National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Ataturk Avenue(East), G-5/1, Islamabad
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Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/R/DL/LAG-264/ 12237-42

December 12, 2014

Mirza Nadeem Hafeez
Director
First Solar (Pvt.) Limited
House No. 10-B, Street No. 26,
Sector F-8/1,
Islamabad

Subject: **Generation Licence No. SPGL/09/2014**
Licence Application No. LAG-264
First Solar (Private) Limited (FSPL)

Reference: *Your letter No. FS/Correspondence/101/01, dated May 30, 2014.*

Enclosed please find herewith Determination of the Authority in the matter of Generation Licence Application of FSPL along with Generation Licence No. SPGL/09/2014 annexed to this determination granted by the National Electric Power Regulatory Authority to FSPL for its 2.01666 MW_P Solar power plant located at Village Mukhayal in Kalar Kahar, District Chakwal, in the province of 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/09/2014)**

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(Syed Safeer Hussain) 12.12.14

Copy to:

1. Chief Executive Officer, Alternative Energy Development Board (AEDB), 2nd Floor, OPF Building, G-5/2, Islamabad.
2. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore
3. Chief Operating Officer, CPPA, 107-WAPDA House, Lahore
4. Chief Executive Officer, Islamabad Electric Supply Company (IESCO), Street No. 40, G-7/4, Islamabad
5. Director General, Environmental Protection Department, Government of Punjab, 4-Lyton Road, Lahore.

National Electric Power Regulatory Authority (NEPRA)

Determination of the Authority in the Matter of Generation Licence Application of First Solar (Private) Limited

December 02, 2014
Application No. LAG-264

(A). Background

(i). Government of Pakistan has set up Alternative Energy Development Board (AEDB) for harnessing Renewable Energy (RE) resources in the Country. AEDB has issued Letter of Intent (LoI) to various RE developers for setting up projects in the country.

(ii). AEDB issued LoI to First Solar (Private) Limited (FSPL) for setting up 2.00 MW (approximately) Solar Power Plant (SPP)/Solar Farm (SF)/Generation Facility at Village Mukhayal in Kalar Kahar, District Chakwal in the Province of Punjab.

(iii). The Authority through its Determination (No. NEPRA/UTS-01/777-779, dated January 21, 2014) announced an up-front tariff (the Up-Front Tariff) for SPP/SF. FSPL decided to unconditionally accept the said mentioned Up-Front Tariff and also approached the Authority for having a Generation Licence.

(B). Filing of Generation Licence Application

(i). In accordance with Section 15 of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the NEPRA Act), FSPL filed an application on June 02, 2014, requesting for the grant of Generation Licence.

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(ii). The Registrar examined the submitted application to confirm its compliance with the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 (the "Regulations"). It was observed that some of required information/documentation was missing. Accordingly, Registrar directed FSPL for submitting the missing information/documentation. FSPL completed the missing information/documentation on June 17, 2014. The Authority admitted the same under Regulation-7 of the Regulations on July 10, 2014 for consideration of grant of a Generation Licence and approved the advertisement about the Notice of Admission (NoA) to be published in daily newspapers, seeking comments of the general public as stipulated in Regulation-8 of the Regulations. The Authority also approved the list of interested/affected parties for inviting comments in the matter as stipulated in Regulation-9 of the Regulations.

(iii). The NoA was published in one Urdu and one English National Newspaper on July 17 & 19, 2014. Further, separate notices were also sent to Individual Experts/Government Ministries/Representative Organizations etc. on July 21, 2014 for submitting their views/comments in the matter for the assistance of the Authority to arrive at an informed decision.

(C). Comments of Stakeholders

(i). In reply to the above, the Authority received comments from five (05) stakeholders. These included Central Power Purchasing Agency (CPPA) of National Transmission & Despatch Company Limited (NTDC), Directorate of Alternative Energy, Energy Department Govt. of Sindh (DoAEEDGoS), Board of Investment (BoI), Islamabad Electric Supply Company Limited (IESCO) and Ministry of Water and Power (MoW&P).

(ii). The salient points of the comments offered by the above stakeholder are summarized in the following paragraphs: -

(a). CPPA supported the grant of Generation Licence to FSPL subject to fulfillment of the relevant policy and other regulatory

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requirements. However, CPPA stressed that FSPL must comply with the requirements of the Grid Code for SPP/SF/Generation Facility. Further, CPPA also proposed that IESCO being the proposed Power Purchaser may be asked to comment on the Interconnection Arrangement for the Project of FSPL;

(b). DoAEEDGoS expressed its support for the development of the Project of FSPL and the grant of Generation Licence to it;

(c). BoI commented that to tap alternate sources for generation of electric power is dire need of the country as it will decrease the shortfall of electricity in the country. Therefore, the grant of Generation Licence to FSPL is supported subject to fulfillment of all codal and technical formalities;

(d). IESCO remarked that purchase of solar power will disturb its consumer-end tariff as the same is generally on the higher side. IESCO has not given any formal consent for acquisition of power from FSPL. The sponsors of the project submitted Grid Interconnection Study and some discrepancies/observations were pointed out which needs to be addressed. The apprehensions of IESCO may be addressed before the grant of Generation Licence; and

(e). MoW&P submitted that the Authority may process the Generation Licence application of FSPL as per provisions of NEPRA Act, relevant rules and Policy Guidelines of Govt. of Pakistan in the matter.

(iii). The above comments of the stakeholders were examined. It was observed that DoAEEDGoS, BoI and MoW&P explicitly supported the grant of Generation Licence to FSPL subject to fulfillments of the requirements of the

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NEPRA Act, relevant rules and regulations. CPPA supported the grant of Generation Licence but also raised the issue of compliance of Grid Code. Further, CPPA also suggested seeking views of IESCO on Interconnection Arrangement. Whereas, IESCO raised the issues of higher cost and discrepancy in Interconnection Study.

(iv). In view of the above, the Authority considered it appropriate seeking perspective of FSPL on the observations of CPPA and IESCO. In its rejoinder to the comments of CPPA, the sponsors of FSPL confirmed that the proposed project will comply with the provisions of the Grid Code without any exception. On the comments of IESCO, it was submitted that FSPL intends accepting Up-Front Tariff announced by the Authority. Further, it was submitted that discrepancies pointed out by IESCO pertaining to the Interconnection Studies were examined and necessary changes were incorporated in the Interconnection Study. FSPL submitted that it was observed that IESCO had some problems with running of the simulation files in its software Programme. The consultant (i.e. Power Planners International-PPI) has guided the relevant staff/experts of IESCO in this regard and it is anticipated that IESCO will not have any further discrepancy in the Grid Interconnection Study and the same will be approved.

(v). In view of the above clarification and considering the fact that the purchase of Power from RE Projects is mandatory under the Policy for Development of Renewable Energy for Power Generation 2006 (the Policy), the Authority considered it appropriate to process the application of FSPL for the consideration of grant of Generation Licence as stipulated in the Regulations and NEPRA Licensing (Generation) Rules, 2000 ("the Rules").

(D). 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 is directly linked with the availability of safe, secure, reliable and cheaper

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

(ii). The existing energy mix of the country is heavily skewed towards the costlier thermal power plants, mainly operating on imported furnace oil. The import of fuel prices 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 FSPL is consistent with the provisions of ESAP. The project will help in diversifying the energy portfolio of the country. Further, it will not only enhance the energy security of the country by reducing the dependence on imported furnace oil but will also help reduction in carbon emission by generating clean electricity, thus improving the environment.

(iii). FSPL is setting up the proposed SPP/SF/Generation Facility at Village Mukhayal in Kalar Kahar, District Chakwal, in the Province of Punjab. The proposed SPP/SF/Generation Facility will have a Total Installed Capacity of 2.01666 MWe. FSPL has informed that in terms of the conditions of the LoI, it completed the Interconnection and System Stability Study for dispersal of electric power from the above mentioned Generation Facility/SPP/SF. According to the said study carried out by PPI, the Dispersal/Interconnection Arrangement will be consisting of 11 KV Double Circuit (D/C) Feeder (Measuring about 10.00 KM) on ACSR DOG Conductor connecting the Generation Facility/SPP/SF of FSPL to N.P. Sethi Grid Station. The Authority has observed that although FSPL had submitted the study to IESCO however, approval of the same is still awaited. Therefore, the

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Authority directs FSPL for taking up the matter with IESCO for expediting the approval of the said study within three (03) months of this Determination.

(iv). 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. The Authority in its Determination for the Up-Front Tariff for the Solar Projects has assumed the Control Period for the Projects to be twenty five (25) years from Commercial Operation Date (COD) of the Project. The Authority in future intends keeping the same period. Therefore, the Authority fixes the term of the Generation Licence of FSPL to twenty five (25) years from COD of the Project.

(v). Regarding the Tariff, it is clarified that in terms of Rule-6 of the Rules, for the provision of electric power, the Licensee is allowed to charge only such tariff as may be determined, approved or specified by the Authority. The Authority directs FSPL to adhere the terms and conditions of the proposed Generation Licence and follow the same in letter and spirit without any exception for tariff.

(vi). The proposed SPP/SF/Generation Facility of FSPL 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 FSPL to initiate the process in this regard at the earliest so that proceeds for the Carbon Credits are materialized. FSPL shall be required to share the proceeds of the Carbon Credits with the Power Purchaser as stipulated in Article-14 of its Generation Licence.

(vii). The proposed Generation Facility/SPP/SF of FSPL for which Generation Licence has been sought, is based on PV Cells using solar radiation for electric power generation. 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 FSPL obligatory to comply with the required rules and regulation on

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environment. Further, the Authority directs FSPL to submit a quarterly report confirming that its operation is compliant with required Environmental Standards of the Environmental Protection Agency of Govt. of Punjab.

(viii). In view of the above, the Authority hereby decides to approve the grant of Generation Licence to FSPL 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.

Authority

Himayat Ullah Khan
Member

5.12.14.

Khawaja Muhammad Naeem
Member

9 XII 14.

Habibullah Khilji
Member/Vice Chairman

3/12/2014

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12.12.14

National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No. SPGL/09/2014

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:

FIRST SOLAR (PRIVATE) LIMITED

Incorporated under the Companies Ordinance, 1984

Corporate Universal Identification No. 0069741, dated June 15, 2009

for its Solar Generation Facility/Solar Power Plant/Solar Farm Located at Village Mukhayal in Kalar Kahar, District Chakwal in the Province of Punjab

(Installed Capacity: 2.01666 MW_P Gross)

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

Given under my hand this 12th day of December Two Thousand & Fourteen and expires on 30th day of August 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 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 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, which are available or can be obtained in relation to the generation facility after the COD;

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

(f). "CPPA" means "the Central Power Purchasing Agency of NTDC" or any other entity created for the like purpose;

(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, as may be amended by the parties thereto from time to time;

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(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). "IESCO" means "Islamabad Electric Supply Company Limited and its successors or permitted assigns;

(l). "Licensee" means "First Solar (Private) 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 of NTDC purchasing power on behalf of XW-DISCOs or IESCO;

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

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

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(r). "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 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 of this Licence.

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

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

4.2 Unless suspended or revoked earlier, the Licensee may within ninety (90) days prior to the expiry of the term of the Licence, apply for renewal of the Licence under the National Electric Power Regulatory Authority Licensing (Application &

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Modification Procedure) Regulations, 1999 as amended or replaced from time to time.

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.

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.

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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 11 KV grid station. The up-gradation (step up) of generation voltage up to 11 KV will be the responsibility of the Licensee.

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

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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.

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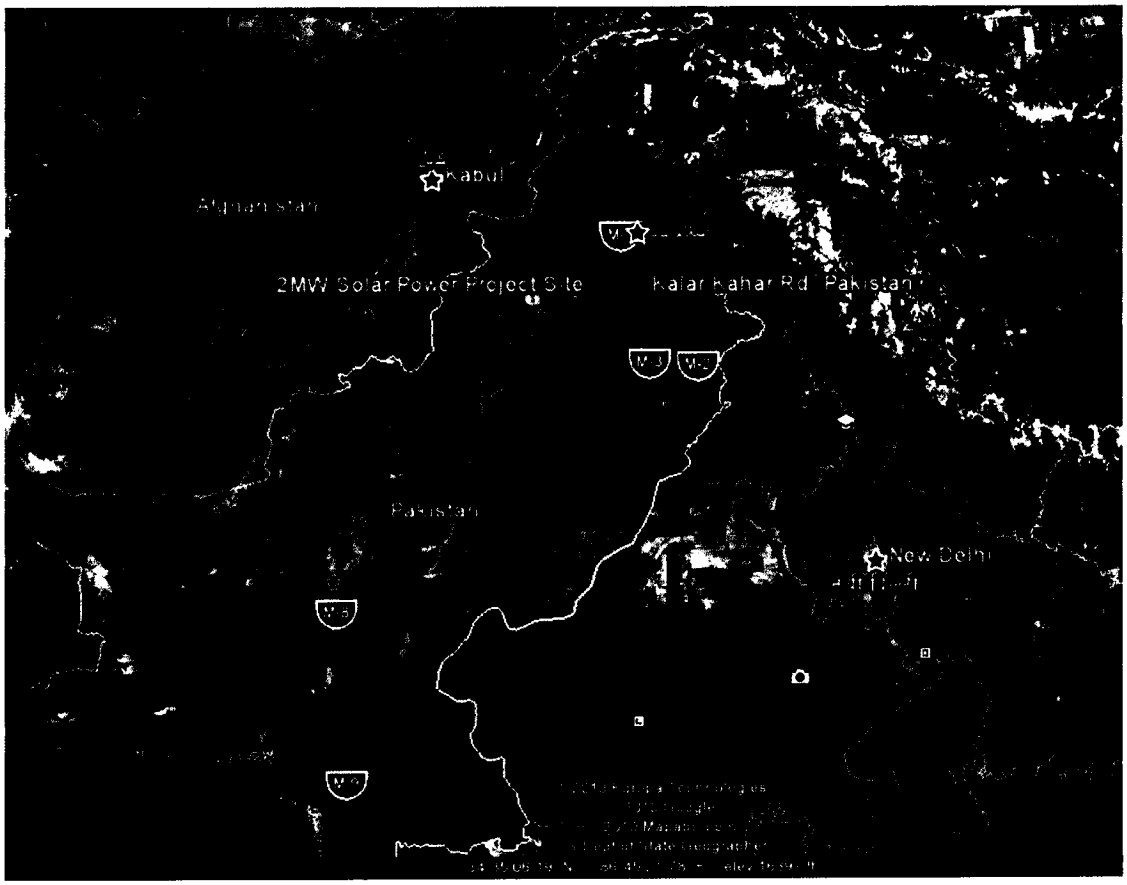
Location of the Generation Facility/ Solar Power Plant/ Solar Farm



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

Boundary Point	Geodetic Coordinates		
	East	Altitude (Meter)	North
1.	72.66026°	AI810	32.66235°
2.	72.66161°	AI815	32.66325°
3.	72.66225°	AI807	32.66254°
4.	72.66142°	AI809	32.66175°
5.	72.66201°	AI806	32.66175°
6.	72.66182°	AI807	32.66145°
7.	72.66132°	AI809	32.66109°
8.	72.66055°	AI819	32.66124°
9.	72.66077°	AI816	32.66318°
10.	72.6604°	AI816	32.66303°
11.	72.66006°	AI816	32.66210°
12.	72.65929°	AI818	32.66184°

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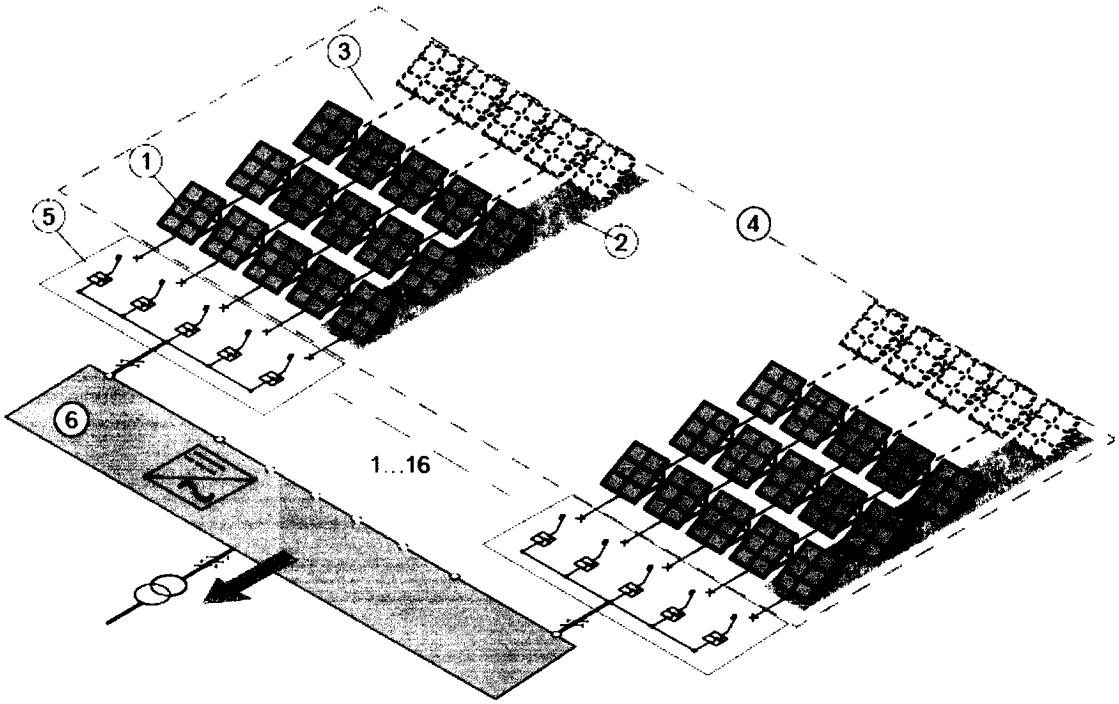
Layout of the Generation Facility/Solar Power Plant/ Solar Farm



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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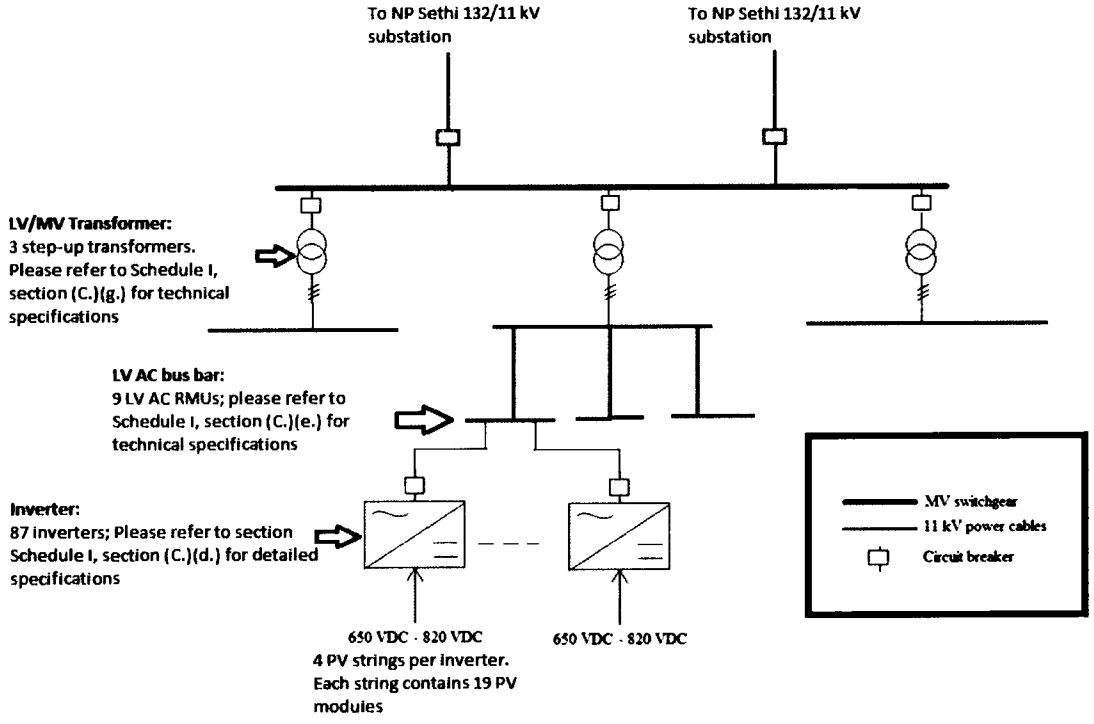
Single Line Diagram (SLD) of the Generation Facility/Solar Power Plant/ Solar Farm



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Interconnection Arrangement/Transmission Facilities for Dispersal of Power from the Generation Facility/ Solar Power Plant /Solar Farm of First Solar (Private) Limited (FSPL)

The power generated from the Generation Facility/Power Plant/Solar Farm of FSPL shall be dispersed to the load center of IESCO.

(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). 11 KV Double Circuit (D/C) Feeder (Measuring about 10.00 KM) on ACSR DOG Conductor connecting the Generation Facility of FSPL to N.P. Sethi Grid Station.

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

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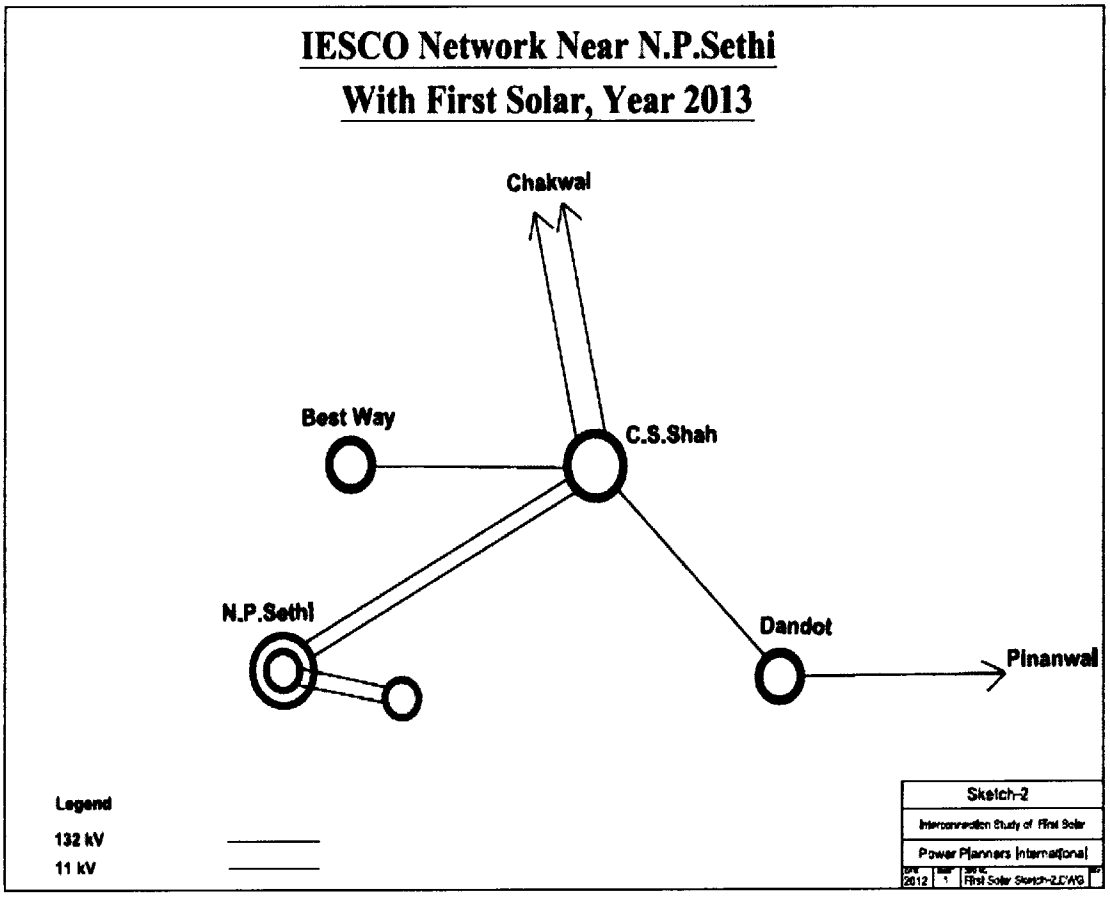
Schematic Diagram of the Interconnection Arrangement/Transmission Facilities for Dispersal of Power from the Generation Facility/ Solar Power Plant /Solar Farm of FSPL



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

(A). General Information

(i).	Name of Company/Licensee	First Solar (Private) Limited
(ii).	Registered/Business Office	10-B, Street No.26, F-8/1, Islamabad
(iii).	Location of the Generation Facility	Village Mukhayal in Kalar Kahar, District Chakwal in the Province of Punjab
(iv).	Type of Generation Facility	Photo Voltaic (PV) Solar Power Plant

(B). Solar Power Generation Technology & Capacity

(i).	Type of Technology	PV Cell
(ii).	System Type	Grid Connected
(iii).	Installed Capacity of Solar Farm (MW)	2.01666 MW_P

(C). Technical Details of Equipment

(a).	**Solar Panels – PV Modules**	
(i).	Type of Module	Canadian Solar/ CS6X-305P
(ii).	Type of Cell	Polycrystalline
(iii).	Dimension of each Module	1954 x 982 x 40mm (76.93 x 38.7 x 1.57in)
(iv).	Module Surface Area	12687m^2
(v).	No. of Panel /Modules	6612
(vi).	Total Module Area	33,220m^2
(vii).	Total Land Area Used	5 hectors (approximately)

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(viii).	Panel's Frame	Anodised Aluminium alloy	
(ix).	Weight of one Module	22 kg	
(x).	Module Output Warranty	For 1st year	For 2nd to 25th year
		97% or above	Not more than 0.7% Output Reduction Each Year
(xi).	Number of Solar Cells in each module	72 Cells	
(xii).	Efficiency of module	15.90%	
(xiii).	Environment Protection System	Encapsulation and sealing arrangements for protection from environment.	
(xiv).	Maximum Power (P_{max})	305W	
(xv).	Voltage @ (P_{max})	1000V (IEC) /600V (UL)	
(xvi).	Current @ P_{max}(STC)	8.41A	
(xvii).	Open circuit voltage (V_{oc}) (@STC)	44.8 V	
(xviii).	Short circuit current (I_{sc}) (@STC)	8.97 A	
(xix).	Maximum system open Circuit Voltage	1000VDC	
(b).	**PV Array**		
(i).	Strings per Inverter	4	
(ii).	Modules in a string	19	
(iii).	Total Nos. of Strings	348	
(iv).	Modules per Inverter	76	
(v).	Total Modules	6612	
(c).	**PV Capacity**		
(i).	Total	2016660 W_P	
(d).	**Inverters**		
(i).	Maximum power capacity of each	22kW AC	

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	unit		
(ii).	Inverter Model	SUN2000-20KTL	
(iii).	Manufacturer	Huawei	
(iv).	Rated Input Voltage	620VDC	
(v).	Min. Operating Voltage	200V DC	
(vi).	Number of Inverters	87units	
(vii).	Total Nominal Power	1914kW AC	
(viii).	Efficiency	98.6%	
(ix).	Max. Allowable Input voltage	DC 1000V	
(x).	Max. input Current per Tracker	DC 18 A	
(xi).	Max. Power Point Tracking Range	400-800V DC (@50°C)	
(xii).	Rated Output Voltage	3×230V/400V+N+PE	
(xiii).	Rated Frequency	50 Hz	
(xiv).	Adjustable Power Factor	0.8 lagging-0.9 leading	
(xv).	Power Control	MPP Tracker	
(xvi).	Environmental Enclosures	Operating Temperature Range	-25°C to +60°C (-13°F to +140°F)
		Relative Humidity	85% - 90% non-condensing
		Audible Noise	<50 dB(A)
		Operating Elevation	<2000 m
		Warranty Period	5 Years
(xvii).	Grid Operation		DC disconnection device

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	Protection	(b).	DC reverse-polarity protection
		(c).	DC surge arresters Type II
		(d).	PV array string fault monitoring
		(e).	AC over current protection
		(f).	AC surge arresters Type III
		(g).	Insulation monitoring
		(h).	Residual current detection
		(i).	Anti-Islanding protection
(e).	**AC Junction Boxes Installed and fixed in Array yard.**		
(i).	Number of AC Junction Box units	9	
(ii).	3-phase Input circuits in each box	10(max)	
(iii).	Max. input current for each circuit	32 A	
(iv).	Rated AC voltage	400 V	
(v).	Max. Power at each box	220kWp	
(vi).	Protection Level	IP 65	
(vii).	Over current protection	Fuse/MCCB	
(viii).	Output switch	400A,disconnector	
(ix).	Surge protection	Type II	
(x).	Purpose of Junction Box	(a).	Combine groups of inverters into Junction Box that will be connected to the Transformer.
		(b).	Provide arrangement for disconnection for each of the groups.
		(c).	To provide inverter group isolation.
		(d)	The current carrying ratings of the AC junction boxes shall be suitable with adequate safety factor to inter-connect the inverters.

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		(e)	10 protected inputs rated at 40A.
(f).	**Data Collecting System**		
(i).	Weather Data	(i).	Pyranometer—2 Sets (Incline to record irradiation level)
		(ii).	Thermometer—2 Sets (to record ambient temp)
(ii).	System Data	(i).	DC input voltage(V) & current (A) of each Inverter/string
		(ii).	Total DC power (kW) generated by PV array.
		(iii).	AC output voltage(V) and current (A) of each Inverter (Phase, Total)
		(iv).	AC output power (kW) and energy (kWh) of each Inverter
		(v).	Frequency (Hz)
		(vi).	Power Factor (PF)
(g).	**Isolating Transformer**		
(i).	Rating	750 kVA x 3nos (LV/MV)	
(ii).	Type of Transformer	ONAN	
(iii).	Input voltage	0.4kV	
(iv).	Output Voltage	11kV	

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(v).	Purpose of Transformer	Step Up Voltage, Galvanic Isolation and Eliminate DC Current Injection
(vi).	Efficiency	98 %
(h).	**Outdoor Cubicle Control Room**	
(i).	Data record	Continuous logging with iManager NetEco 1000S
(ii).	Control Room System	Computerized data acquisition system through Smart Logger
(iii).	Control room System Detail	Interfacing Hardware & Software, Industrial Type PC through RS 485/232 and TCP/IP
(i).	**Mounting Structure**	
(i).	Structure	HDG Carbon Steel Q235B
(ii).	Clamps	6063-T6 Aluminium Alloy
(iii).	Tilt of Array Frame	30°
(iv).	Array Specification	Certified for meteorological requirements
(j).	**Foundation Pillars**	
(i).	No. of Foundations or screw pillars	Total no. of Module Tables are 174 as per initial calculations. The total no. of foundations and type is dependant of Geotechnical Investigation Report
(ii).	Foundation Structure	Screw pillars or Reinforced concrete dependant of Geotechnical Investigation Report

(D). Other Details

(i).	Expected COD of the Generation Facility	August 31, 2015
(ii).	Expected Life of the Generation Facility from COD	25 Years

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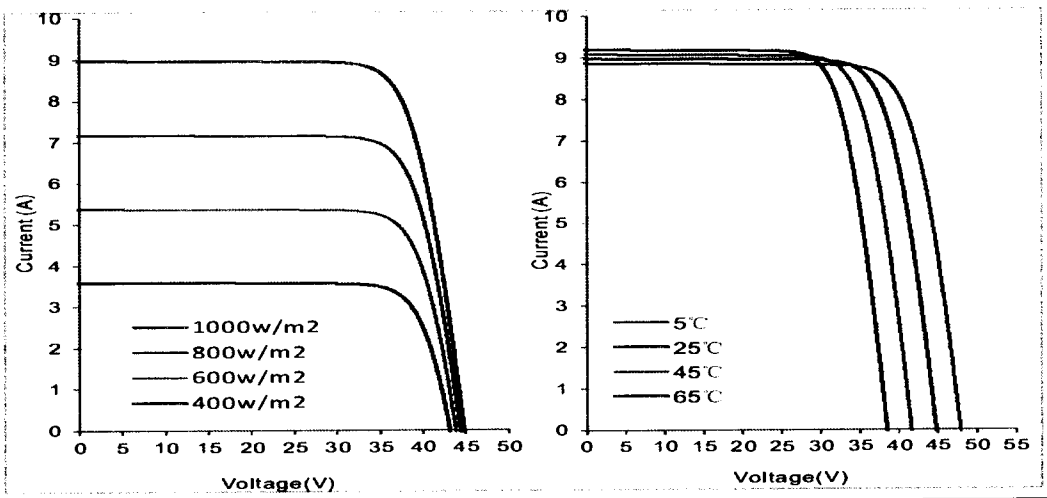
V-I Curve of Solar Cell



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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/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	2.01666 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)	2,829 MWh
(5).	Expected Total Generation in 25 years Life Span	63,816 MWh
(6).	Generation per Year from plant keeping 24 Hours Working	2.01666 x 24 x 365 = 17,665.9416 MWh
(7).	Net Capacity Factor (4/6)	16.2%

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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