



P&G ENERGY PRIVATE LTD, 3RD FLOOR ADEEL PLAZA, FAZAL-E-HAQ ROAD, BLUE AREA, ISLAMABAD

THE REGISTRAR,
National Electric Power Regulatory Authority,
NEPRA Tower, Ataturk Avenue (East),
G-5/1,
Islamabad,
Pakistan.

DATE: 29/08/2019

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Subject: Applicaition for Tariff Petition for 50MW AC ~ 62.2MWp
P&G Energy Pvt Ltd

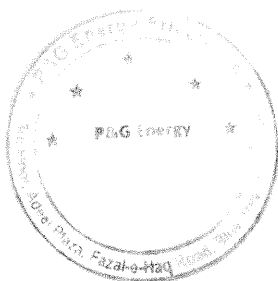
I Adeel Ahmed, Manager Business Development ibvogt GmbH and fully Authorised representative of P&G Energy Pvt Ltd by the virtue of Power of Attorney dated 21/02/2019, hereby submit the Company's Tariff Petition along with the fee as determined by National Electric Power Regulatory Authority (NEPRA) for kind consideration and favorable approval by the Authority in accordance, inter alia, with section 31 of the Regulation of Generation, Transmission and Distribution of Electric Poser Act, 1997 read with Rule 3 of the NEPRA tariff Standards and Procedure Rules, 1998 and other applicable provisions of NEPRA law.

The Tariff Petition (including its Annexures) is submitted in triplicate together with:

- (a) The Bank Draft of 1,051,632.00 PKR /- (One Million Fifty One Thousand Six Hundred Thirty Two Rupees Only) as requisite fee for Tariff Petition.
- (b) Extract Board Resolution of P&G Energy Pvt Ltd
- (c) Affidavit of Mr. Adeel Ahmed

Your Sicerely,


Adeel Ahmed
Authorised Representative
P&G Energy Pvt Ltd



BEFORE
THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (NEPRA)

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

ON BEHALF OF

P&G ENERGY (PRIVATE) LIMITED

FOR NEPRA'S APPROVAL OF REFERENCE GENERATION TARIFF
FOR P&G ENERGY (PRIVATE) LIMITED

FOR A SOLAR PHOTOVOLTAIC POWER PROJECT OF 50 MW (AC) ~ 62.2 MWp (DC)
AT GWADAR, PROVINCE OF BALOCHISTAN, PAKISTAN

DATED: 29/08/2019

P&G ENERGY (PRIVATE) LIMITED

3RD FLOOR, ADEEL PLAZA, FAZAL-E-HAQ ROAD,

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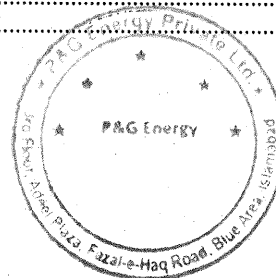


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Annexures

Annexure A – Letter of Intent

Annexure B – Land Approval

Annexure C – Grid Interconnection Study & Approval

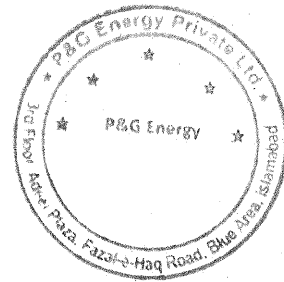
Annexure D – Project Feasibility Study & Approval

Annexure E – EPA Study & Approval

Annexure F – Reference Generation Tariff Table

Annexure G – Debt Repayment Schedule

Ad



1 DETAILS OF THE PETITIONER**NAME AND ADDRESS****P&G Energy (Private) Limited**

3rd Floor, Adeel Plaza, Fazal-e-Haq Road, Blue Area Islamabad, Urban Islamabad Capital

Territory, 44000 Pakistan

Tel: 0512806049

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AUTHORISED REPRESENTATIVES**Mr. Murad Can**

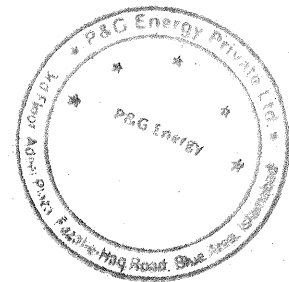
Authorized Representative,

P&G Energy (Private) Limited

Mr Adeel Ahmed

Authorized Representative,

P&G Energy (Private) Limited



2 REGULATORY FRAMEWORK LEADING TO TARIFF PETITION

2.1 NATIONAL ELECTRIC POWER REGULATORY AUTHORITY – COMPETENT AUTHORITY FOR TARIFF DETERMINATION

2.1.1 NEPRA Act, NEPRA Rules:

In terms of the 'Balochistan Power Generation Policy, 2007' (the "Policy"), the Balochistan Power Development Board (the "BPDB"), Government of Balochistan ("GOB") has confirmed its intent for P&G Energy (Private) Limited (the "Project Company") to establish an approximately 50 MW (AC) ~ 62.2 MWp (DC) solar photovoltaic ("PV") power generation project (the Project) in the GWADAR region, in the province of Balochistan, pursuant to a letter of intent dated February 23, 2018 issued by BPDB in favor of the Project Company (the "LOI").

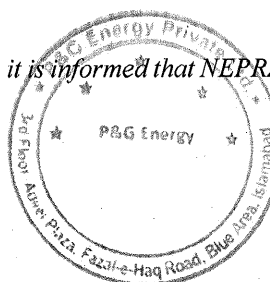
Under the Regulation for Generation, Transmission and Distribution of Electric Power Act (XL of) 1997 (as amended from time to time) (the "NEPRA Act"), the National Electric Power Regulatory Authority ("NEPRA") is responsible, *inter alia*, for determining tariffs and other terms and conditions for the 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 determined tariffs 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 (the "NEPRA Tariff Bidding Regulations"). However, the pre-requisites to the implementation of such competitive bidding regime are not in place, including a GOP policy approved by the competent authorities, pre-qualification and bidding criteria and necessary bidding documents. As such, NEPRA has continued to issue tariff determinations under the NEPRA Tariff Rules to various renewable independent power producers (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 (in Paragraph 14 of the said determination) as follows:

"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'. 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 an unsolicited/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 in this Tariff Petition.

2.2 PROCESS LEADING TO TARIFF PETITION

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

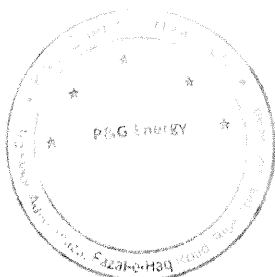
In compliance with the requirements laid out in the Policy and the LOI, the Project Company completed the detailed feasibility in respect of the Project (the "Project Feasibility Study") and submitted the same to the Panel of Experts through BPDB for their review and approval.

Following completion of the detailed review of the Project Feasibility Study by the Panel of Experts and has started approval process in respect of the Project Feasibility Study after the Panel of Experts meeting held on May 31, 2019 communicated by BPDB letter No. dated 29th August 2019 No.PS/Secy:/Energy/2019/197.

2.2.2 Request for Determination of Tariff:

Since the Project Company:

- (a) has been granted the LOI by the BPDB vide letter No. BPDP / Energy (13)/2018/957-66 on February 23, 2018 (attached as ANNEXURE A),
- (b) has land earmarked for the Project by the GOB, the lease document is being executed by the GOB and shall be provided in due course to NEPRA, (Annexure B)
- (c) has received approval in respect of the Grid Interconnection Study for the Project by the Quetta Electric Supply Company (QESCO) vide letters No.



CEO/QESCO/CE(P&E)/15782-87 dated *March 21, 2019* and CEO/QESCO/CE(P&E)/15782-87 dated 12th of June 2019 (attached as ANNEXURE C),

- (d) has completed its technical feasibility study for the Project dated December 25, 2018 and the same has been submitted to Panel of Experts for approval on December 31, 2018, and has started approval process in respect of the Project Feasibility Study after the Panel of Experts meeting held on May 31, 2019 communicated by BPDB letter No. dated 29th August 2019 No.PS/Secy:/Energy/2019/197(attached as ANNEXURE D),
- (e) has obtained the applicable environmental approvals in respect of the Project from the Balochistan Environment Protection Agency *vide* letter No. DG (EPA)/6592/2018-19 dated May 27, 2019 (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 Tariff Rules, read with the provisions of the NEPRA 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 LOI), **P & G Energy (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 July 2021 and as per the interconnection arrangement confirmed in the Grid Interconnection Study approval letter.



3 EXECUTIVE SUMMARY

3.1 PROJECT BRIEF

The Petitioner, P&G Energy (Private) Limited (the “**Project Company**” or “**Petitioner**”), 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 50 MW (AC) – 62.25 MWp solar power generation facility (the “**Facility**”) to be located at Gwadar, Province of Balochistan, Pakistan (the “**Site**”).

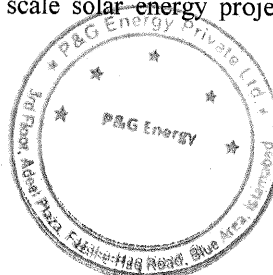
After receiving the LOI, in respect of the proposed 50 MW (AC) solar power project from the BPDB, 202 acres of land were earmarked for the Project by the GoB through the Balochistan Board of Investment and Land Utilization Department. The soil investigation, topography survey and technical feasibility 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 shall enter into an equipment supply contract with ibvogt GmbH for the purposes of implementing the supply of PV Modules and other equipment for the Project on self-EPC mode. A Term Sheet between the Project Company and equipment supplier has been attached as Annexure F.
- (b) The Project Company shall also enter into a construction contract with a local contractor in Pakistan for the purpose of design, construction and commissioning of the Plant on self-EPC mode. The proposed EPC structure for self-EPC mode specifying the division of responsibilities has also been attached as Annexure G.
- (c) Project Feasibility Study in respect of our Site was completed and submitted to BPDB *vide* letter No.2512FS-S dated December 25, 2018.
- (d) Grid Interconnection Study dated December 25, 2018 for our Project was conducted and completed by the M/S, ARCO Energy Pvt Ltd and its approval was conveyed *vide* QESCO letters CEO/QESCO/CE(P&E)/15782-87 dated *March 21, 2019* and CEO/QESCO/CE(P&E)/15782-87 dated June 12, 2019.
- (e) IEE study in respect of our Project was completed and approved by the Balochistan Environmental Protection Agency *vide* letter No. DG (EPA)/6592/2018-19 dated May 27, 2019

3.2 PROJECT EQUIPMENT SUPPLY & CONSTRUCTION APPROACH & O&M ARRANGEMENT

IB VOGT, the major sponsor of the Project Company, has more than fifteen (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 IB VOGT has developed projects in Europe, UK, USA, Australia, Panama, Poland, Spain, India, South East Asia and Africa.

SELF-EPC MODE OF CONSTRUCTION

Given the experience of ibvogt GmbH (the “**Main Sponsor**”) 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 competitive than if the Project had been undertaken a single EPC contract where the EPC contractor would have charged a margin for ‘turnkey’ EPC works resulting in a relatively higher EPC cost and tariff. Given that this project is under self EPC mode, the total Project Cost (as reflected in row 15 of table 2 (hereof) (the “**Project Cost**”) and tariff sought are subsequently lower, resulting in a benefit to the end consumers.

Under the aforementioned approach, the Project Company will engage with the Main Sponsor and hence have access to ibvogt GmbH’s international technical resources and parts distribution networks. The Main Sponsor will use its global network to source equipment for the Project from various vendors at competitive rates. In this regard, the Company has entered into a term sheet with ibvogt GmbH attached herewith as Annexure F, illustrating the allocation of supply of equipment responsibility.

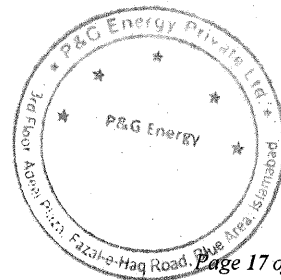
Further, under the agreement, ibvogt GmbH will also assist the Project Company in overall management, coordination and implementation of the Project. This approach would ensure the availability of financing at the least cost from international lenders under the project finance structure.

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 afforested view on the applicability of the EPC Guidelines to projects developing on self-EPC mode.

In the tariff determination for Ghara 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.*”

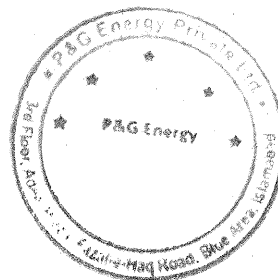
The proposed self-EPC mode structure and the division of works between the Project Company, various local service providers and the equipment supplier is illustrated in the following table:

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EPC DOR for Work Scope	Responsibility		
	Onshore (Local contractor)	Offshore (ibvogt)	Owner SPV
Plant Layout and Basic Engineering details		X	
Engineering & Supply of PV Modules with Inverter, on CFR – Karachi basis		X	
All Inland Logistics	X		
Right of Way, Site acquisition, EIA, Grid Availability			X
Insurance			X
Import permits			X
Civil Infrastructure & Construction (local design input by local contractor and final approved design by IBVOGT)	X	X*	
PV Module Erection & Installation as per ibvogt design	X	X*	
Supply of Mounting structure		X	
Local Design input and Construction from inverter to Substation	X		
Electrical & Instrumentation System Supply, Design from inverter to substation		X*	
Pre-Commissioning & Commissioning Assistance	X	X*	
Substation Commissioning	X	X*	
Performance Warranty as per scope of work (onshore – offshore)	X	X	
O&M	X	X (remote monitoring & reporting for 2 years)	

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		and control)	
Health & Safety	X		X
Quality Control	X		X
Supervision & Management of Project Completion			X

Table 1 showing EPC Onshore – Offshore split

OPERATIONS & MAINTENANCE BY PROJECT COMPANY

Similarly, the Project Company will carry out the Operation & Maintenance (O&M) works itself, drawing upon the extensive know-how and experience of its Main Sponsor ibvogt GmbH. At the moment ibvogt GmbH has an vast solar projects O&M experience of 650 MWs approx.

3.3 PROJECT FUNDING:

The capital structure of the Project is envisaged at 75:25 (Debt: Equity). The Project Company intends to obtain one hundred percent (100%) of the debt from foreign lenders and is in the process of finalizing term sheets for purposes of financing of the Project.

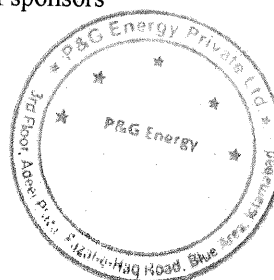
The equity required for the Project is to be funded as follows:

- 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, **IB VOGT GMBH**, of the Project has established two subsidiaries, which are the major shareholders in the Project Company: **IBV GWADAR HOLDCO 1 LIMITED** established in May 11, 2018 under the laws of England and Wales and **IBV GWADAR HOLDCO 2 LIMITED** established in May 11, 2018 under the laws of England and Wales.
- Certain shareholding is also held by **PAKISTAN TESTING SERVICES**.

(**IB VOGT GMBH**, **IBV GWADAR HOLDCO 1 LIMITED** AND **IBV GWADAR HOLDCO 2 LIMITED** together are referred to as the “**Sponsors**”). The Sponsors are committed to fund this Project by investing twenty-five percent (25%) of the Project Cost in the following shareholding ratio:

	Sponsor Group	%
1.	PAKISTAN TESTING SERVICES	20
2.	IBV GWADAR HOLDCO 1 LIMITED	51
3.	IBV GWADAR HOLDCO 2 LIMITED	29

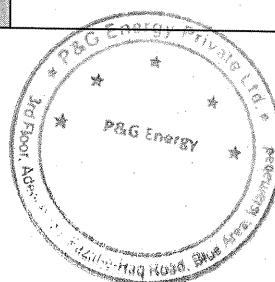
Table 2 showing shareholding of sponsors



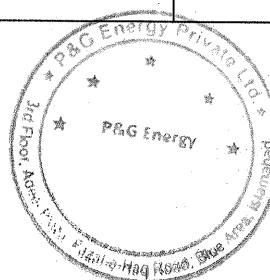
3.4 SALIENT FEATURES OF THE PROJECT

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

PROJECT COMPANY	P&G Energy (Private) Limited	
MAIN SPONSOR	IB Vogt GmbH	
SHAREHOLDERS	(1) IBV Gwadar HoldCo 1 Limited; (2) IBV Gwadar HoldCo 2 Limited; and (3) Pakistan Testing Service.	
PROJECT CAPACITY	62.2 MWp (DC) – 50 MW (AC)	
PROJECT LOCATION	Gwadar, Province of Balochistan, Pakistan	
LAND AREA	202 Acres	
CONCESSION PERIOD	25 years from COD	
PURCHASER	Central Power Purchasing Agency (Guarantee) Limited (CPPA-G)	
ENERGY PRODUCTION	131,587 MWh/year (annual generation of the plant)	
TECHNOLOGY	Bifacial monocrystalline 360W solar panels with single axis trackers and central inverters SG2500HV-MV/SG3000HV-MV	
CAPACITY UTILIZATION FACTOR	24.15%	
DEGRADATION	0.50%	
CONSTRUCTION PERIOD	10 Months	
PROJECT CAPITAL COST	<i>Amount (US\$)</i>	
	EPC Price	50,658,989
	Non-EPC Costs	
	Project Development Costs	2,239,200
	Land	100,000
	Insurance During Construction	253,295
	Financial Charges	1,198,158
	Interest During Construction	1,708,656
	Total Project Cost	56,158,298



FUNDING PLAN	Debt 75%; Equity 25%	
EQUITY	US\$ 14,039,575	
LONG TERM DEBT	US\$ 42,118,724	
TERMS OF LONG-TERM DEBT	Debt Composition	100% Foreign
	Currency	United States Dollars
	Repayment Period	14 years
	Financial Charges	3%
	Grace Period	Up to 12 months for construction
	Repayment basis	Semi-annual
	Interest Rate	Base Rate: 6 Months LIBOR-2.86% Spread: 4.5%
RETURN ON EQUITY	18%	
PROJECT OPERATION COST	Operational & Maintenance <ul style="list-style-type: none"> Foreign USD 7,000 / MW Local USD 11,000 / MW Insurance During Operations – 0.5% of Total EPC Cost – USD 253,295	
TARIFF	PKR/KWh	US Cent/KWh
	YEAR (1-10)	8.04 6.698
	YEAR (15-25)	3.6 2.996
LEVELIZED TARIFF	PKR/Kwh – 7.2 USCents/Kwh – 6.000	
SECURITY DOCUMENTS	<ul style="list-style-type: none"> Energy Purchase Agreement Implementation Agreement Government of Pakistan Guarantee Site Lease Deed 	
APPLICABLE POLICY	The Balochistan Power Generation Policy 2007.	
LEGAL ADVISORS	Haidermota & Co.	
FINANCIAL ADVISORS	EY Ford Rhodes	
TECHNICAL CONSULTANTS	ARCO Energy Consultants	
MILESTONES ACHIEVED BY TITLE	LOI issued by the BPDB on	February 23, 2018
	Land earmarked by GoB	April 23 2018



PROJECT	Documentation for execution of lease agreement is in process	
	* Approval of the Grid Interconnection Study	March 21, 2019
	* Submission of application for generation license	August 29, 2018

Table 3 showing salient features of project

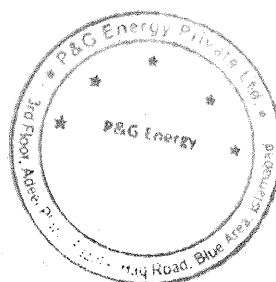
3.5 KEY FEATURES OF THE PROJECT

3.5.1 The Project Site

The Project is located in Gwadar District, Balochistan. The geographical coordinates of our Project are as follows:

S.No.	ENTRY	DETAILS
1	Site Name	Gwadar Solar Farm Site
2	Site Coordinates	P1= Lat 25.3213, Long 62.6368 P2= Lat 25.3239, Long 62.6369 P3= Lat 25.3268, Long 62.6369 P4= Lat 25.3302, Long 62.6369 P5= Lat 25.3302, Long 62.6312 P6= Lat 25.3302, Long 62.6252 P7= Lat 25.3277, Long 62.6245 P8= Lat 25.3277, Long 62.6359 P9= Lat 25.3260, Long 62.6257 P10= Lat 25.3260, Long 62.6286 P11= Lat 25.3266, Long 62.6286 P12= Lat 25.3264, Long 62.6322 P13= Lat 25.3224, Long 62.6318 P14= Lat 25.3199, Long 62.6320

Ad



3	Altitude	33 m (Highest recorded value) 23 m (Lowest recorded value)
4	Proposed AC and DC capacity	50 MW AC ~ 62.2 MW DC
5	Global irradiation levels	2200 KWh / m ² (Solar GIS)

Table 4 (above) showing site coordinates and irradiation levels

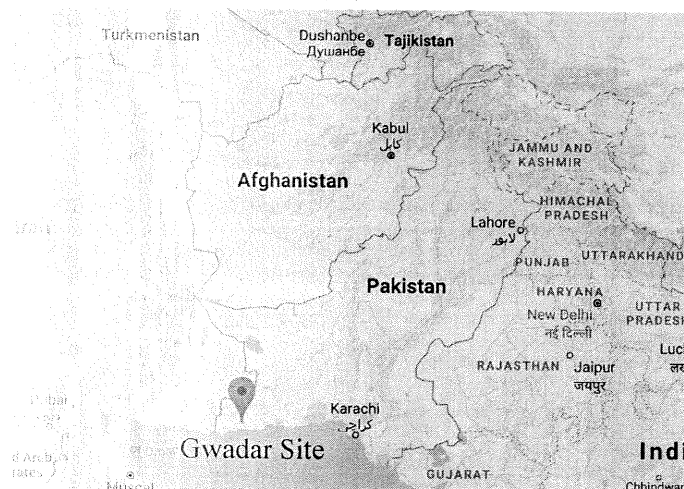


Fig 1 (above) showing the Site location

3.5.2 Selection of Technology

The Project will use bifacial monocrystalline 360W solar panels with single axis trackers and central inverters SG2500HV-MV. The Site will be connected through a 132kV connection with 132KV/11kV Gwadar Industrial Grid. The technology used for the Project went through a process of site specific evaluation during feasibility stage and following are the details:

1. PV Modules

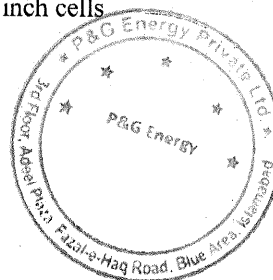
Longi Solar LR6-72BP 360Wp Bifacial monocrystalline modules.

Specification Data

Cell-type PERC monocrystalline, 6 inch cells

Bifaciality $\geq 75\%$

Cell Orientation 72 (6x12)



Dimensions	1977x996x40mm
Weight	26.5 kg
Junction box	IP67, 3 diodes
Output Cable	4mm ² , 300mm in length
Packaging	26pcs per pallet

2. Single Axis Tracker

Aretech Solar single axis tracker.

Specification	Data
Tracking type	Independent horizontal single axis tracker
Tracking range	up 70 120° (±60°)
Driving system	single slewing gear, 24VDC motor
Module / per tracker	Up to 90 modules per tracker
Structural material	Hot dipped galvanized steel

3. Inverters

Max. input voltage	1500 V
Min. PV input voltage / Startup input voltage	800 V / 840 V
MPP voltage range for nominal power	800 – 1300 V
No. of independent MPP inputs	1
No. of DC inputs	18 – 28
Max. PV input current	3508 A
Max. DC short-circuit current	4210 A
PV array configuration	Negative Grounding
AC output power	2750 kVA @ 45 °C / 2500 kVA @ 50 °C
Max. inverter output current	2886 A
AC voltage range	10 – 35 kV
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
THD	< 3 % (at nominal power)
DC current injection	< 0.5 % In
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading – 0.8 lagging
Feed-in phases / Connection phases	3 / 3
Inverter max. efficiency / Inverter CEC efficiency	98.8 % / 98.5 %
Transformer rated power	2500 kVA
Transformer Max. power	2750 kVA
LV / MV Voltage	0.55 kV / 10 – 35 kV

Transformer Vector	Dy11
Transformer cooling type	ONAN (Oil Natural, Air Natural)
Oil type	Mineral oil (PCB free) or degradable oil on request
DC input protection	Load switch + fuse
Inverter output protection	Circuit breaker
AC MV output protection	Load switch + fuse
Overvoltage protection	DC Type II / AC Type II
Grid monitoring / Ground fault monitoring	Yes / Yes
Insulation monitoring	Optional
Overheat protection	Yes
Dimensions (W*H*D)	6058*2896*2438 mm 238.5"*114.0"*96.0"
Weight	15.7 T 34612.6 lb
Degree of protection	NEMA 3R
Auxiliary power supply	220/110Vac, 5 kVA / Optional: 480 Vac, 30 kVA
Operating ambient temperature range	-30 to 60 °C (> 50 °C derating) -22 to 140 °F(> 122 derating)
Allowable relative humidity range (non-condensing)	0 – 95 %
Cooling method	Temperature controlled forced air cooling
Max. operating altitude	1000 m (standard) / > 1000 m (optional) 3280.8 ft(standard) / > 3280.8 (optional)
Display	Touch screen
Communication	Standard: RS485, Ethernet; Optional: optical fiber
Compliance	UL 1741, IEEE 1547, UL1741 SA, NEC Standard
Grid support	Night SVG function (optional), L/HVRT, L/HFRT, active & reactive power control and power ramp rate control

4. DC/AC brand

SG 2500HV-MV will be used having rated DC voltage 1500V, 3508A-current and rated AC voltage 10-35kV, 2886A-current

5. Step-up transformers

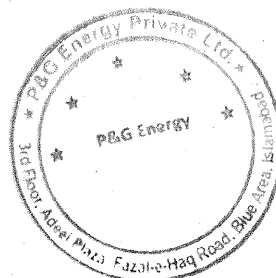
2x55MVA, 33/132kV, % Reactance (X)= 13%.

6. Generation Step-up transformers

20x2.5MVA, 0.4/33kV, % Reactance (X)= 6%.

7. 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.



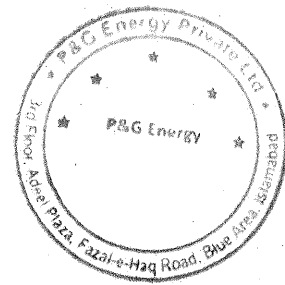
Additional Plant Technical Details

Plant Configuration:

1. Installed Capacity: 50 MW (AC) ~ 62.2 MWp (DC)
2. Capacity at Operating Conditions: 55.81 MWp @ 50° C
3. Auxiliary Consumption approx.: 600 Kva
4. Net output (MSC): 49.4 MW(AC)
5. Life of facility 25 years

The Project will be set up using polycrystalline 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 will be routed to step-up transformer(s)/switchgear(s) for connecting to the system as per the interconnection scheme.

A



4 PROJECT COST, OPERATING COST AND TARIFF

4.1 PROJECT COST SUMMARY

The total Project Cost, expressed in United States Dollars (USD or US\$), 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\$
EPC COST (A)	50,658,989
NON-EPC COST (B)	
PROJECT DEVELOPMENT COST	2,239,200
LAND ACQUISITION	100,000
INSURANCE DURING CONSTRUCTION	253,295
FINANCIAL CHARGES	1,198,158
INTEREST DURING CONSTRUCTION	1,708,656
TOTAL PROJECT COST (A+B)	56,158,298

4.2 DETAILS OF PROJECT COST

4.2.1 Project Completion / Self EPC Cost:

The Proposed Tariff is based on an aggressive EPC cost of USD 786,000 per MW, despite being based on superior technology (compared to precedent projects) i.e. bifacial monocrystalline 360W solar panels with single axis trackers and central inverters Sungrow SG2500HV-MV.

An uplift factor of 3.62% representing levelized cumulative impact of 0.5% annual degradation is applied to bare EPC cost, as per NEPRA precedent, to give an adjusted EPC cost of USD 814,453 per MW.

The assumed EPC cost represents a steep decline of 24% (relative to the last upfront Tariff determination December 16, 2015) and a reduction of ~16% (compared to EPC cost of USD 968,847 per MW proposed benchmark in the draft upfront tariff advertised on June 14, 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 central inverters pertaining to the equipment to be used in this Project.

Please see Table below - Indicative Breakup and Comparison of EPC Cost Benchmark.

COST HEAD	*LAST UPFRONT TARIFF (USD MILLION / MW)	ASSUMED BY P&G (USD MILLION / MW)
Module	0.550	0.34
Inverter	0.090	0.06
Mounting	0.100 (Fixed Tilt)	0.144

		(Tracking)
Monitoring	-	0.025
Civil & Construction	0.10	0.116
Cable & Transformer	0.10	0.085
Transportation/ Security / Staff & Other Costs*	-	0.016
Sub-Total	0.940	0.786
EPC Margin	0.094	-
Base EPC Costs	1.034	0.786
Degradation	0.0374	0.0285
TOTAL EPC COST	1.0714	0.8144

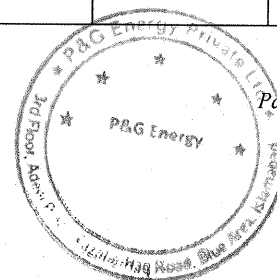
* DETERMINATION OF NATIONAL ELECTRIC POWER REGULATORY AUTHORITY IN THE MATTER OF UPFRONT GENERATION TARIFF FOR SOLAR PV POWER PLANTS DATED DECEMBER 16, 2015

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 central 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 twenty-five (25) years.

As the Project Company intends to install state of the art equipment, bifacial solar panels along with single axis trackers and central 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 24.15% to date in Pakistan (in southern region of Pakistan).

The following table provides a breakdown and comparison of the structure and main components of the subject Project with the last upfront tariff and other Solar IPPs that have recently been granted tariffs in Pakistan:

	As Per 2015 Upfront Tariff (50 to 100MW)	P&G Energy (Project Company)	Siachen Energy Limited	Helios Power / Meridian Energy / HNDS Energy	Zorlu Solar
EPC Contractor	-	Self EPC	Consortium of Power Construction Corporation of China Ltd. and Hydro China International Limited.	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	Central inverters SG2500HV-MV/SG3000HV-MV	Sungrow SG2500U-MV	Sungrow Central SG 3000HV PV inverter	Central Inverter - Siemens of model APS 4000-PV



Capacity Utilization	83% South Region 77% North Region	24.15% (Highest to date)	20.89%	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.

The EPC Cost also includes costs for staff accommodation (construction of the camp buildings), supply of drinking water and electricity (to camp buildings), catering services for the staff, certain project vehicles, standby generator (including fuel), site security during construction period and construction of internal access roads.

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 (Data Sheet attached as Annexure - G) - solar module price is currently at 0.35 USD/W. Source: <https://www.pv-magazine.com/features/investors/module-price-index/> (Data up to Feb 15, 2019)

Inverter: - The new Sungrow SG2500HV-MV inverters that operate at an efficiency of 98.8% are an impressive piece of engineering which appears to be a great option. It promises many benefits to installers in regards to monitoring and efficient remote system trouble shooting and with panel level monitoring software. (Data Sheet attached as Annexure - H)

Function

The SG2500 HV-MV is a grid-tied PV central inverter that converts the DC power generated by PV strings into AC power and feeds the power into the power grid.

Features

High Yield

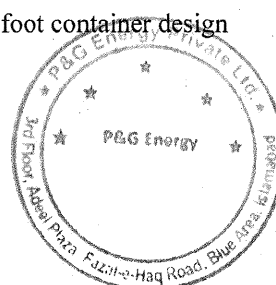
- Advanced three-level technology, max.inverter efficiency 98.8%
- Effective cooling, 1.1 overload capacity, noderating up to 50 °C
- Max. DC/AC ratio more than 1.5

Easy O&M

- Integrated current, voltage and MV parameters monitoring function for online analysis and fast trouble shooting
- Modular design, easy for maintenance
- Convenient external LCD

Saved Investment

- Low transportation and installation cost due to 20-foot container design



- DC 1500 V system, low system cost
 - Integrated MV transformer and LV auxiliary power supply
- Grid Support
- Comply with UL1741, UL1741 SA, IEEE1547, Rule 21 and NEC code
 - Grid support including L/HVRT, L/HFRT, soft start/stop, specified power factor control and reactive power support

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 this 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.

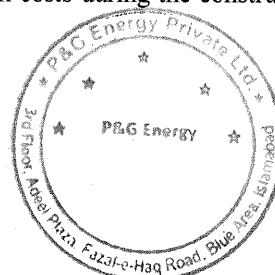
Mounting: - The mounting system costs assumed by the Project Company is for a single axis tracking, which is typically 0.08 – 0.12 USD million / MW higher than fixed systems. However, the Project Company is assuming an increase of only 0.024 USD million / MW in this category compared to the NEPRA benchmark 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 be 4.3m at max, which will increase the mounting structure cost. (Data Sheet attached as Annexure - I)

Cable and Transformer: - The grid price for the Project has been estimated to be fifteen (15%) lower than the NEPRA benchmark provided in the 2015 upfront tariff.

Civil & General works: - The Project has hard rock underneath and requires some attention to the foundations and mounting structure materials, due to salinity in the area. After review of the Geo Tech report attached as Annexure J and to tackle both challenges, engineers have recommended for the Pile foundations almost 2m deep and Hot Dipped Galvanised steel for corrosion protection.

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 0.116 USD/MW p has been considered for civil & general works of the Project.

Transportation & Security cost: - USD million/MW 0.016 is assumed for the security & transportation cost because the Project is located in Gwadar, Balochistan which is almost 574 km away from Port Qasim. Furthermore, due to sensitivity of the area, security will be required to transport the equipment safely on to the Site. It's pertinent to mention that staff accommodation (construction of the camp buildings), site security during construction period have been added to Project Cost and hence, have been considered in the Tariff computation given 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:

The amount of customs duty to be paid by renewable energy projects is to be calculated based on section 12 (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 Commercial Operations Date (COD), for actual customs 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;

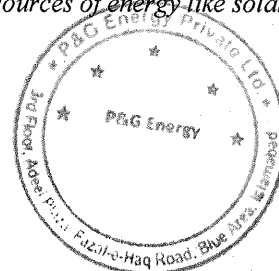
"1. Machinery, equipment and spares meant for initial installation, balancing, modernization, replacement or expansion of projects for power generation through nuclear and renewable energy sources like solar, wind, micro-hydel bio-energy, ocean, waste-to-energy and hydrogen cell etc."

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) (the "**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"

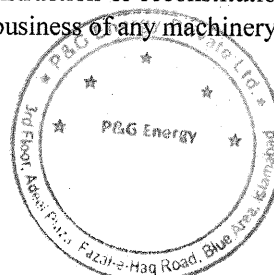
Division III of Part III of the First Schedule prescribes the applicable tax rate on such contracts as seven percent (7%)

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 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:

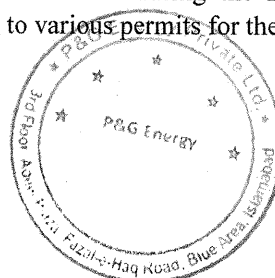
The Non-EPC Cost includes those costs relating to the development and construction of the Project that are not part of the scope of work under various equipment, procurement or construction contracts entered into by the Project Company. A broad breakdown of some of such costs is provided below:

COST	US\$
Project development cost (\$36,000 per MW)	2,239,200
Land Acquisition	100,000
Insurance during Construction	253,295
Financial charges	1,198,158
Interest during Construction	1,708,656
TOTAL NON-EPC & PROJECT DEVELOPMENT COST	5,499,309

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 BPDB; 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.

COST HEAD	LAST UPFRONT TARIFF - (USD MILLION / MW) (50 to 100 MW)	ASSUMED BY P&G SOLAR - PROJECT COMPANY (USD MILLION / MW)	TARIFF DETERMINATION - GHARO - JAN 2018
Project Development	36,658	36,000	30,000

Project development costs of USD 36,000 per MW are 2% lower compared to Project development costs of USD 36,658 per MW in the latest upfront Tariff determination – 16 December 2015.

In comparison to Gharo 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 & supply and for progress / monitoring meetings in Pakistan. 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:

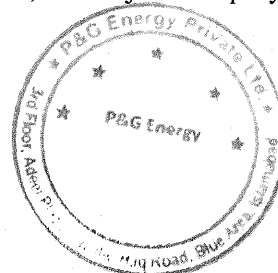
The Project Company will engage an experienced in-house Owner's Engineer to ensure the compliance under the relevant contracts, as well as reporting on progress and budgets. The construction supervision team will comprise site engineers supported by technical experts. The Owner's Engineer will also conduct 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 energy purchase agreement (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 FPOB 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 upfront payment of the site lease for 30 years, payable in advance as per GoB rules, 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 January 2018 and will continue during development and construction period of the Project.

4.2.4 Land Costs

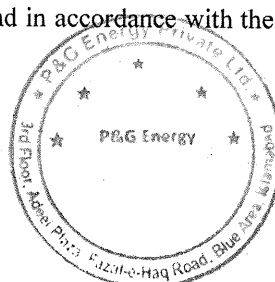
The land will be leased from Government of Balochistan Revenue Department for thirty (30) years. Government of Balochistan has already earmarked the land for the Gwadar solar project and its allocation / offer letter is in finalization process.

4.2.5 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 COD of the Project. The Project company has noticed that in cases of recent solar tariff determinations, insurance during operation has been allowed at 0.5% of the approved EPC cost. Hence, the Project Company requests the Authority to allow the Pre-COD insurance of 0.5% which works out to be USD 253,295 (0.5% multiplied by EPC Cost USD 50,658,989).

However, in the event the Project Company cannot arrange the insurance at 0.5% p.a. due to any reasons beyond its control, NEPRA is requested to allow the actual Pre-COD Insurance Cost at actual up to 1% of the EPC cost.

The Project Company, based on past experience and in accordance with the requirements set



out by the lenders funding such projects, 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.

The Project Company requests NEPRA to allow pre-COD insurance cost at 0.5% of EPC cost including taxes and duties. However, in case of any deviation, NEPRA is kindly requested to allow the actual Pre-COD Insurance Cost in line with earlier tariff determinations by NEPRA for other IPPs.

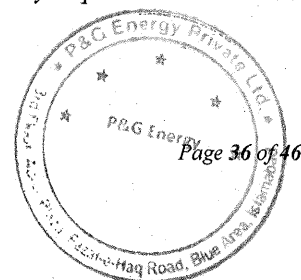
4.2.6 Financial Charges for arranging one hundred percent (100%) foreign financing

Financial Charges include the costs related to the arrangement of one hundred percent (100%) foreign currency debt financing of the Project and are budgeted at 3% of debt figure considering 75% of the Total Project Cost and amount to USD 19,263 per MW. The financial charges of 3% is lower than the NEPRA benchmark of 3.5% in the latest upfront solar tariff and is an aggressive target considering planned financing on foreign debt. Foreign lenders routinely require higher arrangement fee and due diligence costs for foreign legal and technical advisors.

Financing costs include, *inter alia*, 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 are in line with the prevailing market conditions and practices applicable for project financing transactions and as allowed by NEPRA in its other tariff determinations.

It is also pertinent to mention, in case the project is financed through local financing or mix of foreign and local financing. Actual financial charges incurred by the Project Company will reflect prevailing market conditions and practices applicable for project financing transactions and hence may exceed 3% 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 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.

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.

4.2.7 Interest During Construction

The Interest During Construction (the "IDC") has been calculated as USD 27,470 per MW USD based on a 10-month construction period and financing terms outlined in subsequent paragraphs.

The Company will endeavor to keep the IDC 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.

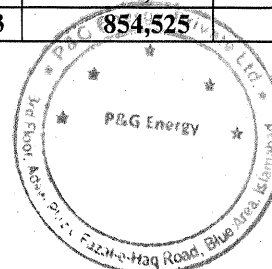
BASIS FOR IDC CALCULATIONS	
BASE RATE - LIBOR	2.86%
SPREAD	4.5%
TOTAL INTEREST RATE	7.36%

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 & TARIFF COMPARISON WITH NEPRA'S UPFRONT TARIFFS

The Petitioner respectfully submits hereunder a comparison of proposed levelized tariff and Project costs with NEPRA's previous upfront tariffs and comparable cost-plus tariffs of similar size and technology:

Project Cost & Tariff Comparison	As Per 2015 Upfront Tariff (50 to 100 MW)	Cost Plus Tariff of Project Company	Saving due to lower cost
	USD/MW	USD/MW	US\$
EPC Cost	1,071,431	814,453	24%
Non-EPC Cost (B)			
Project Development Cost	36,658	36,000	2%
Land Cost	23,810	1,608	93%
Insurance During Construction	10,714	4,072	62%
CAPEX (A+B)	1,142,613	854,525	25%



Finance Cost:			
Financial Charges & Interest During Construction	51,327	46,733	9%
Total Project Cost	1,193,940	902,867	24%
Levelized Tariff - US¢/kWh	10.7251 (South Region)	6.000	44%

As explained in point 4.2, the above comparison indicates that the Project Cost and the Project Company's proposed levelized tariff is substantially lower than the previously announced Upfront Tariffs.

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 75:25, thereby resulting in the following capital structure for the Project:

		US\$
DEBT (FOREIGN)	75%	42,118,724
EQUITY	25%	14,039,575
TOTAL PROJECT COST	100%	56,158,298

4.4.2 Brief on Debt and Equity Financing

The envisaged debt-equity structure of the Project is 75:25 implying a total debt requirement of USD 42,118,724 (based on a Project cost of USD 56,158,298).

Debt financing will comprise of one hundred percent (100%) foreign debt financing.

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

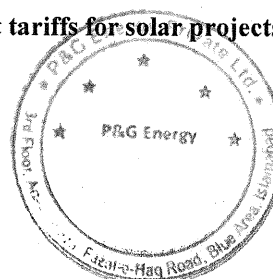
Based on the current Project cost estimates, the equity required to be injected by the shareholders amounts to US\$ 14,039,575/-.

4.4.3 Return on Equity (ROE)

The Tariff Standards prescribed under Rule 17.3(ii) of the NEPRA Tariff Rules require that the return on investment should be "commensurate with other investments of comparable risk".

Accordingly, the ROE of eighteen percent (18%) (IRR basis) has been assumed in calculation of our tariff. 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.

The IRR specified by NEPRA in various precedent tariffs for solar projects is provided in



the table below:

Tariffs	Return on Equity on IRR basis
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%

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 P&G Energy (Private) 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 eighteen percent (18%) (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 Q1FY/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 'B', on grounds of weaker economic settings and limited progress in addressing fiscal imbalances following the elections in mid-2018. Hence, an ROE of 18% is being requested because of a significant jump in country risk premium of Pakistan.

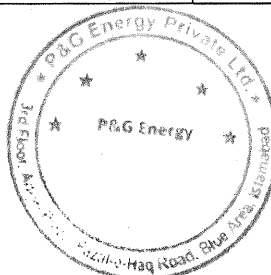
4.4.4 Debt Servicing

The capital structure of the Project is envisaged at 75:25 (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:

Cost Head	Terms
Total Project Value - USD in million	56,158,298



Total Debt -75% of total project value - USD in million	42,118,724
Base Rate - LIBOR	2.86 %
Spread (months)	4.5% (6 months)
Repayment Period	14 years
Grace Period	Up to 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, for local financing (with a loan tenor of up to 12 years) 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

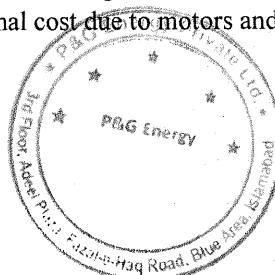
4.5.1 Breakup of Operating Cost

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 proposed upfront tariff by NEPRA:

	Proposed Up-front Solar Tariff by NEPRA (14 June 2016)	P&G Energy (Private) Limited/ Project Company
Project size	1 to 100 MW	62.2 MWp
O&M Cost (USD/MW)	27,005	18,000

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 18,000 per MW is a very competitive figure and is approximately 33% 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, P&G Energy (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.



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 requires regular cleaning and hence have a relatively higher operating cost compared to regular 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.

4.5.2 Insurance During Operation Period

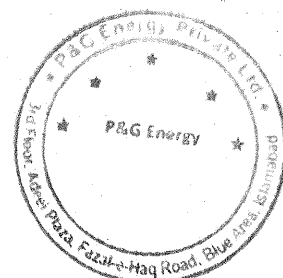
The Insurance Cost consists of the insurances required under the Implementation Agreement and the Energy Purchase Agreement coupled with those customarily required for project financing transactions, including all-risk insurance/reinsurance, business interruption insurance, and machinery break-down, natural calamities, sabotage and terrorism. As these risks are an 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 insurable 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.

During the operations phase, the Project Company intends to acquire insurance from one of the leading insurance companies in the country. As it is standard practice for local insurers to only retain five percent (5%) of the risk and acquire reinsurance for the remaining ninety five percent (95%) through foreign re-insurer, it is prayed to NEPRA that the insurance costs for the operations phase be allowed in US Dollars (as has been done in case of all other power projects). The requirement to have the operational phase insurance cost denominated in US Dollars is further supported by the fact that the lenders financing the Project will inevitably require the Project to be insured on replacement cost basis; since a major part of the total Project Cost is already denominated in US Dollars, the replacement cost basis insurance would also need to be taken out in US Dollars. It is pertinent to highlight, that any replacement costs incurred as a consequence of the occurrence of an insurable event will also be incurred in US Dollars.

A Post-CC Insurance Cost of 0.5% of EPC costs has been assumed.

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 estimated at zero-point five percent (0.50)% of the EPC Cost

including taxes and duties based on the strength of the sponsors relations with the insurers from market, however an increase therefrom up to one 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, cover 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 seventy-five percent (75%) debt funded with loan tenure of fourteen (14) years for repayment (excluding ten (10) months grace period), this means that there will be higher debt service cost requirements in the first fourteen (14) years of the Project. In the last eleven (11) years of the Project, are debt free 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, which is twenty-five (25) years from COD. The tariff is divided into two bands i.e. year 1 to 14 years (grace period and debt serving period) and year 15 to 25 (remaining project term).

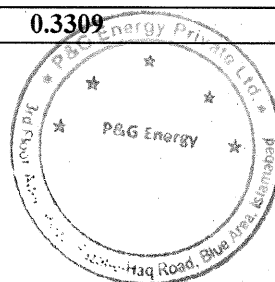
It is pertinent to mention that the above loan tenor period is tentative, the debt tenor may be subject to change based on the Term Sheet finalized with the lenders and hence the Authority is requested to allow adjustments to the Tariff, if any, at the time of COD.

4.6.2 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:

COMPONENT		Tariff (PKR /Kwh)
O&M	LOCAL	0.6240
	FOREIGN	0.3971
INSURANCE		0.2310
ROE		2.3433
DEBT SERVING		4.4417
TARIFF YEAR 1-14		8.04
TARIFF YEAR 15-25		3.6
TOTAL UNWEIGHTED		7.2

COMPONENT		Tariff (US Cents per Kwh)
O&M	LOCAL	0.5200
	FOREIGN	0.3309



INSURANCE	0.1925
ROE	1.9528
DEBT SERVICING	3.7014
TARIFF YEAR I-14	6.698
TARIFF YEAR 11-25	2.996
TOTAL LEVELIZED	6.0

4.7 CLEAN DEVELOPMENT MECHANISM (CDM) & CARBON CREDITS

The Government of Pakistan has 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.

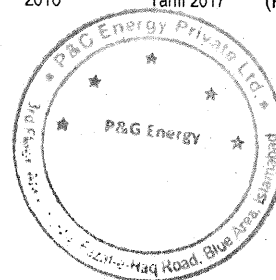
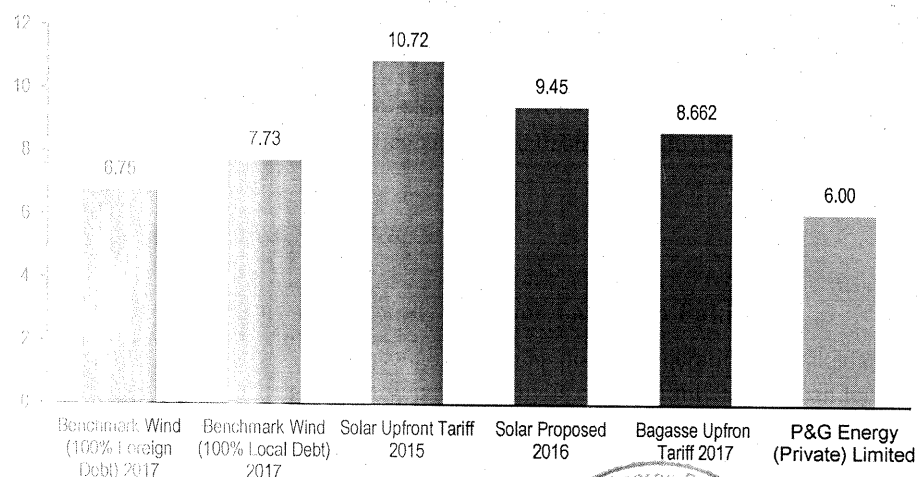
In the Reference Generation Tariff claimed by the Project Company, no adjustment for certified emission reductions has been accounted for. However, upon actual realization of carbon credits, the same shall be distributed between the power purchaser and the power producer in accordance with the applicable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

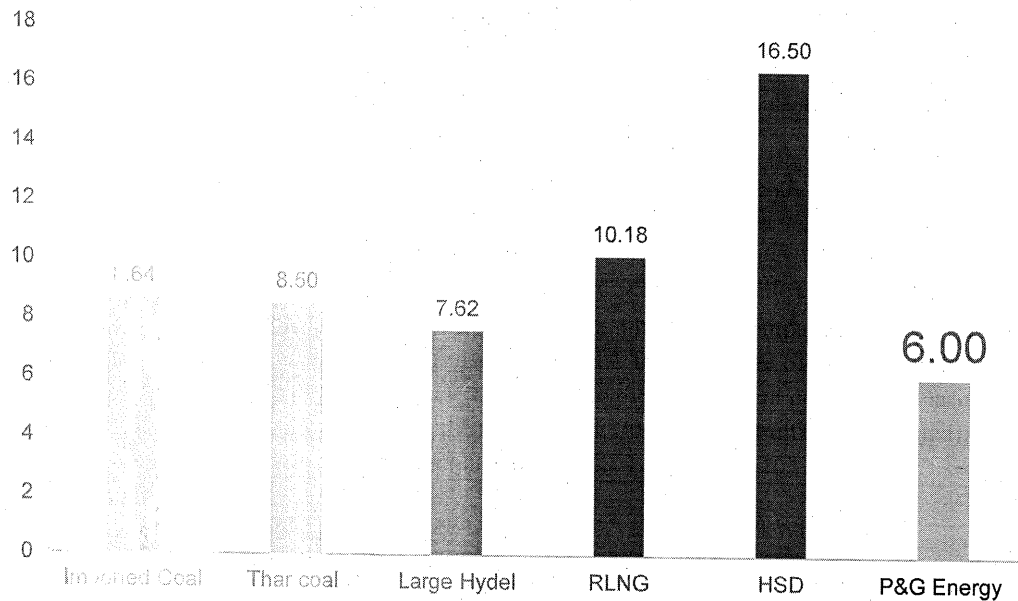
The Proposed Tariff represents a breakthrough for Solar power generation in Pakistan. The below chart shows that the Tariff of the Project Company is considerably lower than levelized tariff for various power projects in different technologies.

Comparison of P&G Energy Levelized Tariffs (Levelized US\$/kWh) with other recently determined or proposed tariffs for Renewable energy projects in Pakistan.



The proposed levelized tariff of US Cents 6.00 / KWh is ~44% lower compared to the levelized figure of US Cents 10.72 / KWh determined by NEPRA for plant size of 50-100 MW in its last upfront tariff dated December 16, 2015. Compared to the more recent new upfront tariff of US Cents 9.45 / KWh advertised by NEPRA on June 14, 2016 (but not ultimately issued), the proposed Tariff still represents a steep decline of ~37%.

P&G Energy Tariff Compared to Conventional Plants (Levelized USC/kWh)



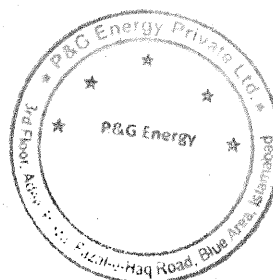
4.9 INDEXATIONS, ESCALATIONS AND COST ADJUSTMENT

4.9.1 Indexations

NEPRA is requested to allow indexation for the various Reference Generation Tariff components in the following manner:

TARIFF COMPONENTS	INDEXATION
Fixed O&M	
Local	[CPI]
Foreign	[PKR/US\$ & US CPI]
Insurance	Actual with maximum of 1% EPC costs.
Debt Service	[PKR/US\$ & LIBOR]
Return on equity	[PKR/US\$]

4.9.2 One Time Adjustments



The following onetime adjustments are requested to the reference tariff:

- (i) Charges for the letter of credit to be opened in favor of the supply contractor or vendors, may be adjusted at COD on actual basis.
- (ii) Duties and/or taxes, not being of refundable nature, imposed on the company up-to the commencement of its commercial operations for the import of its plant, machinery and equipment will be subject to adjustment at actual on COD.
- (iii) The interest during construction may be adjusted at COD on the basis of actual debt draw downs and actual PKR/US\$ exchange rate variation for foreign loan denominated in US\$ and interest calculated on the actual 6 months LIBOR per annum.
- (iv) The return on equity during construction may be adjusted at COD on the basis of actual equity injections during the Project construction period.
- (v) The return on equity (including return on equity during construction) will be adjusted at COD on the basis of PKR/US\$ exchange rate variation.
- (vi) All project costs i.e. costs incurred prior to commercial operations date are allowed in US\$. At COD, all project costs paid in PKR shall be converted using the reference PKR/dollar rate to ensure that the cost incurred do not exceed the cost allowed by NEPRA.
- (vii) The reference tariff table may please be revised at COD while taking into account the above adjustments.

4.9.3 Pass-Through Items

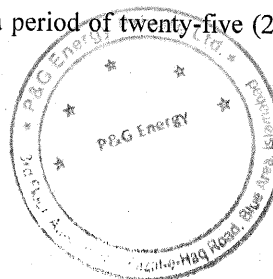
The following pass-through items are requested to the reference tariff:

No provision for income tax, WPPF and WWF have been accounted for in the tariff. If any tax or charges is imposed on the petitioner, the exact amount paid by the petitioner shall be reimbursed by the power purchaser to the petitioner on production of original receipts.

4.9.4 General Assumptions

The following have been assumed while calculating the Reference Generation Tariff and changes in any of these assumptions will result in changes in the Reference Generation Tariff:

- (i) The reference tariff has been calculated on the basis of net annual benchmark energy generation of 131,587MWh/year at annual net plant capacity factor of twenty-four-point one five percent (24.15%) on installed capacity of 62.2 MWp (DC)/ 50 MW (AC).
- (ii) The reference PKR/dollar rate has been assumed at 120.
- (iii) The six months LIBOR is assumed to be 2.86 % p.a.
- (iv) The reference tariff is applicable for a period of twenty-five (25) years commencing from COD.



4.9.5 Submission

In summation, the Project Company herewith most respectfully submits before NEPRA, for its approval on the matters set out in this Tariff Petition and further prays to NEPRA to kindly approve the Reference Tariff Table (attached herewith as Annexure K) together with its assumptions and conditions.

Furthermore, given the advance stage of the Project, NEPRA is kindly requested to process the Tariff Petition at the earliest thereby enabling the Project Company to proceed further with the development process.

