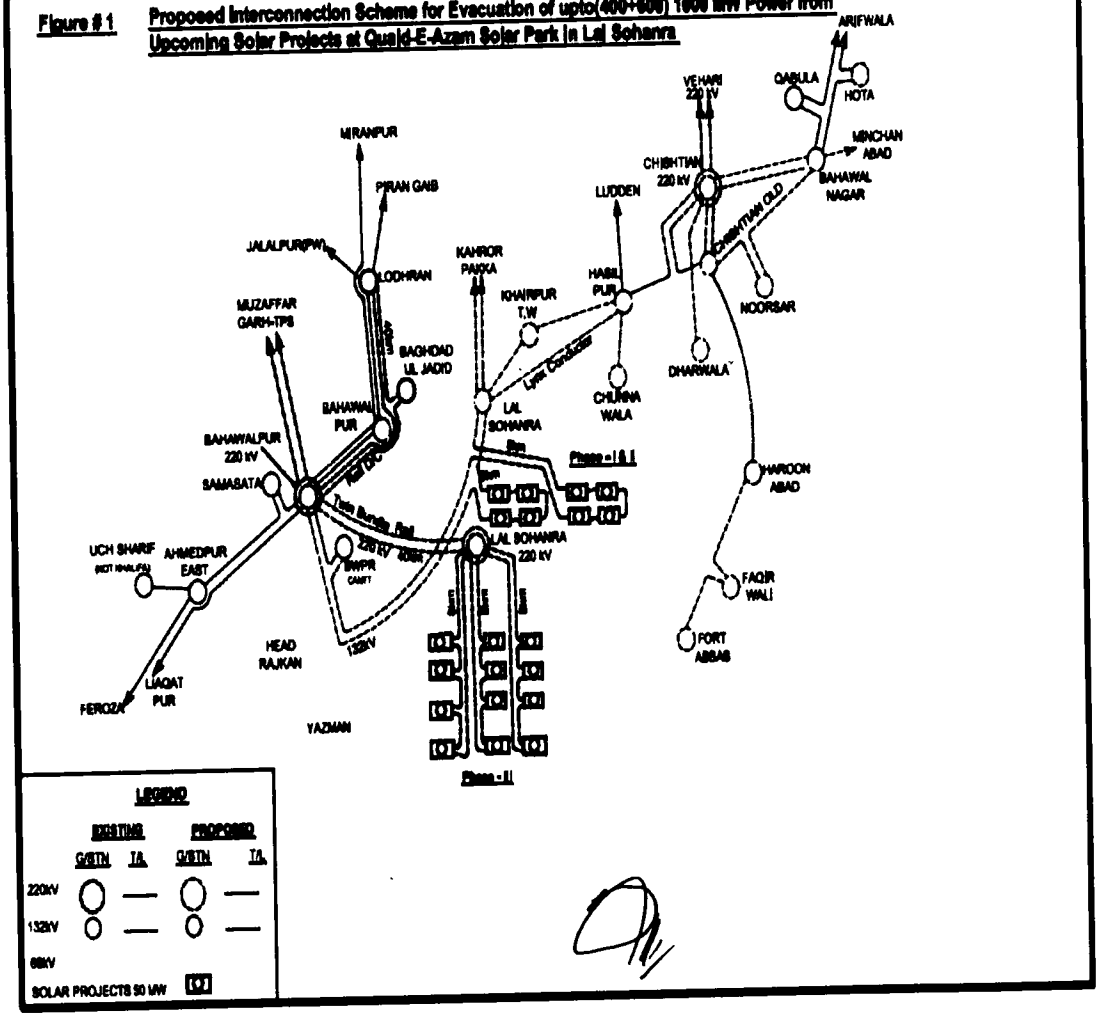
# Schematic Diagram of the Interconnection Arrangement/Transmission Facility for Dispersal of Power from the Generation Facility/Solar Power Plant /Solar Farm of the Licensee

Figure # 1 Proposed Interconnection Scheme for Evacuation of upto(400+600) 1000 MW Power from Upcoming Solar Projects at Quaid-E-Azam Solar Park in Lal Sohanra



# Detail of Generation Facility/Solar Power Plant/ Solar Farm

## (A). General Information

| | | |
|---|---|---|
| (i). | Name of Company/ Licensee | Best Green Energy Pakistan Limited |
| (ii). | Registered/Business Office | House No .29-B, Tech Society, Canal Bank, New Campus, Lahore, Pakistan |
| (iii). | Plants Location | Located at Quaid-e-Azam Solar Park, Lal Sohanra in Cholistan, District Bahawalpur in the Province of Punjab |
| (iv). | Type of Generation Facility | Solar Photovoltaic (PV) Power Plant |

## (B). Solar Technology & Capacity

| | | |
|---|---|---|
| (i). | Type of Technology | PV Cell |
| (ii). | System Type | Grid Connected |
| (iii). | Installed Capacity of the Generation Facility/Solar Power Plant/Solar Farm (MW) | 100.00 $MW_p$ (Approximately) |

## (C). Technical Details of Equipment

| | | |
|---|---|---|
| **(a).** | **Solar Panels – PV Modules** | |
| (i). | Type of Module | Polycrystalline PV Module Type Peak Energy 255; |
| (ii). | Type of Cell | Polycrystalline |
| (iii). | Dimension of each Module | 1650mmx991mmx40mm |
| (iv). | Module Surface Area | 1.635$m^2$ |
| (v). | No. of Panel /Modules | 391,600 |

The exact Installed Capacity of the Generation Facility/Solar Power Plant/Solar Farm is 99 858 MWp which is approximated to 100 00 MWp

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| | | | |
|---|---|---|---|
| (vi). | Total Module Area | 445 acres | |
| (vii). | Total Land Area Used | 498 acres | |
| (viii). | Panel's Frame | Anodised Aluminium Alloy | |
| (ix). | Weight of one Module | 18.2kg | |
| (x). | Module Output Warranty | For 1st year | For 2nd to 25th year |
| | | Not more than 2.5% Output Reduction | Not more than 0.7% Output Reduction Each Year |
| (xi). | Number of Solar Cells in each module | 60 Cells | |
| (xii). | Efficiency of module | 15.6% | |
| (xiii). | Environment Protection System | Encapsulation and sealing arrangements for protection from environment. | |
| (xiv). | Nominal Maximum Power (Pmax) at STC | 255 W | |
| (xv). | Power Tolerance at STC | 0 ~ +5W | |
| (xvi). | Optimum Operating Voltage at STC | 30.29 V | |
| (xvii). | Optimum Operating Current at STC | 8.42A | |
| (xviii). | Open circuit voltage (Voc) at STC | 37.82 V | |
| (xix). | Short circuit current (Isc) at STC | 8.98 A | |
| (xx). | Optimum Operating Voltage at NOCT | 27.71 V | |
| (xxi). | Optimum Operating Current at NOCT | 6.68 A | |
| (xxii). | Open circuit voltage (Voc) at NOCT | 34.88 V | |
| (xxiii). | Short circuit current (Isc) at NOCT | 7.18 A | |
| (xxiv). | Maximum system Voltage at STC | 1000V(IEC) | |
| **(b).** | **PV Array** | | |
| (i). | No. of PV modules | 100 | |

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| | | | |
|---|---|---|---|
| (ii). | Modules in a string | 22 | |
| (iii). | Total number of strings | 17800 | |
| **(c).** | **PV Capacity** | | |
| (i). | Total | 100 MWp | |
| **(d).** | **Inverters** | | |
| (i). | Max. DC power Input | 560kW | |
| (ii). | Inverter Model | SG 500MX | |
| (iii). | Rated Input Voltage | 460VDC~850VDC | |
| (iv). | Minimum Input Voltage | 460VDC | |
| (v). | Number of Inverters | 200 | |
| (vi). | Efficiency | euro:98.5%; CEC:98.7% | |
| (vii). | Max. Allowable Input voltage | DC 1000V | |
| (viii). | Max. Input Current | DC1220 A | |
| (ix). | Output electrical system | 3-phase, 3-wire | |
| (x). | Nominal Output Voltage (AC) | 315 V | |
| (xi). | Rated Frequency | 50 Hz /60Hz | |
| (xii). | Power Factor | Adjustable 0.9 Induction to 0.9 Capacitance | |
| (xiii). | Power Control | MPP Tracker | |
| (xiv). | Environmental Enclosures | Operating Temperature Range | -30° C to 55° C |
| | | Relative Humidity | 0 - 95% non-condensing |
| | | Audible Noise | <55 dB(A) |
| | | Operating Elevation | 6000m( Derating above 3000m) |
| (xv). | Grid Operation Protection | (a). | DC circuit breaker |
| | | (b). | AC circuit breaker |
| | | (c). | DC overvoltage protection |
| | | (d). | Lightning protection level III |

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| | | | |
|---|---|---|---|
| | | (e). | Grid monitoring |
| | | (f). | Insulation monitoring |
| | | (g). | Anti-Islanding |
| **(e).** | **Isolating Transformer** | | |
| (i). | Rating | 1000kVA | |
| (ii). | Type of Transformer | 33kV Box-type transformer | |
| (iii). | Input voltage | AC315V | |
| (iv). | Output Voltage | AC33KV | |
| (v). | Purpose of Transformer | Step Up Voltage | |
| (vi). | Efficiency | 99.6% | |

## (D). Other Details

| | | |
|---|---|---|
| (i). | Expected COD of the Generation Facility/Solar Power Plant/Solar Farm (Anticipated) | December 31, 2015 |
| (ii). | Expected Useful Life of the the Generation Facility/Solar Power Plant/Solar Farm (Anticipated) from COD | 25 Years |

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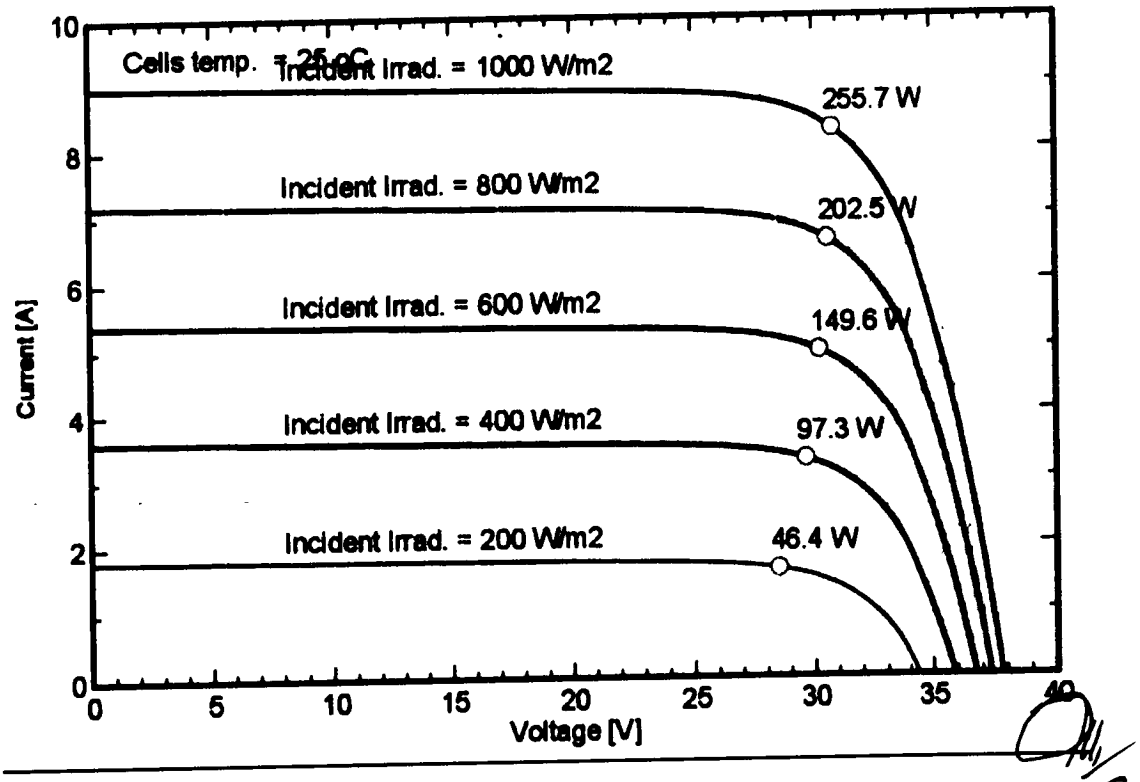
# V-I Curve of Solar Cell

## PV module: JA Solar, JAP6-60-255

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# SCHEDULE-II

The Total Installed Gross ISO Capacity of the Generation Facility/Power Plant/Solar Plant (MW), Total Annual Full Load (Hours), Average Sun Availability, Total Gross Generation of the Generation Facility/Solar Farm (in kWh), Annual Energy Generation (25 years Equivalent Net Annual Production-AEP) KWh and Net Capacity Factor of the Generation Facility/Power Plant/Solar Farm of Licensee is given in this Schedule.

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# SCHEDULE-II

| | | |
|---|---|---|
| (1). | Total PV Installed Capacity of Generation Facility | ≈100.00 MWp |
| (2). | Average Sun Hour Availability/Day (Irradiation on Inclined Surface) | 5.06 Hrs |
| (3). | Days per Year | 365 |
| (4). | PV Plant Generating Capacity Annually (As Per Simulation) | 157561 MWh/year |
| (5). | Expected Total Generation in 25 years Life Span | 3540081 MWh |
| (6). | Generation per Year from plant keeping 24 Hours Working | 100.00 x 24 x 365 = 876000 MWh |
| (7). | Net Capacity Factor (4/6) | 17.99% |

**Note**

All the above figures are indicative as provided by the Licensee. The Net energy available to the Power Purchaser for dispatch will be determined through procedures contained in the Energy Purchase Agreement.

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