National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

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No. NEPRA/R/DL/LAG-391/ 4144-49 March 14, 2018

Syed Mumtaz Hassan,
Country Manager,
Zorlu Solar Pakistan (Private) Limited,
C-117, Clifton, Block 2,
Karachi.

Subject: **Modification in Generation Licence No: SPGL/23/2017**
Licence Application No. LAG-391
Zorlu Solar Pakistan (Private) Limited (ZSPPL)

Reference: ZSPPL's letter dated September 05, 2017 (received on September 07, 2017)

It is intimidated that the Authority has approved "Licensee Proposed Modification" in Generation Licence No. SPGL/23/2017 in respect of Zorlu Solar Pakistan (Private) Limited (ZSPPL), pursuant to Regulation 10(11)(a) of the NEPRA Licensing (Application and Modification Procedure) Regulations 1999.

2. Enclosed please find herewith determination of the Authority in the matter of Licensee Proposed Modification in the Generation Licence of ZSPPL along with Modification-I in the Generation Licence No. SPGL/23/2017 as approved by the Authority.

Enclosure: As Above

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14 03 18
(Syed Safeer Hussain)

Copy to:

1. Managing Director, NTDC, 414-WAPDA House, Lahore.
2. Chief Executive Officer, CPPA-G, ENERCON Building, Sector G-5/2, Islamabad.
3. Chief Executive Officer, Alternative Energy Development Board (AEDB), 2nd Floor, OPF Building, G-5/2, Islamabad.
4. Chief Executive Officer, Multan Electric Power Company (MEPCO), NTDC Colony, Khanewal Road, Multan.
5. Director General, Environment Protection Department, Government of Punjab, National Hockey Stadium, Ferozpur Road, Lahore.

National Electric Power Regulatory Authority (NEPRA)

Determination of the Authority in the Matter of Licensee Proposed Modification of Zorlu Solar Pakistan (Private) Limited

March 14, 2018
Case No. LAG-391

(A). Background

(i). Zorlu Solar Pakistan (Private) Limited (ZSPPL) holds a valid generation licence (No. SPGL/23/2017 dated August 18, 2017) in terms of Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 ("the NEPRA Act").

(ii). The Authority granted the above generation licence to ZSPPL for its Photo Voltaic (PV) based solar generation facility to be located at Quaid-e-Azam Solar Park located at Lal Sohanra at tehsile Hasilpur, district Bahawalpur in the province of Punjab.

(B). Communication of Modification

(i). ZSPPL in accordance with Regulation-10 of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999 ("the Licensing Regulations") communicated a Licensee Proposed Modification (LPM) in its above mentioned generation licence on September 07, 2017.

(ii). In the "text of the proposed modification", ZSPPL submitted that it intends to change the type and quantity of modules which will further have an impact on the other related equipment including invertor and transformer. Further, the Commercial Operation Date (COD) of the proposed generation facility will also be changed to March 31, 2018. Regarding the "statement of the reasons in support of the modification", ZSPPL submitted that in view of the stringent timelines of the project, the selected EPC contractor has suggested that type of

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the modules and other related equipment may be changed as per their availability.

(iii). About the statement of "the impact on tariff", "quality of service" and "the performance by the licensee of its obligation under the licence", ZSPPL stated that proposed changes will not result in any cost variation including the EPC Cost or O&M price. Further, there will be no change in the energy yield or capacity factor of the proposed generation facility. In view of the said, the LPM will not have any impact on tariff, Quality of Service and performance of the ZSPPL as a Licensee.

(C). Processing of Modification

(i). After completion of all the required information as stipulated under the Regulation-10(2) and 10(3) of the Licensing Regulations by the Licensee, the Registrar published the communicated LPM in one (01) English and one (01) Urdu daily newspaper on September 20, 2017, informing the general public, interested/affected parties, and different stakeholders about the said LPM as required under the Regulation-10(4) of the Licensing Regulations.

(ii). The Registrar invited comments of the said stakeholders in favor or against the communicated LPM. Apart from the said notice in the press, separate letters were also sent to individual experts, Government ministries/attached departments and other representative organizations etc. on September 20, 2017 inviting their views and comments for the assistance of the Authority as stipulated in Regulation-10(9) of the Licensing Regulations.

(D). Comments of Stakeholders

(i). In response to the above, comments were received from one (01) stakeholder. This included Mr. Anwar Kamal of Anwar Kamal Law Associates (AKLA). The salient points of the comments offered by AKLA are summarized in the following paragraphs:

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(a). AKLA raised various issues being faced by the electric power sector of the country. It was highlighted that there is under-utilization of various existing generation facilities and resultantly there is surplus capacity. Therefore, induction of new power plants on "Take or Pay" basis etc. is not justifiable. AKLA contested that RE based generation facilities have higher upfront tariff and also enjoy the status of "must run" making such facilities not viable financially and economically. AKLA also questioned the communication of the modification merely after just one month of the grant of generation licence. AKLA stated that the Authority should look into the technical and financial matters of the proposed LPM and stressed that instead of setting up large capacity on grid facilities, preference should be given to small off grid generation facilities.

(ii). The Authority considered the above mentioned comments of the stakeholders and in view of the observations of AKLA decided to seek the perspective of ZSPPL. In response to the said, ZSPPL submitted that the comments offered by AKLA are general in nature and do not specifically relate to its request for modification in the generation licence. ZSPPL explained that comments of AKLA do not reflect an appreciation of the dynamics of the proposed project, the energy sector, and the relevant financial and technical considerations for determining project parameters therefore, the same have no relevance and nexus to its LPM.

(iii). ZSPPL stated that mainstreaming of Renewable Energy (RE) and greater use of indigenous resources could help diversify the energy mix and reduce the dependence on any single source, particularly imported fossil fuels, thereby mitigating against supply disruptions and price fluctuation risks. Further, it was stated that presently Pakistan has the lowest contribution of RE in the energy mix which needs to be improved and brought to the same level as that of other developing economies. ZSPPL stated that comparison of earlier upfront tariffs with

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the current upfront tariff reveals the improvement of technology/plant factor and reduction in cost which is reflected in the current upfront tariff offered by the Authority.

(iv). ZSPPL explained that AKLA in its comments had argued that the proposed modifications should have been accounted for while applying for the original generation licence. In response to the said, it was submitted that every EPC Contract encapsulates the commercial understanding between the particular parties, and that flexibility and firmness in the EPC Contract are not mutually exclusive. Further to the said, ZSPPL submitted that it is not appropriate for AKLA to state that the company should have foreseen the change in availability of the equipment originally envisaged for the project. In fact, the timely submission of the LPM Application of the generation licence is an action to be appreciated not criticized.

(v). ZSPPL reiterated that the proposed modifications shall affect neither the net capacity factor nor the net installed capacity of the project. In this context, the request of AKLA to review the technical and financial impact of the proposed modifications and that approval of a fresh feasibility study is required is not appropriate. Finally, ZSPPL requested that comments of AKLA may be rejected and its LPM may be allowed.

(vi). The Authority considered the above rejoinder of ZSPPL and found the same plausible considering the scope of LPM. Accordingly, the Authority considered it appropriate to proceed further in the matter as stipulated in the NEPRA Licensing (Generation) Rules, 2000 ("the Generation Rules") and the Licensing Regulations.

(E). Observations/Findings

(i). The Authority examined the entire case in details including the already granted licence, communicated LPM, comments of stakeholders and rejoinder from the Licensee. In this regard, the findings of the Authority are explained in the following paragraphs.

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(ii). As explained in the preceding paragraphs, the Authority had granted ZSPPL a generation licence for setting up PV solar based generation facility. It is pertinent to mention that said generation licence was based thin film technology having total of 860314 modules of type FS4115-3 (each of 115 W_P) and FS4118-3 (each 117.50 W_P). As stated in the previous paragraphs, ZSPPL is now planning to change the said type of modules with FS4112-3 (112 W_P), FS4115-3 (115 W_P) and FS4117-3 (117.5 W_P). Further, ZSPPL has also proposed to change the type of invertor from Sungrow to Siemens alongwith related changes in capacities of power transformers. Notwithstanding the above, ZSPPL has also proposed the changes in time line of the project by having Commercial Operation Date as March 31, 2018.

(iii). The Authority has observed that in terms of Regulation-10(5) of the Licensing Regulations, it is permitted to modify an existing licence of a licensee subject to and in accordance with such further changes as it may deem fit, if such modification (a). does not cause the Authority to act or acquiesce in any act or omission of the licensee in a manner contrary to the provisions of the NEPRA Act or the rules or regulations made pursuant to it (b). does not adversely affect the performance by the licensee of its obligations; (c). is or is likely to be beneficial to the consumers; (d). is reasonably necessary for the licensee to effectively and efficiently perform its obligations under the licence; and (e).is reasonably necessary to ensure the continuous, safe and reliable supply of electric power to the consumers keeping in view the financial and technical viability of the licensee;

(iv). In consideration of the above, the Authority has observed that the LPM has been communicated in conformity to the provisions of the NEPRA Act, the relevant rules and regulations made thereunder and has not caused it to act or acquiesce in any act or omission of the licensee in a manner contrary to the provisions of the NEPRA Act or the rules or regulations made pursuant to it. The Authority has considered that LPM will not adversely affect the performance by the licensee of its obligations under the existing licence. The LPM will be beneficial to the consumers as environment friendly electric power will be available to the

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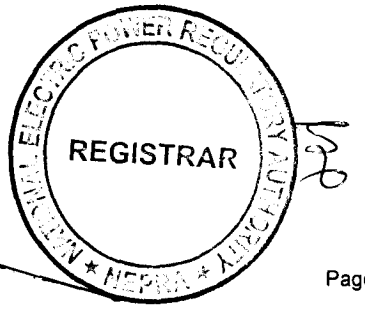
consumers on a fast track basis. Further to the said, the Authority considers that it is reasonably necessary for the licensee to effectively and efficiently perform its obligations under the licence for making the generation licence consistent with its tariff determination which will allow it to complete the project as per the agreed timeline. Also, the LPM is reasonably necessary to ensure the continuous, safe and reliable supply of electric power to the consumers keeping in view the financial and technical viability of the licensee.

(v). As explained above, the Authority has duly considered the comments of the stakeholders and has observed that AKLA has raised certain observations including (a). underutilization of existing power plants having contracts on "Take or Pay" basis; (b). allowing setting up more new power plants on "Take or Pay" basis resulting in increase in consumer end tariff; (c). induction of non-base load power plants of wind, solar, small hydro and bagasse having must run status resulting in higher consumer end tariff; (d). the Licensing Regulations restricting the modification of ac licence before the expiry of 365 days was rescinded in the year 2010 why? (e). the Licensing Regulations require the approval of the feasibility study from panel of experts the proposed changes will require fresh approval; and (f). instead of large capacity grid connected solar generation facilities, small off grid generation facilities be set up.

(vi). The Authority observes that AKLA has been raising these issues on a consistent basis. In this regard, a comprehensive reply on the issues of (a). underutilization of plants; (b). capacity payment without taking electricity from power plants; and (c). addition of RE project having high tariff was sent to AKLA through letter no. NEPRA/SAT-I/TRF-100/7060, dated December 27, 2016. The Authority reiterates its earlier findings and observations given in the aforementioned letter in the matter and is of the considered opinion that in fact there still persists a supply-demand gap resulting in load-shedding and load management. The aforementioned is strengthened from the fact that the proposed generation facility/solar Power Plant/solar Farm of ZSPPL is included in the future expansion plan of NTDC.



(vii). Regarding the observations of AKLA about abolition the restriction of submitting any modification before the expiry of 365 days, the Authority considers that it is entitled to make any modification which are deemed fit. In this regard, the Authority observed that the restriction was causing difficulties for the Licensees therefore, it decided to revoke the condition after duly considering the process of seeking comments of the stakeholders. Regarding the fresh approval of the feasibility study of the project from panel of experts due to suggested changes, the Authority considers that the sponsors of the project carried out the required feasibility study and got the same approved by the Panel of Experts fixing the various parameters including but not limited to type of PV cells, quantity and types of modules, project cost and energy estimates etc. In this regard, the Authority has observed that due to stringent timelines of the project, the sponsors have to made certain changes to the PV modules without affecting the cost and energy yield.

(viii). Further to the above, the Authority has also observed that relevant provisions of the Licensing Regulations pertaining to the LPM do not specifically requires approval of the fresh feasibility study. In view of the said, the Authority does not consider submitting a fresh approval from the appointed Panel of Experts of the agency which had issued the Letter of Intent (LoI) of the project. About the observation of AKLA that instead of large capacity grid connected solar generation facilities, small off grid generation facilities be set up, the Authority considers that both technologies have different type of prerequisites and merit/demerits. In this regard, the Authority has observed that project of ZSPPL is being set up at place which has the highest irradiation in the country. Further, the selected location is barren and can be best utilized for setting up solar based generation facility. In consideration of the said, the Authority is satisfied that apart from the large solar generation facilities, the venues for small scale solar generation are also being explored and in this regard large number of roof top solar system are being installed across the country. In view of the above, the Authority considers that the relevant observations of AKLA stand addressed.

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(F). Approval of LPM

(i). In view of the above, the Authority is satisfied that ZSPPL has complied with all the requirements of the Licensing Regulations pertaining to the modification. Therefore, the Authority in terms of Regulation-10(11)(a) of the Licensing Regulations approves the communicated LPM allowing the proposed changes in PV modules and other related equipment. Further, the Authority allows the change in COD subject to the condition that ZSPPL adheres to the terms of conditions of the determination of its tariff dated January 25, 2018.

(ii). Accordingly, the generation licence (No. SPGL/23/2017 dated August 18, 2017) is hereby modified. The changes made in the generation licence including (a). revised articles of the generation licence; and (b). revised Schedules-I&II are attached as annexure to this determination. The approval of the LPM will be subject to the provisions contained in the NEPRA Act, relevant rules framed there-under, terms & conditions of the generation licence and other applicable documents.

Authority

Syed Masood-ul-Hassan Naqvi
(Member)

Himayat Ullah Khan
(Member)

Saif Ullah Chattha
(Member/Vice Chairman)

Tariq Saddozai
(Chairman)

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National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No. SPGL/23/2017

In exercise of the powers conferred upon under Section-26 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby modifies the Generation Licence granted to **Zorlu Solar Pakistan (Pvt.) Limited** to the extent of changes mentioned as here under: -

(i). The **validity date** indicated on the Face Sheet of Original Generation Licence is changed to March 30, 2043.

(ii). The **Changes** in **Articles** of the Generation Licence are attached as **Revised/Modified Articles** of the Generation Licence;

(iii). The **Changes** in **Schedule-I** are attached as **Revised/Modified Schedule-I**;

(iv). **Changes** in **Schedule-II** are attached as **Revised/Modified Schedule-II**;

This **Modification-I** is given under my hand on 14th **day** of **March Two Thousand & Eighteen.**

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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 as amended or replaced from time to time;

(b). "AEDB" means the Alternative Energy Development Board or any other entity created for the like purpose established by the GoP to facilitate, promote and encourage development of renewable energy in the country;

(c). "Applicable Documents" mean the Act, the rules and regulations framed by the Authority under the Act, any documents or instruments issued or determinations made by the Authority under any of the foregoing or pursuant to the exercise of its powers under the Act, the Grid Code, the applicable Distribution Code, if any, or the documents or instruments made by the Licensee pursuant to its generation licence, in each case of a binding nature applicable to the Licensee or, where applicable, to its affiliates and to which the Licensee or any of its affiliates may be subject;

(d). "Applicable Law" means all the Applicable Documents;

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

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

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(g). "Carbon Credits" mean the amount of Carbon Dioxide (CO2) and other greenhouse gases not produced as a result of generation of electric energy by the generation facility/Solar Power Plant/Solar Farm and other environmental air quality credits and related emissions reduction credits or benefits (economic or otherwise) related to the generation of electric energy by the generation facility/Solar Power Plant/Solar Farm, which are available or can be obtained in relation to the generation facility/Solar Power Plant/Solar Farm after the COD;

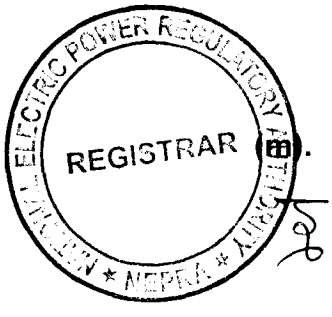
(h). "Commercial Operations Date (COD)" means the day immediately following the date on which the generation facility/Solar Power Plant/Solar Farm of the Licensee is commissioned;

(i). "Commissioning" means the undertaking of the Commissioning Tests of the generation facility/Solar Power Plant/Solar Farm as stipulated in the EPA;

(j). "Commissioning Tests" means the tests to be carried out pursuant to provisions of EPA;

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

(l). "Distribution Code" means the distribution code prepared by the concerned XW-DISCO and approved by the Authority, as it may be revised from time to time with necessary approval of the Authority;



(m). "Energy Purchase Agreement (EPA)" 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 Power Plant/Solar Farm, as may be amended by the parties thereto from time to time;

(n). "Generation Rules" mean the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000 as amended or replaced from time to time;

(o). "Grid Code" means the grid code prepared and revised from time to time by NTDC with necessary approval of the Authority;

(p). "GoP" means the Government of Pakistan acting through the AEDB which has issued or will be issuing to the Licensee a LoS for the design, engineering, construction, insuring, commissioning, operation and maintenance of the generation facility/Solar Power Plant/Solar Farm;

(q). "GoPb" means the Government of the province of Punjab acting through the PPDB which has issued letter of intent to the Licensee for the design, engineering, construction, insuring, commissioning, operation and maintenance of the generation facility/Solar Power Plant/Solar Farm;

(r). "IEC" means "the International Electrotechnical Commission or its successors or permitted assigns;

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

(t). "Implementation Agreement (IA)" means the implementation agreement signed or to be signed between the GoP and the Licensee in relation to this particular generation facility/Solar Power Plant/Solar Farm, as may be amended from time to time;

(u). "Letter of Support (LoS)" means the letter of support issued or to be issued by the GoP through the AEDB to the Licensee;

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(v). "Licensee" means **Zorlu Solar Pakistan (Pvt.) Limited** or its successors or permitted assigns;

(w). "Licensing Regulations" mean the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time;

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

(y). "Net Delivered Energy" means the net electric energy expressed in kWh generated by the generation facility/Solar Power Plant/Solar Farm of the Licensee at its outgoing Bus Bar and delivered to the Power Purchaser;

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

(aa). "Policy" means the "Policy for Development of Renewable Energy for Power Generation, 2006" of GoP as amended from time to time;

(bb). "Power Purchaser" means CPPA-G which will be purchasing electric energy from the Licensee either on behalf of all XW-DISCOs or any single XW-DISCO, pursuant to an EPA for procurement of electric energy;

(cc). "PPDB" means Punjab Power Development Board or any other entity created for the like purpose established by the GoPb to facilitate, promote and encourage development of private sector participation for development of projects for electric power in the province of Punjab;

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(dd). "Punjab Power Policy" means the "Punjab Power Generation Policy 2006" of GoPb as amended from time to time;

(ee). "SCADA System" means the supervisory control and data acquisition system for gathering of data in real time from remote locations to control equipment and conditions;

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

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

1.2 The words and expressions used but not defined herein bear the meaning given thereto in the Act or Generation Rules and Licensing Regulations issued under the Act.

Article-2
Applicability of Law

This licence is issued subject to the provisions of the Applicable Law, as amended from time to time.

Article-3
Generation Facilities

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

3.2 The net capacity/Net Delivered Energy of the generation facility/Solar Power Plant/Solar Farm of the Licensee is set out in Schedule-II of this licence. The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility/Solar Power Plant/Solar Farm before its COD.

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Article-4
Term of Licence

4.1 This licence is effective from the date of its issuance i.e. dated August 18, 2017 and will have a term of twenty-five (25) years from the COD of the generation facility/Solar Power Plant/Solar Farm of the Licensee.

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

Article-5
Licence fee

The Licensee shall pay to the Authority the licence fee as stipulated in the National Electric Power Regulatory Authority (Fees) Rules, 2002 as amended or replaced from time to time.

Article-6
Tariff

The Licensee shall charge only such tariff from the Power Purchaser which has been determined, approved or specified by the Authority.

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 Generation 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 or replaced from time to time.

Article-10
Compliance with Environmental & Safety Standards

10.1 The generation facility/Solar Power Plant/Solar Farm of the Licensee shall comply with the environmental and safety standards as may be prescribed by the relevant competent authority from time to time.

10.2 The Licensee shall provide a certificate on a bi-annual basis, confirming that the operation of its generation facility/Solar Power Plant/Solar Farm is in conformity with required environmental standards as prescribed by the relevant competent authority.

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Article-11
Power off take Point and Voltage

The Licensee shall deliver the electric energy to the Power Purchaser at the outgoing Bus Bar of its generation facility/Solar Power Plant/Solar Farm. The Licensee shall be responsible for the up-gradation (step up) of generation voltage up to the required dispersal voltage level.

Article-12
Performance Data

12.1 The Licensee shall install properly calibrated automatic computerized solar radiation recording device(s) at its generation facility/Solar Power Plant or Solar Farm for recording of the solar radiation data.

12.2 The Licensee shall install SCADA System or compatible communication system at its generation facility/Solar Power Plant or Solar Farm as well as at the side of the Power Purchaser.

12.3 The Licensee shall transmit the solar radiation data and power output data of its generation facility/Solar Power Plant or Solar Farm to the control room of the Power Purchaser.

Article-13
Provision of Information

In accordance with provisions of Section-44 of the Act, the Licensee shall be obligated to provide the required information in any form as desired by the Authority without any exception.

Article-14
Emissions Trading /Carbon Credits

The Licensee shall process and obtain expeditiously the Carbon Credits admissible to the generation facility/Solar Power Plant/Solar Farm. The Licensee shall share the said proceeds with the Power Purchaser as per the Policy.

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Article-15
Design & Manufacturing Standards

The photovoltaic cells and other associated equipment of the generation facility/Solar Power Plant/Solar Farm shall be designed, manufactured and tested according to the latest IEC, IEEE standards or any other equivalent standard in the matter. All the plant and equipment of the generation facility/Solar Power Plant/Solar Farm shall be unused and brand new.

Article-16
Power Curve

The power curve for the individual solar photovoltaic cells provided by the manufacturer and as mentioned in Schedule-I of this generation licence, shall form the basis in determining the cumulative power curve of the generation facility/Solar Power Plant/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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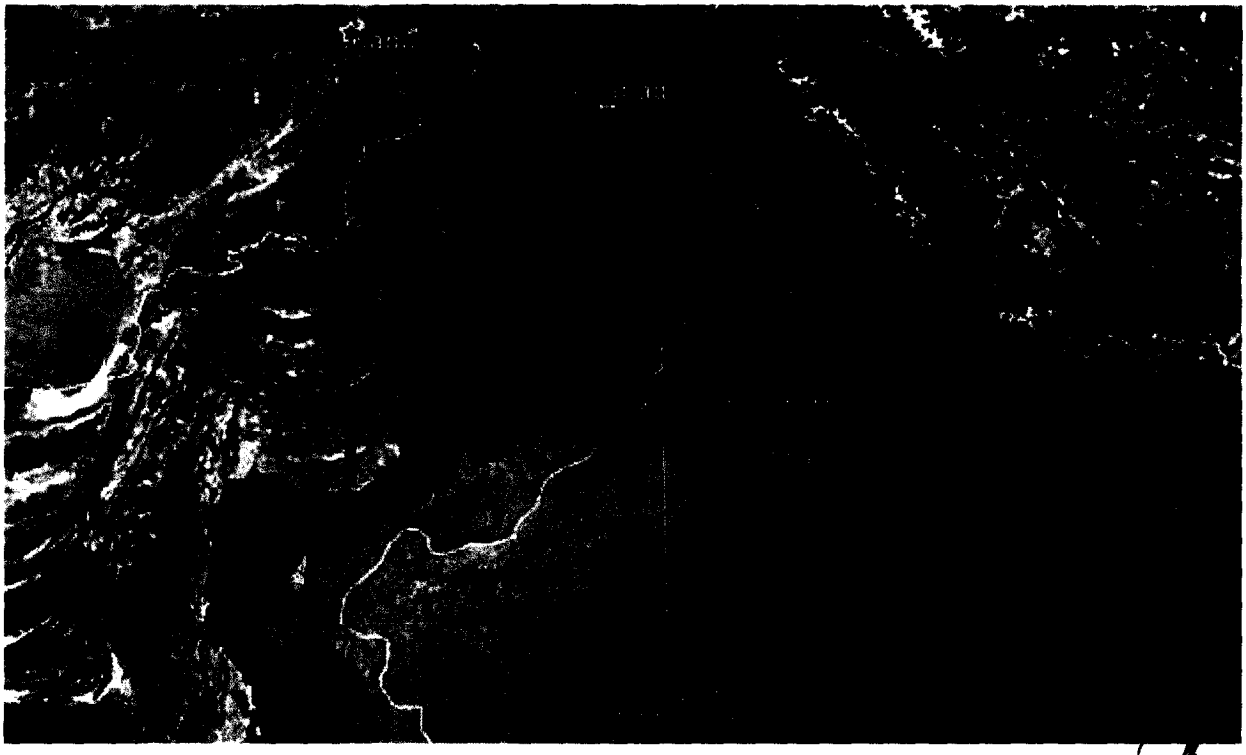
Location of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee



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

Land Coordinates of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee

Boundary 1	29°10'30.10"N	71°47'[illegible]"E

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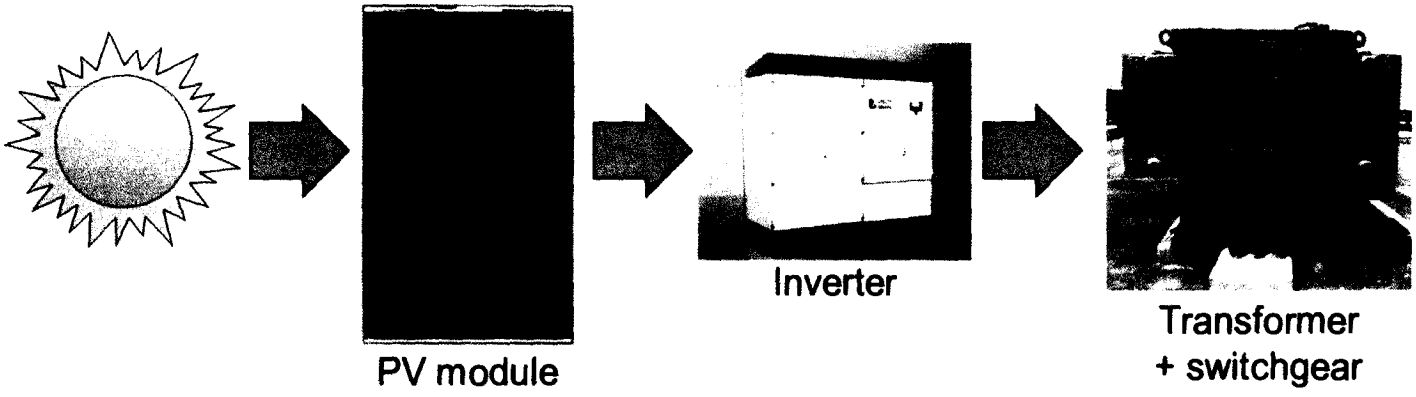
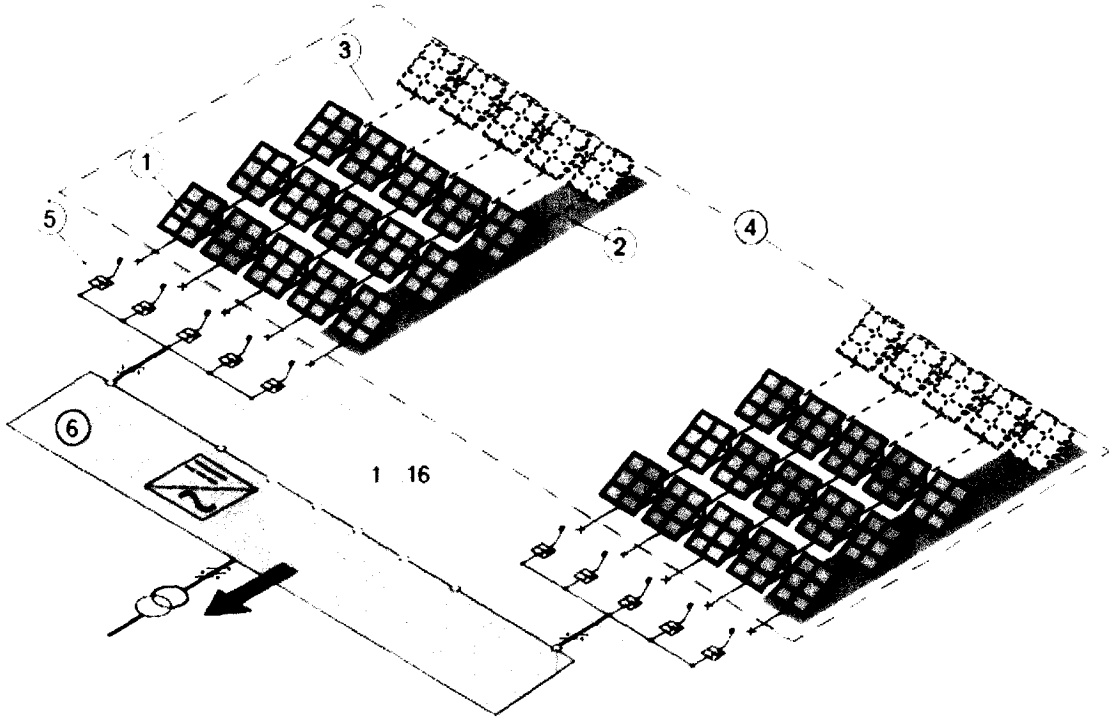
Process Flow Diagram of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee





1	Solar module (photovoltaic module)	3	Solar array	5	Solar array junction box
2	Solar string	4	Solar generator	6	Inverter

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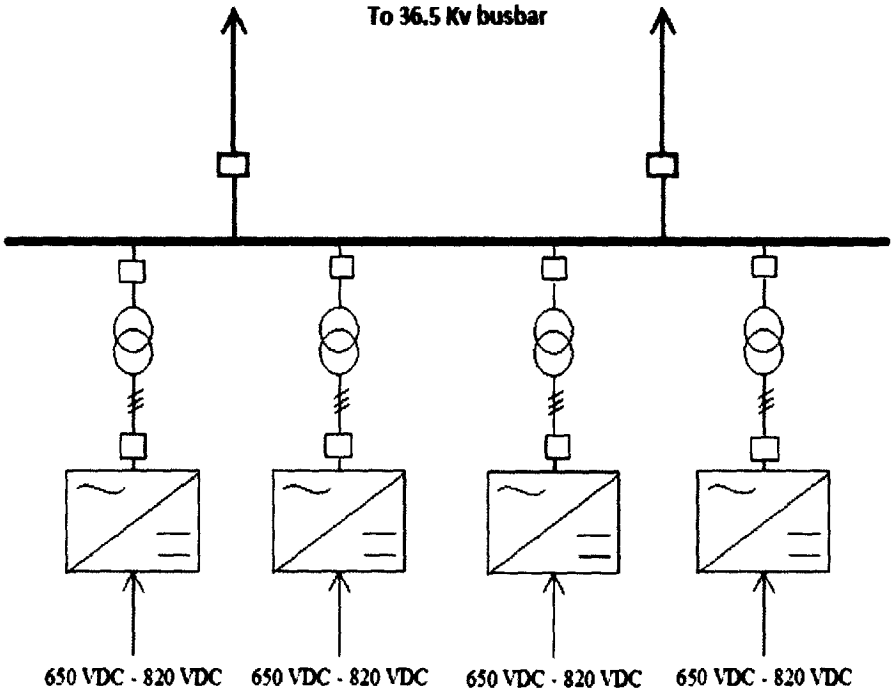
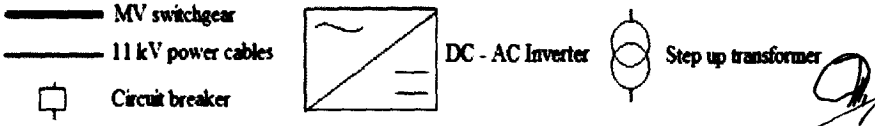
Single Line Diagram of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee





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

The electric power generated from the generation facility/Solar Power Plant/Solar Farm of the Licensee/Zorlu Solar Pakistan (Pvt.) Limited/ZSPPL shall be dispersed to the National Grid through the load center of MEPCO.

(2). The proposed Interconnection Arrangement/Transmission Facilities for dispersal of power from generation facility/Solar Power Plant/Solar Farm of the Licensee/ZSPPL will consist of the following: -

(i). A 132 kV D/C transmission line (measuring approx. 2km long on ACSR Rail conductor) connecting directly with 220/132kV Lal-Sohanra grid station/substation;

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

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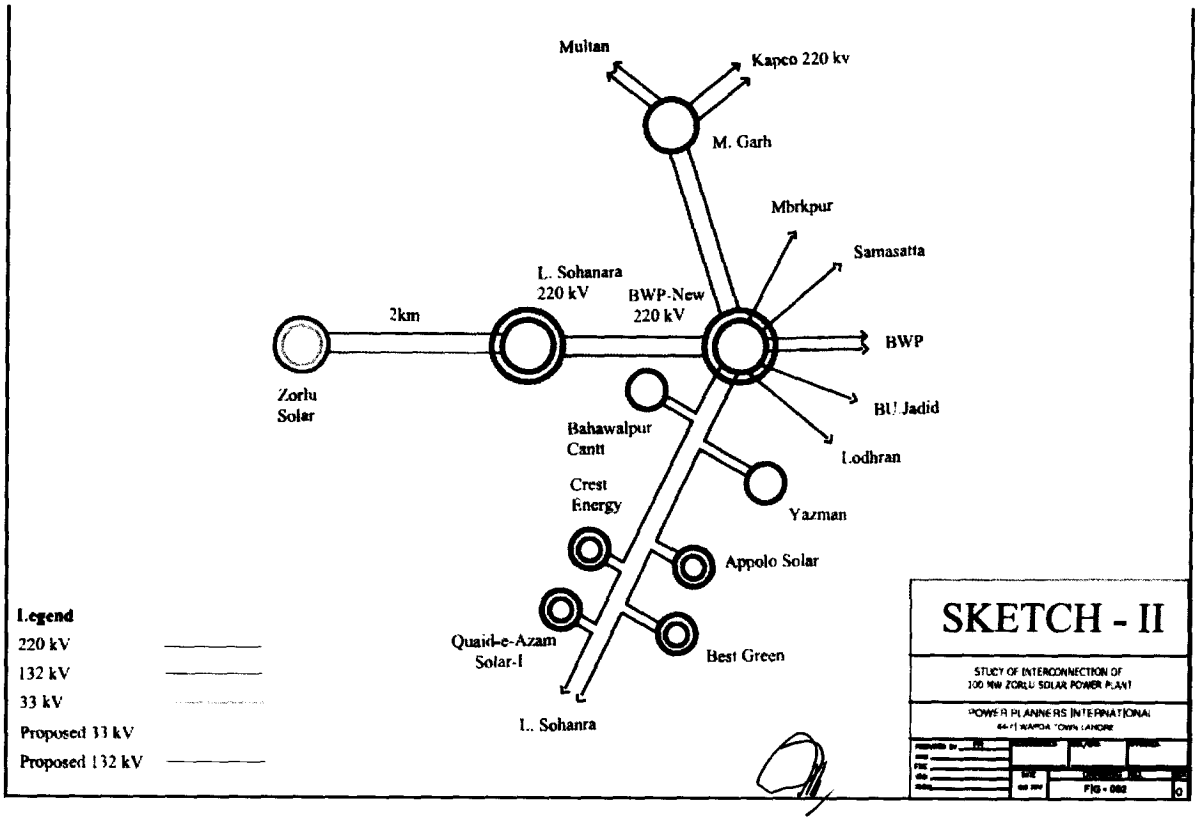
Schematic Diagram of the Interconnection Arrangement/Transmission Facility for Dispersal of Power from the Generation Facility/Solar Power Plant /Solar Farm of the Licensee



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Detail of Generation Facility/Solar Power Plant/ Solar Farm

(A). General Information

(i).	Name of the Company/ Licensee	Zorlu Solar Pakistan (Pvt.) Limited
(ii).	Registered/ Business office of the Company/ Licensee	C-117, Clifton Block-2, Karachi Pakistan.
(iii).	Location of the generation facility Solar Power Plant/ Solar Farm	Extension of Quaid-e-Azam Solar Park, in the Province of Punjab
(iv).	Type of the generation facility/ Solar Power Plant/ Solar Farm	Solar Photovoltaic (PV)

(B). Solar Power Generation Technology & Capacity

(i).	Type of Technology	Photovoltaic (PV) Cell
(ii).	System Type	Grid Connected
(iii).	Installed Capacity of the generation facility Solar Power Plant/ Solar Farm (MW)	100 MW

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(C). Technical Details of Equipment

(a).	**Solar Panels – PV Modules**			
(i).	Type of Module	FS4112-3	FS4115-3	FS4117-3
		10.38 MW	76.64 MW	12.97 MW
(ii).	Type of Cell	Cd-Te Thin Film		
(iii).	Dimension of each Module	1200*600*6.8 mm		
(iv).	No. of Panel /Modules	869,160		
(v).	Module Area	0.72m^2		
(vi).	Panel's Frame	None		
(vii).	Weight of one Module	12 kg		
(viii).	No of Solar Cells in each module	up to 216 cells		
(ix).	Efficiency of module	FS4112-3 112.5 W	FS4115-3 115 W	FS4117-3 117.5 W
		15.6 %	16.0 %	16.3 %
(x).	Maximum Power (Pmax)	FS4112-3	FS4115-3	FS4117-3
		112.5 Wp	115 Wp	117.5 Wp
(xi).	Voltage @ Pmax	FS4112-3	FS4115-3	FS4117-3
		68.50 V	69.30 V	70.10 V

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(xii).	Current @ Pmax	FS4112-3	FS4115-3	FS4117-3
		1.64A	1.66A	1.68A
(xiii).	Open circuit voltage (Voc)	FS4112-3	FS4115-3	FS4117-3
		87.00 Volt	87.60 Volt	88.10 Volt
(xiv).	Short circuit current (Isc)	FS4112-3	FS4115-3	FS4117-3
		1.83A	1.83A	1.83A
(xv).	Maximum system open Circuit Voltage	1500 V		
(b).	**Inverters**			
(i).	Capacity of each unit	4000kW		
(ii).	Manufacturer	SIEMENS - WSTECH		
(iii).	Input Operating Voltage Range	836V-1500V		
(iv).	Number of Inverters	20		
(v).	Efficiency of inverter (EU)	98.5 %		
(vi).	Max. Allowable Input voltage	1500 V DC		
(vii).	Max. Current	4 x 1220 A		

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(viii).	Max. Power Point Tracking Range	836 ~ 1500V	
(ix).	Output electrical system	3 phase, 3 wire	
(x).	Rated Output Voltage	550V	
(xi).	Power Factor (adjustable)	0 ~ 1 (leading & lagging)	
(xii).	Power control	MPP tracker	
(xiii).	Rated Frequency	50 Hz	
(xiv).	Environmental Enclosures	Relative Humidity	0~95%, non-condensing
		Audible Noise	< 55 dB(A)
		Operating Elevation	4500m (>3000m derating)
		Operating ambient temperature	-25℃~+60℃
(xv).	Grid Operating protection	A	DC circuit breaker
		B	AC circuit breaker
		C	DC overload protection (Type 2)
		D	Overheat protection
		E	Grid monitoring
		F	Insulation monitoring
		G	Ground fault monitoring
(c).	**Junction Boxes Installed and fixed on main steel structure in Array yard.**		
(i).	Number of J/Box units	645	
(ii).	Input circuits in each box	13	

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(iii).	Max. input current for each circuit	20A
(iv).	Protection Level	IP65
(v).	Over current protection	Fuse
(vi).	Surge protection	Yes
(d).	**Data Collecting System**	
(i).	System Data	Hardwire connection via RS485 and/or Ethernet.
(e).	**Power Transformer**	
(i).	Rating	2x80/100 MVA
(ii).	Type of transformer	ONAN/ONAF
(iii).	Purpose of transformer	Step-up (33 kV/132 kV)
(iv).	Output Voltage	132 kV

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(f).	**Unit Transformer**	
(i).	Rating	20×4000 kVA
(ii).	Type of transformer	33kV Oil Typed Transformer
(iii).	Purpose of transformer	Step-up (2x0.55kV/33kV)
(iv).	Output Voltage	33 KV

(D). Other Details

(i).	Project Commercial Operation date (COD)-Anticipated	March 31, 2018
(ii).	Expected Life of the Project from Commercial Operation date (COD)	25 years

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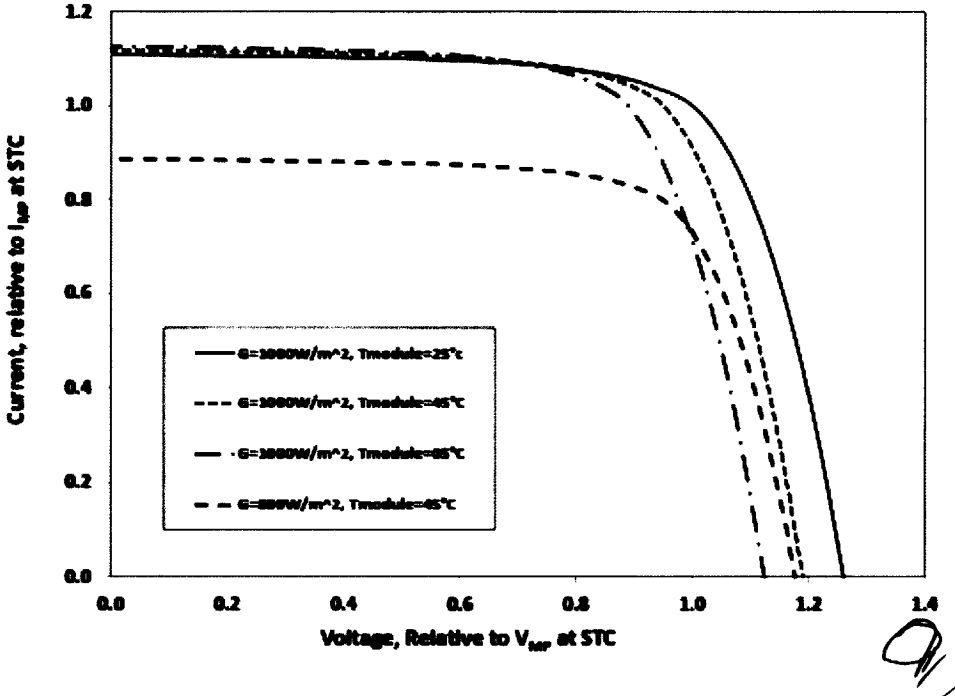
V-I Curve of Solar Cell



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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/Solar Farm of Licensee are given in this Schedule.

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SCHEDULE-II

(1).	Total Installed Capacity of the Generation Facility/Solar Power Plant/Solar Farm	100 MW
(2).	Average Sun Hour Availability/Day (Irradiation on Inclined Surface)	8 to 8.5 Hours
(3).	No. of days per year	365
(4).	Annual generating capacity of Generation Facility/Solar Power Plant/Solar Farm (As Per Simulation)	179,580 MWh
(5).	Total expected generation of the Generation Facility/Solar Power Plant/Solar Farm during the twenty five (25) years term of this licence	4,009,691 MWh
(6).	Annual generation of Generation Facility/Solar Power Plant/Solar Farm based on 24 hours working	876,000 MWh
(7).	Net Capacity Factor of Generation Facility/Solar Power Plant/Solar Farm	20.50%

Note

All the above figures are indicative as provided by the Licensee. The Net Delivered Energy available to Power Purchaser for dispatch will be determined through procedures contained in the Energy Purchase Agreement (EPA) or the Applicable Document(s).

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