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-319/ 37c - 77 January 09, 2017

Mr. Umar Malik
Director
Shams Power (Private) Limited
Al-Maalik Building, 19-Davis Road,
Lahore

Subject: **Grant of Generation Licence No. SPGL/18/2017**
Licence Application No. LAG-319
Shams Power (Private) Limited (SPPL)

Reference: Your application vide letter No. RC/GP/S.01, dated July 09, 2015 (received on July 25, 2015).

Enclosed please find herewith Determination of the Authority in the matter of Application of "Shams Power (Private) Limited (SPPL)" for the "Grant of Generation Licence" along with Generation Licence No. SPGL/18/2017 annexed to this determination granted by the National Electric Power Regulatory Authority (NEPRA) to Shams Power (Private) Limited (SPPL) for its 0.07956 MW Solar Generation Facility/Solar Power Plant located on the roof-top of Al-Maalik Building, 19-Davis Road, Lahore, 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/18/2017)

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(Syed Safeer Hussain)

Copy to:

1. Secretary Ministry of Water & Power, 'A' Block, Pak Secretariat, Islamabad.
2. Secretary, Ministry of Science & Technology, 1-Constitution Avenue, Sector G/5-2, Islamabad.
3. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore.
4. Chief Executive Officer, CPPA-G, 6th Floor, Shaheed-e-Millat Sectariat, Jinnah Avenue, Blue Area, Islamabad.
5. Chief Executive Office, Alternative Energy Development Board, 2nd Floor, OPF Building, G-5/2, Islamabad.
6. Chief Executive Officer, Lahore Electric Supply Company (LESCO) 22-A, Queen Road, Lahore
7. 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 Application of Shams Power (Private) Limited for the Grant of Generation Licence

January 03, 2017
Case No. L-319

(A). Background

(i). In accordance with the provisions of Section-7 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (hereinafter referred to as "NEPRA Act"), the Authority is mandated to regulate the provision of electric power services by generation, transmission and distribution companies.

(ii). According to the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 ("the NEPRA Act"), any person who intends to sell electric power is required to obtain a generation licence under the NEPRA Act.

(B). Filing of Application

(i). Pursuant to Section-15 of the NEPRA Act, Shams Power (Private) Limited (hereinafter referred to as "SPPL") filed an application on July 09, 2015 requesting for the grant of generation licence for its 50.00 MW solar generation facilities (1.20 MW in Phase-I and 48.80 MW in Phase-II).

(ii). The Registrar examined the application and identify the same as non-compliant with the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 ("the Regulations") as certain documents were not filed with the application. In view thereof, the Registrar directed SPPL to submit the missing/required information/documents as stipulated in Regulation-6(1) of the

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Regulations. SPPL filed the missing information/documentation on September 09, 2015.

(iii). Thereafter, the Registrar submitted the application/case for consideration of the Authority. The Authority considered the application/case in its Regulatory Meeting held on November 26, 2015 and admitted the same for the grant of distribution licence as stipulated in Regulation-7 of the Regulations.

(iv). The Authority approved the advertisement containing (a). the prospectus of the company and (b). a notice to the general public regarding admission of the application of SPPL, to invite the general public for their comments in the matter as provided in Regulation-8 of the Regulations.

(v). The Authority also approved the list of interested/affected parties for inviting comments or otherwise for the assistance of the Authority as stipulated in Regulation-9(2) of the Regulations. Accordingly, a notice of admission was published in one Urdu and one English national newspaper on December 02, 2015 for seeking comments of the stakeholders/interested/affected parties.

(vi). In addition to the above, separate letters on December 3, 2015 were also sent to government ministries, their attached departments, representative organizations and individual experts etc. to seek their views/comments in the matter for assistance of the Authority.

(C). Comments of Stakeholders

(i). In response to the above, the Authority received comments from four (04) stakeholders including Pakistan Council of Renewable Energy Technologies, Govt. of Pakistan, Ministry of Science & Technology, Rasikh Consilium and Ministry of Water and Power. The main points of the comments offered by the said stakeholders are as under:-

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(a). Pakistan Council of Renewable Energy Technologies submitted that it has no objection if SPPL is granted generation licence for the generation of 1.20 MW solar power plant in District Lahore. Pakistan Council of Renewable Energy Technologies added that it cannot comment on the financial or other terms of reference of the project;

(b). Ministry of Science & Technology commented that it has no objection for grant of generation licence to SPPL in respect of its 1.20 MW solar generation facility;

(c). Rasikh Cosilium submitted that the gross capacity of the generation facility would be up to 50.00 MW and that has to be attained in two phase. Phase-I would be of 1.20 MW while the Phase-II would be for the remaining quantum of capacity. In both phases, generation facility would be at different sites which shall be dependent on buyer. However, no site would be more than 950 KW. The initial site in Phase-I of 1.20 MW is the model site of Al-Maalik building rooftop;

(d). Ministry of Water and Power in its comments enquired about the tariff of SPPL;

(ii). The comments of the stakeholders were examined in detail and found the same supportive to the grant of generation licence to SPPL, except the observation made by Ministry of Water and Power regarding tariff. SPPL was directed through a letter dated January 21, 2016 to submit its response on the observation of Ministry of Water and Power regarding tariff. In response, SPPL through its letter dated February 8, 2016 informed that the business model of the SPPL is not based on sale of electricity, generated through its facilities, to the National Grid (CPPA-G/NTDC) nor the concerned DISCO and as such the applicant will not seek any sovereign guarantee to secure the sale proceeds. Therefore, in

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view of the business model of the SPPL as briefed above, the rates will be mutually decided with Pak Ping C (Private) Limited in the present case.

(iii). SPPL through its letter dated March 28, 2016 communicated that their application for the grant of generation licence for Phase-I may be modified as they have decided to limit the size of their project for Phase-I to 0.07956 MW instead of 1.20 MW.

(iv). Considering the fact that there is a change in the submitted information, the Authority in its Regulatory Meeting held on May 27, 2016 approved an addendum to the already published Notice of Admission. The addendum was published in the press on June 18, 2016 to reflect the changes in the information. In response, the Authority did not receive any comments from the stakeholders.

(v). In view of the above, the Authority considered appropriate to process the application of SPPL for consideration for grant of generation licence in terms of the NEPRA Act, the Regulations and NEPRA Licensing (Generation) Rules, 2000 ("the Rules").

(D). Analysis of the Authority

(i). The Authority has examined the case in detail including the information provided by SPPL along with the generation licence application. The main features of the application are as under:

(a). SPPL was incorporated on January 15, 2015 under Section-32 of the companies ordinance, 1984, with corporate universal identification No. 0091515. The business office of the company is at 2nd Floor, AL-Maalik building, 19-Davis Road Lahore;

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(b). The memorandum of association of SPPL, inter alia, includes the business of power generation as one of its business objectives. The company has financial strength to meet with the requirements of the project;

(c). SPPL is setting up a grid connected/tied rooftop photovoltaic power system/generation facility at rooftop of AL-Maalik building, 19-Davis Road Lahore. SPPL plans to install Poly-Crystalline photovoltaic modules of CS6P-260P. SPPL has proposed 360 modules each of 260 watt making the total installed capacity of 0.07956 MW;

(d). A grid-connected/tied rooftop photovoltaic power system is electricity generating solar photovoltaic power system which has its electricity-generating solar panels mounted on the rooftop of a residential or commercial building or structure and connected to the utility grid. A grid-connected/tied rooftop photovoltaic power system consists of solar panels, one or several inverters, a power conditioning unit/energy meter and grid connection equipment. Rooftop photovoltaic power systems are small in capacity as compared to ground-mounted photovoltaic power stations;

(e). The photovoltaic panels convert the solar irradiation into DC supply and by using inverters, DC supply is converted into AC supply at 230/400 Volts. The interconnection point is within the premises and as identified by the buyer. The grid-connected photovoltaic system can supply the excess power, beyond consumption by the connected load, to the utility grid;

(f). SPPL intends to sell 0.07956 MW to Pak Ping C (Private) Limited through long term energy purchase agreement. Pak Ping C (Private) Limited provides different services to the

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tenants of the Al-Maalik building. The services include security, lift services/O&M, cleaning services, CCTV coverage, utility services like electricity, water and gas and parking services etc.;

(g). SPPL shall use rooftop of Al-Maalik building which is owned by Eastern C. PK (Private) Limited. Ping C (Private) Limited and Eastern C. PK (Private) Limited are associated/sister concerns as they have common directors;

(h). SPPL has entered into an agreement of thirty (30) years (i.e. from February 02, 2016 to February 01, 2046 with Eastern C. PK (Private) Limited for utilizing the rooftop of the Al-Maalik building;

(i). Al-Maalik building has one basement, one ground floor and five flours. The total area of building is about 1,00,000 square feet. Eastern C. PK (Private) Limited has allowed SPPL to utilize 5565 square feet area for erection of photovoltaic panels and 170 square feet for inverter stations/rooms as per agreement;

(j). The activity of generation and sale of electricity shall take place within the same premises directly connecting to the distribution panel of Pak Ping C (Private) Limited and shall not be fed or exported to the distribution system of the utility;

(k). The electricity generated through the generation facility of SPPL shall be less than the total demand of Pak Ping C (Private) Limited hence it will not be a replacement for the utility company but only a partial arrangement;

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(l). SPPL shall be responsible for the operation and maintenance of the system, including periodical washing of the photovoltaic modules, of the generation facility installed at the site of Pak Ping C (Private) Limited.

(E). Grant of Generation Licence

(i). Electricity is a fundamental element for the economic growth of any country. 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 supply of electricity. In view of the said reasons, Authority is of the considered opinion that for sustainable development, all types of electric power generation resources must be tapped and developed on priority basis both in public and private sectors.

(ii). Pakistan is an energy deficient country and has been under severe energy crisis since last two decades. Despite of significant solar resource availability, electricity production in the country is not sustainable and it is mainly dependent on conventional sources of energy. Consequently, environmental hazards along with energy security have become the major concerns in the current energy scenario of the country. Dependence on conventional sources of energy for electricity generation also leads towards impacts on climate change and depletion of fossil fuels resources.

(iii). Renewable energy provides an alternate solution to sustainable electricity production by replacing fossil fuels. Government of Pakistan has taken some initiatives in form of development of Quaid-e-Azam Solar Park in Punjab, but there is a need to replicate such steps throughout the country to overcome long prevailing energy crisis in the country.

(iv). Many people in the country have started thinking the need of

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installing rooftop PV solar system for their homes, apartments, complexes or offices use. Rooftop PV solar system is cost-effective for home owners, business owners, and their communities. Rooftop PV solar system can be installed in cities, towns or anywhere where adequate sunshine and sufficient space is available on the rooftop of the buildings. Rooftop PV solar system is clean and helps prevent damage to the environment by producing no pollution. A rooftop PV solar system with a battery-powered storage system can provide power in the event of an electrical outage.

(v). The term of a generation licence under the Rule-5(1) of the Rules, is to be commensurate with the maximum expected useful life of the units comprised in a generation facility. The Authority considers that as per the international benchmarks available, the useful life of a photovoltaic based generation facility is taken as twenty five (25) years from its operation. Therefore, the Authority fixes the term of the proposed generation licence of SPPL to twenty five (25) years from its COD.

(vi). Regarding the tariff that SPPL will charge from Pak Ping C (Private) Limited, it is hereby clarified that under Section-7(3)(a) of the NEPRA Act, determining tariff, rate and charges etc. is the sole prerogative of the Authority. In view of the said, the Authority directs SPPL to charge the Pak Ping C (Private) Limited only such tariff which has been determined, approved or specified by the Authority.

(vii). The proposed generation facility of SPPL for which the generation licence has been sought, is based on Photovoltaic cells using solar radiation for generation of electric power. Solar radiation is a RE resource which does not cause any pollution however, the operation of the generation facility may cause some other type of pollution including soil pollution, water pollution and noise pollution during construction of the project. The Authority has considered these aspects and has made SPPL obligatory to comply with the environmental rules and regulations.

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Foregoing in view, the Authority hereby approves the grant of generation licence to Shams Power (Private) Limited on the terms and conditions 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 there under and other applicable documents.

Authority

Maj. Rtd. Haroon Rashid
(Member)

Syed Masood-ul-Hasan Naqvi
(Member)

6/1/17

Himayat Ullah Khan
(Member/Vice Chairman)

6.1.17.

Tariq Saddozai
(Chairman)

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09.01.17

National Electric Power Regulatory Authority (NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No. SPGL/18/2017

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 Generation Licence to:

SHAMS POWER (PRIVATE) LIMITED

Incorporated on January 15, 2015 Under Section-32 of the Companies Ordinance, 1984, having corporate Universal Identification No. 0091515

for its Grid Connected Solar Generation Facility/Solar Power Plant Located on the Roof top of Al-Maalik Building, 19-Davis Road, Lahore In the Province of Punjab

(Installed Capacity: 0.07956 MW Gross ISO)

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

Given under my hand this 09th day of January Two Thousand & Seventeen and expires on 08th day of January Two Thousand & Forty Two

09.01.17

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

Article-1
Definitions

1.1 In this Licence

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

(b). "Applicable Documents" mean the Act, the NEPRA rules and regulations, 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;

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

(d). "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;

(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;

(g). "Energy Purchase Agreement" means the energy purchase agreement, entered or to be entered into by and between the

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Power Purchaser and the Licensee, for the purchase and sale of electric power generated by the generation facility, as may be amended by the parties thereto from time to time;

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

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

(j). "Law" means the Act, relevant rules and regulations made there under and all the Applicable Documents;

(k). "Licensee" means "**Shams Power (Private) Limited**";

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

(m). "Power Purchaser" means the Pak Ping C (Private) Limited;

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

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

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

1.2 Words and Words and expressions used but not defined herein bear the meaning given thereto in the Act or rules and regulations issued under the Act.

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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 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.

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 COD.

Article-4
Term of Licence

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

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 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.

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Article-6
Tariff

The licensee shall charge only such tariff 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.

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.

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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 at 220/400 voltage level to the Power Purchaser at the sites of the buyers and understands that the activity of generation and sale of electricity shall take place within the same premises directly connecting to the distribution panel of the buyer.

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.

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.

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Article-14
Design & Manufacturing Standards

14.1 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.

14.2 All the plant and equipment of the generation facility/Solar Farm shall be unused and brand new.

Article-15
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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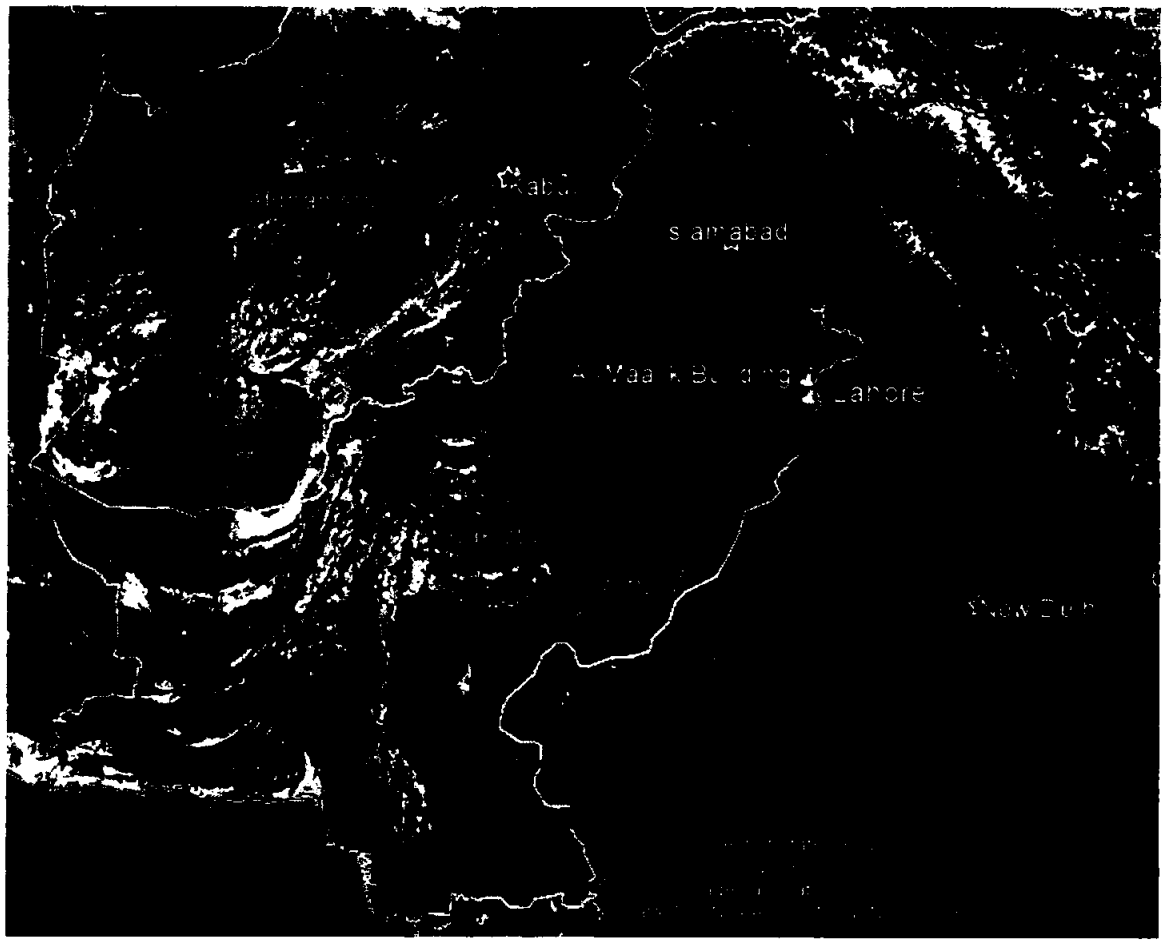
Location of the Generation Facility/Solar Farm/Solar Power Plant of the Licensee/SPPL on Map of Pakistan



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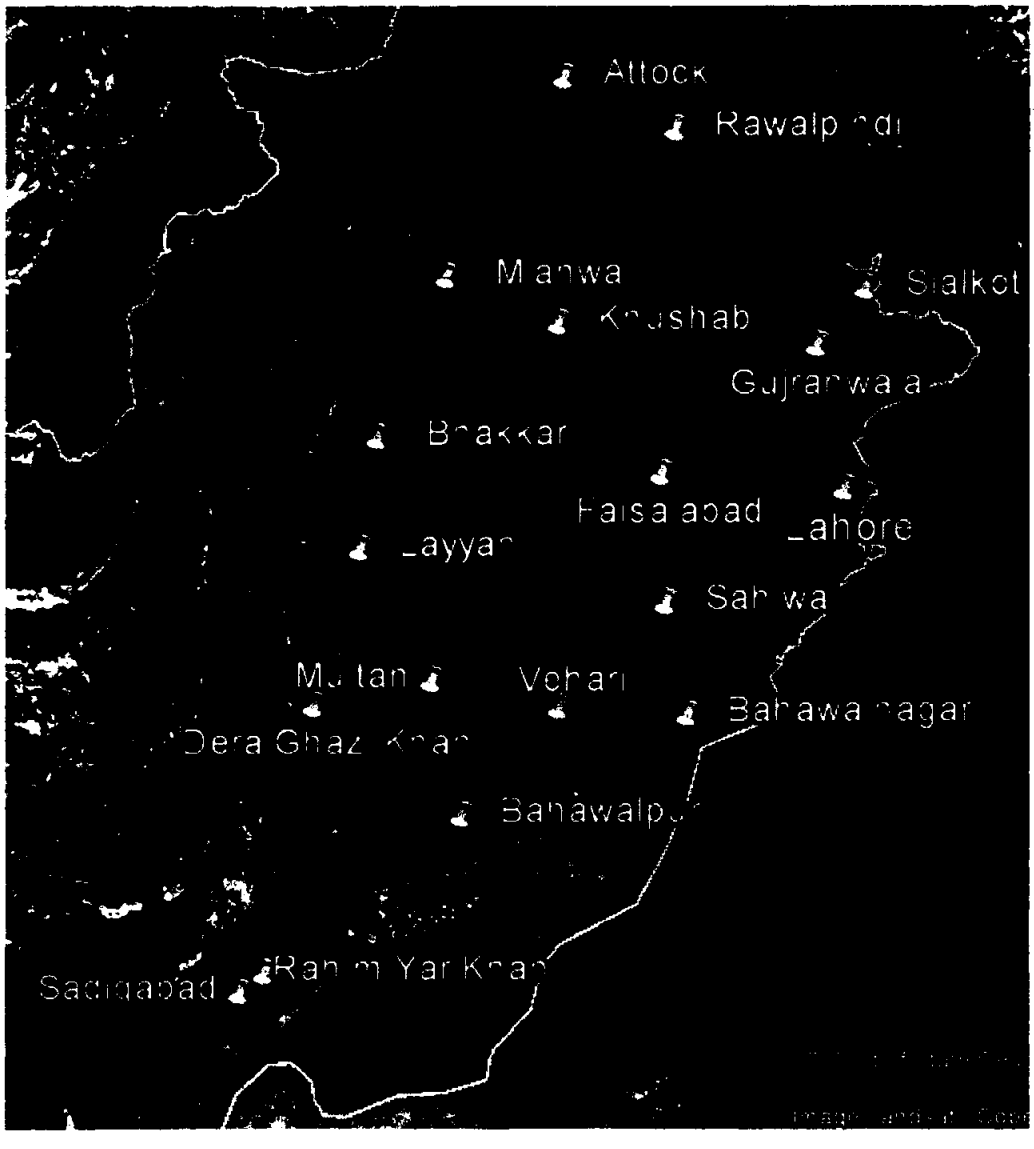
Location of the Generation Facility/Solar Farm/Solar Power Plant of the Licensee/SPPL on Map of the Province of Punjab



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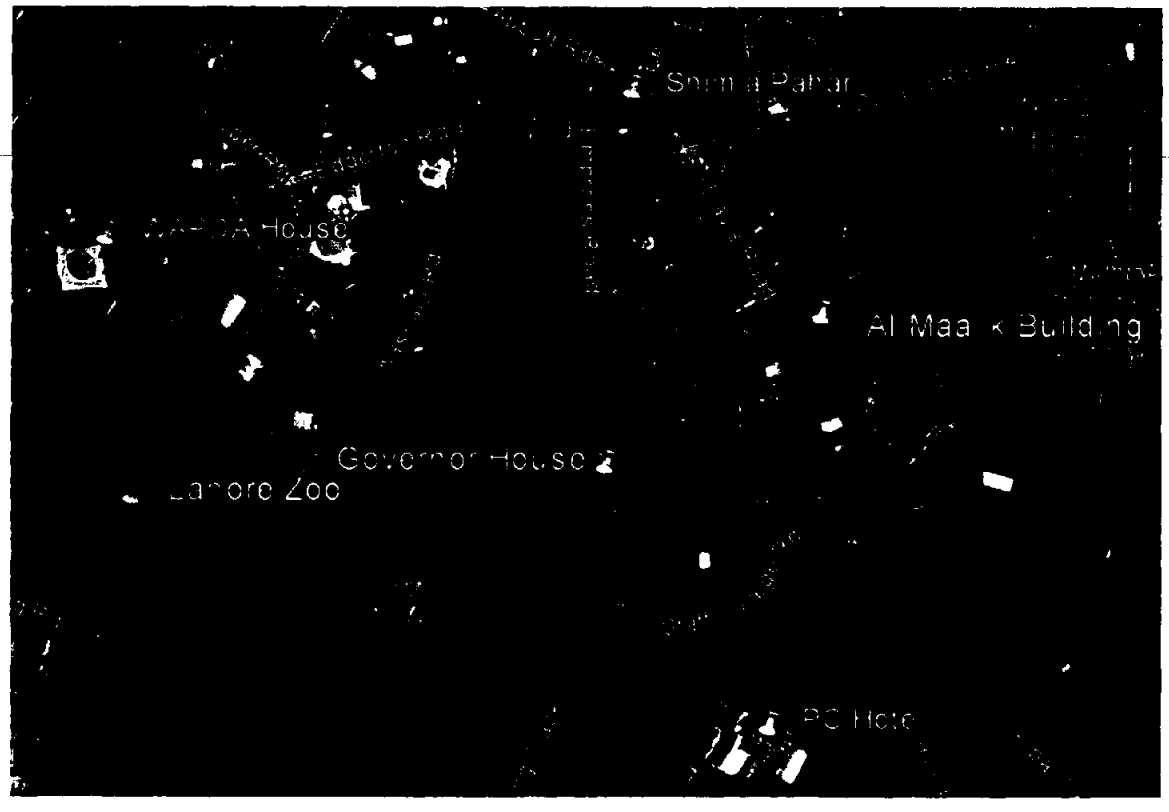
Location of the Generation Facility/Solar Farm/Solar Power Plant of the Licensee/SPPL on Map of Lahore

Access Road/Link of the Generation Facility/Solar Farm/Solar Power Plant of the Licensee/SPPL on Map of Lahore



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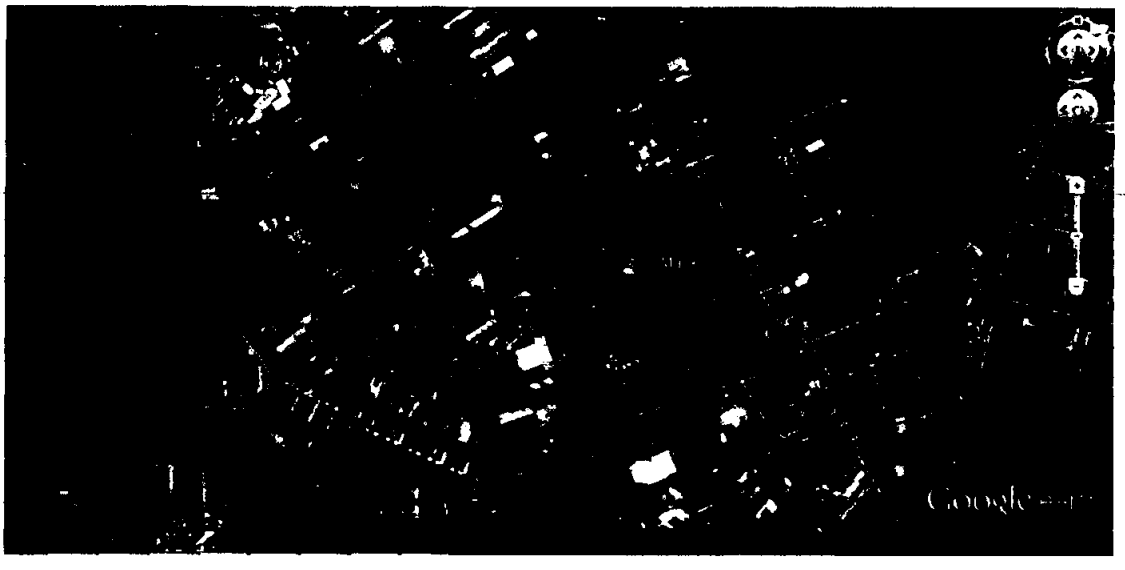
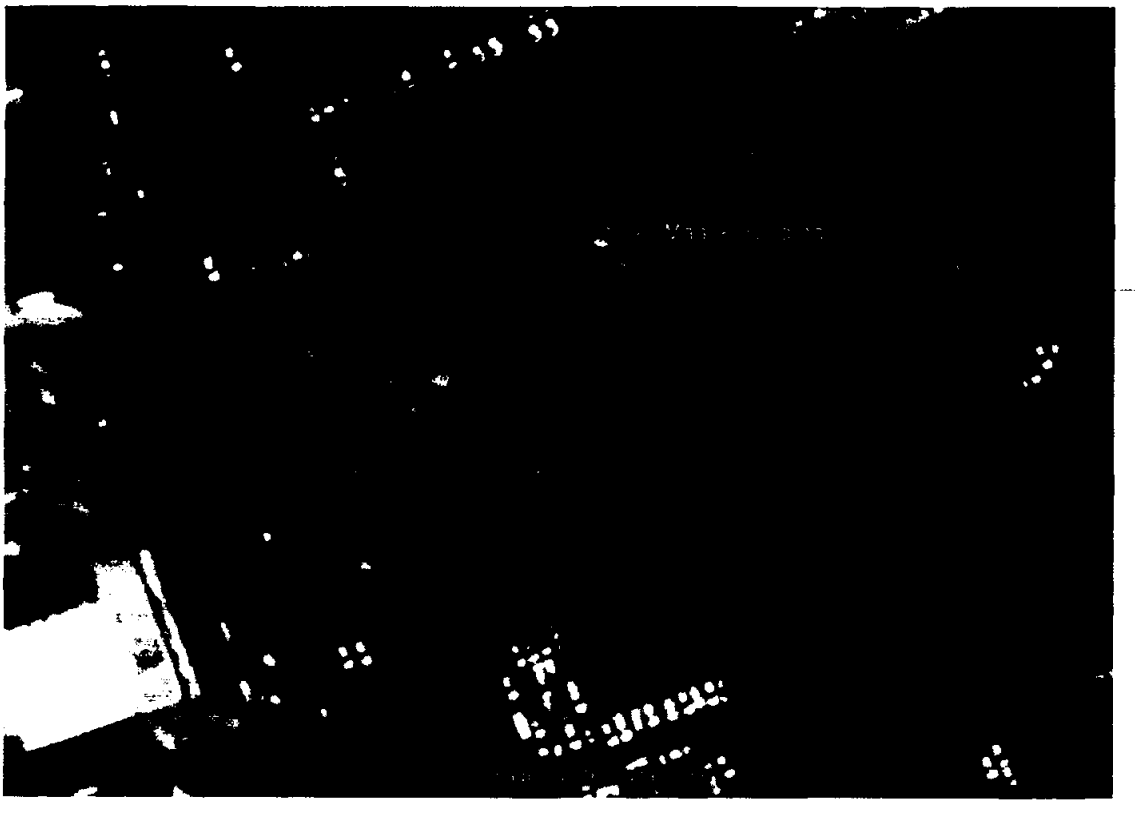
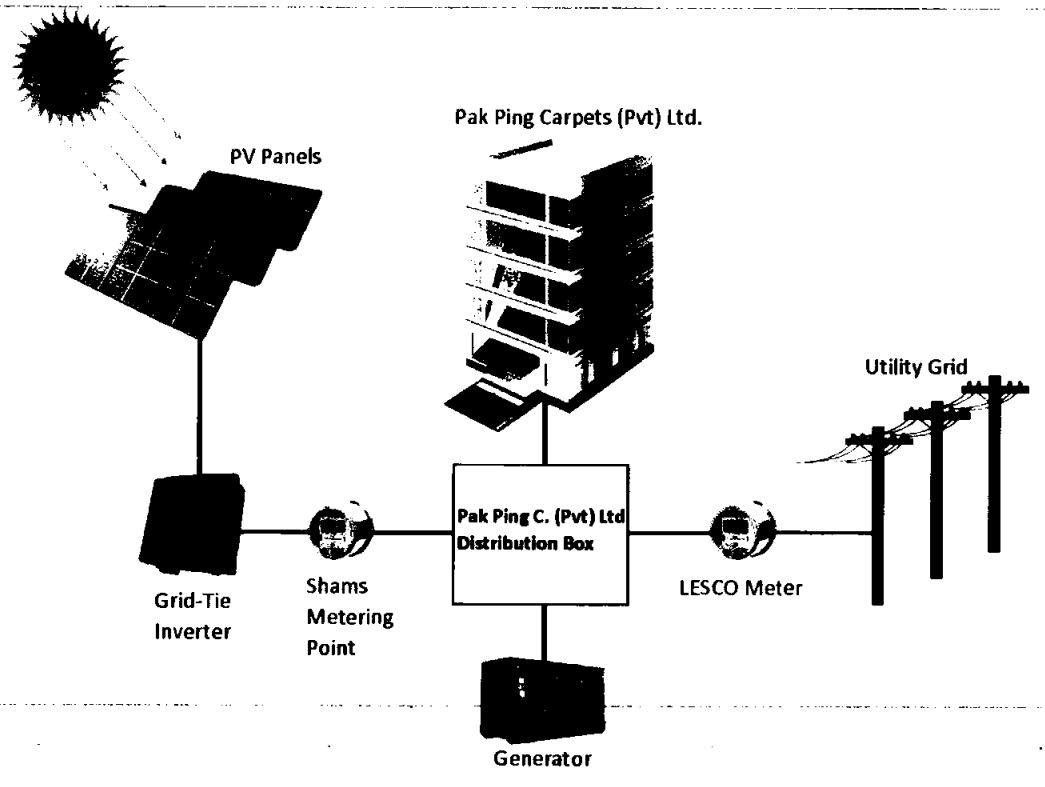
Location of the Generation Facility/Solar Farm/Solar Power Plant of the Licensee/SPPL





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



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

Latitude (North)	Longitude (East)
31° 33' 30.53"	74° 20' 57.99"

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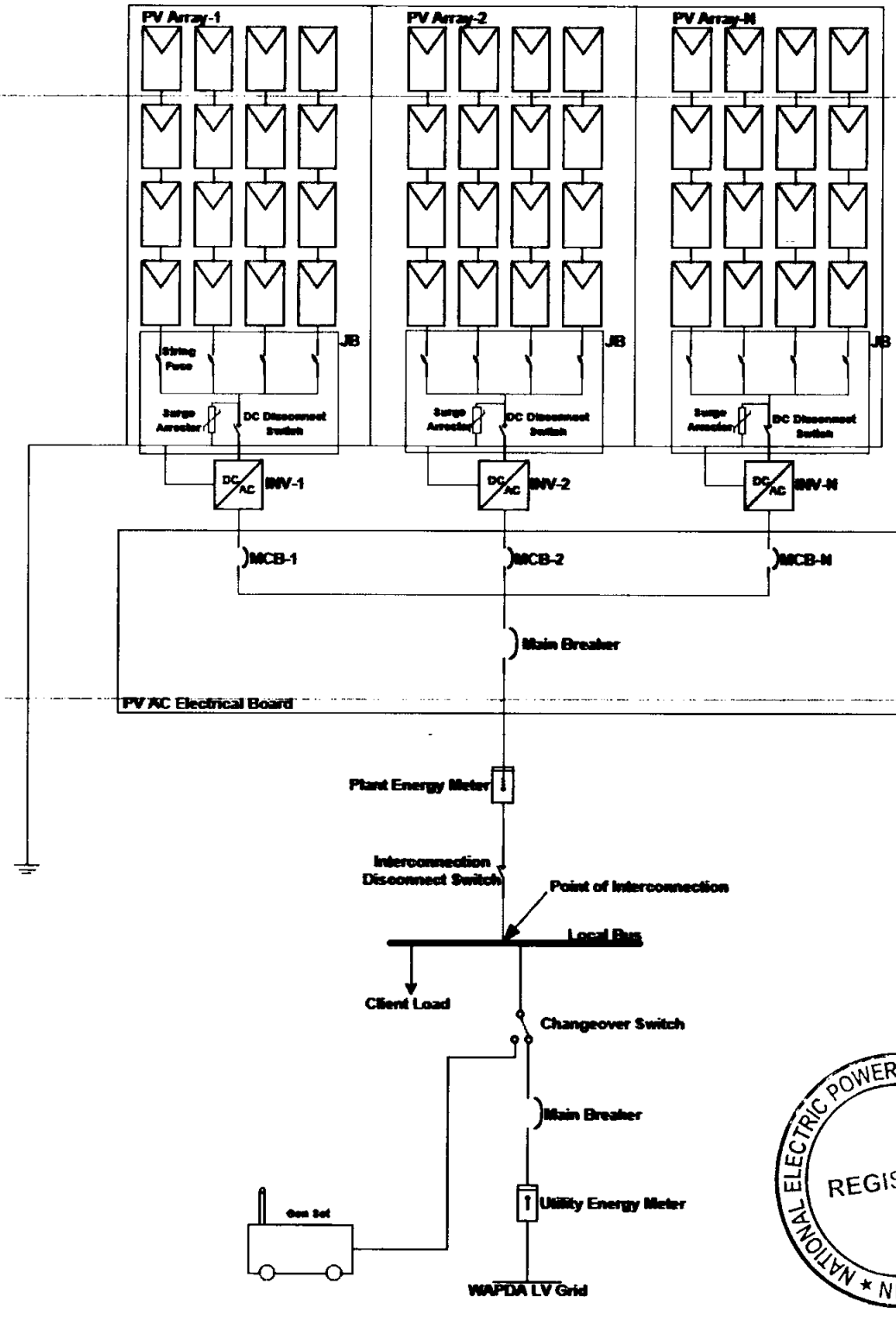
Block Diagram of the Generation Facility/Solar Farm/Solar Power Plant of the Licensee/SPPL



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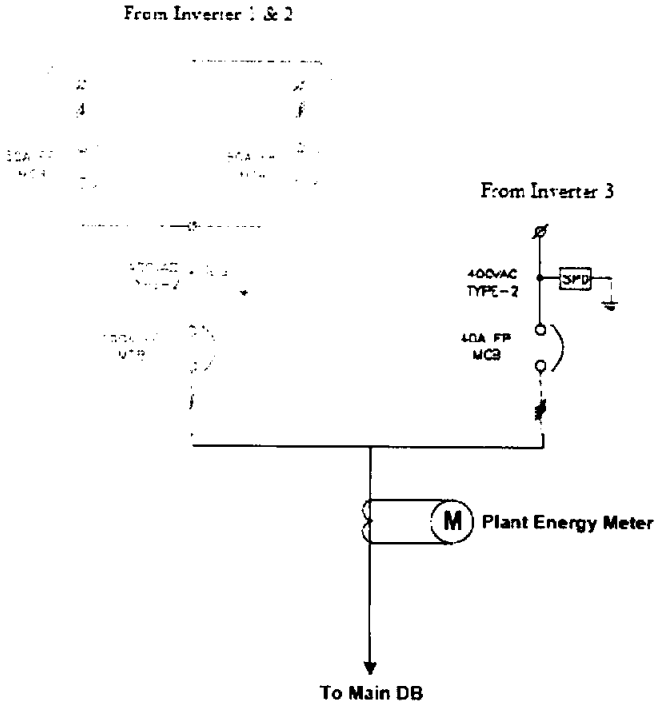
Single Line Diagram of Generation Facility/Solar Farm/Power Plant of the Licensee/SPPL (DC-Side)

Single Line Diagram of Generation Facility/Solar Farm/Solar Power Plant of the Licensee/SPPL (AC-Side)

Single Line Diagram AC Side



Interconnection Arrangement for Dispersal of Power from the Generation Facility/Solar Power Plant of Shams Power (Private) Limited

The power generated from the generation facility/power plant of Shams Power (Private) Limited shall be dispersed at rooftop of Al-Maalik Building, 19-Davis Road Lahore for in-house utilization.

(2). The proposed Interconnection Arrangement for dispersal of electric power for the generation facility/power plant will be as under:-

(a). 230V/400V single circuit on bus bar of existing LT distribution panel of Pak Ping C (Private) Limited.

(3). Any change in the above Interconnection Arrangement duly agreed by Shams Power (Private) Limited and Pak Ping C (Private) Limited shall be communicated to the Authority in due course of time.

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Detail of
Generation Facility/Solar Power Plant

(A). General Information

(i).	Name of the Company/ Licensee	Shams Power (Private) Limited
(ii).	Registered/Business Office of the Company	2nd Floor, Al-Maalik Building 19-Davis Road Lahore
(iii).	Principal Office	2nd Floor, Al-Maalik Building 19-Davis Road Lahore
(iv).	Plants Location	Al-Maalik building roof top, 19-Davis Road Lahore
(v).	Field Type	Fixed Tilted Plane
(vi)	Field Parameters	Tilt 8° & Azimuth 32°
(vii).	Type of Generation Facility	Solar Photovoltaic (PV)

(B). Solar Power Generation Technology & Capacity

(i).	Type of Technology	Photovoltaic (PV) Cell
(ii).	Type of Cell	Polycrystalline
(ii).	Type of System	Grid Tied
(iii).	Installed Capacity of the Generation Facility (MW)	0.07956 MW

(C). Technical Details of Equipment

(a).	**Solar Panels-PV Modules**	
(i).	Type of Module	Polycrystalline PV Type Module CS6P-260P
(ii).	Surface Area of Module	1.605240 m²

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(iii).	Dimension of each Module	1638 mm x 982 mm x 40mm	
(iv)	Total area of roof top for Solar Panels-PV Modules	5565 sq ft	
(v).	No. of Modules	306	
(vi).	Frame of Module	Anodised Aluminium Alloy	
(vii).	Weight of one Module	18.00 kg	
(viii).	Module output warranty	For 1st Year	For 2nd Year to 25th Year
		97.5% or above	Not more than 0.7% output reduction each year
(ix).	Number of Solar Cells in each Module	60 Cells	
(x).	Efficiency of Module	16.16 %	
(xi).	Environment Protection System	Encapsulation and sealing arrangements for protection from environment.	
(xii).	Maximum Power (P_{max})	260 W_P	
(xiii).	Power Tolerance at STC	0 ~ +5W	
(xiv).	Voltage @ (P_{max})	30.4 V	
(xv).	Current @ (P_{max})	8.56 A	
(xvi).	Open circuit voltage (V_{oc})	37.5 V	
(xvii).	Short circuit current (I_{sc})	9.12 A	
(xviii).	Optimum Operating Voltage at NOCT	27.7 V	
(xix).	Optimum Operating Current at NOCT	6.80 A	
(xx).	Open circuit voltage (Voc) at NOCT	34.5 V	
(xxi).	Maximum system open Circuit Voltage	1000V(IEC) or 1000V (UL) or 600V(UL)	
(b).	**PV Array**		
(i).	No. of Sub-Arrays	6	

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(ii).	Modules in a String	18	
(iii).	Total No. of Strings	17	
(iv).	Modules in Sub-Array	270 Modules (5 Sub Arrays and 54 Modules each) 36 Modules (1 Sub Array of 36 Modules)	
(v).	Total Modules	306	
(c).	**PV Capacity**		
(i).	Total Capacity	0.07956 MW	
(ii).	Net Capacity Factor	16.78%	
(d).	**Inverters**		
(i)	Total area of inverter room	170 sqft	
(ii).	Maximum DC Power Input	71.54 KW (@50°C)	
(iii).	Inverter Model	01 x Sunny Tri power 20000TL (20 KW) 02 x Sunny Tri power 25000TL (25 KW)	
(iv).	Manufacturer	SMA Solar Technology, Germany	
(v).	Maximum DC Input Voltage	DC 1000 V	
(vi).	Start Voltage	DC 150 V	
(vii).	Number of Inverters	3	
(viii).	Efficiency	98.4% (Sunny Tri power 20000TL) 98.3% (Sunny Tri power 25000TL	
(x).	Max. Input Current	DC 66 A	
(xi).	MPP Voltage Range	320 V- 800 V DC (@50°C)	
(xii).	Output electrical system	3-Phase, 4-Wire	
(xiii).	Rated Output Voltage	AC 230/400 V	
(xiv).	Rated Frequency	50 Hz	
(xv).	Power Factor	1	
(xvi).	Power Control	MPP Tracker	
(xvii).	Environmental Enclosures	Operating Temperature Range	-25° C to 60° C
		Relative Humidity	100% non-condensing

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		Audible Noise	51 dB(A)
		Operating Elevation	<3000m
(e).	**Junction Boxes**		
(i).	Number of Junction Box units	6	
(ii).	Input circuits in each box	1 box with 2 inputs, 5 boxes with 3 inputs	
(iii).	Max. Input current for each circuit	15 A	
(iv).	Max. Input voltage	1000 V	
(v).	Power at each box	28kW$_p$	
(vi).	Protection Level	IP 64	
(vii).	Over-Current protection	Fuse	
(viii).	DC Disconnect switch	6	
(ix).	Surge protection	Yes (1000V)	
(x).	Purpose of Junction Box	(a).	Combining the strings
		(b).	DC Side Protection
(f).	**Data Collecting System**		
(i).	Weather Data	(a).	Irradiance Meter (Survey 100/200R)- 1 Set (to record ambient temp& radiation level)
(ii).	System Data	(a).	DC input voltage (V) & current (A) of each Inverter (Phase, Line)
		(b).	Total DC power (kW) generated by PV array.
		(c).	AC output voltage(V) and current (A) of each Inverter (Phase, Total)
		(d).	AC output power (kW) and energy (kWh) of each Inverter
		(e).	Frequency (Hz)
		(f).	Power Factor (PF)

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(D). Other Details

(i).	COD of the Project	Mar 07, 2016
(ii).	Expected Life of the Project from the COD	25 Years

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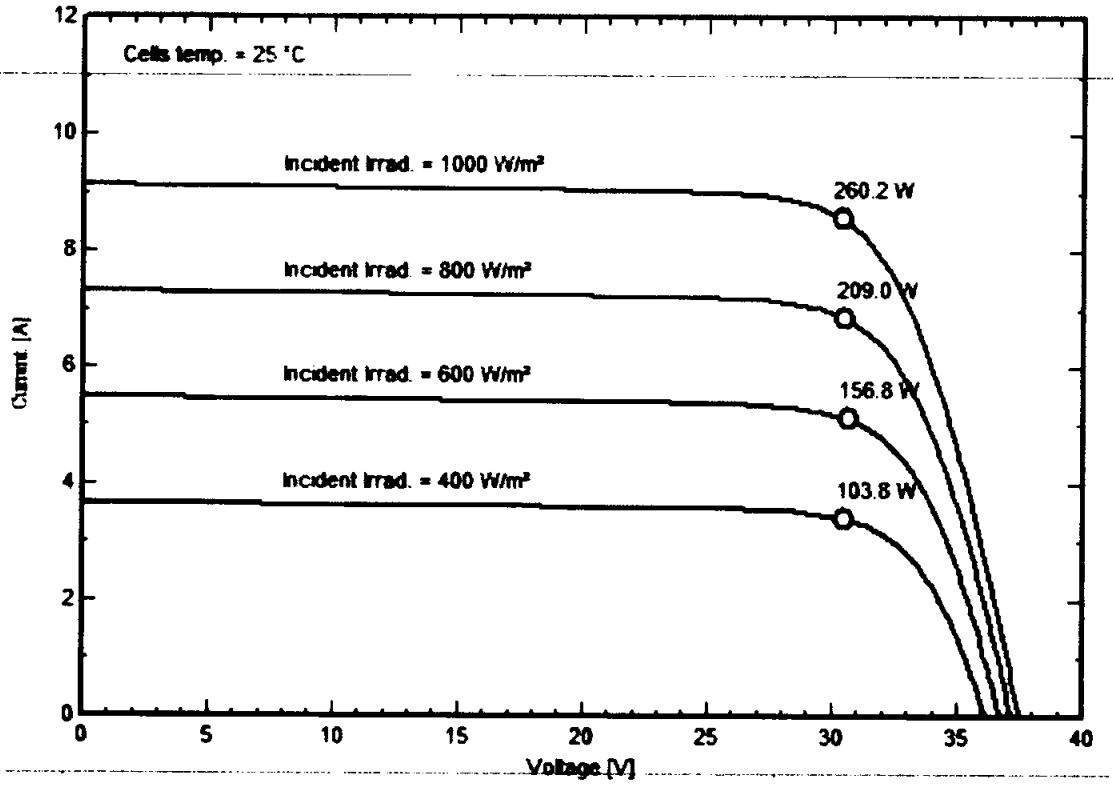
VI Curve at STC of the Generation Facility/Solar Farm/Solar Power Plant of the Licensee/SPPL

PV module: Canadian Solar Inc., CS6P - 260P



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SCHEDULE-II

The Total PV Installed Capacity of Generation Facility/Solar Power Plant (MW), Average Sun Hour Availability/Day (Irradiation on Inclined Surface), Days Per Year, PV Plant Generating Capacity Annually (As Per Simulation), Expected Total Generation in 25 years life span, Generation per Year from plant keeping 24 Hours Working and Net Capacity Factor of the Generation Facility/Solar Power Plant of Licensee is given in this Schedule.

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SCHEDULE-II

(1).	Total PV Installed Capacity of Generation Facility	0.07956 MW
(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)	97,986 KWh
(5).	Expected Total Generation in 25 years life span	2,449,650 KWh
(6).	Generation per Year from plant keeping 24 Hours Working	70 x 24 x 365 = 613,200 KWh
(7).	Net Capacity Factor (4/6)	16.00%

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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