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Dy. No. 3168  
Dated: 11-04-18

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BEFORE  
THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (NEPRA)

TARIFF PETITION  
PURSUANT TO NATIONAL ELECTRIC POWER REGULATORY AUTHORITY  
(TARIFF STANDARDS AND PROCEDURE RULES), 1998 (AS AMENDED AND  
MODIFIED FROM TIME TO TIME)  
READ WITH THE PROVISIONS OF  
THE REGULATION FOR GENERATION, TRANSMISSION AND DISTRIBUTION OF  
ELECTRIC POWER ACT, 1997 (AS AMENDED AND MODIFIED FROM TIME TO  
TIME)  
& THE RULES AND REGULATIONS MADE THEREUNDER

ON BEHALF OF

K1 SOLAR POWER LAHORE (PRIVATE) LIMITED

FOR NEPRA'S APPROVAL OF REFERENCE GENERATION TARIFF  
FOR K1 SOLAR POWER LAHORE (PRIVATE) LIMITED

FOR A SOLAR PHOTOVOLTAIC POWER PROJECT OF 12.5 MW (AC) - 15 MW<sub>p</sub> (DC)  
AT MANKERA, PROVINCE OF PUNJAB, PAKISTAN

DATED: 10 / 04 / 2019

K1 SOLAR POWER LAHORE (PRIVATE) LIMITED

216 LANDMARK PLAZA,

JAIL ROAD, GULBERG LAHORE, PAKISTAN

TEL: +92 042-35791134

EXTRACTS OF THE RESOLUTION PASSED BY THE BOARD OF DIRECTORS K1  
SOLAR POWER LAHORE (PRIVATE) LIMITED ON 14/02/2019

BOARD RESOLUTIONS

"It is hereby unanimously resolved that:

- (A) KI SOLAR POWER LAHORE (PRIVATE) LIMITED (*a private company duly established and existing under the laws of Pakistan with its registered office located at 2<sup>nd</sup> Floor, No. 9, Farid Jot Road, Lahore, Pakistan*) (the Company), having obtained a Letter of Interest in favour of its sponsors for the development of a 15MWp solar power project to be located at Mankera, Punjab, Pakistan (the Project) from the Punjab Power Development Board, January 09, 2018; and having made steady progress in respect of the development of the Project;

BE AND IS HEREBY AUTHORIZED to prepare, finalize, deliver, file, apply and submit, pursuant to the applicable laws of Pakistan, including the '*Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997*' (the NEPRA Act) and the rules and regulations made thereunder (including regulation 10(2) of the '*National Electric Power Regulatory Authority Licensing (Tariff Standards and Procedures) Rules, 1998*' (the Applicable NEPRA Laws),--a petition (together with all documents attached thereto) (the Tariff Petition) before the NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (the Authority) for the Authority's approval of the tariff and to, *inter alia*, enter into and execute all required documents, make all filings, attend all hearings, provide all required information and pay all applicable fees, in each case, of any nature whatsoever.

- (B) FURTHER RESOLVED THAT, in respect of the matters relating to the Tariff Petition Application, MR. CHARLES ANTON MILNER (being the Director of the Company and having Passport No. 525622078) is HEREBY is singly appointed as authorized representative of the Company and is HEREBY authorized and empowered for and on behalf of the Company, as the Company duly appointed AUTHORIZED REPRESENTATIVE, to address, perform, negotiate, decide, execute, implement and/or undertake all matters of any nature whatsoever in relation to the Tariff Petition including, without limitation:

- (i) review, execute, submit, and deliver the Tariff Petition and any related documentation required by the Authority for its approval, including any contracts, documents, powers of attorney, affidavits, statements, letters, forms, applications, deeds, guarantees, undertakings, approvals, memorandum, amendments, letters, communications, notices, certificates, request statements and any other instruments of any nature whatsoever;
- (ii) represent the Company in all negotiations, representations, presentations, hearings, conferences and/or meetings of any nature whatsoever with any entity (including, but in no manner limited to the Authority, any private parties, companies, partnerships, individuals, governmental and/or semi-governmental authorities and agencies, ministries; boards, departments, regulatory authorities and/or any other entity of any nature whatsoever);
- (iii) sign, execute and deliver, for and on behalf of the Company, all necessary documentation (including any contracts, documents, powers of attorney, affidavits,

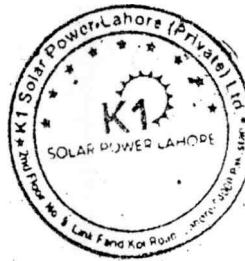
CERTIFICATION  
CERTIFIED TO BE TRUE COPY

CERTIFIED, that, the above resolutions were duly passed by the board of directors of P&G ENERGY (PRIVATE.)\_LanTED\_Capivate company duly established and existing under the laws of Pāci rwtth-- its registered office located at 3rd Floor, Adeel Plaza, Fazal-e-Haq Road, Blue Area, Islamabad, Pakistan) on 14/02/2019.

FURTHER CERTIFIED, that the afore-stated resolutions have not been resc' and are in operation and in full force and effect as at the date hereof and that this is a true copy same.

*Yandehs*

.....  
COMPANY SECRETARY



- (iii) pay the necessary fees, and to do all other acts necessary for processing and approval of the Generation License Application and the Tariff Petition of the Company.

AND I HEREBY ratify and confirm all lawful acts done by the said Sub Attorneys pursuant to this Power of Attorney.

SIGNED AND executed in the presence of the following witnesses on the day, month and year first above written.



CHARLES ANTON MILNER

WITNESSES:

1

.....

Name: Jeffrey Chiaming Chang

Address: Urbanstr. 176, 10961 Berlin  
Berlin  
PASSPORT NO.: 566139863

2



Name: Leif Oliver Loyda

Address: Nachodstr. 18, 10779  
PASSPORT No.: C3HZ9 8 C3R



AS N MUSED BY THE NOTARY PUBLIC



APR 2019

Die Echtheit vorstehender Unterschriften des Notars in Berlin

**Stefan Thon**

und die Echtheit der begedruckten Dienstsiegel werden hiermit bestätigt. Zugleich wird bescheinigt, dass der Vorgenannte zur Vornahme der Amtshandlung gesetzlich befugt war.

Berlin, den 25. Februar 2019

Die Präsidentin des Landgerichts

Im Auftrag



*[Faint illegible text]*

*[Handwritten signature]*  
Stefan Thon

Vorsitzende Richterin am Landgericht

9101 E/F 788/19

Gebühren 20,00€ bezahlt.

Berlin, den 25. Februar 2019

*[Handwritten signature]*

(Kuja)  
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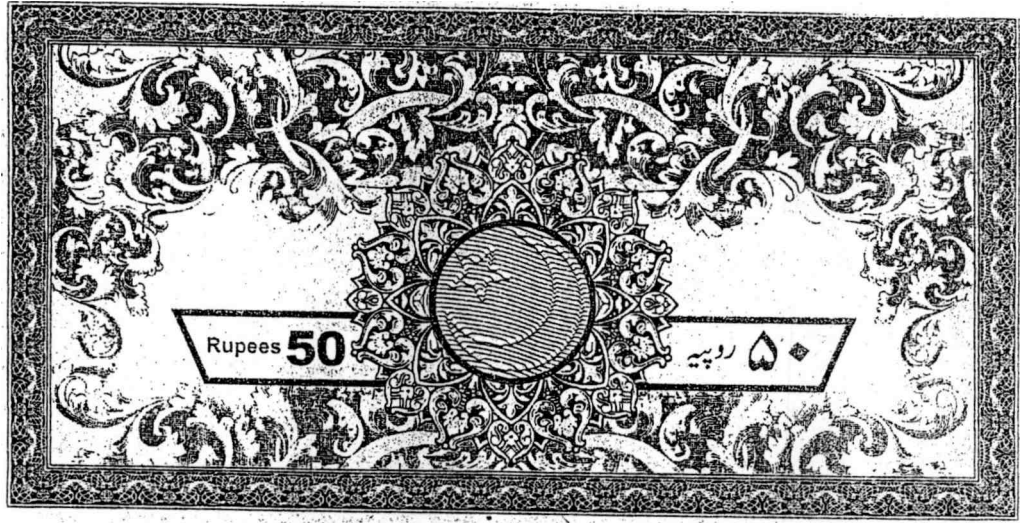
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Berlin

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BEFORE

THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

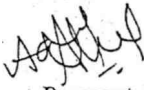
IN THE MATTER OF APPROXIMATELY 12.5 MW (AC) 15 MWP (DC).SOLAR POWER PLANT

AT MANKERA, PUNJAB, PAKISTAN

AFFIDAVIT

of Mr/Ms. Adeel Ahmed, son/daughter of Ahmed Khan Dar, resident of 73 Saville Road Gatley UK, duly authorized representative of K1 Solar Power Lahore (Private) Limited, through a Power of Attorney dated 21/02/2019 hereby declares and affirms on oath as under:

1. That the accompanying Tariff. Petition has been filed before the National Electric Power Regulatory Authority and the contents of the same may kindly be read as an integral part of this affidavit.
2. That the contents of the , accompanying Tariff Petition are true and correct to the best of , my knowledge and belief and nothing has been concealed or mis-stated therein.

  
Deponent

Verification

Ver4Fcl on oath at Islamabad on this 10th day of April, 2019 that the contents of the above affidavit are Virs:FIVCAcl correct to the best of my knowledge and belief.

  
10/4/19

  
Deponent

## Annexures

Annexure A — Letter of Intent

Annexure B — Land Agreement

Annexure C — Grid Interconnection Study & Approval

Annexure D — Project Feasibility Study & Approval

Annexure E — EPA Study & Approval

Annexure F - Reference Generation Tariff Table

Annexure G - Debt Repayment Schedule



## 2 REGULATORY FRAMEWORK LEADING TO TARIFF PE 11110N

### 2.1 NATIONAL ELECTRIC POWER REGULATORY AUTHORITY — COMPETENT AUTHORITY FOR TARIFF DETERMINATION

#### 2.1.1 NEPRA Act, NEPRA Rules:

In terms of the 'Punjab Power Generation Policy 2006' (the Policy), the Punjab Power Development Board (the PPDB), Government of Punjab (GOPb) has confirmed its intent for K1 Solar Power Lahore (Private) Limited (Project Company) to establish an approximately 12.5 MW (AC) — 15 MW (DC) solar photovoltaic (PV) power generation project (the Project) in the Mankera region, in the province of Punjab, pursuant to a letter of intent dated 09<sup>th</sup> January, 2019 issued by PPDB in favor of the Project Company (the LOI). The LOT is currently valid up to twelve (09) months from the date of its issuance i.e., 09<sup>th</sup> January, 2019.

Under the Regulation for Generation, Transmission and Distribution of Electric Power Act (XL of) 1997 (the NEPRA Act) read with the Regulation for Generation, Transmission and Distribution of Electric Power (Amendment) Act (XII of) 2018 (NEPRA Amendment Act), the National Electric Power Regulatory Authority (NEPRA) is responsible, *inter alia*, for determining tariffs and other terms and conditions for the supply or provision of electric power services through generation, transmission and distribution. NEPRA is also responsible for determining the process and procedures for reviewing tariffs and recommending tariff adjustments. Further, pursuant to the enabling provisions of the NEPRA Act, the procedure for tariff determination has been prescribed in the NEPRA (Tariff Standards and Procedure) Rules, 1998 (the NEPRA Tariff Rules).

It is prudent to state that NEPRA discontinued the upfront tariff regime for solar power generation projects pursuant to its decision dated March 03, 2017, bearing ref No. NEPRA/SPVPGT-2017/2915-2917. Since the discontinuation of upfront tariffs for solar power generation projects, NEPRA has been issuing tariff determinations to the interested parties i.e., solar energy independent power producers (IPPs) under the NEPRA Tariff Rules. The nature of tariff determinable under the NEPRA Tariff Rules is cost-plus i.e., where the price of units of electric power generated by the IPP is based on the actual cost plus an agreed return (as per prevalent policy). In this mode, the IPP is required to submit a petition to NEPRA for determination of tariff for a particular project containing the tariff proposed for the project and supporting documents evidencing the indicated costs.

In this respect, we also note that there have been developments for the establishment of a framework wherein a tariff is to be arrived at through competitive bidding i.e., under the NEPRA Competitive Bidding Tariff (Approval Procedure) Regulations, 2017, as amended and modified from time to time (NEPRA Tariff Bidding Regulations). However, the pre-requisites to implementation of such competitive bidding regime are not in place, including *inter alia* development of necessary template bidding documents. As such, NEPRA has continued to issue tariff determinations under the NEPRA Tariff Rules to various RE IPPs.

By way of illustration, in precedent tariff determinations issued by NEPRA i.e., the tariff determination dated January 25, 2018 and bearing ref No. NEPRA/TRF-403/GSPL-2017/1190-1192, in favor of Gharo Solar (Private) Limited, NEPRA acknowledged and confirmed that (see, Paragraph 14 of the said determination):

*"Regarding the point of Tariff Bidding Regulations, it is informed that NEPRA dated March 03, 2017 issued its tariff decision for solar power projects. In the instant decision, the Authority decided to discontinue the upfront tariff regime and shifted towards competitive bidding for induction of solar power. Nevertheless, the Authority is of the view that it cannot refuse the interested parties, subject to fulfilment of the stipulated conditions, to not file petition under the Tariff Rules, 1998 especially when the agencies who have to carry out the bidding process are in process of developing the requisite documents."*

Therefore, it would be right to conclude that following the discontinuation of the upfront tariff regime for solar power generation projects by NEPRA, pursuant to its above-mentioned decision of March 2017, parties interested in setting up a solar power generation project may opt for: (i) a competitive tariff bidding under the NEPRA Tariff Bidding Regulations; or (ii) a cost-plus tariff under the NEPRA Tariff Rules.

However, we note that the NEPRA Tariff Bidding Regulations shall only be applicable in cases where detailed feasibility studies are available and are not applicable in cases of "Raw Sites" (section 1(4) of the NEPRA Tariff Bidding Regulations). The term 'Raw Site' is defined in section 2(1)(h) of the NEPRA Tariff Bidding Regulations as: "a site for a power project where feasibility study and detailed engineering design has not been completed;". Since the Project is a raw site proposal and the technical feasibility study of the site for the Project (attached as ANNEXURE D) and the detailed engineering design has been carried out by the Project Company itself (and not the implementing government agency), thus, the NEPRA Tariff Bidding Regulations do not apply to the Project.

In view of the foregoing, the Project Company has opted to apply for a cost-plus tariff, under the NEPRA Tariff Rules, and hereby submits the details of the Project provided in this Tariff Petition (defined below).

## 2.2 PROCESS LEADING TO TARIFF PETITION

### 2.2.1 Submission of the Feasibility Study and approval of the same:

In compliance with the requirements laid out in the Policy and the LOI, the Project Company completed the detailed feasibility in respect of the Project (the Project Feasibility Study) and submitted the same to the Panel of Experts through PPDB for their review and approval.

Following completion of the detailed review of the Project Feasibility Study by the Panel of Experts in the meeting held on 27 / 02 / 2019 the Panel of Experts granted their approval of the Project Feasibility Study, communicated vide PPDB letter No. PPDB/R.E/MRE /68/2019 dated 18/02 / 2019.

### 2.2.2 Request for Determination of Tariff:

Since the Project Company:

- (a) has been granted the LOI by the PPDB vide letter No. PPDB / RE /DRE/27/2018 on 09<sup>th</sup> January, 2018 (attached as ANNEXURE A),
- (b) has procured the private land for the Project in Mankera District Bakhar, the land purchase agreement is being executed by the parties and title transfer documents shall

be provided in due course to NEPRA (*see the land purchase agreement attached as ANNEXURE B*),

- (c) has received approval in respect of the Grid Interconnection Study for the Project by the Faisalabad Electric Supply Company (FESCO) *vide* letter No. 2271-74/CE(P&D) dated 26 / 03 / 2019 (attached as ANNEXURE C),
- (d) has completed its technical feasibility study for the Project dated 01/09/2018 and the same has been submitted to Panel of Experts for approval on 03/10/2018, which accordingly received approval in respect of the Project Feasibility Study by the Panel of Experts *vide* minutes of the meeting held on 27 / 02 / 2019 communicated by PPDB letter No PPDB/R.E/MRE/97/2019 dated 07/ 03 / 2019 (attached as ANNEXURE D),
- (e) has obtained the applicable environmental approvals in respect of the Project from the Punjab Environment Protection Agency *vide* letter No. DD (EIA)/EPAJ393(IEE)2018/616/1808 dated 28 / 09 / 2018 (attached as ANNEXURE E)

accordingly, it is submitted that the requirements of the regulatory process for applying to NEPRA for a cost-plus tariff determination for the Project have been completed.

### 2.2.3 Submission

Pursuant to the relevant provisions of the NEPRA Rules, read with the provisions of the NEPRA Act (as amended by the NEPRA Amendment Act) and the rules and regulations made thereunder, in accordance with the Policy; AND in view of compliance by the Project Company of the foregoing (including the LOD, K1 Solar Power Lahore (Private) Limited submits herewith before NEPRA, the competent regulatory authority lawfully authorized to determine tariff for solar power generation companies, for its perusal, a tariff petition (the Tariff Petition) for approval of:

- (i) the reference generation tariff (the Reference Generation Tariff);
- (ii) the indexations and escalations;
- (iii) the adjustments at commercial operations date (COD); and
- (iv) other matters set out in this Tariff Petition.

Given the advanced stage of the Project, NEPRA is kindly requested to process the Tariff Petition at the earliest, thereby enabling the Project Company to achieve financial close and start generation on or before December 2019 and as per the interconnection arrangement confirmed in the Grid Interconnection Study approval letter and the Power Evacuation Certificate received from NTDC.

### 3 EXECUTIVE SUMMARY

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#### 3.1 PROJECT BRIEF

The Applicant, K1 Solar Power Lahore (Private) Limited (the Project Company), is a private limited company incorporated under the laws of Pakistan and has been specifically established to undertake power generation business and activities in Pakistan.

The Project Company, following the grant of a generation license and upon receiving approval of the Project. Company's reference generation tariff by NEPRA, proposes to design, engineer, construct, insure, commission, operate and maintain the Project constituting of a 12.5 MW (AC) — 15 MWp, solar power generation facility (the Facility) to be located at Mankera, Province of Punjab, Pakistan (the Site).

After receiving the letter of intent letter No. PPDB / R.E /DRE/27/2018 dated 09<sup>th</sup> January 2018 (LOI), in respect of our proposed 15 MW (DC) solar power project (Project) from PPDB, the Project procured 62.4 acres of land from the private landowners. The soil investigation, topography survey and technical feasibility were carried out.

In view of the foregoing, we continued with our development activities on our unsolicited site and the following milestones were completed:

(a) The project company through ibvogt GmbH (Main sponsor) shall enter into multiple supply contracts with vendors for the purposes of implementing the Project on self-EPC mode. Preliminary list of the suppliers or vendors is attached in the Petition.

(b) Project Feasibility Study in respect of our Site was completed and submitted to PPDB vide letter No. 0309FSB dated 01/09/2018.

Zc:TAGrid Interconnection Study dated 28/09/2018 for our Project was conducted and completed by the ARCO Energy Consultants and its approval was conveyed vide FESCO letter and the certificate approving the Grid Study with confirmation for evacuation of power issued by GSC, FESCO vide letter No. 2271-74/CE(P&D) dated 26/03/2019.

(d) IEE study in respect of our Project was completed and approved by the Punjab Environmental Protection Agency vide letter No. No. DD (EIA)/EPA/393(TEE)2018/616/1808 dated 28/09/2018.

#### 3.2 EPC APPROACH & O&M ARRANGEMENT:

IB VOGT, the major sponsor of the Project Company, has more than 15 years of solar industry experience and being an expert in large scale solar energy projects has already developed solar projects portfolio of above 1,159 MWp. LB VOGT has developed projects in Europe, UK, USA, Australia, Panama, Poland, Spain, India, South East Asia and Africa.

Given the experience of the main sponsor as mentioned in the above paragraph, the Project Company does not intend to enter into a turnkey EPC contract and plans to execute the Project in a self EPC mode.

Under the self EPC mode, as shown in paragraph 4.2.1, the Base EPC Cost will be relatively lower than if the Project had been undertaken a single EPC contract where the EPC contractor would have charged an EPC Margin resulting in a relatively higher EPC cost and Tariff. Given that this project is under self EPC mode, the total Project Cost and Tariff are subsequently lower resulting an increased benefit to the Government of Pakistan and end consumers.

Under self-EPC approach the Project Company will enter into an Agreement with IB VOGT GMBH and hence have access to IB VOGT GMBH's international technical resources and parts distribution networks. Further, under the agreement, IB VOGT GMBH will also assist the Project Company in overall management, coordination and implementation of the project. This approach would ensure the availability of financing at the least cost from international lenders under the project finance structure.

Therefore, the NEPRA (Selection of Engineering, Procurement and Construction Contractor by Independent Power Producers) Guidelines, 2017 (the EPC Guidelines) that apply to power projects that intend to award EPC contract(s) for whole or part of the power project, do not apply to the Project. In this respect, we have reproduced hereunder the relevant excerpt from a recent tariff determination for a solar power project wherein NEPRA has established the affirmed view on the applicability of the EPC Guidelines to projects developing on self-EPC

In the tariff determination for Gharao project, vide Case No. NEPRA/TRF-403/GSPL-2017/1190-1192 NEPRA, has held in this regard that, *"GSPL submitted that it does not intend to award EPC contracts either whole or part of the Project and shall implement the Project in self-EPC mode through direct supervision and management of multiple consultants, suppliers and contractors. Accordingly, the recently issued NEPRA (Selection of Engineering, Procurement and Construction Contractor by Independent Power Producers) Guidelines, 2017 ('EPC Guidelines') are not applicable to the instant petition."*

Project Company will carry out the Operation & Maintenance works by itself while using the resources from its Main Sponsor ib vogt GmbH.

### 3.3 PROJECT FUNDING:

The capital structure of the Project is envisaged at 80:20 (Debt: Equity). The Project Company intends to obtain one hundred percent (100%) of the debt from foreign Lenders is in the process of finalizing term sheets for purposes of financing of the Project.

The equity required for the Project is to be funded as follows:

The main sponsor, IB VOGT GMBH intends to be a major player in developing projects in the energy sector with particular emphasis on development of renewable energy projects through investment in efficient and profitable projects. The main sponsor of the Project has established one subsidiary i.e. K1 ENERGY LAHORE PVT LTD [established in 09/11/2016 under the laws of England and Wales], which is the major shareholder in the Project Company: K1 SOLAR POWER LAHORE (PRIVATE) LIMITED. Certain shareholding is also held by Mr. ANTON MILNER AND MR. CARL VON BRAUN. (Together the three sponsors are referred to as the Sponsors). The Sponsors are committed to fund this project by investing twenty-five (20%) of the project cost in the following shareholding ratio:

Shareholding Structure		
1.	K1 ENERGY LAHORE PRIVATE LIMITED	98
2.	ANTON MILNER	1%
3.	CARL VON BRAUN	1%


### 3.4 SALIENT FEATURES OF THE PROJECT

Subject to the assumptions contained in this Tariff Petition, please find below a summary of the Project for NEPRA's perusal:

PROJECT COMPANY	K1 Solar Power Lahore Private Limited	
MAIN SPONSOR	ib vogt GmbH	
SHAREHOLDERS	(1) K1 Energy Lahore Pvt Limited; (2) Anton Milner; and (3) Carl Von Braun	
PROJECT CAPACITY	15 MWp (DC) – 12.5 MW (AC)	
	Mankera, Province of Punjab, Pakistan	
LAND AREA	62.4 Acres	
CONCESSION PERIOD <sup>1</sup>	25 years from commercial operations date	
PURCHASER	Central Power Purchasing Agency (Guarantee) Limited (CPPA-G)	
	30,380 MWh/year (annual generation of the plant)	
	Bifacial monocrystalline 360W solar panels with single axis trackers and string inverters SUN2000-105KTL	
CAPACITY UTILIZATION FACTOR	23.12%	
	0.50%	
	6 Months	
	<i>Amount (US\$)</i>	
	EPC Price (A)	13,335,894
	Non-EPC Costs (B):	
	Project development Costs	525,000
	Land Acquisition	189,990
	Insurance During Construction	53,344
	Financial Charges	225,668

# **KI SOLAR POWER LAHORE (PRIVATE) LIMITED**

Interest		246,083
cc t		14,575,979
Debt 80%: Equity 20%		
US\$ 2,915,196		
US\$ 11,660,783		
100% Foreign Financing		
-Atrlency		United States Dollars
e a • ent		12 years
Frio -		
Financia charges		
terest		Base Rate: 6 Months LIBOR — 2.86%
		Spread 4 25%
Operational & Maintenance		
<ul style="list-style-type: none"> <li>Foreign USD 6,000 / MW</li> <li>Local USD 10,000 / MW</li> </ul>		
Insurance During Operations — 0.4% of Total EPC Cost — USD 53,344		
PKR/KWh		US Cent/KWh
8.728 (Years 1 to 12)		7.273 (Years 1 to 12)
2.958 (Years 13 to 25)		2.465 (Years 13 to 25)
<ul style="list-style-type: none"> <li>US Cents/kWh: 6.07</li> <li>PK Rupees/kWh: 7.29</li> </ul>		
<ul style="list-style-type: none"> <li>Energy Purchase Agreement</li> <li>Implementation Agreement</li> <li>Government of Pakistan Guarantee</li> <li>Site Lease Deed</li> <li>Lender's Direct Agreements</li> </ul>		
Policy for Development of Renewable Energy for Powe Generation, 2006 and the Punjab Power Generation Policy 2006 revised 2009.		
EY Ford Rhodes		
HaidermotaBNR & Co.		
CO Energy Consultants		

	<ul style="list-style-type: none"> <li>LOI issued by the PPDB on</li> </ul>	09 <sup>th</sup> January, 2018
	<ul style="list-style-type: none"> <li>Land Purchased</li> </ul>	18/04/2019
	<ul style="list-style-type: none"> <li>Documentation for execution of lease agreement is in process</li> </ul>	
	<ul style="list-style-type: none"> <li>Approval of the Grid Interconnection Study</li> </ul>	26/03/2019

### 3.5 KEY FEATURES OF THE PROJECT

#### 3.5.1 The Project Site

The project is located in Mankera District, Punjab. The geographical coordinates of our project are as follows:

S.No.	Entry	Details
1	Site Name	Mankera Solar Farm
2	Site Coordinates	P1= 31°24'3.62"N, 71 °28'42.77"E P2= 31°24'15.96"N, 71°28'42.54"E P3= 31°24'16.54"N, 71°29'8.41"E P4= 31°24'4.38"N, 71°29'7.94"E
3	Altitude	164 m (Highest recorded value) 162 m (Lowest recorded value)
4	Proposed AC and DC capacity	12.5 MW AC — 15 MW DC
5	Global irradiation levels	1784 KWh / m <sup>2</sup> (Solar GIS)



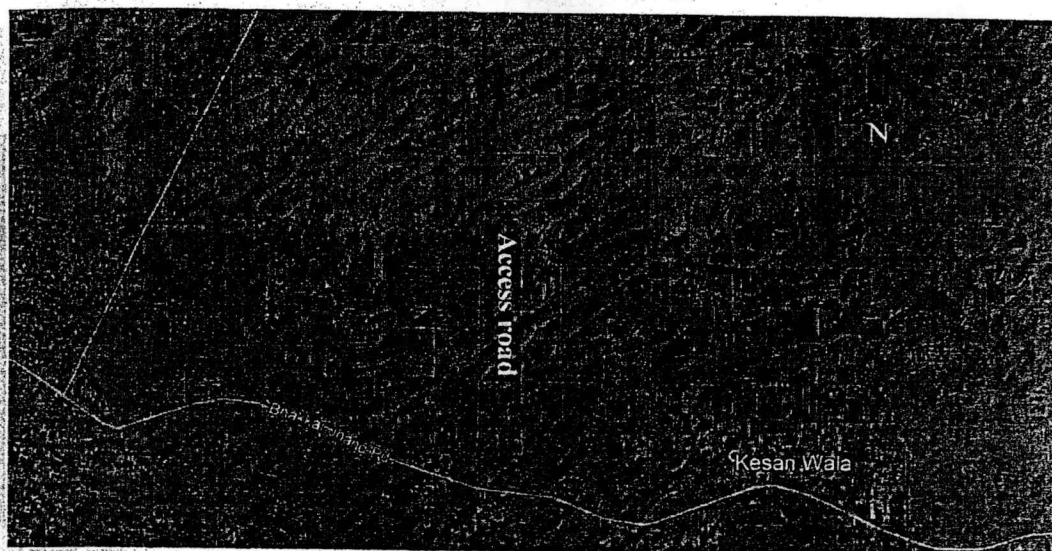


Fig 1 showing location of the site

### 3.5.2 Selection of Technology

The project will use bifacial monocrystalline 360W solar panels with single axis trackers and string inverters SUN2000-105KTL. The site will be connected through a 11kV connection with 66/11kV Mankera Grid. The project technology evolved during the feasibility stage of the project. During first Panel of Experts (POE) meeting with Punjab Power Development Board, the Monocrystalline solar panels, Central inverters and single axis trackers were used while quoting 20.65% capacity factor in draft feasibility study. The panel of experts asked the project company to increase the project yield and overall capacity factor. During second POE meeting the project company submitted the feasibility study with revised design parameters and used cutting edge technology for the project, in form of more efficient Monocrystalline Bifacial solar panels and String inverters along with single axis trackers. It improved the project yield and overall capacity factor to 23.12%.

#### 1. PV Modules

Longi Solar LR6-72BP 360Wp Bifacial monocrystalline modules.	
Specification	Data
Cell-type	PERC monocrystalline, 6 inch cells
Bifaciality	>75%
Cell Orientation	72 (6x12)
Dimensions	1977x996x40mm
Weight	26.5 kg
Junction box	1P67, 3 diodes
Output Cable	4mm <sup>2</sup> , 300mm in length
Packaging	26pcs per pallet

## 2. Single Axis Tracker

### Arctech Solar Skysmart tracker specifications

Tracking type	Independent Horizontal Single "Axis Tracker
Tracking Range	Up to 120° ( $\pm 60^\circ$ )
Driving System	One Slewing Gear, 24VDC Motor
Modules per Tracker	Up to 90 modules per tracker
System Voltage	1000 Volt or 1500 Volt
Ground Coverage Ratio	1000 Volt or 1500 Volt
Foundation options	Ramming / Pre-drilling/Concrete Piles/Screw Pile
Terrain Adaption	Up to 20% N-S Slope
Structure Material	Hot Dipped Galvanized/Pre-Galvanized Steel
Power Supply	Self-powered PV series
Daily Energy Consumption	Typical 0.08KWh
Standard Wind Design	105mph(47m/s) per ASCE7-10, higher wind load available
Wind Protection	Stow when wind speed > 18m/s
Module Supported	Most commercially available
Operation Temperature	-30° to 60° C
Electronic Controller Specifications	
Control System	1 Controller per 3 trackers
Control Algorithm	Astronomical Algorithms + Tilt Sensor Close Loop
Tracking Accuracy	< +2°
Backtracking	Yes
Communication	RS 485 cable/LoRa wireless
Night Position	Yes

## 3. Inverters

Model No.	SUN2000-105KTL-H1
Input Data(DC)	
Max. DC Voltage	1500 V
Rated DC Voltage	1080 V
Min. DC Voltage to Start Feed In	650 V
Max. DC Current	150 A
MPP(T) Voltage Range	600-1500 V

No of MPP Trackers	
DC Inputs	12
Output Data (AC)	
Max. AC Power	116 kW
Rated AC Voltage	800 V
Max. AC Current	84.6 A
Rated AC Current	75.8 A
Frequency	50, 60 Hz
Power Factor (cosO)	0.8
Distortion (THD)	< 3 %
No of feed-in phases	3
Max. Efficiency	99%
Euro Efficiency	98.80%
General Data	
Dimensions (H/W/D)	1075x605x310 mm
Weight	79 kg
Operating Temperature	-25 — +60 °C
Transformer	Transformerless
Protection Class	1P65
Humidity	0-100 %
Cooling	Natural
Max. Altitude	4000 m
Interface	RS 485, USB, Bluetooth
Display	LED
Protection Features	
Protection Features	Anti Island Protection(ENS), Overcurrent Protection, Residual Current Device (RCD), Reverse Polarity Protection, Surge Protection

Ad

4. DC/AC brand

HuaweiSun2000 — 105KTL-H1 model will be used, having rated DC voltage 1080V, 150A-current and rated AC voltage 800V, 75.8A-current.

5. Step-up transformers

Five step up transformer of 2750KVA, 0.8/11kV will be used to connect 12.5MW AC to National Grid.

6. SCADA

Monitoring and control of the photovoltaic system is to be supplied by Gantner Instruments. Meteorological data as well as key electrical measurements will be logged and processed to trouble shoot system faults and to evaluate the photovoltaic systems performance.

Additional Plant Technical Details

Plant Configuration:

1. Installed Capacity: 15 MWp
2. Capacity at Operating Conditions: 13.602 MWp (50°C)
3. Auxiliary Consumption approx.: 120 KvA
4. Net output (MSC): 12.5 MW (AC)
5. Life of facility 25 years

The Project will be set up using PV modules, which will be installed in arrays, and their DC output will be converted in to AC through inverters. Thereafter, a group of arrays/inverters be routed to step-up transformer(s)/switchgear(s) for connecting to the system as per the interconnection scheme.

## 4 PROJECT COST, OPERATING COST AND TARIFF

### 4.1 PROJECT COST SUMMARY

The total Project Cost, expressed in United States Dollars, has been calculated after thorough analysis, evaluation and understanding of the dynamics that affect the development and operation of a solar power project. The reference exchange rates used to convert the relevant costs into United States Dollars are USD 1 = PKR 120.

For NEPRA's benefit and approval, a summary of the Project Cost is given below:

INVESTMENT COST	US\$
<b>EPC COST (A)</b>	<b>13,335,894</b>
<b>NON-EPC (B)</b>	
Project development Costs	525,000
Land Acquisition	189,990
Insurance During Construction	53,344
Financial Charges	225,668
Interest During Construction	246,083
<b>TOTAL PROJECT COST (A+B)</b>	<b>14,575,979</b>

### 4.2 DETAILS OF PROJECT COST

#### 4.2.1 EPC Cost:

The Proposed Tariff is based on an aggressive based EPC cost of USD 858,000 per MW including higher capex for bifacial monocrystalline 360W solar panels with single axis trackers and string inverters SLTN2000-105KTL. An uplift factor of 3.62%; representing levelized cumulative impact of 0.5% annual degradation is applied to base EPC cost as per NEPRA pred6Cient to give an adjusted EPC cost of USD 889,060 per MW.

Indicative Breakup and Comparison of EPC Cost Benchmark is as follows

	W110	e) -411
Module	0.550	0.34
		0.14
		(string inverter + monitoring, pyranometer + data string + Air Temperature + Data Logger + Data storage + Communication)
Inverter	0.090 (central inverter)	
Mounting	0.100 ixed Tilt	0.15 single axis trackers
		0.128
		(extra ground work will be carried out to make ground surface more reflective)
Civil & General Work	0.10	

Cable & Transformer	0.10	0.10 (Including SCADA system and housing)
Sub-Total	0.940	0.858
EPC Margin	0.094	-
Base EPC Costs	1.034	0.858
Degradation (3.62%)	0.0374	0.0312
Amortment for Project size	0.04289	-
<b>TAR</b>	<b>Up</b>	

\* DETERMINATION OF NATIONAL ELECTRIC POWER REGULATORY AUTHORITY IN THE MATTER OF UPFRONT GENERATION TARIFF FOR SOLAR PV POWER PLANTS DATE: DECEMBER 16, 2015

The assumed EPC cost represents a steep decline of 20% relative to the last upfront Tariff determination — 16 December 2015 and a reduction of —8% compared to EPC cost of USD 968,847 per MW proposed benchmark in the draft upfront tariff advertised on 14 June 2016. It is pertinent to highlight that NEPRA benchmark were based on fixed tilt system, which has significantly lower CAPEX and energy yield than the cutting-edge tracking Bifacial monocrystalline 360W solar panels modules and string inverters pertaining to the solar plant to be used in this project.

Further, it is important to highlight that prior Cost-plus Tariffs petitions approved by NEPRA were either based on standard modules/Non-Bifacial solar module, Polycrystalline Solar Panels (p-Si) or Thin-Film: Amorphous Silicon Solar Panels (A-SI) technology with regular inverters which had a significantly lower capex and energy yield than the cutting-edge bifacial solar panels along with single axis trackers and string inverters that will be used by the Project Company which has a slightly higher EPC cost but significantly higher energy yield ensuring the reliability of energy generation during the concession period of 25 years.

As the Project Company intends to install state of the art equipment, bifacial solar panels along with single axis trackers and string inverters which is relatively expensive than other technologies used by Solar IPPs in Pakistan, the plant is expected to achieve the highest capacity factor of 23.12% to date in Pakistan (in northern region of Pakistan).

	As Per 2015 Upfront Tariff (1 to 20MW)	K1 Energy (Project Company)	Gharo Solar Private Limited	Helios Power / Meridian Energy / HNDS Energy	Zorlu Solar
EPC Contractor	-	Self EPC	Self EPC	Consortium of Scatec Solar ASA & Scatec Solar (Pvt.) Ltd.	Consortium of Zorlu Enerji Elektrik Uretim & Zorlu Industrial Pakistan
Module Type	Polycrystalline Solar Panels (p-Si) or Thin-Film	Bifacial monocrystalline 360W solar panels	Single Axis Tracker PV Module Tier 1	BYD330-P6C-36DG — Series 4BB solar module (Polycrystalline Silicon)	First Solar's cadmium-telluride (CdTe) thin film solar modules
Inverter Type	Regular Inverter	String inverters	Central Inverter-Sungrow	Sungrow Central SG 30001W PV inverter	Central Inverter - Siemens of model APS 4000-PV



Capacity Utilization	18% South Region 17% North Region	23.12% (Highest to date)	22.21%	22.21%	20.5%
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The EPC Cost includes the cost of generator step up transformers, MV Substation, HV Substation, protection system, SCADA system, communication system, metering system and anemometry system, electrical equipment, together with ancillary equipment and other goods, systems and machinery and includes the cost of, *inter alia*, the erection, testing, completion and commissioning of the equipment and construction of the facility that is capable of fulfilling the intended purpose.

#### Justification of the Proposed EPC Costs

Module: - Module price has been targeted at 0.34 USD million / MW even though the average spot price of high-efficiency Bifacial monocrystalline - solar module price is currently at 0.35 USD/W. Source: <https://www.pv-magazine.com/features/investors/module-price-index/> (Data up to 15 Feb 2019)

Inverter: - The new Huawei SUN2000-105KTL-H1 inverters are an impressive piece of engineering which appears to be a great option for a flexible grid-tie system. It promises many benefits to installers in regards to monitoring and efficient remote system trouble shooting and with panel level monitoring software it is a great option for grid tie installations.

#### Function

The SUN2000 is a grid-tied PV string inverter that converts the DC power generated by PV strings into AC power and feeds the power into the power grid.

#### Features

- Intelligent

Six independent maximum power point tracking (MPPT) circuits and 12 PV string inputs: Supports the flexible configuration of 2+2+2+2+2+2 strings. 12 routes of high-precision smart PV string monitoring: Help identify and rectify exceptions timely.

- Power line communication (PLC) networking: Uses the existing power line for communication and does not require an additional communications cable, which reduces the construction and maintenance costs and improves communication reliability and efficiency.
- Smart I-V curve diagnosis: Implements I-V scanning and health diagnosis for PV strings. In this way, potential risks and faults can be detected in time, improving the plant operation & maintenance (O&M) quality.
- Safe: Embedded DC and AC SPDs: all-dimensional surge protection Embedded residual current monitoring unit: Immediately disconnects from the power grid upon detecting that the residual current exceeds the threshold.

Reliable

Natural cooling

Free fuse design

Protected to P65.

- Effective design against ground subsidence: The AC terminal block can be pulled down by up to 50 mm due to the pulling force.
- Due to smart, efficient technology and better equipped to meet the hot climatic conditions. Huawei string inverter is definitely the right pick, but due to relatively new technology and better output, it comes with relatively high cost as compared to its market competitors. The other big advantage of using string inverter as compared to central is, in case the inverter is shut down due to schedule maintenance or due to a fault, only one string will be unavailable whereas in case of fault in central inverter whole 2.5MW — 3MW (depending on inverter rating) will be out of the system and will result in an economic loss to project sponsor.
- the spot price of the high efficiency inverter is 1.838 USD / Wp for all brands and average spot price for all brands is 0.125 USD/Wp (only inverter).

Source: <http://pvinsights.com/RetailerPrice.php> updated on 25 March 2019

Mounting: - The mounting system costs assumed by the Project Company is for a single axis tracking, which is typically 0.08 — 0.12 USD million / MW higher than fixed systems. However, the Project Company is assuming an increase of only 0.03 USD million / MW in this category compared to the NEPRA benchmark for fixed tilt on the basis of its sponsors' established experience with single axis tracking systems in Asia-Pacific and Europe and planned optimization of tracker design and cost. The mounting structure required for bifacial solar panel will be higher from the front and back, so that solar panels can get proper reflection from the ground. Comparatively a 2p tracking system has a front height of 0.15m from the front and almost 1.5-2.0m high from the back depending on the tilt angle. Whereas for bifacial solar panels minimum front height that will be required is 0.5m and back height would 4.3m at max which will increase the mounting structure cost.

Cable and Transformer: - The Grid price for the project has been considered same as approved by NEPRA in 2015 upfront tariff and also similar was approved for Ghara Solar tariff petition.

Civil & General works: - Piling and Installation works for tracking plants are typically more complex as the structural loads of the tracker is higher than the fixed system. Due to use of bifacial solar panel the cost of the foundations for mounting structure will increase, due to increase in the height of the structure from front and back, to get the maximum reflection from the ground. Hence 0.128 USD/Wp has been considered for civil & general works of the project.

As mentioned earlier, the Project Company does not intend to enter into a turnkey EPC contract and plans to execute the Project in self EPC mode. Under the approach, the Project Company shall enter into separate supply contracts for PV modules, inverters and other balance of plant, design services, construction services, and commissioning whereby the implementation and wrap-around risk will be borne by the Project Company.



It's pertinent to mention that, staff accommodation (construction of the camp buildings), site security during construction period have not been added to Project Cost and hence, not been considered in the Tariff computation although the Project Company will have to incur such costs during the construction phase of the Project.

#### 4.2.2 Taxes & Custom Duty

The extract of the relevant legislatures reproduced below are basis for our assumption on costs associated to taxes and custom duties considered in this petition.

##### Custom Duty:

Section 22A of the Customs Act, 1969 (as amended up to June 30, 2018) (the Customs Act) provides for the duty free reimport of those imported plant and machinery which had been temporarily exported and not been alternated, renovated or refurbished, subject to specific or general terms and conditions prescribed the Federal Board of Revenue by rules.

Notably, section 19 of the Customs Act states that the Federal Government may, whenever circumstances exist to take immediate action for the purposes of, *inter alia*, implementation of bilateral and multilateral agreements with the GoP (i.e., the IA being a bilateral agreement between the GoP and the independent power producer) and subject to such conditions, limitations or restrictions (if any), as it deems fit to impose, by notification in the official Gazette, exempt any goods imported into, or exported from, Pakistan or into or from any specified port or station or area therein, from the whole or any part of the customs-duties chargeable thereon and may remit fine, penalty, charge or any other amount recoverable under the Customs Act.

The amount of customs duty to be paid by renewable energy projects is to be calculated based on section 18 (1A) of the Customs Act read with Serial 11 to the Part I of Fifth Schedule of the Customs Act (the Schedule), which allows Customs Duty at a rate of Zero percent (0%) for the following items:

*"Machinery, equipment and spares meant for initial installation, balancing, modernization, replacement or expansion of projects for power generation through nuclear and renewable energy sources like solar, wind, micro-hydel bio-energy, ocean, waste-to-energy and hydrogen cell etc."*

Accordingly, the Project Company has assumed Zero percent (0%) customs duty on imported plant, equipment, machinery etc. in accordance with the above.

However, in case of applicability of any custom duty, the Project Company prays NEPRA to allow adjustment of capital cost of the Project and tariff at COD, for actual customs duty paid.

##### Additional Custom Duty:

Additional Custom Duty is assumed at Zero percent (0%), as the same is correlated with the items exempted in the fifth schedule of the Custom Act. In case the Project must pay customs

duty then the Special Excise Duty at one percent (1%) is levied. Accordingly, the Project Company requests NEPRA to kindly allow adjustment in capital cost of the Project and the tariff at COD, for actual special excise duty paid.

Sales Tax on imports:

No Sales Tax is assumed on import and local supply of the imported plant, equipment, and machinery etc., as per Table 3 of Sixth Schedule (the Schedule) to the Sales Tax Act, 1990 read with Section 13 (1) of the Sales Tax Act, 1990 wherein exemption from applicability of sales tax is provided. Serial # 7 of the Schedule cites following items which are exempt from sales tax;

*"1. Machinery, equipment and spares meant for initial installation, balancing, modernization, replacement or expansion of projects for power generation through nuclear and renewable energy sources like solar, wind, micro-hydel bio-energy, ocean, waste-to-energy and hydrogen cell etc."*

However, in case of change in laws by virtue of which if federal sales tax applicable on procurement of plant, machinery and equipment becomes applicable the same is requested to be adjusted in Project Cost and Tariff allowed at COD / Tariff true-up stage.

Advance Income Tax on import:

Advance Income Tax at zero percent (0%) has been assumed at the time of import of machinery, equipment, goods, spares and materials for the Project in line with exemption provided under section 153 of the Income tax Ordinance 2001(amended up to October 31, 2018 through the Supplementary Finance Act, 2018) (Income Tax Ordinance), read with clause 77 to the Part IV of 2nd Schedule to the Income Tax Ordinance, as reproduced hereunder

*"(77) Provisions of sections 148 and 153 shall not be applicable on import and subsequent supply of items with dedicated use of renewable sources of energy like solar and wind etc., even if locally manufactured, which include induction lamps, SMD, LEDs with or without ballast with fittings and fixtures, wind turbines including alternator and mast, solar torches, lanterns and related instruments, PV modules (with or without) the related components including invertors, charge controllers and batteries. "*

However, in case of change in laws before import of related plant, equipment and machinery by virtue of which such advance income tax rate is increased from currently applicable Zero percent (0%) then the same is requested to be adjusted in Project Cost and Tariff allowed at COD / Tariff true-up stage.

Tax on Contract for Construction Services signed with a Local Company:

Section 153 of the Income Tax Ordinance 2001 states that:

*(1) Every prescribed person making a payment in full or part including a payment by way of advance to a resident person or permanent establishment in Pakistan of a non-resident person... ..*

(a)

(b) .....

*(c) on the execution of a contract, ..... shall, at the time of making the payment, deduct tax from the gross amount payable (including sales tax, if any) at the rate specified in Division III of Part III of the First Schedule"*

Division III of Part III of the First Schedule prescribes the applicable tax rate on such contracts as seven percent (7%)

The Project Company is obligated to deduct this tax at the rate of seven percent (7%) of the value of contracted supply or service which being the final tax liability of such contractor is termed as its cost. It is customary for all contractors to quote the price for contracted supplies and services, net of any tax obligations. The tax obligation being an uncertain rate for long term contracts is paid by the Project Company.

However, in case of change in law by virtue of which such tax rate is changed from its prevailing rate of seven percent (7%) then the same is requested to be adjusted in Project Cost and Tariff allowed at COD / Tariff true-up stage.

Further note that the Income Tax Ordinance provides in the Second Schedule Part I, Section 132 that, profits and gains derived by a taxpayer from an electric power generation project set up in Pakistan on or after July 01, 1988, are exempted from taxation. This exemption shall apply to such project which is:

- (i) owned and managed by a company formed for operating the said project and registered under the Companies Ordinance, 1984 (now repealed and replaced by the Companies Act, 2017 (as amended, restated and modified from time to time)), and having its registered office in Pakistan;
- (ii) not formed by the splitting up, or the reconstruction or reconstitution, of a business already in existence or by transfer to a new business of any machinery or plant used in a business which was being carried on in Pakistan at any time before the commencement of the new business (provided that the aforesaid conditions shall not apply to electric power generation project formed by the splitting up, or the reconstruction or the reconstitution of an electric power generation business already in existence and availing exemption under this clause); and
- (iii) owned by a company fifty percent (50%) of whose shares are not held by the Federal Government, Provincial Government or Local Government or which is not controlled by the Federal Government or a Provincial Government or a Local Government.

Provided, *inter alia*, that the exemption under this clause shall also be available to the expansion projects of the existing independent power projects already in operation.

Federal Excise Duty (FED):

FED on the payments to be made to (1) local financial institutions; and (2) insurer's, has not been assumed. In case FED is levied on the financial advisors and lead arrangers' fee, debt arrangement fee, commitment fee, L/C commission and charges, loan administration charges, and insurance premium the same should be allowed as pass-through under the tariff.

*The taxes and duties are requested to be adjusted at actual at the COD stage tariff adjustment / Tariff true-up.*

#### 4.2.3 Non-EPC and other Project Development Cost:

The Non-EPC Cost includes those costs relating to the development and construction of the project that are not part of the scope of work under various equipment, procurement or construction contracts entered into by the Project Company. A broad breakdown of some of Non-EPC Costs is provided below:

t		US\$
4.2.3.1	Project development cost (\$35,000 per MW)	525,000
4.2.3.2	Land Acquisition	189,990
4.2.3.3	Insurance during Construction	53,344
4.2.3.4	Financial charges	225,668
4.2.3.5	Interest during Construction	246,083
	<b>TOTAL NON-EPC &amp; PROJECT DEVELOPMENT COST</b>	<b>3,790,653</b>

*The Non-EPC costs are requested to be adjusted at actual at the COD stage tariff adjustment / Tariff true-up.*

##### 4.2.3.1 Project development cost

The Non-EPC Cost includes the 'Project Development Costs', which are the costs, incurred or to be incurred, by the Project Company for the purpose of project development work. These costs include, inter alia, costs of feasibility studies, grid interconnection studies, environmental studies, topographical survey of land, geotechnical investigation of land; fees of consultants; costs related to the bank guarantee to be furnished to PPDB; costs related to the Purchaser letter of credit to be furnished to the power purchaser i.e., CPPA-G pursuant to the provisions of the EPA; various fees to be paid to the Alternative Energy Development Board (AEDB), NEPRA and other governmental agencies; costs incurred during the Project Company's formation and capital enhancement; costs relating to various permits for the Project; land cost; post financial close technical supervision; and site security.

Project Development	34,320	35,000	30,000
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Project development costs of USD 35,000 per MW are 13% lower compared to Project development costs of USD 40,320 per MW in the latest upfront Tariff determination — 16 December 2015.

In comparison to Ghara Solar, the Project Company's Project development costs are slightly higher because of higher travelling and security costs (boarding & logging) associated with foreign personnel from Germany and United Kingdom for development, arrangement of financing & EPC and for progress / monitoring meetings in Pakistan.

It is pertinent to mention, that the above Project Development costs is an estimate, hence, we request NEPRA to allow for these costs to be adjusted at actual at the COD stage tariff adjustment / Tariff true-up. The Project Development comprises of the following:

A. Consultancy Costs & Technical Studies - Pre-Financial Close:

The Project Company has engaged highly reputed and leading consultants as Project advisors that have unmatched expertise in planning, engineering, financial, legal and technical matters. The Project Company has endeavored to put together the best team of consultants for the Project to ensure that solar power sector in the country is further developed and support the scale up of solar power in the province and increased access to electricity and the Project is bankable from all aspects. Based on the requirements of technical consultants, the Project Company has already completed electrical, geotechnical, topographical, soil and other related studies for the purpose of completing Project's feasibility study.

B. Owner's Engineer & Supervision Costs — Post Financial Close:

The Project Company will engage an experienced in-house Owner's Engineer to ensure the compliance under the relevant contracts, as well as reporting on progress and budgets. The construction supervision team will comprise site engineers supported by technical experts. The Owner's Engineer will also conduct review of proposed designs, construction monitoring and witnessing of key tests to ensure project's success.

C. Independent Engineer:

The Project Company is required to engage an Independent Engineer pursuant to the EPA. Under the terms of the EPA the Independent Engineer will be a firm of engineering consultants that would be appointed and hired by the Project Company, with the approval of the CPPA-G, to monitor the construction of the Project (including its commissioning) and to deliver the related certificates and carry out all of the responsibilities specified in the EPA, including certifying the results of the commissioning tests, readiness of interconnection facilities and synchronization.

D. Permits, Permissions and Related Costs:

During development and construction of the Project, the Project Company will incur costs related to various fees and charges payable in respect of permits and permissions required from various authorities and regulatory bodies including but not limited to cost of bank guarantees to be provided by the Project Company in respect of the LOI and the Letter of Support (LOS), the letter of credit to be issued in favor of the power purchaser, the fee in respect of the LOS, AEDB and PPDB registration/facilitation and legal fee, NTDC vetting charges for Grid Interconnection Study, NEPRA fee and charges, registration and other charges to SECP, etc. to be incurred during development and construction of the Project.

E. Site works, transportation and Infrastructure:

This head includes transportation of staff during construction and costs related to site leveling & preparation, site access, infrastructure, electricity connection costs, etc.

F. Administration and Other Development Expenses:

The Project Company's head office is based in Islamabad. In addition, there will be a site office located at the Site of the Project with limited accommodation to coordinate the construction and monitoring activities at Site. This portion of the Non-EPC Cost includes costs associated with accounting and admin staff, rent, utilities, equipment inspection, communication charges,

printing and stationery, supplies, communication charges, vehicle fuel and maintenance and other allied expenses during the construction period.

**G. Travelling Cost:**

This head covers costs related to travelling, accommodation, daily allowances and other allied expenses of the foreign and local staff, incurred for development, arrangement of financing & EPC and for progress / monitoring meetings, etc. since April 2015 and will continue during development and construction period of the Project.

**H. Security Expense**

The Project Company is responsible for the security of its local and foreign personnel and the Equipment contractors' staff together with the solar plant equipment.

Any other cost that relates to development and construction of the Project, if incurred, will be provided at True-up stage.

**4.2.3.2 Land Cost:**

Land for this project has been privately procured from the land owners at a rate of \$ 3044.72/acre. The land is located in Mankera Bakhar, Punjab. Total Land procured for the project is 62.4 acres, sufficient to install 15MWp solar power plant. As per Land Agreement K1 Solar Power Lahore Pvt ltd will own the project land.

**4.2.3.3 Pre-COD Insurance Cost:**

Pre-COD Insurance Cost covers the insurance cost of the Project Company's assets during construction and the same are incurred prior to the commercial operations date (COD) of the Project. A Pre-COD Insurance Cost of 0.4% of EPC costs has been assumed, in line with NEPRA's notification dated 19 June 2018, and works out to be \$ 53,344 (0.4% multiplied by total EPC cost of USD 13,335,894)

However, in the event the Project Company cannot arrange the insurance at 0.4% p.a. due to any reasons beyond its control, NEPRA is requested to allow the actual Pre-COD Insurance Cost at actual up to a maximum of one percent (1%) of the EPC cost in line with earlier tariff determinations by NEPRA for other IPPs.

The Project Company, in accordance with the requirements set out by the lenders funding the Project, intends to procure the following insurances during the construction phase of the Project:

- (a) Construction All Risk Insurances (CAR);
- (b) CAR Delay in Start-up Insurance;
- (c) Terrorism Insurance;
- (d) Marine and Inland Transit Insurance;
- (e) Marine - Delay-In Startup Insurances; and

(f) Comprehensive General Liability.

The premiums payable under the above stated Pre-COD insurances do not include the administrative surcharge, the Federal Insurance Fee and the Federal Excise Duty, and the Project Company requests that the same kindly be allowed by NEPRA as part of the One-Time Adjustments allowed at the time of COD.

*Howevtr, in case of any deviation in the Pre-COD Insurance Cost, NEPRA is kindly requested to allow the actual Pre-COD Insurance Cost capped at one percent (1%) of the EPC cost in line with earlier tariff determinations by NEPRA for other IPPs.*

4.2.3.4 Financial Charges for arranging one hundred percent (100%) foreign financing

Financial Charges include the costs related to the arrangement of one hundred percent (100%) foreign currency debt financing of the Project. Such costs include, *inter cdi*a, the advisory and arrangement fee to secure insurance cover, the lenders' up-front fee and commitment fee; mandate and processing fee, fees payable, and stamp duty applicable on the financing documents; agency fee; security trustee fee; lenders' Project monitoring fee and the fees for the lenders' legal and other advisors customary for a foreign lender to engage in order to carry out the due diligence, drafting of financing documents and monitoring of the project during the construction period.

These financial charges of 2% (on the debt proportion of the claimed capital costs) have assumed in line are in with NEPRA's notification dated 19 June 2018. Accordingly, the financial charges amount to USD 225,668.

*Actual financial charges incurred by the Project Company will reflect prevailing market conditions and practices applicable for project financing transactions and hence may exceed 2% allowed by NEPRA. In this case it is kindly requested that NEPRA allows an adjustment for actual cost at the time of COD.*

*Given the Foreign debt is to be arranged, the Project Company may have to incur Sinosure fee/ECA exposure fee/credit insurance fee. Hence, if applicable, we request NEPRA, to allow adjustment of any Sinosure fee/ECA exposure fee/credit insurance fee incurred by the company to a maximum of 7% of debt service amount in accordance with the bench mark established in the coal upfront tariff.*

*Furthermore, the Project Company requests NEPRA that as the Project Company has not considered any duties and taxes on account of Financial Fees and Charges, any duties and taxes if applicable on account of these costs may kindly be allowed as adjustment for actual cost at the time of COD.*

*It is also pertinent to mention, in case the project is financed through local financing or mix of foreign and local financing, we request NEPRA to allow KIBOR + maximum spread up-to 2.75% at the time of adjusted at actual at the COD stage tariff adjustment / Tarifftrue up.*

4.2.3.5 Interest During Construction

The Interest During Construction (the IDC) has been calculated as USD 16,406 per MW based on a 6-month construction period and financing terms outlined in subsequent paragraphs.

The Company will endeavor to keep the DC to its bear minimum therefore actual IDC, shall be subject to change depending on the fluctuations in base rate (i.e. 6-month LIBOR), funding requirement (draw-downs) of the Project during the construction period, changes in Project Cost including changes due to Taxes and Duties, and variations in PKR / USD exchange rate.

BASIS FOR IDC CALCULATIONS	
BASE RATE - LIBOR	2.86%
SPREAD	4.25%
TOTAL INTEREST RATE	7.11%

The spread of 4.25% assumed in the project is line with NEPRA's notification dated 19 June 2018.

*IDC, at this stage, is an estimated figure, which is adjustable at COD, based on actual LIBOR, timing and amount of loans drawdown during the Project construction period after financial close, therefore, it is prayed that NEPRA kindly allow adjustment for the same at the time of tariff true-up at COD.*

#### 4.3 PROJECT COST WITH NEPRA'S PROJECT COST UPFRONT TARIFFS

The Petitioner respectfully submits hereunder a comparison of proposed Project costs with Project cost in NEPRA's previous upfront tariff

Project Cost & Tariff Comparison	As Per 2015 Upfront Tariff (21MV/s20MW) Dec 16 2015	Cost Plus Tariff of Project Company - K1 Solar	Savings due to lower cost
	US\$/MW	US\$/MW	
EPIC Cost	1,114,288	889,060	-20.21%
Non-EPIC Cost			
Project Cost (4419.111/1011)	40,320	35,000	-13.19%
Land Cost	23,810	12,666	-46.80%
Insurance during construction	7,429	3,556	-52.13%
CAPEX (A+B+C)	1,185,846	940,282	-20.71%
Finance Cost			
Financial Charges & Interest During Construction	41,693	31,451	-24.57%
Total Project Cost - US\$/MW	1,227,540	971,732	-20.55%

The above comparison indicates that the Project cost of the Project Company is substantially lower than the Project cost in announced Upfront Tariff Determination — 16 December 2015.

#### 4.4 PROJECT FUNDING STRUCTURE (DEBT & EQUITY)

##### 4.4.1 The Funding Plan

The Project Cost will be funded based on a Debt: Equity ratio of 80:20, thereby resulting in the following capital structure for the Project:



		US\$
DEBT FOREIGN	80%	11,660,783
EQUITY	20%	2,915,196
TOTAL PROJECT COST	100%	14,575,979

#### 4.4.2 Brief on Debt and Equity Financing

The envisaged debt-equity structure of the Project is 80:20 implying a total debt requirement of USD 11,660,783 (based on a project cost of USD 14,575,979 ).

The one hundred percent (100%) debt financing will be funded by foreign financing.

Debt amount will be denominated in USD (repayment in USD, interest payments to be indexed to LIBOR).

Based on the current Project cost estimates, the equity required to be injected by the shareholders amounts to US\$ 2,915,196.

#### 4.4.3 Return on Equity (ROE)

The Tariff Standards prescribed under Rule 17.3(H) of the NEPRA Tariff Rules require that the return on investment should be "commensurate with other investments of comparable risk". Accordingly, the ROE of sixteen percent (16%) (IRR basis) has been assumed in calculation of our tariff as per established precedent for renewable energy projects. As allowed in previous solar tariffs, the Return on Equity During Construction (ROEDC) will be adjusted at COD on the basis of actual equity injections (within the overall equity allowed by NEPRA at COD) during the project construction period of ten months allowed by NEPRA.

I	16%
Development of New Tariff for Solar PV Projects (Notice of Suo Moto Preceding — June 2016)	16%
Upfront Generation Tariff for Solar PV Power Plants - December 16, 2015	17%
Determination of New Tariff for Wind Power Generation Projects - January 27, 2017	16%
Upfront Tariff for Small Hydro Power Generation Projects Upto 25 MW Installed Capacity - April 2, 2015	17%

Determination of upfront tariff for bagasse cogeneration projects - 2013	17%
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Although, we understand that in the most recent solar cost-plus tariffs approved, NEPRA has allowed an IRR to the limit of 15%, however it is important to mention that K1 Solar Power Limited is bearing substantial risks and can end up with substantial unforeseen risks due to self-EPC mode of Project Execution. Accordingly, the ROE of sixteen percent (16%) (IRR basis) has been assumed in calculation of our tariff.

Furthermore, we understand that 15% was allowed to solar projects in the first quarter of 2018 calendar and fiscal year, however it is pertinent to mention the drastic changes in economic conditions since Q I FY/CY18 which have pushed up country risk profile of Pakistan. Standard & Poor's on February 2019 downgraded Pakistan's long-term credit rating to 'B-Negative' from '13', on grounds of weaker economic settings and limited progress in addressing fiscal imbalances following the elections in mid-2018. Hence, an ROE of 16% is being requested because of a significant jump in country risk premium of Pakistan.

#### 4.4.4 Debt Servicing

The capital structure of the Project is envisaged at 80:20 (Debt: Equity).

##### 4.4.4.1 Terms of Debt Financing:

The following terms for financing the debt portion of the Project Cost have been agreed and locked, between the Project Company and the lenders, through execution of the financing term sheets attached at ANNEXURE H:

Total Project Value - USD in million	14,575,979
Total Debt - 80% of total project value - USD in million	11,660,783
Base Rate — LIBOR (15 November 2018)	2.86%
Spread	4.25%
Repayment Period	12 years
Grace Period	12 months
Re-Payment	Semi-annual

Given the Foreign debt is to be arranged, the Project Company may have to incur Sinasure fee/ECA exposure fee/credit insurance fee. Hence, if applicable, we request NEPRA, to allow adjustment of any Sinasure fee/ECA exposure fee/credit insurance fee incurred by the company to a maximum of 7% of debt service amount in accordance with the bench mark established in the coal upfront tariff.

It is also pertinent to mention, in case the project is financed through local financing or mix of foreign and local financing, we request NEPRA to allow KIBOR + maximum spread up-to 2.75% at the time of adjusted at actual at the COD stage tariff adjustment / Tariff true-up.

#### 4.5 OPERATING COSTS

##### 4.5.1 Breakup of Operating Cost

The operations cost of the Project Company comprises of the operations and maintenance cost and the cost of the operational insurances to be taken out by the Project Company. Break-up of the same is provided hereunder and are compared with the cost of two other projects of similar nature:

	Proposed Up-front Solar Tariff by NEPRA (14 June 2016)	K1 Solar Private Limited / Project Company	Gharo Solar Private Limited	Siachen Energy Limited
Project size	1 to 100 MW	15 MWp	50 MWp	100 MWp
O&M Cost (USD/MW)	27,005	16,000	15,180	12,650

In this regard, kindly note that the Project Company has proposed significantly low O&M cost compared to previous upfront tariffs and suo-moto proceedings, because of the use of superior technology and Project execution on Self-EPC/O&M mode and hence avoiding high profit expectations and premiums charged by third party O&M contractors.

The Tariff based on an O&M cost USD 16,000 per MW is a very competitive figure and is approximately 41% lower than the comparable benchmark in the proposed Up-front Solar Tariff advertised by NEPRA. It is important to highlight, while the NEPRA benchmark was for a fixed tilt system, K1 Solar Private Limited is assuming a much-reduced figure for a tracking system which typically has a higher operational cost due to motors and rotating parts.

Compared to Gharo Solar and Siachen Projects, project size of 15 MW of K1 Solar Power Limited is substantially small and hence the Project Company does not benefit from economies of scale available to larger solar plants. For example, if K1 Solar Power is compared to a solar plant of 100 MWp, the operational manpower requirements for both plants will be the same so the larger plant would have a lower O&M cost on per MW basis compared to K1 Solar Power Limited.

Furthermore, it is important to highlight, Bifacial Solar Modules cleaning may be a bit more complex as both the front and back side of the module require regular cleaning and hence have a relatively higher operating cost compared to non-bifacial solar modules.

In view of the foregoing, the O&M costs suggested in the Tariff Petition are clearly well within local benchmarks. It is the humble request of the Project Company that the O&M costs presented below may kindly be allowed by NEPRA in order to ensure smooth, efficient, and effective operation of the Project.

## Insurance During Operation Period

The Insurance Cost consists of the insurances required under the Implementation Agreement and the Energy Purchase Agreement coupled with those customarily required for project financing transactions, including all-risk insurance/reinsurance, business interruption insurance; and machinery break-down, natural calamities, sabotage and terrorism. As these are all impediment to the smooth and efficient running of the day-to-day affairs of the project it is critical that all risks associated with the Project are adequately addressed and all insurance events are catered for in a foolproof manner. Keeping in view the generally adopted global trends and the magnitude of the Project, a comprehensive operational insurance and reinsurance arrangement is also fundamental to ensure bankability of the Project.

At present, COD Insurance Cost of 0.4% of EPC costs has been assumed, in line with NEPRA's notification dated 19 June 2018.

The Project Company, in view of the practices set by the other IPP's in Pakistan and in accordance with the requirements set by the lenders, proposes to procure the following insurance during the operational phase of the Project:

- Property Damage and Comprehensive Machinery Insurance (including Business Interruption insurance);
- Third Party Liability;
- Terrorism insurance;
- Group Personal Accident Insurance; and
- Motor Comprehensive Insurance

*The insurance cost has been assumed at [zero-point four percent (0.40)]% of the EPC Cost including taxes and duties, however any increase therefrom up to one point percent (1 %) of the EPC Cost may kindly be allowed upon submission of evidences. The insurance cost shall be charged by the Project Company at actual (subject to proposed cap) and will be recoverable as the insurance cost component of the Reference Generation Tariff.*

*The insurance cost (for the operations phase) set out in the Tariff Petition does not, however, covers the administrative surcharge, Federal Excise Duty and Federal Insurance Fee, that might be applicable on the insurance cost, the same should be treated as a pass-through item under the tariff determination.*

## 4.6 REFERENCE GENERATION TARIFF & DEBT SCHEDULE

### 4.6.1 Tariff Control Period

As the Project is 80% debt funded with loan tenure of twelve (12) years for repayment, this means that there will be higher debt servicing cost requirements in the first twelve (12) years of the Project. In the last thirteen (13) years of the Project, there will no debt therefore the tariff will decrease significantly.

The proposed tariff is for the life of the Project i.e. term of the EPA, signed with the Purchaser,

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Twenty-five (25) years from COD. The tariff is divided into two bands i.e. year 1 to 12 (serving period) and year 13 to 25 (remaining project term).

### Summary of Reference Generation Tariff

A summarized Reference Generation Tariff table is provided below, subject to indexations, escalations and one-time adjustments further submitted below:

WZA W	ACW
Lo	0.5925
4fag	0.3555
Wifi	0.2107
Ti s.-4 - . -in	1.799
	5.770
110.11 i V4, - 2 .	<b>8.728</b>
- , - 9 : . - 5	2.958
roTX91Tr	<b>7.289</b>

arriFONEST	ent per	, r.,
O&M	0.4938	
ma	0.2963	
	0.1756	
igp	1.500	
0-111SEAVARIVIIMS=	4.808	
- : , _ _ _ " 2120V	7.273	
UAREEFAYM43-2	2.465	
- " A i - 4 LizUMf	6.074	

## 4.7 CLEAN DEVELOPMENT MECHANISM (CDM) & CARBON CREDITS

The GoP approved Policy for Development of Renewable Energy for Power Generation, 2006, in which it specified constitution of Joint Management Committee (JMC) for sale and management of CERs earn through renewable energy projects. The JMC comprise of power purchaser, power producer and AEDB.

In the Reference Generation Tariff claimed by the Project Company, no adjustment for certified emission reductions has been accounted for. However, upon actual realization of carbon credits, the same shall be distributed between the power purchaser and the power producer in accordance with the applicable GoP Policy, amended from time to time and the same is requested to NEPRA for approval.

## 4.8 JUSTIFICATION OF PROPOSED TARIFF

### 4.8.1 Comparison with other Renewables and Thermal Tariffs in Pakistan