National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
Ph: +92-51-9206500, Fax: +92-51-2600026
Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/TRF-400/ZSPL-2017/1169-1171
January 25, 2018

Subject: **Determination of National Electric Power Regulatory Authority in the matter of Tariff Petition filed by M/s. Zorlu Solar Pakistan (Pvt.) Limited for Determination of Reference Generation Tariff in respect of 100 MWp Solar Power Project** (Case No. NEPRA/TRF-400/ZSPL-2017)

Dear Sir,

Please find enclosed herewith the subject Determination of the Authority along with Annex-I & II (29 pages) in Case No. NEPRA/TRF-400/ZSPL-2017.

2. The Determination is being intimated to the Federal Government for the purpose of notification in the official gazette pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

3. Order of the Authority along with Annex-I & II of the Determination needs to be notified in the official Gazette.

Enclosure: As above

25.01.18

(Syed Safeer Hussain)

Secretary
Ministry of Energy
'A' Block, Pak Secretariat
Islamabad

CC:

1. Secretary, Cabinet Division, Cabinet Secretariat, Islamabad.
2. Secretary, Ministry of Finance, 'Q' Block, Pak Secretariat, Islamabad.

DETERMINATION OF NATIONAL ELECTRIC POWER REGULATORY AUTHORITY IN THE MATTER OF TARIFF PETITION FILED BY M/S ZORLU SOLAR PAKISTAN (PVT.) LIMITED FOR DETERMINATION OF REFERENCE GENERATION TARIFF IN RESPECT OF 100 MWp SOLAR POWER PROJECT

1. M/s Zorlu Solar Pakistan (Pvt.) Ltd. (hereinafter referred to as the "ZSPL" or "the petitioner/company") filed a tariff petition before National Electric Power Regulatory Authority ("NEPRA/the Authority") on May 16, 2017 for determination of reference generation tariff in respect of its 100 MWp solar power project to be set up at Quaid-e-Azam Solar Power Park (Extension), Lal Sohanra, District Bahawalpur, Punjab under NEPRA (Tariff Standards and Procedure) Rules, 1998 ("Tariff Rules").

SUBMISSION OF THE PETITIONER

2. The petitioner submitted that it is a company incorporated under the laws of Pakistan and Punjab Power Development Board (PPDB) has issued a Letter of Intent ("LoI") to it for establishment of 100 MW solar power project.

3. Summary of the key information provided in the tariff petition is as follows:

Project company	:	Zorlu Solar Pakistan (Pvt.) Ltd.
Sponsor	:	Zorlu Enerji Elektrik Uretim A.S,
Capacity	:	100 MWp
Project location	:	Quaid-e-Azam Solar Power Park (Extension), Lal Sohanra, District Bahawalpur, Punjab
Land area	:	500 Acres
Concession period	:	25 years from COD
Purchaser	:	Central Power Purchasing Agency (Guarantee) Ltd.
PV modules	:	First Solar's cadmium-telluride (CdTe) thin film solar modules
Inverter	:	Sungrow SG 2500HV PV inverter
Annual Energy production	:	179.6 GWh
EPC contractor	:	Consortium of Zorlu Enerji Elektrik Uretim A.S (offshore) and Zorlu Industrial Pakistan (Pvt.) Ltd (Onshore)
O&M contractor	:	Zorlu O&M Pakistan (Pvt.) Ltd.
Project basis	:	BOO

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Project cost		**USD in millions**	
EPC cost	:	96.800	
Non-EPC & Project Development Cost	:	1.500	
Pre-COD Insurance cost	:	0.581	
Financial Charges	:	2.225	
Interest during construction	:	1.130	
Total project cost	:	**102.235**	
Financing structure	:	Debt: 75% Equity: 25%	
Debt composition	:	100% Foreign loan	
Interest rate	:	3 month LIBOR + 4.6%	
Debt repayment term	:	14 years	
Grace period	:	Upto 12 months	
Repayment basis	:	Quarterly	
Return on equity & ROEDC	:	11.93% IRR based	
Operations cost:		**USD in millions**	
Fixed O & M (foreign)	:	1.000	
Fixed O & M (local)	:	0.200	
Insurance cost	:	0.242	
Total annual operational cost	:	**1.442**	
Tariff:		**PKR/kWh**	**US Cents/kWh**
Year (1-14)	:	7.1532	6.8125
Year (15-25)	:	2.6256	2.5005
Levelized Tariff	:	**6.3000**	**6.0000**
Exchange rate	:	1 USD = 105 PKR	

PROCEEDINGS

4. In accordance with Rule 4 of Tariff Rules, the tariff petition was admitted by the Authority on June 22, 2017. Notice of Admission was published in the daily national newspapers on July 8, 2017 providing salient features of the petition and inviting comments/intervention request from

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the interested parties. In response to the Notice of Admission, comments were received from the following four parties:

i) Alternative Energy Development Board
ii) Oursun Pakistan Limited
iii) Mr. Adeel Ahmed
iv) Mr. Muhammad Junaid Arshad

5. AEDB submitted that the petitioner has claimed higher plant capacity factor, higher spread on debt and higher degradation factor. AEDB supported for debt repayment period claimed by the petitioner and requested that impact of degradation may be capitalized. Oursun objected the claimed higher capacity factor and submitted that ZSPL is claiming huge amount on account of foreign O&M for a maintenance free plant. Mr. Adeel Ahmed submitted that the petitioner has claimed higher EPC cost and project cost and should be reviewed by the Authority. Mr. Muhammad Junaid Arshad submitted that the claimed EPC cost seems not taken into account of decrease in material prices. The comments of these parties are discussed in detail in the relevant issues discussed below.

6. Notice of Hearing was published in daily national newspapers on August 13, 2017 conveying schedule of hearing and issues framed for the hearing. Individual Notices of hearing were also served to the relevant stakeholders vide letters dated August 18, 2017 and August 30, 2017 for participation in the hearing.

7. Post advertisement of Notice of Hearing, Anwar Kamal Law Associates (AKLA) vide letter No. R/NEPRA/622/17 dated August 24, 2017 submitted an intervention request in the instant case which was approved by the Authority and communicated to AKLA vide letter No. NEPRA/R/TRF-400/15412-13 dated September 13, 2017. AKLA in the intervention requested submitted that although petitioner's proposed tariff is 1/3rd of the tariff of solar power plants supply electricity to CPPA-G, even with Rs.6/kWh may not be financially and economically feasible due its nature of non-base-load power plant with capacity utilization factor of only 19-20%. Further, AKLA submitted that cost of evacuation of power from solar power plant to end-consumer is quite high i.e. around 4-5 times higher than conventional base-load power plant. In addition, AKLA highlighted issues of underutilization of existing "take or pay" power plants, induction of "must-run" RE power plants, non-affordability of RE power tariff, lower tariff of US Cents 3/kWh offering in India and UAE compared to tariff proposed by ZSPL, etc. At the end, AKLA opined that off-grid, roof-top solar power plants and net metering is the best possible solution to promote solar power in the country. On-grid solar system will adversely affect the power system

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of Pakistan. In response to AKLA submission, ZSPL in its response submitted that most of comments of AKLA are regarding the general nature of electricity tariff in the power sector awarded by the Authority. The petitioner submitted that AKLA's comments, though well intentioned, reveal a fundamental lack of understanding of the dynamics of a viable power policy. Most of their comments are directed towards "Take or Pay" feature that AKLA contemplates being changed to "Take and Pay". ZSPL submitted that this monumental change would be disastrous for the independent power industry in Pakistan, which has otherwise seen tremendous growth. Regarding financially and economically non-viability of the solar power plant, the petitioner in its response submitted that mainstreaming of RE and greater use of indigenous resources can help diversify Pakistan's energy mix and reduce the Country's dependence on any single source, particularly imported fossil fuels, thereby mitigating against supply disruptions and price fluctuation risk relating to fuel stocking. Regarding AKLA's adverse effect of on-grid solar system issue, the petitioner referring GOPA study conducted by NTDC submitted that GOPA study showed available capacity for induction of RE i.e. solar energy into the grid. Regarding high tariff compared to India & UAE, the petitioner submitted that the intervener fails to explain the factors that contribute to the low tariff such as a reduced financing rate, longer debt terms, and additional concessions by the respective governments of the countries used as a benchmark. The Authority has noted that that most of the issues raised by AKLA in the intervention request have already been considered by the Authority at the time of granting generation license to ZSPL. However, the submissions of AKLA with respect to the tariff parameters are discussed below in the relevant sections.

8. Based upon the submissions of the petitioner as well as the commentators and intervener, following issues were framed to be considered during the course of hearing: -

ISSUES FOR HEARING

9. Following are the issues which were framed by the Authority for the hearing:

- Whether any bidding process was carried out for the selection of project company?
- Whether the petitioner holds a valid letter of intent (LOI)?
- Whether the consent for power evacuation from NTDCL and consent for power purchase from CPPA-G have been obtained?
- Whether the claimed EPC cost is competitive, comparative and based on the firm and final agreement(s)?

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- Whether the claimed Non-EPC cost is justified?
- Whether the claimed O&M cost is justified?
- Whether the claimed insurance during operation cost is justified?
- Whether the claimed return on equity of 11.93% is justified?
- Whether the claimed financing/debt terms are justified?
- Whether the claimed annual energy production and net plant capacity factor are justified?
- Whether calculation/study of ground irradiance data was carried out or otherwise?
- Whether the claimed degradation factor of 0.7% per annum is reasonable and justified?
- Whether the claimed construction period is justified?
- Whether the claimed tariff indexation/adjustment mechanism at COD and during operations is justified?
- Whether the claimed tariff control period of twenty five (25) years is justified?

10. The hearing in the matter was held on September 7, 2017 (Thursday) at 11:00 A.M. at NEPRA Tower, G-5/1, Islamabad which was attended by a large number of participants including the petitioner, representatives of Alternative Energy Development Board ("AEDB"), PPDB, National Transmission & Despatch Co. Ltd. ("NTDCL"), Private Power & Infrastructure Board ("PPIB"), Asian Development Bank ("ADB"), World Bank and others.

11. Arguments heard, and record perused. Based upon the related submission of respective parties and examination of record, issue wise findings of the Authority is as under: -

Whether any bidding process was carried out for the selection of project company?

12. PPDB vide its letter No. PPDB/RE/MRE/1208/2017 dated August 28, 2017 submitted that for promotion of solar power sector and attracting investment in the Province, Government of Punjab (GoPb) established Quaid-e-Azam Solar Park (QASP) at Lal Sohanra, Bahawalpur. At QASP, solar projects of 400 MW are already in commercial operations phase. PPDB further submitted that GoPb has decided that remaining 600 MW at QASP shall be offered for early placement to most affordable projects.

13. PPDB submitted that ZSPL was selected after competitive bidding process carried out by the Energy Department, GoPb. On a query of the Authority, the representative of PPDB during the hearing submitted that bidding was carried out for allotment of land. The tariff offers of US

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Cents 6/kWh or less was the criteria set by PPDB for the award of project. ZSPL offered tariff of US Cents 6/kWh was declared as winner among three companies. It was also clarified by PPDB that bidding was conducted while clearly stating the condition that approval of tariff shall be obtained from NEPRA.

14. The Authority has considered the aforesaid submissions of PPDB; particularly the clarification that tariff of ZSPL has to be approved by NEPRA. In view thereof, the Authority has decided not to consider the tariff bid by ZSPL as final. Accordingly, the Authority has made due deliberation for required rationalizations for the different cost parameters as claimed by ZSPL in its tariff petition which are explained in the relevant sections of this determination.

Whether the petitioner holds a valid letter of intent (LOI)?

15. The petitioner submitted that PPDB under the Punjab Power Generation Policy 2006-Revised 2009 ("Policy") issued LOI for development of 100 MW solar power project on January 17, 2017. A copy of LOI No. PPDB/114/2017 dated January 17, 2017 was also provided with the petition having validity period of three (03) months from the date of its issuance.

16. During the hearing, the petitioner submitted that the only milestone required to be met by the company under the LOI was to complete the feasibility study. After the issuance of LOI, all the required studies were carried out on fast track basis to complete the feasibility study. The feasibility study was submitted to PPDB in February, 2017 which was approved in March 2017. Along with the petition, the petitioner also submitted PPDB's letter No. PPDB/432/2017 dated March 13, 2017 whereby Panel of Experts ("PoE") approved the project's feasibility study subject to approval of interconnection study from NTDCL and No Objection Certificate ("NOC") from Environmental Protection Agency. During the hearing, ZSPL submitted that project's grid interconnection has been approved by NTDCL, environmental study has been approved by Environmental Protection Agency, power evacuation certificate has been issued by NTDCL and generation license has been granted by NEPRA.

17. PPDB through letter dated August 28, 2017 also submitted clarification regarding the validity of LOI of ZSPL. PPDB submitted that it issued LOI to the company after competitive process for award of land to conduct project's feasibility study. PPDB stated that the sponsor already completed the feasibility study which was approved by POE of PPDB on March 10, 2017.

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18. Based on the submissions of the petitioner and clarifications provided by the PPDB, it is considered that LOI was issued for the completion of many milestones which have been completed by the company. In view thereof, this issue is settled.

Whether the consent for power evacuation from NTDCL and consent for power purchase from CPPA-G have been obtained?

19. With its petition, ZSPL submitted power evacuation certificate of NTDCL having No. GMPP/CEMP/TRP-380/3415 dated June 15, 2017. NTDCL in the said letter certified that the power generation from 100 MW Zorlu solar project will be evacuated and power injection by Zorlu will not have any adverse effect on the national grid as required under the prevailing grid code.

20. With respect to the power purchaser's consent letter, NEPRA vide letter No. NEPRA/SAT-I/TRF-400/13116 dated July 28, 2017 directed the petitioner to submit consent certificate of Central Power Purchasing Agency (Guarantee) Ltd. ("CPPA-G/power purchaser") which was followed by a reminder dated September 22, 2017. CPPA-G vide letter No. Tech/2017/CEO/ZEEU/36330-34 dated October 18, 2017 issued its consent to purchase power from ZSPL.

Whether the claimed EPC cost is competitive, comparative and based on the firm and final agreement(s)?

21. The petitioner has claimed USD 96.800 million on account of EPC cost comprising of offshore portion of USD 76.700 million and onshore portion of USD 20.100 million.

22. ZSPL submitted that the claimed EPC cost includes the cost of 860,314 PV modules, 34 PV inverters, electrical equipment together with ancillary equipment and other goods, systems and machinery including 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. Further, the claimed EPC Cost includes staff accommodation, supply of drinking water and electricity, catering services for the staff, certain project vehicles, standby generator (including fuel), site security during construction period and internal access roads.

23. ZSPL submitted that to ensure the quality solution, timely completion of project, to attain lowest cost of energy and ensure availability of financing, it has adopted a hybrid EPC Model incorporating favourable elements of "multiple contracting approach" and "single EPC approach" for construction and commissioning of this Project. ZSPL submitted that it has

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appointed and signed EPC heads of agreement with a consortium consisting of its affiliated entities namely Zorlu Enerji Elektrik Uretim A.S (ZEEU) and Zorlu Industrial Pakistan (Private) Limited (ZIPL) and is in process of finalising the detailed form of onshore and offshore agreements. ZEEU and ZIPL being the EPC contractors shall be responsible for the overall management, coordination and implementation of the project. Being subsidiaries of the Zorlu Group, ZEEU and ZIPL will have access to Zorlu's international technical resources and parts distribution networks and have agreed to commit the same to the project as part of their obligations set out in the EPC agreement.

24. ZSPL submitted that ZEEU has already selected world class PV module vendor "First Solar USA Inc." and PV inverter supplier "Sungrow" for the Project. The petitioner submitted that cadmium telluride thin film solar modules of First Solar of models FS 4115-3 (50MW) and FS4117-3 (50MW) shall be installed for this project. The selected First Solar's advanced thin film solar modules generate more energy than conventional crystalline silicon solar modules with the same power due to higher temperature coefficient, superior spectral response and anti-reflective coated glass. Further, these modules have also proven track record for highly predictable energy in all climates and applications and have passed a number of certifications for reliable performance. The proposed inverters of model SG 2500HV from Sungrow shall provide secured yield and flexibility of operations.

25. However, during the hearing the petitioner submitted that few modifications in proposed technology have been made for the project. The petitioner submitted that now 869,164 cadmium telluride thin film solar modules of First Solar with models of FS4112-3, FS4115-3 and FS4117-3 shall be installed for this project. Regarding inverters, the petitioner submitted that 20 inverters of Siemens of model APS 4000-PV shall be installed. ZSPL vide its letter dated October 4, 2017 also informed about these changes and requested the Authority to consider the above updates in the tariff petition. In response to NEPRA's letter, ZSPL vide letter dated October 31, 2017 certified that the proposed changes shall not affect the parameters claimed in the petition as there is no change in the technology of the PV modules.

26. Along with its petition, ZSPL submitted the EPC Heads of Agreement signed with EPC contractors on May 15, 2017. The heads of agreement state the fixed lump sum price of USD 96.8 million consisting of offshore works of USD 76.70 million and onshore works of USD 20.10 million. It was mentioned in the heads of agreement that the parties shall work together to execute the split onshore and offshore EPC agreements and the contract price shall remain unchanged. Subsequently, the petitioner vide letter dated September 6, 2017 submitted the copies of onshore supply and services contract as well as offshore supply contract. These

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contracts were signed on August 24, 2017 on the same prices as given in the heads of agreement.

27. During the hearing, while justifying its EPC cost claim, the petitioner submitted that it is substantially lower than the costs that were allowed by the Authority in the previous upfront tariffs and in line with the costs proposed for the last tariff proceedings. Further, the petitioner submitted that prices are a bit higher because the company locked prices at the time when it had to participate in the bidding. Moreover, ZSPL submitted that it is setting up its project on thin film technology which it is purchasing from top ranked manufacturer of the world and that is another reason for claimed higher EPC cost.

28. The commentator namely Mr. Adeel Ahmed in his comments stated that the claimed EPC cost by the petitioner is on higher side. He submitted that presently a 100 MW solar power plant's EPC cost is around USD 70.0 million. Mr. Muhammad Junaid Arshad in his comments stated that the petitioner did not take into account the decrease in material prices which will further come down at the time of construction of the project.

29. The Authority has observed that other comparable solar projects are claiming EPC cost in the range of 0.75 million per MW to 0.86 million per MW and that too for relatively costlier tracking technology and smaller sizes of the projects. Whereas ZSPL is claiming USD 0.968 million per MW for relatively cheaper fixed-tilt system technology. The Authority has also noted that the claimed EPC cost of ZSPL is even higher than the cost proposed by NEPRA for its last proceedings back in mid of 2016. The Authority considered the submission of ZSPL of locking in prices in December, 2016 and found that non-maintainable as the heads of agreement was only signed in May, 2017. In view thereof, NEPRA considered that EPC cost being claimed by ZSPL is not prudent and requires assessment.

30. For this purpose, the Authority has relied upon the EPC cost and project cost data in different countries. The prices of different types of modules, inverters and mounting structures in different parts of the world were researched through a number of reports published by credible organizations. Moreover, a number of online sources providing spot prices data of equipment of solar power system were also surfed. Furthermore, the costs being claimed by other comparable projects were also checked. It was found that the equipment prices (modules, inverters, mounting structures etc.) in most of the countries were roughly the same. The differences were noticed in total setup cost primarily because of the soft costs such as land cost, development cost, available expertise, cost of labour, manufacturing facilities etc.

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31. It has been noted that the average prices of solar modules of different types and brands have gone as low as USD 0.32 million per MW. The costs of inverters have been found reported as low as USD 0.04 million per MW. For mounting structures, the prices were found as USD 0.08 million per MW for fixed tilt and USD 0.15 million per MW for tracking technologies. Nevertheless, the factors such as transportation cost, existing local market conditions, local manufacturing base, purchasing module from top brand etc. were given due consideration. The costs of civil and electrical works as allowed by the Authority in the previous upfront tariffs were modified slightly only to account for the larger scale of the ZSPL's project. It has also been ensured to provide a reasonable amount of profits to the EPC Contractors. Keeping in view all these factors, the Authority has assessed the EPC cost of ZSPL as USD 0.714 million per MW (USD 71.400 million) which is hereby approved.

32. The allowed EPC cost is the maximum limit on overall basis. Applicable foreign portion of this cost shall be allowed variations at Commercial Operations Date ("COD") due to change in PKR/USD parity during the allowed construction period, on production of authentic documentary evidence to the satisfaction of the Authority.

Whether the claimed Non-EPC cost is justified?

33. The petitioner has claimed USD 5.436 million on account of non-EPC cost. The break-up of cost components provided by the petitioner is as follows:

Non-EPC cost	(USD million)
Non-EPC & Project Development Cost	1.500
Pre-COD Insurance cost	0.581
Financial charges	2.225
Interest during construction	1.130
Total non-EPC cost	**5.436**

Non-EPC and Project development cost

34. The petitioner has submitted following break-up of non-EPC and project development cost in its tariff petition:

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S.#	Non-EPC & Project Development Cost	(USD million)
i	Consultancy Cost & technical studies-Pre-financial close	0.655
ii	Owner's Engineer supervision-Post financial close	0.150
iii	Independent engineer-pursuant to the Energy Purchase Agreement ("EPA")	0.100
iv	Permits, permissions and related costs	0.050
v	Site, security and infrastructure	0.350
vi	Administration cost	0.120
vii	Travelling costs	0.075
	Total	**1.500**

i) Consultancy cost & technical studies cost of USD 0.655 million has been claimed related to project consultancy services to be engaged before financial closing for planning, engineering, financial, legal and technical related matters. ZSPL has submitted that based on the requirements of the technical consultants, it has already completed geotechnical, topographical, soil and other related studies for the purpose of completing project's feasibility study.

ii) Owner's engineer supervision cost USD 0.150 million has been claimed. ZSPL has submitted that it will engage an experienced engineering supervision team to ensure the contractors compliance with the relevant contracts, as well as reporting on progress and budget. The construction supervision team will comprise a site engineer supported by technical experts. The Owner's Engineer will also conduct review of proposed designs, construction, monitoring and witnessing of key test to ensure project's success.

iii) Independent engineer cost of USD 0.100 million has been claimed. ZSPL has submitted that it 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 ZSPL with the approval of the CPPA-G, to monitor the construction of the Complex and 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.

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iv) The petitioner has claimed USD 0.050 million on account of Permits, Permissions and related costs. ZSPL has submitted that during development and construction of the project, it 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 for LOI and LOS, SBLC in favour of power purchaser, NOC from competition commission, LOI Fee, AEDB/PPDB facilitation and legal fee, NTDCL vetting charges for Grid Electrical Grid Studies, NEPRA fees and charges, registration and other charges to SECP etc. to be incurred during development and construction of the project.

v) The petitioner has claimed USD 0.350 million for site, security and infrastructure. ZSPL submitted that this cost head include the upfront payment for site lease for 25 years, site levelling and preparation, site access, infrastructure, electricity connection and security costs for local, foreign personnel and contractor staff.

vi) The petitioner has claimed USD 0.120 million on account of administration cost for expenditure such as salaries of accounting and admin staff, rent, utilities, communication, vehicle fuel and allied expenses during the construction period.

vii) The petitioner claimed USD 0.075 on account of travelling costs of foreign and local staff for travelling and accommodation expenses.

35. The Authority has considered non-EPC and project development cost claim of ZSPL and has found it reasonable. Therefore, the Authority has decided to approve this cost as claimed by the petitioner. The allowed cost shall be adjusted at actual, subject to allowed amount as maximum limit, at the time of COD on production of authentic documentary evidences to the satisfaction of the Authority.

Pre-COD insurance cost

36. The petitioner has claimed USD 0.581 million on account of pre-COD insurance cost based on 0.60% of EPC cost. ZSPL has also requested to allow the said cost at actual up to 1.0% of EPC in case it cannot arrange insurance at 0.60% due to any reason beyond its control. Following insurance coverage has been requested by the petitioner:

a) Construction All Risk Insurances (CAR)
b) CAR delay in start-up insurance
c) Terrorism insurance

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d) Marine and inland transit insurance

e) Marine-delay-in start-up insurance

f) Comprehensive General Liability

37. The Authority has observed the data of this cost for the comparable operational power projects. Moreover, it has also been noted that one of the solar power project is not claiming this cost at all. This cost as allowed by the Authority in the most recent decisions of comparable renewable technologies was also looked at. Based on this information, the Authority has decided to allow insurance during construction at the rate of 0.5% of the allowed EPC cost to ZSPL which works out to be around USD 0.357 million. Insurance during construction shall be adjusted at actual, subject to allowed amount as maximum limit, at the time of COD on production of authentic documentary evidences to the satisfaction of the Authority.

Financing Fee and Charges

38. The petitioner has claimed USD 2.225 million on account of financial charges. ZSPL submitted that this cost head includes 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 fee for lender's advisors. The petitioner has submitted that 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. ZSPL also submitted the indicative loan term sheet for arrangement of debt financing agreed with the lenders.

39. The Authority noted that financial charges claimed by the petitioner works out to be around 3% of debt portion of claimed capital expenses. In line with its most recent decision in the comparable renewable energy projects and keeping in view the claim of this cost being made by other solar power projects, the Authority has decided to allow financing fee and charges at the rate of 2.5% on the allowed debt portion of the approved capital cost of ZSPL. The allowed amount works out to be around USD 1.374 million. Financing Fee and Charges shall be adjusted at actual, subject to allowed amount as maximum limit, at the time of COD on production of authentic documentary evidences to the satisfaction of the Authority.

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Interest during construction (IDC)

40. The petitioner has claimed USD 1.130 million on account of interest during construction (IDC) based on agreed term sheet with lenders for a construction period of six (06) months while using 3 months LIBOR (0.6%) plus spread of 4.6%. ZSPL has submitted that for the calculation of the IDC, a notional drawdown schedule has been assumed and that actual IDC shall change subject to fluctuation of base interest, actual drawdowns during construction, taxes & duties and variation in PKR/USD exchange rate.

41. Based on the approved EPC cost, drawdowns schedule as provided by the petitioner and taking into account the claimed construction period of six months, the interest during construction works out to be around USD 0.873 million and is hereby approved. The terms of financing used to work out the aforesaid amount of IDC is discussed in the ensuing relevant sections. The allowed IDC shall be re-computed at COD, for the allowed construction period starting from the date of financial close, on the basis of actual drawdowns (within the overall debt allowed by the Authority at COD) by applying 3 month LIBOR applicable at the day of the respective drawdowns.

42. Recapitulating above, the approved project cost under various heads is given hereunder:

Project Cost	(USD million)
EPC Cost	71.400
Non-EPC and Project Development Cost	1.500
Insurance during construction	0.357
Financing Fee and Charges	1.374
Interest During Construction	0.873
Total	**75.504**

Whether the claimed O&M cost is justified?

43. The petitioner has claimed O&M cost per annum of USD 1.2 million comprising of foreign portion of USD 1.0 million and local portion of USD 0.2 million. For the foreign portion, the petitioner has requested for the indexation with PKR/USD and US CPI. Whereas for local portion of O&M, the indexations with respect to local CPI has been claimed by the petitioner.

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44. In its petition, the petitioner submitted that it is in process of finalizing the O&M agreement with Zorlu O&M Pakistan Ltd. The said agreement shall be signed initially for a tenor of 14 years to provide comfort to the lenders. The O&M contractor shall be responsible for provision or procurement and performance of all the works, services, supplies and other activities including management services necessary to operate and maintain the project to ensure energy production is maximized and that the project is operated and maintained in accordance with the applicable performance standards, agreed environmental-social and monitoring plans and prudent operating practices. Upon completion of the 14 years O&M contract period, ZSPL has submitted that it will carry out a cost benefit analysis of carrying out the O&M themselves or again outsourcing the work to an O&M contractor. This decision will depend on a number of factors including level of development of the local solar industry, availability of critical spare parts in the secondary market, presence of skilled manpower in the local market etc. Subsequently, the petitioner vide letter dated October 27, 2017 submitted the signed copy of O&M contract.

45. Justifying its claim, the petitioner stated the claimed O&M cost of USD 12,000/MW/annum is quite lower than costs earlier approved by NEPRA in its upfront tariffs. The reduction has been achieved due to superior technology selection by EPC process, risk assumption by the Zorlu group for a lower tariff, etc. Further, the petitioner stated that the selected First Solar PV frame-less/double glass modules required less cleaning in dusty area resulting less maintenance requirement.

46. AKLA in the intervention request highlighted that presently O&M cost for solar power plants is very low, hence the cost needs to be revised downwards. Oursun commented that the petitioner claimed huge amount of USD 1.0 million on account of fixed O&M (foreign) for such a maintenance free solar plant. The petitioner in response to comments replied that it has claimed lower O&M cost compared to the Authority's earlier approved upfront O&M cost by using First Solar modules and Siemens inverters. The petitioner submitted that foreign O&M component includes provision of all the spares of the plant.

47. To evaluate this claim of ZSPL, the O&M cost being allowed in other parts of the world has been referred while keeping in view the local market conditions, required skilled manpower, spare parts, inverters etc. As this cost component constitutes significant portion of the cost of human resource, hence, it was noted that doing comparison of O&M cost with the developed countries may not be appropriate due to higher labour costs in those countries. Based on these analyses, the Authority is of the view that the claimed cost requires slight rationalization due to scale of the project and decided to approve USD 1.10 million per year in respect of O&M cost to ZSPL.

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The Authority has noted that the cost of manpower required for management office and site office constitutes quite a large portion of the total O&M cost which can be incurred in local currency. Further, it has also been noted that O&M cost in upfront tariffs were approved allowing major portion of local cost. In view thereof, the allowed O&M cost has been divided into local and foreign components in the ratio of 50:50.

Whether the claimed insurance during operation is justified?

48. The petitioner submitted that the insurance cost during operation has been estimated at 0.25% of the EPC Cost (equivalent to USD 0.242 million/year) based on the strength of the Zorlu Group, however any increase therefrom up to 0.75% of the EPC Cost may kindly be allowed upon submission of evidence at the time of COD.

49. The petitioner submitted that this claim consists of the insurances required under the Implementation Agreement ("IA") and EPA coupled with those customarily required for project financing transactions. ZSPL, referring the practices set by the other IPPs 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

50. ZSPL submitted that it intends to acquire insurance from one of the leading insurance companies in the country. The petitioner submitted that it is standard practice for local insurers to only retain 5% of the risk and acquire reinsurance for the remaining 95% through foreign reinsurer. Further, ZSPL submitted that the lenders financing the Project will inevitably require the project cost (denominated in US dollars) to be insured on replacement cost basis. Stating these reasons, it has requested the Authority to allow the insurance cost in US dollars.

51. AKLA in the intervention request submitted that the risk profile for solar projects is very low; therefore, the cost needs to be revised downwards.

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52. Based on the data of operational power projects, NEPRA has allowed insurance during operation at the rate of 0.5% of the EPC cost in the recent cases of comparable renewable energy projects. In view thereof, the Authority has decided to allow insurance during operation at maximum limit of 0.5% of the approved EPC cost to ZSPL. This cost shall be allowed adjustment on annual basis as per the mechanism given in the order part of this determination.

Whether the claimed return on equity of 11.93% on Internal Rate of Return (IRR) basis is justified?

53. The petitioner has submitted that while applying the internationally accepted Capital Asset Pricing Model ("CAPM"), the required return for this project works out to be 19.43%. However, the petitioner submitted that it is claiming Return on Equity (ROE) of 11.93% (IRR basis) subject to the condition that the claimed project costs is accepted and allowed by NEPRA. The petitioner submitted that if NEPRA reduces the claimed project costs, the requested ROE may proportionately be increased to arrive at a levelized tariff of US Cents 6/kWh. For the calculation of the claimed tariff, the petitioner did not include the impact of Return on Equity during Construction ("ROEDC") and requested the Authority to allow the same at the time of COD.

54. The Authority has noted that in the most recent comparable cases of renewable technologies, it has allowed IRR to the limit of 15%. As the claimed EPC and O&M cost of the petitioner has been rationalized, therefore, the Authority found it appropriate to allow return to ZSPL at the level of 15% on IRR basis as being allowed in other comparable solar power projects.

Whether the claimed cost financing/debt terms justified?

55. The petitioner has submitted that the capital structure of the Project is envisaged at 75:25 (Debt: Equity). International Finance Corporation (IFC), Asian Development Bank (ADB), and ECO Trade & Development Bank will contribute 33.33%, 52.17% and 14.50% of the required debt respectively. The door to door tenor of the loan agreed with the lenders is 15 years. The financing will be based on 3-month LIBOR plus a margin of 4.6 % adjustable on quarterly basis. To support the claim of its financing cost, the petitioner submitted the indicative term sheet signed with the prospective financiers.

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56. During the hearing, the petitioner submitted that previously International DFIs have financed at LIBOR plus margins of 4.50% to 4.60% over LIBOR for 12 years and in this case the tenure is 15 years, hence the rate of 4.60% is a significant achievement despite the tenor increase.

57. The Authority has noted that other solar projects are claiming spreads in the range of 4.3% to 4.5%. Moreover, it has been observed that the premiums of 4.25% over base LIBOR has been allowed in the most recent cases of comparable renewable technologies. In view thereof, the Authority has decided to allow financing cost at the rate of LIBOR plus premium of 4.25% to ZSPL. The claimed debt to equity ratio of 75:25 and debt servicing tenor of fourteen years are found reasonable and hereby approved.

Whether the claimed annual energy production and net plant capacity factor are justified? Whether the petitioner's proposed solar modules and inverter technology satisfies the international standards of quality and operation? Whether calculation/study of ground irradiance data was carried out or otherwise?

58. The petitioner submitted that in line with PPDB's guidelines, the project's technical consultant has carried out detailed evaluations to estimate the energy production for the project and the summary of the results is as follows:

Project capacity	100 MWp
Annual energy generation	179.598 GWh
Net capacity factor	20.5%

59. ZSPL submitted that it has selected world class PV module vendor "First Solar USA Inc." and PV inverter supplier "Siemens" for the Project. First Solar's advanced thin film solar modules generate more energy than conventional crystalline silicon solar modules with the same power due to higher temperature coefficient, superior spectral response and anti-reflective coated glass. Further, these modules have also proven track record for highly predictable energy in all climates and applications and have passed a number of certifications for reliable performance. The petitioner submitted that detailed resource assessment was conducted through site surveys as well as commonly used meteorological database were reviewed and modeled. ZSPL submitted that based on sixteen years of solar data, the average annual solar resource, i.e. Global Horizontal Irradiation is found to be 1930 kWh/m^2. Based on the said solar resource,

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proposed technology and taking into account all losses, the estimated energy of 179.598 GWh is worked out during the 1st year of operations using professional software PVSyst 6.3.8.

60. AEDB and Oursun Pakistan Limited (Oursun) through comments indicated that capacity factor of 20.5% claimed by the petitioner is on higher side. AEDB commented that conventional thin solar panels without tracking system can attain capacity factor within the range of 19.2%-19.5%. The energy yield calculation indicates 100% availability and 1% soiling losses which seem on the lower side. As per industry norms, availability is 98% and soiling losses are 2-3%. Mr. Adeel Ahmed in his comments submitted that claimed capacity factor is on the lower side. Regarding the comments of AEDB and Oursun for higher capacity factor, the petitioner in its reply dated September 6, 2017 submitted that the project company has carried out due diligence and assessment and is comfortable with risk of attaining the capacity factor of 20.5%.

61. The Authority has considered the modules and inverters proposed by ZSPL with respect to their quality and energy yield. The solar resource figure submitted by the petitioner has also been checked. Considering these factors, the Authority is of the view that the proposed net annual capacity utilization factor of 20.50% is reasonable and decided to approve the same. Further, the Authority has decided that the solar resource risk shall be borne by the power producer and a sharing mechanism given in the order part of this determination shall be applied on the energy produced beyond the approved capacity utilization factor.

Whether the claimed degradation factor of 0.7% per annum is reasonable and justified?

62. The petitioner stated in the petition that ageing and degradation of PV modules would impact electricity generation and revenue inflows during the project's life. The petitioner requested to allow the actual degradation subject to a cap of 0.7% per annum of initial power through adjustment in reference tariff in respective years.

63. AKLA submitted that solar technology has comparatively achieved much maturity in the last few years; therefore, degradation factor should not exceed 0.5%. AEDB submitted that renowned solar PV manufacturers including First Solar are now guaranteeing degradation factor maximum of 0.5%. AEDB further suggested that instead of adjustment of tariff on annual basis on account of degradation, its impact may be capitalized as the Authority has already done in upfront tariff for solar PV power projects for the year 2016.

64. It has been noted that the Authority approved degradation factor of 0.5% in the last upfront tariff of solar technology. Further, the Authority has noted that the petitioner has vouched to

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purchase PV modules manufactured by top ranked and most bankable manufacturer in the world. In view thereof, the Authority has decided to approve annual degradation factor of 0.5%. The Authority has considered the submissions of the petitioner and AEDB with respect to adjustment of degradation factor and has decided to capitalize its impact in the approved project cost. The amount of USD 2.585 million has been made part of the approved project cost while calculating the same at the levelized rate of 3.62% of the allowed EPC cost.

Whether the claimed construction period is justified?

65. The petitioner has claimed the construction period of six months. AKLA in the intervention request submitted that construction period should not exceed six months. The Authority has found this claim of the petitioner reasonable and has decided to allow the same.

Whether the claimed tariff control period of twenty five (25) years is justified?

66. The tariff control period of 25 years has been proposed by Company while stating that the same is at par with the International Solar Industry norms and as per the practice in other solar projects in Pakistan. NEPRA had determined all the previous upfront tariffs for solar power project for a control period of twenty five years; therefore, the claim of the petitioner is found justified and therefore approved.

ORDER

67. The Authority hereby determines and approves the following generation tariff along with terms and conditions for Zorlu Solar Pakistan Power (Private) Limited for its 100 MWp power project for delivery of electricity to the power purchaser:

Rs./kWh

Tariff Component	Year 1-14	Year 15-25
Operations and Maintenance Cost	0.6432	0.6432
Insurance during Operation	0.2087	0.2087
Return on Equity	1.7839	1.7839
Debt Servicing	3.6204	-
Total	**6.2562**	**2.6358**

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- Levelized tariff works out to be US Cents 5.3086/kWh.
- The aforementioned tariff is applicable for twenty five (25) years.
- Debt Service shall be paid in the first 14 years of commercial operation of the plant.
- Debt Servicing has been worked out using three months LIBOR (1.694%) + Spread (4.25%).
- Debt to Equity of 75:25 has been used.
- Return on Equity during construction and operation of 15% has been allowed.
- Construction period of six (06) months has been allowed for the workings of ROEDC and IDC.
- Insurance during Operation has been calculated as 0.50% of the allowed EPC Cost.
- Reference Exchange Rates of 105 PKR/USD has been used.
- Detailed component wise tariff is attached as **Annex-I** of this decision.
- Debt Servicing Schedule is attached as **Annex-II** of this decision.

A. <u>One Time Adjustments at COD</u>

- Applicable foreign portion of the allowed EPC cost will be adjusted at COD on account of variation in PKR/USD parity, on production of authentic documentary evidence to the satisfaction of the Authority. The adjustment in approved EPC cost shall be made only for the currency fluctuation against the reference parity values.
- For cost items other than EPC cost, the amounts allowed in USD will be converted in PKR using the reference PKR/USD rate of 105 to calculate the maximum limit of the amount to be allowed at COD.
- Duties and/or taxes, not being of refundable nature, relating to the construction period directly imposed on the company up to COD will be allowed at actual upon production of verifiable documentary evidence to the satisfaction of the Authority.
- IDC will be recomputed at COD on the basis of actual timing of debt draw downs (for the overall debt allowed by the Authority at COD), applicable LIBOR and premium.
- The tariff has been determined on debt : equity ratio of 75 :25. The tariff shall be adjusted on actual debt : equity mix at the time of COD, subject to equity share of not more than 25%. For equity share of more than 25%, allowed IRR shall be neutralized for the additional cost of debt : equity ratio.
- The reference tariff has been worked out on the basis of 3 months LIBOR of 1.694% plus a premium of 425 basis points. In case negotiated spread is less than the said limits, the savings

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in the spread over LIBOR shall be shared between the power purchaser and the power producer in the ratio of 60:40 respectively.

- ROEDC will be adjusted at COD on the basis of actual equity injections (within the overall equity allowed by the Authority at COD) during the project construction period of six months allowed by the Authority.

B. Indexations

i) Operation and Maintenance Costs

O&M components of tariff shall be adjusted on account of change in local Inflation (CPI), foreign inflation (US CPI) and exchange rate quarterly on 1st July, 1st October, 1st January and 1st April based on the latest available information with respect to CPI notified by the Pakistan Bureau of Statistics (PBS), US CPI issued by US Bureau of Labor Statistics and revised TT & OD selling rate of US Dollar notified by the National Bank of Pakistan as per the following mechanism:

$F.\ O\&M_{(REV)}$	=	$F.\ O\&M_{(REF)} * US\ CPI_{(REV)} / US\ CPI_{(REF)} * ER_{(REV)}/ER_{(REF)}$
$L.\ O\&M_{(REV)}$	=	$L.\ O\&M_{(REF)} * CPI_{(REV)} / CPI_{(REF)}$
Where;		
$F\ V.\ O\&M_{(REV)}$	=	The revised O&M Foreign Component of Tariff
$L.\ O\&M_{(REV)}$	=	The revised O&M Local Component of Tariff
$F.\ O\&M_{(REF)}$	=	The reference O&M Foreign Component of Tariff
$L.\ O\&M_{(REF)}$	=	The reference O&M Local Component of Tariff
$US\ CPI_{(REV)}$	=	The revised US CPI (All Urban Consumers)
$US\ CPI_{(REF)}$	=	The reference US CPI (All Urban Consumers) of 246.669 for the month of November, 2017
$CPI_{(REV)}$	=	The revised CPI (General)
$CPI_{(REF)}$	=	The reference CPI (General) of 220.420 for the month of November, 2017
$ER_{(REV)}$	=	The revised TT & OD selling rate of US dollar
$ER_{(REF)}$	=	The reference TT & OD selling rate of RS. 105/USD

Note: The reference indexes shall be revised after making the required adjustment in tariff components at the time of COD.

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ii) **Insurance during Operation**

The actual insurance cost for the minimum cover required under contractual obligations with the Power Purchaser, not exceeding 0.5% of the EPC cost, will be treated as pass through. Insurance component of reference tariff shall be adjusted annually as per actual upon production of authentic documentary evidence according to the following formula:

AIC	=	$Ins_{(Ref)} / P_{(Ref)} * P_{(Act)}$
Where;		
AIC	=	Adjusted insurance component of tariff
$Ins_{(Ref)}$	=	Reference insurance component of tariff
$P_{(Ref)}$	=	Reference premium @ 0.5% of EPC Cost at Rs. 105
$P_{(Act)}$	=	Actual premium or 0.5% of the EPC Cost converted into Pak Rupees on exchange rate prevailing at the time of insurance premium payment of the insurance coverage period whichever is lower

iii) **Return on Equity**

The ROE component of the tariff will be adjusted on quarterly basis on account of change in USD/PKR parity. The variation relating to these components shall be worked out according to the following formula;

$ROE_{(Rev)}$	=	$ROE_{(Ref)} * ER_{(Rev)} / ER_{(Ref)}$
Where;		
$ROE_{(Rev)}$	=	Revised ROE Component of Tariff
$ROE_{(Ref)}$	=	Reference ROE Component of Tariff
$ER_{(Rev)}$	=	The revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan
$ER_{(Ref)}$	=	The reference TT & OD selling rate of Rs. 105/USD

Note: The reference tariff component shall be revised after making the required adjustments at the time of COD.

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iv) **Indexations applicable to debt**

Foreign debt and its interest will be adjusted on quarterly basis, on account of revised TT & OD selling rate of US Dollar, as notified by the National Bank of Pakistan as at the last day of the preceding quarter, over the applicable reference exchange rate.

v) **Variations in LIBOR**

The interest part of capacity charge component for the loan shall remain unchanged throughout the term except for the adjustment due to variation in interest rate as a result of variation in LIBOR according to the following formula:

ΔI	=	$P_{(REV)}$* ($LIBOR_{(REV)}$ - 1.694%) /4
Where;		
ΔI	=	The variation in interest charges applicable corresponding to variation in 3 month LIBOR. ΔI can be positive or negative depending upon whether 3 month LIBOR $_{(REV)}$ per annum > or < 1.694%. The interest payment obligation will be enhanced or reduced to the extent of ΔI for each quarter under adjustment.
$P_{(REV)}$	=	The outstanding principal (as indicated in the attached debt service schedule to this order), at the relevant quarterly calculations date. Quarter 1 shall commence on the commercial operations date (i.e. the first figure will be used for the purposes of calculation of interest for the first quarter after commercial operations date).
$LIBOR_{(REV)}$	=	Revised 3 month LIBOR as at the last day of the preceding quarter

Note: The reference tariff component shall be revised after making the required adjustments at the time of COD.

C. Terms and Conditions

The following terms and conditions shall apply to the determined tariff:

- All plant and equipment shall be new and of acceptable standards. The verification of the plant and equipment will be done by the independent engineer at the time of the commissioning of the plant duly appointed by the power purchaser.

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- This tariff will be limited to the extent of net annual energy generation supplied to the power purchaser up to 20.50% net annual plant capacity factor. Net annual energy generation supplied to the power purchaser in a year, in excess of 20.50% net annual plant capacity factor will be charged at the following tariffs:

Net annual plant capacity factor	**% of the prevalent tariff**
Above 20.5% to 21.5%	80%
Above 21.5% to 22.5%	90%
Above 22.5%	100%

- The risk of solar resource shall be borne by the power producer.
- In the tabulated above tariff 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.
- In case the company shall secure full or certain portion of debt under any concessionary financing including one introduced by State bank of Pakistan, the tariff of the company shall be adjusted at COD on the terms of the said financing.
- Allowed limit of degradation has been made part of the approved project cost. No extra financial compensation shall be provided in the EPA.
- The company will have to achieve financial close within one year from the date of issuance of this tariff determination. The tariff granted to the company will no longer remain applicable/valid, if financial close is not achieved by the company in the abovementioned timeline or its generation license is declined/revoked by NEPRA.
- The targeted maximum construction period after financial close is six months. No adjustment will be allowed in this tariff to account for financial impact of any delay in project construction. However, the failure of the company to complete construction within six months will not invalidate the tariff granted to it.
- Pre COD sale of electricity is allowed to the power producer, subject to the terms and conditions of Energy Purchase Agreement, at 50% of the applicable tariff. However, pre COD sale will not alter the required commercial operations date stipulated in the EPA in any manner.

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- In case the company is obligated to pay any tax on its income from generation of electricity, or any duties and/or taxes, not being of refundable nature, are imposed on the company, the exact amount paid by the company on these accounts shall be reimbursed on production of original receipts. This payment shall be considered as a pass-through payment. However, withholding tax on dividend shall not be passed through.

- No provision for the payment of Workers Welfare Fund and Workers Profit Participation has been made in the tariff. In case, the company has to pay any such fund, that will be treated as pass through item in the EPA.

- The approved tariff along with terms & conditions shall be made part of the EPA. General assumptions, which are not covered in this determination, may be dealt with as per the standard terms of the EPA.

68. The Order part along with two Annexures is recommended for notification by the Federal Government in the official gazette in accordance with Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

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NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

Case No.NEPRA/TRF-400/ZSPL-2017

January ________, 2018

Petitioner:

Zorlu Solar Pakistan (Pvt.) Limited

Authority:

Himayat Ullah Khan
Member

Syed Masood-ul-Hassan Naqvi
Member

Saif Ullah Chattha
Vice Chairman

23.1.2018

Brig (R) Tariq Saddozai
Chairman

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Zorlu Solar Pakistan (Pvt.) Ltd.
Reference Tariff Table

Year	O&M-Local	O&M-Foreign	Insurance during Operation	Return on Equity	Loan Repayment	Interest Charges	Total Tariff
	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh
1	0.3216	0.3216	0.2087	1.7839	1.6206	1.9999	6.2562
2	0.3216	0.3216	0.2087	1.7839	1.7191	1.9014	6.2562
3	0.3216	0.3216	0.2087	1.7839	1.8236	1.7969	6.2562
4	0.3216	0.3216	0.2087	1.7839	1.9344	1.6860	6.2562
5	0.3216	0.3216	0.2087	1.7839	2.0520	1.5685	6.2562
6	0.3216	0.3216	0.2087	1.7839	2.1767	1.4437	6.2562
7	0.3216	0.3216	0.2087	1.7839	2.3090	1.3114	6.2562
8	0.3216	0.3216	0.2087	1.7839	2.4493	1.1711	6.2562
9	0.3216	0.3216	0.2087	1.7839	2.5982	1.0222	6.2562
10	0.3216	0.3216	0.2087	1.7839	2.7561	0.8643	6.2562
11	0.3216	0.3216	0.2087	1.7839	2.9237	0.6968	6.2562
12	0.3216	0.3216	0.2087	1.7839	3.1014	0.5191	6.2562
13	0.3216	0.3216	0.2087	1.7839	3.2899	0.3306	6.2562
14	0.3216	0.3216	0.2087	1.7839	3.4898	0.1306	6.2562
15	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
16	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
17	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
18	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
19	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
20	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
21	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
22	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
23	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
24	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
25	0.3216	0.3216	0.2087	1.7839	-	-	2.6358
Levelized Tariff	**0.3216**	**0.3216**	**0.2087**	**1.7839**	**1.8139**	**1.1243**	**5.5741**

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Annex-II

Zorlu Solar Pakistan (Pvt.) Ltd.
Reference Debt Service Schedule

Relevant Quarter	Principal (USD)	Principal Repayment (USD)	Interest (USD)	Balance Principal (USD)	Total Debt Service (Million USD)	Annual Principal Repayment Rs./kWh	Annual Interest Rs./kWh
1	58,566,477	677,656	870,339	57,888,821	1,547,994	1.6206	1.9999
2	57,888,821	687,726	860,268	57,201,095	1,547,994		
3	57,201,095	697,946	850,048	56,503,149	1,547,994		
4	56,503,149	708,318	839,676	55,794,831	1,547,994		
5	55,794,831	718,844	829,150	55,075,986	1,547,994	1.7191	1.9014
6	55,075,986	729,527	818,468	54,346,460	1,547,994		
7	54,346,460	740,368	807,626	53,606,092	1,547,994		
8	53,606,092	751,370	796,624	52,854,721	1,547,994		
9	52,854,721	762,536	785,458	52,092,185	1,547,994	1.8236	1.7969
10	52,092,185	773,868	774,126	51,318,317	1,547,994		
11	51,318,317	785,368	762,626	50,532,949	1,547,994		
12	50,532,949	797,039	750,955	49,735,909	1,547,994		
13	49,735,909	808,884	739,110	48,927,025	1,547,994	1.9344	1.6860
14	48,927,025	820,905	727,090	48,106,120	1,547,994		
15	48,106,120	833,104	714,891	47,273,017	1,547,994		
16	47,273,017	845,484	702,510	46,427,532	1,547,994		
17	46,427,532	858,049	689,946	45,569,483	1,547,994	2.0520	1.5685
18	45,569,483	870,800	677,194	44,698,683	1,547,994		
19	44,698,683	883,741	664,254	43,814,943	1,547,994		
20	43,814,943	896,874	651,121	42,918,069	1,547,994		
21	42,918,069	910,202	637,793	42,007,867	1,547,994	2.1767	1.4437
22	42,007,867	923,728	624,266	41,084,139	1,547,994		
23	41,084,139	937,455	610,539	40,146,684	1,547,994		
24	40,146,684	951,387	596,608	39,195,297	1,547,994		
25	39,195,297	965,525	582,470	38,229,772	1,547,994	2.3090	1.3114
26	38,229,772	979,873	568,121	37,249,899	1,547,994		
27	37,249,899	994,435	553,560	36,255,464	1,547,994		
28	36,255,464	1,009,213	538,782	35,246,251	1,547,994		
29	35,246,251	1,024,210	523,784	34,222,040	1,547,994	2.4493	1.1711
30	34,222,040	1,039,431	508,563	33,182,609	1,547,994		
31	33,182,609	1,054,878	493,117	32,127,732	1,547,994		
32	32,127,732	1,070,554	477,441	31,057,178	1,547,994		
33	31,057,178	1,086,463	461,531	29,970,715	1,547,994	2.5982	1.0222
34	29,970,715	1,102,609	445,386	28,868,106	1,547,994		
35	28,868,106	1,118,994	429,000	27,749,112	1,547,994		
36	27,749,112	1,135,623	412,371	26,613,489	1,547,994		
37	26,613,489	1,152,499	395,495	25,460,989	1,547,994	2.7561	0.8643
38	25,460,989	1,169,626	378,368	24,291,363	1,547,994		
39	24,291,363	1,187,008	360,987	23,104,355	1,547,994		
40	23,104,355	1,204,648	343,347	21,899,708	1,547,994		
41	21,899,708	1,222,549	325,445	20,677,158	1,547,994	2.9237	0.6968
42	20,677,158	1,240,717	307,277	19,436,441	1,547,994		
43	19,436,441	1,259,155	288,839	18,177,286	1,547,994		
44	18,177,286	1,277,867	270,127	16,899,418	1,547,994		
45	16,899,418	1,296,857	251,137	15,602,561	1,547,994	3.1014	0.5191
46	15,602,561	1,316,129	231,865	14,286,432	1,547,994		
47	14,286,432	1,335,688	212,306	12,950,743	1,547,994		
48	12,950,743	1,355,537	192,457	11,595,206	1,547,994		
49	11,595,206	1,375,682	172,313	10,219,525	1,547,994	3.2899	0.3306
50	10,219,525	1,396,125	151,869	8,823,399	1,547,994		
51	8,823,399	1,416,873	131,122	7,406,527	1,547,994		
52	7,406,527	1,437,928	110,066	5,968,599	1,547,994		
53	5,968,599	1,459,297	88,698	4,509,302	1,547,994	3.4898	0.1306
54	4,509,302	1,480,983	67,011	3,028,319	1,547,994		
55	3,028,319	1,502,992	45,003	1,525,327	1,547,994		
56	1,525,327	1,525,327	22,667	(0)	1,547,994		

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