National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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No. NEPRA/UTS-01/905-907
January 22, 2015

Subject: **Determination of National Electric Power Regulatory Authority in the Matter of Upfront Generation Tariff for Solar PV Power Plants**

Dear Sir,

Please find enclosed herewith the subject Determination of the Authority along with Annex-I, Ia, II, IIa, III, IIIa, IV, IVa, V, Va, VI, VIa (62 pages).

2. The Determination is being intimated to the Federal Government for the purpose of notification of the approved tariff in the official gazette pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997) and Rule 16(11) of the National Electric Power Regulatory Authority Tariff (Standards and Procedure) Rules, 1998.

3. Please note that Order of the Authority at para 14 of the Determination along with Annex-I, Ia, II, IIa, III, IIIa, IV, IVa, V, Va, VI, VIa needs to be notified in the official Gazette.

Enclosure: As above

22.01.15

(Syed Safeer Hussain)

Secretary
Ministry of Water & Power
'A' Block, Pak Secretariat
Islamabad

CC:

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

National Electric Power Regulatory Authority

(NEPRA)

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Determination

of National Electric Power Regulatory Authority

In the matter of Upfront Generation Tariff for Solar PV Power Plants

January 22,2015

Interveners

1. QA Solar (Private) Limited
2. Anwar Kamal Law Associates
3. StormHarbour Partners LP
4. RIAA Law

Commentators

1. Asia PetroleumLimited
2. Janpur Energy Limited
3. Total Energies Nouvelles Ventures
4. Punjab Power Development Board
5. China Power International New Energy Holding Limited
6. Government of Sindh (Energy Department)
7. Access Solar (Private) Limited
8. ET Solar International Co. Ltd.
9. Burj Capital UAE
10. Zhenfa Energy Group co., Ltd.
11. IPS Private Limited.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

This determination is being given in accordance with Section 31 Sub Section (4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 read with Rule 3 of NEPRA Tariff (Standards and Procedure) Rules, 1998 and Regulation 3 of the Upfront Tariff (Approval & Procedure) Regulations, 2011 (vide S.R.O. 757(1) 2011). An applicant can opt for the Upfront Generation Tariff for Solar PV Power Plant once notified in the Official gazette pursuant to section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (XL of 1997).

Authority

22 01 XV

(Khawaja Muhammad Naeem)
Member

21/1/15

(Maj (R) Haroon Rashid)
Member

22.1.15

(Himayat Ullah Khan)
Member

22/1/2015

(Habibullah Khilji)
Vice Chairman

22/1/15

(Brig (R) Tariq Saddozai)
Chairman

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

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1. Introduction:

1.1 The Authority vide its Determination dated 21st January 2014 determined upfront solar tariff for solar photovoltaic (PV) power plants ranging 1MW to 10MW for a total capacity of 50MW with a validity period of 6 months from the date of announcement. Out of 50MW capacity, Upfront tariffs were granted to six projects with a total capacity of 47.56MW under that upfront solar tariff determination.

1.2 The Government of Punjab dedicated 6500 acres of land near Lal Sohanra, Cholistan, Bahawalpur for the purpose of establishing a 1000 MW Solar Power Park for generation of electricity from the solar energy. In the first phase, Quaid-e-Azam Solar Power (Private) Limited, wholly owned by the Government of Punjab, has been established to undertake solar PV project of 100 MW. Government of Punjab requested NEPRA to announce the new Upfront Tariff for Solar Projects of 100 MW. The Government of Sindh (GoS) also requested NEPRA to announce upfront tariff for various capacities to facilitate the investors and project sponsors. GoS also informed that they have initiated 5 projects of 20 MW each of solar PV in five districts of the province.

1.3 Considering the requests of Government of Punjab and Government of Sindh regarding development of Upfront Solar Tariff and also considering the expiry and utilization of already determined upfront tariff, the Authority decided to initiate suo moto proceedings in terms of Rule 3 of NEPRA Tariff(Standards and Procedure) Rules, 1998 and Regulation 3 of NEPRA Upfront Tariff (Approval and Procedure) Regulations, 2011for development of new upfront solar tariff and information was sought from Government of Punjab, Punjab Power Development Board (PPDB), Quaid-e-Azam Solar Power (Pvt.) Ltd (QA Solar) and Alternative Energy Development Board (AEDB)vide letters No. NEPRA/R/TRF-100-UTS/5555-57 & 5559 dated May 28, 2014. Letters were also sent to Secretaries Energy Sindh Province, Balochistan Province and KPK Province for submission of information. Only QA Solar vide letter No. QAS-14/06-19-08 dated June 19, 2014 provided the requisite information. The information provided by QA Solar is as under:

a) Project Cost of US$ 152.694 million. Breakup of EPC Cost and Non- EPC Cost is as under:

Project Cost	USD
EPC Cost (including onshore taxes and duties USD 4,736,537)	135,886,537
Non-EPC Cost	1,850,000
Project Development Cost	3,665,751
Pre-COD Insurance	1,019,149
Interest During Construction	7,943,423
Financial Fees and charges	2,328,680
Total	**152,693,540**

b) According to QA Solar, the EPC contractor, M/s TBEA Xinjiang SunOasis Co. Ltd, was selected after international competitive bidding process and the price of EPC of the successful bidder was US 151,982,803.78 plus USD 4,736,537 as onshore taxes and duties. However, after its selection as successful bidder, M/s TBEA gave a voluntary discount of USD 18,663,131.37 on account of perpetual friendship between Pakistan and China. QA Solar also reduced the bid EPC for US$ 2.169 million on account of cost of items as per special provision in the bid, thereby making US$ 135.886 million.

c) The Authority considered the information and other documents submitted by QA Solar and decided to ignore the discount. Accordingly as per procedure and to involve all interested/affected parties and general public in tariff setting process, an advertisement was published in National Press on 12th July 2014 with the following proposed project costs and other terms and conditions:

Project Cost	USD
EPC Cost (including onshore taxes and duties USD 4,736,537)	156,719,341
Non-EPC Cost	1,850,000
Project Development Cost	3,665,751
Pre-COD Insurance	1,019,149
CAPEX	163,254,241
Financial Fees and charges	2,328,680
Interest During Construction	7,943,423
Total	**173,526,344**

d) Proposed Financial Arrangements are as under:

Project Financing	%
Equity	25%
Debt	75%
Total	**100%**

e) Proposed O&M cost for 25 Years is as under:

O&M Services	USD 72,040,316.21
Amount of Asset Replacement Fund (ARF)	USD 1,745,900.00
O&M Cost	USD 73,786,216.21

f) The project will be financed by a syndicate of local banks and Bank of Punjab is the Lead Financer. According to the term sheet Mark-up rate is 6 Month KIBOR (10.09%) plus a premium of 300 bps (3%).

g) Based on the Plant Factor of 17.5% as per IFE figure the proposed energy generation from 100 MW project for the first year is 153,072 MWh.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

2. Hearing

2.1 In order to provide an opportunity to the stakeholders to assist the Authority in making an informed decision, public hearing was scheduled at Avari Hotel on 24th July 2014 at 10.30 AM. Notice of Hearing was published on 12th July 2014 in the National Press inviting comments/intervention requests from stakeholders and interested/affected persons and the parties. Individual letters were also sent to all concerned.

3. Filing of Intervention Requests

3.1 In response to the Notice of Hearing, intervention requests were received from the following:

1. QA Solar (Private) Limited
2. Anwar Kamal Law Associates
3. StormHarbour Partners LP
4. RIAA Law

QA Solar (Private) Limited (Intervener)

3.2 QA Solar submitted following in its intervention request:

a) Calculation Basis of the Tariff:

i. As per the notice of hearing dated 12 July 2014 ("NOH") NEPRA has used QAS's tariff information as the basis of its workings for the proposed upfront tariff. NEPRA has however used our tariff numbers rather selectively.

ii. EPC Cost: QAS's EPC cost has been erroneously mentioned as USD 156,719,341 whereas our EPC Cost (including onshore taxes and duties of USD 4,736,537) is USD 135,886,537.This is also reflected in the documentation submitted to NEPRA. Whilst we fully appreciate that the rebate provided to QAS may be unavailable to other IPPs (and therefore USD135,886,537 may not be reflective of a typical turnkey EPC contract), the way to have dealt with this (If NEPRA had to insist on using our tariff model) would have been to clearly state QAS's EPC cost and then discount the rebate on account of it not being likely to be provided to another IPP.

iii. Other Costs: all other project costs including non EPC costs, project development costs, pre-COD insurance costs, financing fee /charges and interest during construction estimated costs quoted in the NOH are QAS's initial costs which were always intended to be 'trued up' following commercial operations under a cost plus tariff. The numbers cannot be quoted as the average costs and therefore can by no means be used as the basis of an upfront tariff determination. Further, similar to 2.1 above, such prices/ costs should also be understood to be unreflective of the sector. Surely NEPRA understands that, QAS being a wholly owned subsidiary of the Government of Punjab does not necessarily face market costs as would other IPPs. This should be reflected in the tariff.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

iv. Financing fees and charges: similarly, QAS's financing fees and charges are not reflective of market norms. QAS has arranged the full debt amount from the Bank of Punjab. This therefore necessarily means that QAS has not incurred many of the financial charges and fees as an IPP in the private sector would.

v. O&M Costs: QAS O&M Costs consist of following components

O&M Cost	**USD**	**Indexation**
Local O&M cost	884,000 per annum	Local CPI (General)
Foreign O&M cost (For 25 years)		
Operator Fee	73,786,216	PKR/USD
Operator Asset Replacements	1,745,900	PKR/USD
Operator Taxes	4,598,318	PKR/USD
Company Asset Replacements	4,000,000	PKR/USD and CPI

The NOH makes no mention of the O&M costs other than the operator fee of USD 73,786,216 for 25 years. This is misleading and therefore will not assist in arriving at a fair and informed determination.

vi. Finally on this point, instead of picking and choosing some of QAS's tariff numbers, we would request NEPRA to ensure that the upfront tariff is a result of extensive workings by the relevant authorities (namely AEDB) as has been the case with all upfront tariffs NEPRA has previously issued. The idea that a new upfront tariff is being envisioned solely on QAS's initial numbers and without AEDB's detailed workings and recommendations is a cause for concern.

b) Cap on Upside:

Whilst the NOH is silent on this, the proposed cap on the upside will be an unwelcome addition if included in the relevant upfront determination. The existing upfront solar tariff determination dated 21 January 2014 ("Existing Determination") provides that any electricity produced over and above a predetermined capacity factor is paid at a reduced tariff. The proposed mechanism is inherently flawed for the following reasons:

- Nature of off-take/solar risk: If the IPP does not generate electricity, it does not receive the tariff. Since there are no capacity payments, QAS will only receive monies for energy generated and supplied. In the event QAS does not generate as per its expected benchmarks (either due to plant performance or irradiance), the purchaser, GOP or NEPRA do not provide any buffer or protection - even minimum debt payments are not guaranteed. In other words, where the project sponsors are exposed to the downside (i.e. full project risk), they should also be entitled to the full upside. The proposed tariff exposes the developer to a 100% of the solar risk and without any reason, deprives the developer from the benefit of increased generation.
- Discouraging procurement of the best available equipment: The simple rule is —the better the quality of the equipment, the more such plant will generate. With this rule in mind, QAS has procured quality equipment. If NEPRA caps the upside, it is doing

nothing other than encouraging developers to buy suboptimal equipment. Such a cap will discourage developers from investing in efficient technology.

c) Fixed Construction Time:

The NOH is silent on the maximum construction time NEPRA will permit following financial close. Whilst eight months may have been sufficient for a 10 MW solar plant, it is certainly not so for a 100 MW plant. At minimum 12 months should be allowed for a 100MW plant following Financial Close.

d) Others:

Other material information that is missing in the NOH is as follows:

a. MW Cap: unlike the Existing Determination, the NOH make no mention of a maximum MW that will be eligible for the upfront tariff. If there is to be a cap, it should not be counter-intuitive and should reflect the energy needs of Pakistan.

b. Validity of the tariff: similarly the NOH make no mention of the validity of the tariff. Again this should be a reasonable time and should encourage investment rather than deter developers.

c. Deadline for achievement of FC: same as above.

d. Dispatch: we assume that dispatch, unlike the Existing Tariff will be to 132-kV and 220-kV. The same should be confirmed in the tariff.

e. Status of grid code amendment: we assume that this is no longer an issue and there will be no restrictions on off-take due to the grid code.

f. Status of EPA and IA for Solar: NEPRA had directed, in the Existing Tariff that the EPA and IA for solar should be finalized within 45 days of the date of the Existing Tariff determination (i.e. early March 2014). Till date, the EPA and LA have not been provided in final form.

g. Local and foreign financing we assume that NEPRA will allow for the tariff to reflect both local and foreign debt as this will be imperative not only for other developers but also for QAS in the future.

<u>Anwar Kamal Law Associates (Intervener)</u>

3.3 Mr. Anwar Kamal submitted following in its intervention request:

a) The Policy of the Government of Pakistan, NEPRA and of DISCOs for maintaining different categories of consumers and determining cross-subsidies inter-se these categories and within the categories is not known. The Intervener reserves the right to add grounds of objection once the Policies governing this issue are disclosed. A request for the disclosure of the Policies for determining Agricultural Tariff has been submitted and W.P. No. 28596/2012 titled Ihsanullah Khan vs. Federation of Pakistan

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

and 6 others, including NEPRA as Respondent No. 3, is pending adjudication in the Lahore High Court, Lahore.

b) In the Public Notice published on 12.07.2014, the Authority has disclosed information about Upfront Tariff which goes against its own stated position declared in its latest Annual Report for 2012-13 in the following words:

"The year 2012-2013 also saw some significant steps taken by the GoP for addressing these issues. Serious efforts have been made to explore the renewable energy potential focusing on bringing wind and solar power plants that have successfully attracted investors. A number of companies have already launched their projects for wind power generation in Pakistan. However, whereas it is encouraging to see the interest of investors in renewable energy projects in Pakistan, at the same time it is imperative to carefully analyze, at the very outset, the overall impact of any specific technology vis-à-vis the objectives of availability of affordable electric power for end consumers in the long run and then move forward. Some of the issues that need attention while contemplating renewable energy, particularly wind and solar power plants, are: overall impact of these plants on the basket price of electricity in the country, lower plant factors of these plants, their location vis-à-vis load centers, their seasonal availability etc. which do not permit their use as base load plants. Parallel investment is needed to develop base load plants in addition to these wind and solar power plants in the country. Further, given the specific location of wind power plants, heavy investment will be required to develop transmission network which may not be used at optimum level due to wide variation in plant load factor besides higher T&D losses in transmitting electricity to the distant load centers."

c) The most critical issue is one of affordability. The proposed Upfront Tariff is not a levelized Tariff and is loaded for the first ten years. The survival of Pakistan is now dependent on the electric power sector. Front loading for the first ten years may mean that we will not be able to survive these first ten years.

d) We, the consumers are already paying the cost of idle capacity to IPPs and GENCOs at almost the same Tariff rate as is being proposed to be given to Solar Power Plants that is Rs. 20 to Rs. 22. Without first determining how much idle capacity is available in Pakistan, and why it is not being utilized, it is not prudent to bring in more expensive technology and power plants in the system.

e) The GST being claimed and realized on the consumption of electricity is grossly unfair and the Authority is requested to intervene in the matter in the performance of its statutory function of protecting consumers.

f) The tariff of all categories of consumers had been loaded on account of financial charges incurred on the loan of Rs 22 billion taken by NTDC and disbursed as advance to the RPPs through ex-WAPDA GENCOs.

The Intervener reserves the right to add to the grounds on receipt of information regarding the repayment of these loans and the impact of the return of advances,

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

adjustment of loans and consequential passing on of the benefit to the consumers in the form of reduced Power Purchase Price (PPP) of the ex-WAPDA DISCOs.

g) Since Pakistani consumers are still going to pay capacity charges for the idle capacity lying with IPPs due to long-term contractual commitments, it makes no economic sense to induct expensive new technology, which will further increase the cost of electricity for end-consumers.

h) The Authority appears to be moving with imprudent haste. Failure to observe procedural requirements and to publicly debate all relevant issues is not only not prudent but also appears not to be an independent and sagacious decision.

i) NEPRA has already granted/approved Upfront Tariff for Wind Power Plants, which is against its own stated Policy.

j) NEPRA has already approved Upfront Tariff for Solar Power Plants, which is against its own stated Policy.

k) NEPRA is again set to determine Upfront Tariff for 100 MW Solar Power Plants, against its own stated Policy. This will affect the basket-price and make electricity unaffordable.

l) NEPRA has demonstrated unholy haste in granting Generation Licences etc. to Solar Power Plants and has violated statutory procedures in doing so. This haste compares most unfavorably with the tortoise speed with which NEPRA determines the consumer-end tariff of DISCOs and that too in contravention of statutory time-limits, which adversely affects millions of consumers and the entire power sector.

m) That the following extract from news report in the daily DAWN of 20th July, 2014 may caution the Authority as to the hazards of the path it is treading upon. Titled " People paying more for less electricity," it reads:

"Among the top 15 contributors to CPI inflation, electricity was the biggest contributor after education which was slightly higher.

The electricity contribution to CPI in June 2013 was zero while in June 2014,it rose to 15.82 per cent."

n) The Intervener seeks the permission of the Authority to add to/or modify the grounds in the light of the further information he is seeking from various sources.

<u>StormHarbour Partners LP (Intervener):</u>

3.4 StormHarbour Partners LP in its intervention request raised the similar issues as has been raised by QA Solar (Pvt.) Limited under (b) and (d) above except the following:

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Degradation

The Existing Determination estimates degradation not exceeding 0.7% annum of the initial power. Whilst the NOH is silent on this issue, we request that the same be reflected in the upfront tariff when the same is determined by NEPRA.

RIAA Law (Intervener)

3.5 RIAA Law in its intervention request submitted the following:

1. **Project Cost**

   Non-EPC Cost: We understand that the Proposal is based on information provided by Quaid-e-Azam Solar (Private) Limited, which is being developed within the Quaid-e-Azam Solar Park, wherein the provincial government is supplementing non-EPC costs by providing land at concessionary rates, boundary walls, access roads, water for cleaning modules. On the other hand, project being developed outside the park will be incurring higher non-EPC costs and development costs by ensuring construction of boundary walls, security, access roads, water supply and privately arranging land at market rates.

   It is unclear from the Proposal as to what amenities are assumed to be included in the non-EPC project costs. Furthermore, in the case that these figures are based on the QA Solar Project's information it would be reasonable that projects being developed outside the solar park will be given an adjustment in the tariff on account of the non-EPC expenses which they would need to provide themselves such as boundary walls, roads, water etc.

2. **Proposed Financial Arrangements**

   a. **Flexibility required for various types of projects:** We note that the financing arrangement is assumed to be based on debt to equity ratio of 25:75. There is no discussion in the Proposal of any flexibility in this ratio.

      We note that the "Determination by the Authority In the Matter of Upfront Tariff for Wind Power Generation" dated 24 April 2013 provides, at page 20, that "*all companies are eligible to apply for this tariff, irrespective of their actual financing structure*".

   b. **Origin of Financing:** It appears from the Proposal that the tariff calculations is based on 100% local financing without accounting for the possibility of financing based on foreign or mixed (local and foreign) debt.

   c. **Compensation under the IA:** While in a cost plus mode of tariff determination the financing term sheet submitted to AEDB states the projected debt repayment schedule, in an upfront mode no such term sheet is submitted. Therefore, NEPRA is required to provide a projected repayment schedule in order to facilitate the calculation of 'debt component' compensation under the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

IA. As stated above, the option to avail local, foreign or mixed currency financing should be available.

3. Proposed Generation

Energy Cap: We note that the Proposal is based on a plant factor of 17.5%. Whilst there is no specific discussion of circumstances where the actual output exceeds the minimum output the excess energy we note that the earlier Determination of Upfront Generation Tariff for Solar PV Power Plants, dated January 21, 2014 ("**Solar FIT**") contained a mechanism for an 'energy cap' whereby a higher plant capacity factor would result in a reduced tariff.

If a similar adjustment mechanism were to be included in the Proposal, we feel that it would discourage project sponsors to opt for more efficient technology and solutions which are capable of higher energy output over longer period of time as compared to low energy yielding cheaper solar PV technology options (with high annual performance degradation).

Aiming for technology which only meets the minimum efficiency benchmarks often results in reliance on Asian technology and avoidance of European or US technology. As a result, this seriously limits the financing options available to project sponsors as they would be unable to avail financing from European or American financial institutions and other agencies providing credit on the basis of equipment form their region.

4. Tariff Provided in the Proposal

Indexations, Escalations and One Time Adjustments: We note that the tariff breakdown does not provide any information on indexations, escalations or onetime adjustments.

5. Choice of Power Purchaser

Another factor of key importance is the identity of the power purchaser. Currently, guidelines from NEPRA are interpreted to restrict the ability of CPPA to procure power at a voltage level lower than 132 KV (*ref: NEPRA letter no. NEPRA/R/LAG-60/7320 dated 28 April 2008*). Please note that as CPPA does not itself own transmission lines this rationale for requiring small projects to enter into an EPA with DISCOs is unfounded. In contrast, NTDC's transmission license specifically provides that any voltage levels may be considered for generation facilities connected directly or indirectly to the transmission system (ref: Article 2(4) of NTDC's transmission license).

Requiring a project to enter into an EPA with a DISCO would be a major roadblock for projects being developed on a project finance basis (particularly where the financiers are foreign entities), and would raise serious issues of 'bankability' as lenders have the following key concerns:

a. **Inadequate Experience**: DISCOs procure power in bulk from NTDC/CPPA and their primary operational focus is on enhancing and streamlining their distribution activities. Consequently, to-date the DISCOs have not entered into any power purchase arrangements with 'Independent Power Producers' (IPP). Therefore DISCOs do not have the requisite experience to efficiently negotiate or manage such contracts.

b. **Inadequate/Adequate Balance Sheets:** DISCOs lack the requisite financial capability to satisfy project lenders.

From a developer's perspective, NTDC/CPPA have the relevant industry experience, capacity and financial strength to ensure timely development of projects, for which negotiation of the power purchase contracts and demonstration of financial viability as off-taker are of key importance. Therefore in view of the developers' and lenders' concerns the only acceptable power purchaser will be CPPA.

6. **Land and Allocation**

As you may be aware, in the case of wind projects, the time gap in acceptance of the tariff and allocation of land severely set back timelines and deterred developers. We are aware that the Government of Punjab and AEDB are working to develop criteria for allocation of land in the Quaid-e-Azam Solar Park and in other sites earmarked for solar PV projects upon which technical feasibilities are being conducted.

7. **Condition for Opting for Tariff**

There is no discussion in the Proposal on the conditions for being eligible to opt for the new upfront tariff being proposed.

8. **Time Line for Achieving Financial Close**

While there is no mention in the Proposal of any timelines or deadline for achieving financial close by sponsors who opt for the proposed upfront tariff, such a deadline was stated in the Solar FIT whereby the sponsors would need to acquire financial close within twelve months (assuming that AEDB would have issued the standard EPA / IA within forty-five days required under the Solar FIT).

While such a twelve month deadline may be realistic for projects wishing to utilize PKR financing from the local financial market, it would be a very aggressive timeline for projects who are looking to secure foreign currency financing, given the exhaustive project information requirements and due diligence criteria. One such example is that foreign lenders require solar resource data from on-site ground stations (which in itself typically requires a minimum of 12 months' historical data).

Furthermore, the first step in achieving financial close is a detailed due diligence of the project documents and execution of EPA and IA, which as you will appreciate to date has not yet been made available to project sponsors and has been a cause for concern for those who opted for the Solar FIT. The Authority in its determination of the Solar FIT instructed the standard EPA and IA to be provided within 45 days of

the date of the tariff; however it is now 4 months over the deadline provided by NEPRA for this task.

9. Carrying Cost

While in a cost plus mode of tariff determination the financing term sheet submitted to AEDB states the projected debt repayment schedule, in an upfront mode no such term sheet is submitted. Therefore, NEPRA is required to provide a projected schedule in order to facilitate the calculation of 'debt component' compensation under the Implementation Agreement. As stated above, the option to avail local, foreign or mixed currency financing should be available.

10. Pre-COD Sale

We note that there is no discussion in the Proposal of allowance of pre-COD Sale.

11. Carbon Credits

We note that there is no discussion of allocation of carbon credits in the Proposal. We also note that the solar FIT makes reference to the RE Policy 2006 in regard to allocation carbon credits between the power purchaser and power producer. However, we note that a considerable number of projects do not opt for registration in the carbon credits regime as the administrative costs associated with the registration process often outweigh the benefit. It is advisable that NEPRA and the facilitating agencies revisit the approach to carbon credits in order to encourage projects to register for the scheme.

4. Filing of Comments

4.1 In response to the Notice of Hearing, comments were received from the following:

12. Asia Petroleum Limited
13. Janpur Energy Limited
14. Total Energies Nouvelles Ventures
15. Punjab Power Development Board
16. China Power International New Energy Holding Limited
17. Government of Sindh (Energy Department)
18. Access Solar (Private) Limited.

Asia Petroleum (Commentator)

4.2 Asia Petroleum filed following comments for the consideration of the Authority:

a) APL has recently submitted a proposal to Punjab Power Development Board to establish a 30 MW plant. NEPRA (Authority) is therefore requested to either include specific 30 MW capacities or allow range of capacities to include 30 MW projects opting for upfront tariff.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

b) The capital costs as well as operations and maintenance costs for power plants do not vary proportionately with size of the plant due to impact of fixed costs / expenditure. We therefore request Authority to consider this impact.

c) The spread over KIBOR considered by the Authority is 300 bps as compared to spread of 350 bps allowed in upfront tariff for Coal Power Plants and previous upfront tariff determined for Solar Power Plants. Considering Solar Power is still nascent in Pakistan; high returns offered on Government Bonds and spread of 350 bps allowed in other upfront tariffs determined by the Authority, arranging financing at this rate may become difficult.

Janpur Energy Limited (Commentator)

4.3 Janpur Energy Limited filed following comments for consideration of the Authority:

a) **Cap on Tariff Availability:** While there is no mention of any limit on total approvals that NEPRA may consider under the underdevelopment upfront tariff, there was a cap of first 50MW that was stated in the Determination of Upfront Generation Tariff for Solar PV Power Plants, dated January 21th, *2011* **("Solar FIT").** Given that there are in excess of 1,000 MW worth of LOIs issued and under evaluation / process by AEDB and various provincial power boards, we feel that in order to allow all project sponsors an equal opportunity to benefit from tile upfront tariff regime, NEPRA should take this reality in to its consideration when deciding on a cap On total approvals.

b) **Plant Factor:** We refer to Point 1. (v) of Notice of Hearing which mentions a plant factor of 17.5% for the determination of the electricity produced out of a solar PV plant. While there is no mention that the Tariff proposed in Point 1. (vi) would be capped to this capacity factor, we would like to draw your attention to the adjustment mechanism for capacity facto' higher than 17.5% stated in the Solar FIT. If a similar adjustment mechanism were to be included in the Proposal, we feel that it would discourage project sponsors to opt for most efficient and latest solar PV technology, such as solutions which utilize mono-crystalline silicon cells and single access tracker system. Capable of higher energy output over longer period of time as compared to low energy yielding cheaper solar PV technology options with high annual performance degradation currently available in the market. Furthermore, such a provision would also limit attractive foreign currency financing options available to project sponsors as they would be unable to tap financing from US or European multi-lateral agencies, export credit agencies, and other international lenders who often only extend credit to projects where equipment and services are being sourced from their country of domicile.

c) **Proposed Financial Arrangements:** We refer to Point 1 (iv) of Notice of Hearing, which mentions Mark-up rate of 6 Month KIBOR (10.09%) plus 300bps (3%). This would imply that the Tariff calculation in Point 1 (vi) is based on 100% PKR financing basis. We request that, as done for precedent upfront tariffs, the Authority to also derive Tariff on 100% foreign currency financing and mixed PKR and foreign currency financing options. Furthermore, we request the Authority to allow flexibility to project sponsors to opt

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

for upfront tariff and confirm financing currency and mix once firm financing offers / lender approvals are in place as opposed to confirming at time of application for the upfront tariff. As you will appreciate, this will allow for changes in market conditions where certain financing options may not be available due to exogenous factors, which are beyond the control of the project sponsors.

d) **Deadline for Financial Close post approval by NEPRA of upfront tariff application by sponsors:** While there is no mention in the Proposal of any timelines or deadline for achieving financial close by sponsors who opt for the proposed upfront tariff, there was such a deadline stated in the Solar **FIT** whereby the sponsors would need to acquire financial close within 12 months (assuming that AEDB would have issued the standard EPA / IA within 45 days required under the Solar **FIT).**While such a deadline may be realistic for projects wishing to utilize PKR financing from local bank market, it is our opinion that it would be very aggressive for projects who are looking to secure foreign currency financing given exhaustive project information requirements and project due diligence criteria, such as solar resource data from on-site ground station (which in itself typically requires a minimum of 12 months historical data), in addition to longer processing time for approvals of international lenders. Furthermore, the first step in achieving financial close is a detailed due diligence of the project documents and execution of EPA and IA, which as you will appreciate to date has 3rot yet been made available to project sponsors and has been a cause for concern for those who opted for the Solar FIT. The Authority in its determination of the Solar FIT instructed the standard EPA and IA to be provided within 45 days of the date of the tariff; however it is now 4 months over the deadline provided by NEPRA for this task. We, therefore, request the Authority to take these observations into account in its development of the new upfront solar tariff and ensure that (I) the timeline for achieving financial close is triggered only once the standard EPA and IA are available; and (ii) the timelines for financial close are realistic to avail foreign or mixed currency financing.

e) **Compensation mechanism under IA:** While in a cost plus mode of tariff determination the financing term sheet submitted to AEDB states the projected debt repayment schedule, in an upfront mode no such term sheet is submitted. Therefore, NEPRA is required to provide a projected schedule in order to facilitate the calculation of 'debt component' compensation under the IA. As stated above, the option to avail local, foreign or mixed currency financing should be available. Therefore, accordingly a debt repayment schedule for all three types of financing should be provided -- foreign, local and mixed currency financing.

f) **Carrying Cost:** As you are aware in the case of any pre-COD delay on account of the power purchaser a carrying cost (for interest during construction) is paid to the project company under the EPA. As per precedent upfront tariffs, such a carrying cost should be specified in the proposed upfront tariff.

g) **Allocation of Land:** As you may be aware, in the case of wind project developers the gap in acceptance of the tariff and allocation of land severely set back timelines and

deterred developers. We are aware that the Government of Punjab and AEDB are working to develop criteria for allocation of land in the Quaid-e-Azam Solar Park and in other sites earmarked for solar PV projects upon which technical feasibilities are being conducted. We would request that such a land allocation mechanism be developed at the earliest possible so that projects wishing to aggressively meet timelines are able to do so and necessary provision is made in the new upfront tariff to allow for any delays related landing allocation.

Total Energies Nouvelles Ventures (Commentator)

4.4 Total Energies Nouvelles Ventures submitted following comments for the consideration of the Authority:

Refer to point 1(v) of Notice of Hearing which mentions a basic plant factor of 17.5% for the determination of the electricity produced out of a given solar PV plant. While there is no mention that the tariff proposed in Point 1 (vi) would be capped to this capacity factor, we have, however, noted that an adjustment mechanism for capacity factor higher than 17.5% existed in the Determination of Upfront Generation Tariff for Solar PV Power Plants, released on January 21th, 2014, and applicable to 1-10 MW solar projects. If a similar adjustment mechanism was to be included in the underdevelopment upfront solar tariff, Total/SunPower would not be in a position to consider investment in Pakistan's solar sector under the Upfront Solar Tariff regime.

We would like to highlight to the regulator NEPRA a couple of explanatory points to help articulate our point of view

a) A PV power plant's capacity factor is a key driver of a solar project's economics. It is a function of (1) the irradiation at the project location; (2) the performance of the PV panel (primarily as it relates to high temperature performance); (3) the orientation of the PV panel to the sun; (4) the system electrical efficiencies; and (5) the availability of the power plant to produce power.

b) SunPower solar cells, panels and systems present the highest efficiency and highest reliability available today on the market given any level of solar irradiation. Typically, while conventional technology would consider a capacity factor of 17.5%, SunPower technology, which is proven both commercially and technically for large utility scale installations, could reach a capacity factor of 23%; which means that, for a given installed capacity (MWp), SunPower technology would increase energy production (MWhr) by more than 30%. For a 100MWp project, for the first year, typical plant would produce 153,072 MWhr, while SunPower plant would produce 202,300 MWhr.

c) The increased performance of SunPower technology not only means more electricity generated per MW capacity installed but also requires less land for plant installation as compared to other solar PV technologies available in the market today: up to 30 % less land required.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

Given the above, applying a cap on the output energy based on a capacity factor of 17.5% would downgrade significantly the economics of solar project built with high efficiency solar panels and other key balance of plant equipment and would discourage project sponsors from investing in market leading and most efficient solar PV technology in Pakistan.

Punjab Power Development Board (Commentator)

4.5 Punjab Power Development Board (PPDB) submitted the following comments for consideration of the Authority.

a) Economics of Project's CAPEX Estimation: The SPV based power project's costs encompass both 'Module' and Balance of System (the "BoS") costs. The Modules constitute 40-60 % of the cost while the BoS comprises the rest. It is not out of place to mention that BoS and installation costs may vary significantly. Thereby, when costs for site preparation, laying foundation, system design, engineering, assembly and installation labor are higher, total installation costs increase correspondingly.

It has been witnessed that from 2010 and onward, increase in global PV manufacturing capacity and reduction in demand due to global recession has resulted into decline of SPV module's price. Most of the international studies reveal that the prices of solar components continue to drop moderately. Eventually, keeping in view, relatively favoring economics of SPV based IPPs, the Authority, in its previous, first of ever, SPV based Upfront Tariff determination (of 14th January 2014) for 10 MWp IPPs, arrived at below tabulated CAPEX/MWp:

Description	Amount (M USD)
EPC Cost	1.693
Non EPC & Project Development Cost	0.132
Insurance during Construction	0.013
Total	1.838

The Hearing Notice provides below given estimates of CAPEX/MWp:

Description	Amount (M USD)
EPC Cost	1.567
Non EPC	0.019
Project Development Cost	0.037
Insurance during Construction	0.010
Total	1.633

It is pertinent to mention that M/s Quaid-e-Azam Solar Power (Private) Limited (the "QA Solar") vide letter bearing No.QAS-14/06/19-03 of 19th June 2013 (copy

enclosed), addressed to Deputy Registrar NEPRA and copy to Managing Director PPDB as well, reveals following estimates of CAPEX/MWp:

Description	Amount (M USD)
EPC Cost	1.359
Non EPC	0.019
Project Development Cost	0.037
Insurance during Construction	0.010
Total	1.425

Thorough scrutiny of the contents of afore-mentioned QA Solar letter vis-à-vis Hearing Notice transpires that the impact of rebate, allowed by the EPC Contractor to QA Solar, as a good will gesture to people of Pakistan, has been ignored altogether under head EPC Cost component (i.e. USD 1.359/MWp) of the CAPEX. Therefore, CAPEX of USD 1.633/MWp, while ignoring impact of said rebate, seems to be a reasonable cost estimate under this head. However, the Authority may further investigate the prudence of these estimates, upward and/or downward, because such types of negotiation leverages available to QA Solar may not possibly be in the reach of other private power producers. Since, the Hearing Notice discloses development of Upfront Tariff by the Authority for varying magnitudes of capacity (i.e. 10/20/50 and 100 MWp), therefore practicality of above CAPEX (i.e. USD 1.633/MWp for 100 MWp project), warrants further due diligence with respect to power projects of lesser capacities by applying principle of economies of scale.

b) Project's Financing Arrangements: Financing Mix (debt to equity ratio) of 75:25 has been divulged in the Hearing Notice. In this regard, we understand that minimum and maximum equity injection into the project may be capped to 20% and 30% respectively, without imposition of any limitation on the higher side, subject to treatment of equity exceeding 30% of the total project capital cost as debt.

c) Equity Financing Cost of Capital: The Hearing Notice does not mention reckoning of any Rate of Return on Equity (RoE) about equity component of the project's capital cost. Previously, NEPRA has been allowing, 17% RoE (IRR based) net of 7.5% With-holding Tax on dividend, resulting into an ultimate nominal RoE of 18.38%. Conventionally, RoE of 17%, being allowed with the intention to promote development of renewable energy based IPPs, was 2% more than permitted by the Authority in case of thermal power projects. Now, in the recent past, the Authority has also allowed 18% RoE (IRR based) net of 7.5% With-holding Tax on dividend, for renewable energy based IPPs. This results into an ultimate nominal RoE of 19.46%.

In view of the above, it is, suggested that the Authority, in the instant case, may also consider allowing of 18% RoE (IRR based) to promote development of SPV based IPPs in the country. However, With-holding Tax on dividend may not be treated as a Pass-through item in line with the recently announced coal based upfront tariff.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

d) Debt Financing Cost of Capital: The Hearing Notice discloses reckoning of local debt financing cost of capital based on bi-annual KIBOR (10.09%) plus a spread of 300 bps. In this regard, it is suggested that the Authority may consider allowing of LIBOR plus a spread of 450 bps and KIBOR plus a spread of 350 bps for foreign and local based debt financing respectively in line with the recently announced tariff determinations. Moreover, savings, if any, in the premium may be specified for sharing between the power purchaser and the power producer in the ratio of 60:40 respectively.

e) Financial Fees and Charges: The Hearing Notice provides an amount of USD 2.329 M on this account without specifying rate therefore on debt component of the project's capital cost. Apparently, it reckons to be about 2% of the assumed debt, which undoubtedly seems to be on very lower side. Normally, financial institutions do not provide loan/debt with such lesser charges under this head of account.

In this regard, it is suggested that the Authority may consider allowing of Financial Fees and Charges @ 3.5% of the debt component of the project's capital cost in line with its earlier tariff determinations about different technologies.

f) Upfront Tariff for varying magnitudes of capacity: The Hearing Notice specifies development of Upfront Tariff for 100, 50, 20 and 10 MWp power projects. In this regard, following ranges of capacity in terms of MWp are suggested for development of Upfront Tariff:

i. Up to and equal 10 MWp
ii. Above 10 MWp and up to 50 MWp
iii. Above and equal to 100 MWp

Keeping in view, interconnection modalities about these ranges of capacity, it is pertinent to mention that in case the power purchaser requires interconnection at a voltage level other than 11 kV, cost for additional power producers' interconnection equipment is required to be adjusted in the CAPEX of the Upfront Tariff.

g) Project's Construction Period: The Hearing Notice depicts IDC amounting to USD 7.943 Million without mentioning of project's construction period. We understand that keeping in view peculiarities of varying magnitudes of capacity in terms of MWp, construction period of 12 months and 8 months suffices the requirement for and above 50 MWp capacity and below 50 MWp SPV based IPPs respectively.

h) Adjustment about Module's Degradation Factor: Aging/degradation of SPV modules has a substantial impact on the total electricity that a SPV system can produce over its economic lifetime. Normally, manufacturers provide guarantee with respect to modules' performance along with a definite margin of safety and for design purpose. Therefore, there may be no degradation impact during initial years (may be first 2-3 years). We understand that quality of modules is of immense importance and is directly proportional to incidental aging/degradation factor. It may range from 0.50% to 0.70% and even above, in certain cases, depending upon quality of the SPV modules. The Authority, in its previous SPV based Upfront Tariff determination (of

14th January 2014) for 10 MWp IPPs, resolved for treatment of modules' aging/degradation impact under the Energy Purchase Agreement. As an alternative to this arrangement, we understand that modules' aging/degradation impact may also be reckoned in the CAPEX at the time of development of Upfront Tariff by considering an additional modules' cost per year as against modules' degradation during project's operational period.

i) Project's Operational Cost Estimation: The Hearing Notice provides an amount of USD 73,786 M under this head of account for 25 years project's lifetime, without specifying its further segregation into O&M and Insurance Cost components. Accordingly, it is suggested that the Authority may consider allowing of its already established benchmarks for these components of the tariff. However, it is also requested that quality of SPV system and resultant CAPEX may also be taken into account while arriving at these benchmarks.

j) Clarity about Power Purchaser: It has been observed that SPV based IPPs having capacity below than 50 MWp, either under facilitation of PPDB or AEDB are facing difficulties regarding ultimate "Power Purchaser". NTDC and its allied entity CPPA refers these IPPs towards DISCOs whereas DISCOs are of the view that NTDC/CPPA has to take care of these IPPs as the "Power Purchaser. In this regard, it is suggested that keeping in view capacity of DISCOs to deal with such type of unique business, CPPA, by virtue of its mandate under "Generation License" of NTDC granted by NEPRA, may be made responsible to deal with these IPPs on behalf of DISCOs irrespective of size of the plant. NTDC/CPPA and respective DISCO may arrive at a mechanism to deal with their bilateral technical and commercial concerns without any interference on part of the power producer.

k) Carbon Credits: The Hearing Notice does not mention any treatment in the tariff calculations with respect to operational period's proceeds emanating from Certified Emission Reductions. We understand that such proceeds are required to be distributed between power producer and power purchaser in accordance with the stipulations of the federal RE Policy-2006.

<u>China Power International New Energy Holding Limited (Commentator)</u>

4.6 China Power International New Energy Holding Limited (CPINE) filed the following comments for the consideration of the Authority:

a) According to CPINE's experiences in power development, construction and operation in China, it costs USD 140 Million to build up a similar solar power plant in China. Based on our market research in Punjab, to invest in Pakistan as a Chinese investor, we will have to incur much higher project costs for labor force, material and transportation, comparing to doing the similar projects in China. Furthermore, extra expense for security and insurance lay upon us. For example:

- Labor cost for hiring Chinese labor is twice as much as that in China.

- Rebar unit price in China is 601USD/t, while in Punjab it is 907USD/t.
- Cement unit price in China is 51.6USD/t, while in Punjab it is 120USD/t.
- Main Local raw material for construction is more than 1.5 times as much as that in China in general.
- Transportation cost accounts for 5.5% of equipment cost, with route from China port to Karachi port, and then to project site.
- For loan from Chinese banks, loan insurance and investment insurance from Sino sure are both required, 8% and 2.89% of total project costs respectively.

Considering all the above and through our careful estimation, project costs would be USD187.95 Million as per the detailed project. During operation, expense for labor, security and repairs are all higher than Chinese domestic level. For example:

- Wage and benefits for Chinese management personnel are 2 times as much as that in china.
- High ambient temperature in Cholistan and low temperature difference between day and night bring negative impacts on operation of PV module and other main electrical elements, leading to higher replacement rate of equipment and higher repair costs.

b) It's one company's comprehensive project investment ability, rather than the origin of the loan, to decide whether high or low loan rate can be achieved. It's also where the fundamental interests of one company rests. Hence, tariff should not be adjusted because of loan rate differences; otherwise the investors would lose interests of investment.

c) The proposed construction time is 18 months. CPINE will try the best to accelerate the process. We promise that with the assured Equity IRR 17% as a basis, tariff could be adjusted according to the actual construction time,

d) Your Authority is requested to determine the tariff to be denominated and settled in USD, for our risk estimation.

e) Whether there would be withholding tax of dividend repatriation for China-Pakistan economic corridor projects is unknown at present. If it exists, tariff should be adjusted accordingly.

f) If the announced upfront tariff for 100MW/5OMW/20MW/10MW solar power projects after public hearing is quite different from what we calculate and estimate, does your Authority accept tariff negotiation with us?

g) All in all, CPINE finalizes its tariff calculation based on our own project experience in China, our diligent market research in Pakistan and the commitment from your government. If the actual project costs in the end after construction is quite different from the original estimation, we promise to adjust the tariff accordingly,

For CPINE, to ensure 17% Equity IRR is the requirement from company board for investing in overseas projects. Otherwise,

- No obvious investment advantages and attractions can be shown in doing projects in Pakistan comparing to doing similar solar power projects in China.
- Furthermore, there would be no chance of getting this project approved in our company's board meeting.

Government of Sindh (Commentator)

4.7 **Government of Sindh (Energy Department)** in its comments submitted that the proposal of upfront tariff for various categories is supported with the request for early determination of upfront tariff.

Access Solar (Private) Limited (Commentator)

4.8 **Access Solar (Private) Limited** filed the following comments for the consideration of the Authority:

a) **Non-EPC Cost/Development Cost:** We note that the information provided in the Proposal is based on a project that will be developed in the Quaid-e-Azam Solar Power Park (the "**Solar Park**").

We note that the projects to be developed within the Solar Park will benefit from the infrastructure already in place at the Solar Park and such a project will further be leasing the land at a concessionary rate from the provincial government. Whereas any solar power project developing outside of the park will be incurring higher non-EPC costs and development costs by ensuring: (i) the construction of a boundary wall; (ii) that security staff are hired; (iii) paving an access road; and (iv) arrangements for water supply for the cleaning of modules, etc.

We note that the tariff does not specify the adjustment in the tariff to be provided for projects which will be developing outside of the Solar Park. We therefore request that the Authority adequately adjust the Proposal for projects being developed outside of the Solar Park so that all solar power project developers, whether being developed within the Solar Park or otherwise, may have the benefit of an even playing field.

b) **DISCOs and Fast-track Projects:** The Authority will appreciate that one of the key reasons for inducting solar power is that a solar power facility can be connected to grid within six (6) to eight (8) months of the project achieving financial close as against the much longer construction period involved with other technologies.

Currently, guidelines from NEPRA are interpreted to restrict the ability of the Central Power Purchasing Agency (the "**CPPA**") from procuring power at a voltage level lower than 132 KV (*ref: NEPRA letter no. NEPRA/R/LAG-60/7320 dated 28 April 2008*). Please note that as CPPA does not itself own transmission lines, this rationale for requiring small projects to enter into an EPA with DISCOs is unfounded. In contrast, NTDC's

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

transmission license specifically provides that any voltage levels may be considered for generation facilities connected directly or indirectly to the transmission system (ref: Article 2(4) of NTDC's transmission license).

Requiring a project to enter into an EPA with a DISCO would be a major roadblock for projects being developed on a project finance basis (particularly where the financiers are foreign entities), and would raise serious issues of 'bankability' as lenders have the following key concerns:

(i) **Inadequate Experience**: DISCOs procure power in bulk from NTDC/CPPA and their primary operational focus is on enhancing and streamlining their distribution activities. Consequently, to-date the DISCOs have not entered into any power purchase arrangements with 'Independent Power Producers' (IPP). Therefore DISCOs do not have the requisite experience to efficiently negotiate or manage such contracts.

(ii) **Inadequate Adequate Balance Sheets:** DISCOs lack the requisite financial capability to satisfy project lenders. From a developer's perspective, NTDC/CPPA have the relevant industry experience, capacity and financial strength to ensure timely development of projects, for which negotiation of the power purchase contracts and demonstration of financial viability as off-taker are of key importance. Therefore in view of the developers' and lenders' concerns the only acceptable power purchaser will be CPPA. In light of the above, we request NEPRA to expeditiously issue a clarification / addendum that allows for the purchase of power by NTDC/CPPA on behalf of the DISCOs for projects under50MWp connecting to a grid of any voltage (11 kV or 132 kV).

5. Framing of Issues

5.1 In the light of comments/intervention requests submitted by the stakeholders, the Authority decided to hold a 2nd hearing in the matter on 8th September 2014. Notice of hearing along with the issues framed for the hearing was made public in national newspapers on 27th August 2014. Individual letters were also sent to all concerned including the interveners and the commentators. The following issues were framed for the hearing:

i) Whether the project cost of US$ 1.73 million/MW is reasonable?

ii) Whether US$ 25,000 / MW is a reasonable estimate of cost for land, boundary wall, water supply, access roads and security for the projects outside the project areas developed by the Government?

iii) Whether the sharing mechanism of excess energy, provided in the existing Upfront Tariff, is justified?

iv) Whether the existing benchmark of annual O & M cost of 1.5% of EPC cost is reasonable and justified?

v) Whether the 8 months construction period is reasonable?

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

vi) Whether the issue raised by the intervener regarding the affordability of the high tariff of solar power plants is reasonable and justified?

vii) What should be the reasonable level of induction of solar energy in the system in accordance with the Notified Grid Code?

6. Filing of Comments on the Issues Framed for the Hearing

6.1 In response to the Notice of Hearing, comments were filed from the following:

i. Anwar Kamal Law Associates
ii. ET Solar International Co. Ltd.
iii. Asia Petroleum
iv. Government of Sindh (Energy Department)
v. Burj Capital UAE
vi. StormHarbour
vii. Zhenfa Energy Group co., Ltd.
viii. IPS Private Limited.

Anwar Kamal Law Associates (Intervener)

6.2 **Mr. Anwar Kamal** submitted following comments:

a) Whether the project cost is reasonable?

It is submitted that the Project Cost is not justified, being on the grossly higher side. It appears that the Model being used is the Quaid-e- Azam, Solar Power (Pvt) Limited. This is most inapt as it is a Government owned Company and none of the figures cited are verifiable or appear to have been verified by the Authority. It is requested that the Authority may have an independent verification of the figures carried out in the consumers' interest prior to a decision of this Issue.

b) Whether US $ 25,000/MW is a reasonable estimate of costs for land, boundary wall, water supply access roads and security for the projects outside the project areas developed by the Govt.?

This Issue leads to the question whether $ 1.73 million/ MW includes $25,000/MW? If not, what does this $ 25,000/MW reflect? Secondly, what are the costs in the Govt. Project areas? Thirdly, what concessions are being allowed in Government Project Areas and what is their nature? Fourthly, is the Government of Punjab the 'Single Buyer' of the Power that will be produced? It appears that all Pakistani consumers will be affected beneficially, while consumers in the Punjab will be footing the bill in the form of concessions in the cost of land, roads etc. It is submitted that $25,000/MW is not a reasonable estimate of such costs.

d) Whether the sharing mechanism of excess energy, provided in the existing Upfront Tariff, is justified?

In response to this Issue, it is submitted that since already very expensive technology is being considered with a high rate of return, the benefit of excess energy should go to the consumers through the Power Purchaser. The question is how is this to be managed? Since per unit cost would stand reduced, the benefit should obviously go entirely to the consumers.

e) Whether the existing benchmark of annual O& M cost of 1.5% of EPC cost is reasonable and justified?

It is submitted that this is not justified. As there are no moving parts, the 0&M should be much lower. Moreover 1.5% of EPC cost is a percentage, not a specific number. It is not prudent to allow 0&M as a percentage, especially since the O&M break up has not been given.

f) Whether the 8 months construction is reasonable?

The Authority needs to compare this with International Best Practices.

g) Whether the issue raised by the intervener regarding the affordability of the high tariff of solar power plants is reasonable and justified?

As submitted above, the most important question is that of affordability. The 1st ten years could break the back of the consumers in the existing scenario.

The question is who is asking for this Upfront Tariff: Q-e-Solar/PPDB? It is not affordable as parallel Investment in Base Load Plants is a must. Desires/ Wishes notwithstanding, the question of affordability has to be answered today! Not left for tomorrow.

What securities are going to be there in the proposed Contracts? The examples of Japan Power and Saba Power (250/300 MW) with Plant Capacity paid are there, No power is being supplied today.

At whose risk & cost in the Procurement going to take place? Is the Regulator's approval understood/guaranteed? The principal question is one of 'Timing'. Is induction now or later feasible? Where is the study/analysis?

h) What should be the reasonable level of induction of solar energy in the system in accordance with the Notified Grid Code?

"Notified Grid Code": what does it mean? Has the Grid Code been published in the Newspaper or in the Official Gazette? Have the questions of 'Connectivity' and 'System Stability' been addressed? It is a relative decision relating to Economics. For example the Grid Code allows it, but we still do not take HSD Electricity, simply because we cannot afford it.

The Grid Code talks of technical acceptance of any technology, including Solar on account of their specific technology characteristics and behavior. But in the modern age, economics is the main tool for consideration in deciding the issues. The quantum of Solar Energy to be inducted in Pakistan's Power System should be decided on the basis of economic affordability. Inter connection to evacuate power from any of the Power

Producers is most important. While Projecting Project costs, the financial cost of interconnection/ power evacuation infrastructure must be calculated.

Kindly bring it to the attention of the Authority that I am not a technical or financial expert in these matters. While the Investor is allowed re-imbursement through tariff for payments made to consultants/lawyers, the Authority is mandated by law to protect the consumers' interest. I have only laid some material points before the Authority, which has to ensure due diligence, R&D and prudent costs.

ET Solar International Co. Ltd. (Commentator)

6.3 ET Solar International Co. Ltd. submitted following comments for the consideration of the Authority:

a) Whether the Project cost of $1.73 M/MW is justified: In our considered opinion project cost of $1.73 M is reasonable only for large scale projects that are in range of 100 MW. The Authority needs to consider having different set of project cost based on size of projects. We would recommend that four category of project size should be set up for tariff. The size of projects that make economic sense can be: 140 MW; 11-25 MW; 26-50 MW; and 51-100 MW. The project costs differ because of economies of construction. A reasonable project cost for 10 MW plant should be $ 1.85M/MW; for 25 MW plant project cost should be $ 1.81M/MW; for 50 MW a reasonable project cost should be $ 1.77M/MW; and for 100 MW size solar plant $1.74M/MW. The supposedly slightly higher tariff for smaller solar plants is more than offset by the government not having to build / construct / invest in supporting infrastructure for evacuation of energy and minimal technical losses.

b) Whether $ 25,000/MW is reasonable estimate of costs for land, boundary wall, water supply, access roads, and security for projects: during past 6 months our team has made several trips to Pakistan to look at lands available for solar projects, the costs of such land and cost of constructing required infrastructure. If government is not providing land at concessionary rates and constructing, there is no way that the items listed under this head can be achieved at price of $ 25,000/MW. We have found that cheap non-agriculture barren land costs around $ USD 3,000 per acre. The cost of brick wall is around PKR 11,000/m. Solar plant of 1 MWp will require around 180m length of wall. Our survey shows that a 4m wide road for $0 Ton Load Trailer would cost around Rs. 15,000 to 20,000 per Meter. You will have to assume a length of Access Road and it will be same irrespective of size of Plant and cannot be expressed in terms of per MWp. Water supply is dependent on number of variables - location, quality, depth of water table etc. It is very difficult to price this item without Site information.

c) Whether sharing mechanism of excess energy provided in existing upfront tariff is justified: since the government is not guaranteeing any minimum energy production and the downside risk is entirely on sponsor / investor, the benefit of upside, if any, should also go to the investor. However, we can see the merit that if there is significant upside

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

then the Pakistan consumers should share some benefit. We, therefore feel that upside benefit up to 4% should be to the account of the investor and anything above it can be shared.

d) Whether the existing benchmark of annual O&M cost of 1.5% of EPC cost is reasonable: based on our experience of operating solar plants in various countries as well as cost estimates we have carried out in Pakistan, we find that it is not at all possible to cover all O&M costs in budget of 1.5% of EPC cost for smaller size projects. The Authority should keep in view the fact that solar IPP is nasant industry in Pakistan. Spare parts that are required to keep the plants operational on 24/7 basis are not available in stock in country; each project developer will have to keep a decent size spare parts inventory which increases O&M budget. Non-availability of solar technical trouble shooting expertise in Pakistan is another factor that should be kept in view. Sponsors need to keep a reasonable budget for travel/hotel of technical staff which may be required to be flown from abroad from time to time during the term of EPA. It should be noted that many expenses such as project office rent, car/driver/fuel, office support staff, utility bills, etc remain more or less the same whether plant is of 10 MW or 100 MW. We, therefore, request that the Authority should consider allowing O&M costs for a 100MW at 1.75% of EPC. For 50MW plant the O&M should be 1.95% of EPC, for 25 MW solar plants the O&M should be 2.30 % of EPC and for 10 MW plants it should be 2.50% of EPC cost. After the first 200-300 MW of solar IPP's have been in operation in Pakistan the O&M cost will certainly come down. The Authority should consider lower O&M after at least 300 MW of plants have been in operation for at least 5 years.

e) Whether 8 month construction period is reasonable: we feel that 8 months is reasonable for smaller projects but for larger size solar projects (50MW plus size) the construction period allowed should be 12 months.

f) Whether the affordability of higher solar tariff of solar plants reasonable/justified: Solar plants will have minimal impact on overall average basket price due to fact that Solar Power Plants have low plant factor — average 18%. . Based on Pakistan's generating capacity of 5,000 MW, the 50 MW upfront tariff capacity that the Authority has allowed represents only 0.33% of the total capacity. The 50 MW plants will generate power during the day only and will be representing a meager 9 MW of capacity on average during the year. This means only 0.06% of the total 15,000 MW capacity. In reality, the overall tariff is affected at the 3rd decimal place as can be seen from computations below which we have carried out on basis of data available on NEPRA website. Our computations show that the Average Tariff projected by NEPRA for the Year 2013-14 is PKR 10.694/kWh. After induction of 50 MW solar (effectively 9 MW) the Projected Average Tariff will increase PKR 0.0049/kWh.

The table below provides you with the impact which different levels of addition of solar will have on tariff. For example induction of 500 MW of solar will result in increasing

the average tariff in Pakistan by PKR 0.048; induction of 1,000 MW of solar will still have less than 1 Paisa (0.096) on the national tariff.

MW Installed	Change in Tariff (PKR/kWh)
50	0.005
100	0.010
200	0.019
300	0.029
400	0.039
500	0.048
1000	0.096

g) What should be reasonable level of induction of solar energy in system: we are not in knowledge about the Grid constraints in Pakistan. For a country that is embarking on opening up solar sector for IPP's we feel that a reasonable limit would be 1,000 MW in 18 months throughout the country. *It would be interest of stability of Grid system that the total solar capacity is disbursed throughout the country and not concentrated at one location /area.* It will be prudent to distribute the total solar capacity in provinces according to load/demand. We would also recommend that no single sponsor should be allowed more than 50 MW. This we are suggesting to eliminate performance risk of the sponsors and allow healthy completion among larger number of sponsors.

Asia Petroleum Limited (Commentator)

6.4 Asia Petroleum Limited submitted following comments for the consideration of the Authority:

i. Whether the Project cost of US$ 1.73 million / MW justified?

The amount of US$ 1.73 million has been based on the information obtained from QA Solar (Pvt.) Limited which is an IPP of 100 MW. We reiterate our comment that project cost per MW of smaller projects will be higher as the large projects will benefit from volumetric discounts. Further, cost of equipment do not vary proportionately with the project size such as most of the AC power system of the plant including substation, switchgear, transformers, earthling and surge protection and plant controlling, monitoring and metering systems including SCADA, etc..

ii. Whether US$ 25,000 / MW is a reasonable estimate of cost for land, boundary wall, water supply, access roads and security for the projects outside the project areas developed by the Government?

Except for the cost of land, according to our estimate the amount will be adequate for all the other costs mentioned in the notice.

iii. Whether the sharing mechanism of excess energy, provided in the existing upfront tariff, is justified?

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Existing mechanism favors power purchaser only. Under the current mechanism, all risks of lower output including due to lower solar irradiation are to be borne by power producer while the benefit of higher output is to be shared between power producer and purchaser.

The Plant capacity factor of 17.5% for South region will be achieved in initial years. However, due to 0.7% degradation in panel efficiency every year, the capacity factor will not be achievable after five to seven years of commercial operations. In the initial years, when the output is higher than the capacity factor of 17.5%, the benefit will be shared while in later years, the loss due to lower capacity factor will be completely borne by the power producer. We believe that an equitable and a mutually beneficial mechanism should be devised. We suggest following mechanisms:

- both the profits and losses should be shared between power producer and power purchaser; or
- benchmark plant factor should be set at expected average plant factor over the 25 years period.

iv. Whether the exiting benchmark of annual O&M cost of 1.5% of EPC Cost is reasonable and justified?

NEPRA has reduced the amount of O&M even from the information published in notice for 1st hearing. The Authority should consider that large portion of the total O&M cost is human resource cost which is largely fixed and almost same for both larger and smaller plants. Therefore, defining the same percentage for all sizes of plants does not seems to be justified and according to our estimate, O&M cost for a 30 MW plant will be approximately 3% of the of the EPC cost.

v. Whether the 8 months construction period is reasonable?

The construction period of eight months was considered by the Authority in its previous upfront tariff determined for projects up to 10 MW. The period is appropriate for a 10 MW plant. However, a larger sized plant may require a longer construction period. Therefore, a range from eight to twelve months shall be defined in the upfront tariff for projects of 10 MW to 100 MW.

iv. Whether the issue raised by intervener regarding the affordability of high tariff of solar power plants is reasonable and justified?

Country is facing severe power deficit, resulting in losses of billions of Rupees annually in lost output. If the other economic impacts of hampered growth rate, closure of industry and unemployment are considered, the aggregate losses to the economy would be colossal. Solar Energy Plants with their short construction period will help in reducing some of the deficit in a shorter period of time.

Cost of generation of solar power is well below the inefficiently run GENCO's running on furnace oil where the cost per units goes up to more than Rs 30 per unit with only the fuel cost component being more than Rs 23. Moreover, generation cost of furnace oil plants is heavily dependent upon fuel prices which considering the past trends have

increased manifolds. Whereas, solar plants, with no fuel requirement will not shut down due to fuel non availability nor is there any chance of fuel theft. Furthermore, fuel based plants which are dependent on imported fuel result in continuous outflow of foreign exchange throughout their life.

Solar power is environment friendly with zero emissions and is supported by most multilateral funding agencies. Furthermore, introduction of solar plants will also help in propagating the clean technology in the country especially in the far flung areas where national grid is not available.

Government of Sindh (Commentator)

6.5 Government of Sindh (Energy Department) submitted following comments for consideration of the Authority:

a) The project cost may be rationalized keeping in view the type of solar panels.

b) The US$ 25,000 /MW may needs to be rationalized as the solar projects are recommended on barren lands and not the fertile agricultural.

c) Regarding the sharing mechanism GoS suggested no sharing. They further added that under the RE Policy, the excessive energy is being purchased by power purchaser in order to attract the investments. The same may also be retained for solar power projects also, as at this stage, the solar power market has not been fully emerged in the country. The option of sharing mechanism may be postponed for at least three to five years, as the country facing severe energy crisis and the heavy FDIs are required for energy sector rehabilitation.

d) Yes, the annual O&M cost of 1.5% of EPC cost is reasonable and justified.

e) 8 months construction period is not reasonable due to grid connectivity problems and system availability. it is suggested that a range of 8-12 months period may be considered keeping in view the available poor grid system.

f) The affordability of the high tariff of solar power plants is reasonable and justified. Over the time period, the per unit cost of fossil fuel power plants in increasing and the per unit cost of solar power plants will remain stable.

g) Keeping in view the limited fossil fuel resources and international trend of increase in RE share ,the grid code may be amended to absorb 10% of RE in the total energy mix. This share may further gradually be increased.

Burj Capital (Commentator)

6.6 Burj Capital submitted following comments for the consideration of the Authority:

a) The total generation capacity should not be limited to one province. It should be applicable country-wide

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

b) The limit of generation capacity should, at least, be 1,000 MW

c) The total generation capacity per sponsor should be limited to 100 MW.

StormHarbour International LP (Intervener)

6.7 StormHarbour International LP submitted following comments for the consideration of the Authority:

a) **Cap On Upside—Sharing Of Excess Energy**

Inclusion of an annual cap on the upside, whereby the tariff reduces annually following generation of a pre-determined quantity of energy, is not consistent with international practice. An annual cap on upside will deter prospective developers from opting for the upfront tariff and fast tracking solar project development. Under the relevant regime, if StormHarbour does not generate electricity, it will not receive the tariff. Since there are no capacity payments, StormHarbour will only be entitled to payments for energy generated and supplied. In the event StormHarbour does not generate as per its expected benchmarks (either due to plant performance or irradiance), the purchaser, the Government of Pakistan and NEPRA provide no buffer or protection, not even for minimum debt payments. In other words, whilst project sponsors are exposed to the full downside (i.e. solar and other project risk), they are, without any rationale, deprived from the benefit of the full upside. If NEPRA caps the upside, it may encourage developers to buy suboptimal equipment as they would be devoid from the benefit of generating excess electricity.

The precedent cap on the upside is particularly problematic if the project company produces excess energy in one year (receiving a reduced tariff) followed by other years where generation is below benchmarks (not receiving an inflated tariff to compensate). If NEPRA truly intends to develop a mechanism for reducing the tariff for excess energy generation, then the determination of 'excess energy' should be made over the life of the plant (i.e. the term of the Energy Purchase Agreement). If the cumulative energy generation over the life of the plant exceeds a predefined level (associated with an agreed capacity factor), any excess energy would attract a lower tariff, similar to the tiered structure under the upfront wind tariff structure. This mechanism will not penalize the project company from year to year and balances the interests of both the consumers and the developer.

b) **Eight (8) Months Construction Time**

The 2nd NOH raises the question of whether eight (8) months construction period is reasonable. It is respectfully submitted that whilst eight (8) months may have been sufficient for a 10 MW solar plant, it is certainly not so for a 100 MW plant. At minimum fifteen (15) months should be accounted for a 100 MW plant following financial close particularly since the lead time to receive delivery of the I32KVA station is generally twelve (12) months for reputable suppliers.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

c) **Solar Risk**

The upfront tariff determination must also cater for a mechanism for adjustment of solar irradiance or leave enough room for the risk taken by the IPP. As NEPRA is no doubt aware, sufficient and accurate solar irradiance data is fundamental for securing financing (both foreign and local) and development of any solar plant. Since bankable ground irradiance data is not available in Pakistan NEPRA needs to provide for a mechanism to compensate for such missing information. It should be noted that the variability of solar irradiance at a given site is lower than wind variation and the solar risk, if assumed by the government, would be less than the wind risk. Therefore, either the government should provide one year of bankable solar irradiance data for the project site or take solar risk and provide a solar / irradiance guarantee for the life of the project.

d) **Tax Issues**

We understand that a new tax has been imposed on projects which may impact the overall project cost. Further details on this issue will be brought forward and discussed by our legal counsel at the hearing.

Zhenfa Energy Group Co. Ltd (Commentator)

6.8 Zhenfa Energy Group Co. Ltd submitted following comments for the consideration of the Authority.

a) **Project cost of USD 1.73 Million/MW:** Project Cost would depend on the duties/local taxes structure therefore following questions should be answered in determining the cost:

Q 1: What's onshore taxes and duties for 100MW including in the above project cost? How many percentage import duty will be levied for machinery and components used for PV plants?

Q2: If solar project is 100% invested by one china company, when the machinery and components using for own projects have to be imported to Pakistan, it still requires to pay onshore tax and duties? Whether there is some Preferred Tax policy to encourage foreign company to make the investment in Pakistan?

Q 3: Whether it's allowed to install Sun Tracking system, with Sun tracking system, it will require double land area of the fixed structure; output power will be 25% higher than the fixed structure.

b) **Sharing Mechanism of excess energy in the existing Upfront tariff:** Based on our calculation and our record from west region in china, the proposed energy generation from 100MW project with the fixed structure for the first year will be around 160,000MWh. If 50MW installation with the fixed structure , 50MW installation with single —axis sun tracking system, proposed energy generation from 100MW for the first year will be around 180,000MWH

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Our comment: Government should not put limitation on excess energy generation from PV Plant and shall use the same Solar tariff for excess energy in order to encourage the developer to use better components and better technology to create higher energy yield at the same project size. If plant factor is less than 17.5%, what's tariff can be taken?

c) **8 month construction period:** If all jobs including confirmation of construction drawing, pile testing result prepare in advance, and get ready for construction, construction can be completed in 8 months provided:

i. What are the instructions from QA Park project management for on-site construction? Developer shall know what kinds of procedures need to be done before starting the construction. How long would it take to get confirmation of construction drawing and test report after submitting those relative documents?

ii. It should have smooth customs clearance for importing machinery and components used for own projects and don't stay at seaport for longer time, those imported machinery and components used for own projects can be tax exemption or not, if collecting the on-shore tax, how much need to be paid? Whether we need to apply for in advance?

d) **Annual O& M cost of 1.5% of EPC cost** is reasonable, considering that there is higher insurance rate during O& M period in Pakistan and keep certain stock components available due to long distance of importing procedure.

IPS Private Limited (Commentator)

6.9 IPS Private Limited submitted following comments for the consideration of the Authority.

a) Whether the project cost of US$ 1.73 million/MW is justified?

It is assumed the questionnaire is based on smaller projects ranging from 1 to 10 MWp and connected to 11 kV system. In this case the project cost reflects the prevailing rate where all the equipment for the solar projects is imported. There can be variation in costs based on country of origin.

b) Whether US$ 25,000/MW is a reasonable estimate of cost of land, boundary wall water supply access roads and security for the projects outside the project areas developed by the Government?

No. Land cost is based on location, its vicinity to cities, highways, infrastructures and other amenities. Civil work cannot be a fixed number. Foundation requirements vary as per Topographic and Geotechnical surveys. Water supply depends on how far the land is from the main supply or how deep one has to go to get water and thereafter the water has to be chemically balanced to avoid any contamination that can corrode framing and connectors. Point that has not been included in the above question is the housing requirements for projects which are remotely located.

c) Whether the sharing mechanism of excess energy, provided in the existing upfront tariff, is justified?

Yes! It compels and provides incentive to developers in procuring most efficient and reliable equipment.

d) Whether the existing benchmark of annual O&M cost of 1.5% of EPC is reasonable and justified?

Yes! Since it covers both local and expat staff.

e) Whether the 8 months construction period is reasonable?

Project connected to 11kV system and are under 10 MW can achieve commissioning under 9 months, provided grid connectivity is available.

f) Whether the issue raised by the intervener regarding the affordability of the high tariff of solar power plants is reasonable and justified?

Yes! If it is compared to RFO, HFO and Diesel based plants. if Pakistan installed more solar and wind projects it will reduce Foreign Exchange outflow and keep CO2 emissions low. Thus providing more opportunity to Pakistan to install Coal based projects where funding is selectively available for countries with lower emission level and lack of alternate energy sources.

g). What should be the reasonable level of induction of solar energy in the system in accordance with the Notified Grid Code?

If distributed generation is considered and wheeling is adapted widely, intermittent power sources such as solar can provide 4,000 to 5,000 MW of energy to Pakistan Grid. It should be considered that due to instability of 11/33/66 kV network, the larger projects should be given priority which can be connected to 132/220/500 kV network, which has the stability and evacuation capacity and transient load flow adaptability.

7. Second Hearing

7.1 The second hearing was held on 8th September 2014 at Pearl Continental Hotel Lahore on 8th September 2014 and warmly participated by the stakeholders. All those, willing to express their views, were given appropriate time. Generally the discussion was on the issues framed. The participants reiterated their comments mentioned above. The representative of K Electric requested that the cost of land in Karachi is higher than other parts of the country which should be kept in mind in order to provide equal opportunity to the developers in the jurisdiction of K Electric. The representative from QA Solar submitted that their O&M cost is 80% foreign and 20% local as against the 30% foreign and 70% local in the existing upfront solar tariff which needs to be given due consideration.

8. Discussion of the issues

8.1 Based on the framed issues and comments of the stakeholders, the issue wise discussion, analysis and determination of the Authority is provided in the succeeding paragraphs.

9. Whether the project cost of US$ 1.73 million/MW is justified, whether US$ 25,000/MW is reasonable estimate of costs for land, boundary wall, water supply, access roads, and security for projects and whether the construction period of 8 months is reasonable?

9.1 Mr. Anwar Kamal opposed the project cost being on the higher side and suggested an independent verification of the cost. ET Solar suggested project cost of US$ 1.85 million/MW for 10 MW project, US$ 1.81 million/MW for 25 MW project, US$ 1.77 million/MW for 50 MW project, US$ 1.74 million/MW for 100 MW project. According to ET Solar, if government is not providing land at concessionary rates, there is no way that the items listed under this head can be achieved at price of US$ 25,000/MW. Asia Petroleum reiterated their earlier comment that project cost of smaller projects will be higher as compared to large projects. Regarding US$ 25,000/MW cost, Asia Petroleum submitted that except for the cost of land, the amount will be adequate for all other costs mentioned in the notice. Government of Sindh suggested rationalization of the project cost without mentioning upside/downside. GoS also suggested rationalization of US$ 25,000/MW cost because the solar power projects are recommended on barren lands. According to Zhenfa Energy, the project cost will depend upon the tax and custom duty structure and installation of equipment with or without sun tracking system. China Power International in its earlier comments submitted a project of US$ 187.95 million. PPDB in its earlier comments suggested CAPEX of US$ 1.633/MWp, while ignoring impact of the rebate as a goodwill gesture by the EPC contractor to the people of Pakistan, seems reasonable cost estimate. PPDB added that the Authority may further investigate the prudence of these estimates, upward and/or downward, because such types of negotiation leverages available to QA Solar may not possibly be in the reach of other private power producers. PPDB further added that the above CAPEX warrants further due diligence with respect to power projects of lesser capacities by applying principle of economies of scale. PPDB also suggested announcement of upfront tariff for three categories 1-10MW, >10≤50 and >50MW. Having considered the arguments put forwarded, the Authority considers that upfront tariff for three ranges i.e. >1MW≤20 MW, >20MW≤50MW and >50MW≤100MW would provides more flexibility for the investors; therefore has decided to announce the tariff for the same.

EPC Cost

9.2 QA Solar in its intervention request submitted that the EPC cost has been erroneously mentioned as USD 156,719,341 whereas our EPC Cost (including onshore taxes and duties of USD 4,736,537) is USD 135,886,537. Regarding other costs, QA Solar submitted that these are initial costs which were always intended to be 'trued up' following commercial operations under a cost plus tariff. The numbers cannot be quoted as the average costs and therefore can by no means be used as the basis of an upfront tariff determination. QAS being a wholly owned

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

subsidiary of the Government of Punjab does not necessarily face market costs as would other IPPs.

9.3 The Authority has considered the comments of the stakeholders, information and documents submitted by QA Solar and the EPC cost of US$ 1.692 million/MW allowed in the previous upfront solar tariff. Keeping all the factors in view and the evidence placed before the Authority during the proceedings, the Authority considers that the EPC cost indicated by QA Solar is reasonable. In view thereof, the Authority has decided to approve the EPC cost of US$ 1.359 million/MW for >50MW≤100MW project including taxes and duties of US$ 47,365/MW.

9.4 Since larger project sizes enjoy economies of scale as compared to smaller projects, it would be appropriate compensate smaller projects to mitigate the scale benefit which is not available to smaller projects. Accordingly the Authority has decided to approve US$ 1.385 million/MW for >20MW≤50MW and US$ 1.411 million/MW for >1MW≤20 MW. The approved EPC cost includes taxes and duties of US$ 47,365/MW.

9.5 The approved taxes and duties of US$ 47,365/MW in the EPC cost will be adjusted as per actual at the time of COD stage adjustment of tariff on the basis of verifiable documentary evidence.

Non-EPC Cost

9.6 The Authority has considered the cost estimates provided by QA Solar for non EPC cost. QA Solar in its intervention request submitted that all other costs are mere estimates which were intended to be trued up later, therefore can not be used as basis for upfront tariff. The Authority has also considered the comments of other stakeholders and the cost allowed in the previous upfront tariff for non EPC cost. In the opinion of the Authority, US$ 43,500/MW is a reasonable estimate of cost for non-EPC for a >50MW≤100MW projects. In order to offset the economies of scale available to 100MW projects, the Authority has decided to provide a slightly higher cost for smaller projects. Accordingly US$ 45,675/MW and US$ 47,850/MW are being approved for >20MW≤50MW and >1MW≤20MW projects respectively.

Project Development Cost

9.7 No specific comments have been received regarding reasonability or other wise of the project development cost of US$ 36,658/MW (US$ 3.6658 million for 100MW project) estimated by QA Solar. Therefore, project development cost of US$ 36,658/MW is being approved for100 MW project. For smaller projects of >20MW≤50MW and >1MW≤20MW, US$ 38,490/MW and US$ 40,323/MW respectively are being approved on account of project development cost.

Insurance During Construction

9.8 The estimated insurance during construction cost in the instant proceedings was US$ 1.019 million for 100 MW project (USD 10,191/MW). Since none of the stakeholder objected this cost, therefore, USD 10,191/MW is being approved for all three types of projects.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Financing Fees & Charges

9.9 QA Solar estimated financing fees and charges of US$ 2.328 million for its 100 MW project (US$ 23,287/MW). QA Solar submitted that its financing fees and charges are not reflective of market norms and it has arranged the full debt amount from the Bank of Punjab. This therefore necessarily means that QAS has not incurred many of the financial charges and fees as an IPP in the private sector would incur. According to PPDB the estimated financial fees & charges reckons to be about 2% of the assumed debt, which undoubtedly seems to be on very lower side. PPDB submitted that normally, financial institutions do not provide loan/debt with such lesser charges under this head of account and suggested that the Authority may consider allowing of Financial Fees and Charges @ 3.5% of the debt component of the project's capital cost in line with its earlier tariff determinations for different technologies.

9.10 The Authority in the previous upfront solar tariff allowed financing fees and charges @ 3.5%. Similar benchmark cost was provided in the upfront coal tariff. In consistent with the earlier decision, financing fees and charges @ 3.5% of the debt amount are being approved. Accordingly, US$ 39,629/MW for >1MW≤20MW projects, US$ 38,836/MW for >20MW≤50MW projects and US$ 38,042/MW for >50MW≤100MW projects are being approved for financing fees and charges.

Construction Period

9.11 Most of the commentators objected the construction period of 8 months for a 100 MW project and suggested 12 months to 18 months as a reasonable estimate of time for construction of 100 MW Project. PPDB suggested 8 months and 12 months construction period for projects <50MW and >50MW respectively. The Authority in case of previous solar upfront tariff for 10 MW capacity determined 8 months construction period. As the project size increases the construction period will also increase. Accordingly keeping in view the previous determination and on the basis of the comments of the stakeholders and project sizes, construction period of 8 months, 10 months and 12 months is approved for >1MW≤20MW, >20MW≤50MW and >50MW≤100MW projects respectively.

Interest During Construction

9.12 On the basis of the approved construction period, LIBOR 0.31% plus a premium of 4.5% and the project cost approved in the preceding Paragraphs, the interest during construction has been worked out as US$ 13,450/MW for >1MW≤20MW projects, US$ 20,385/MW for >20MW≤50MW projects and US$ 27,058/MW for >50MW≤100MW projects and the same has been approved. The interest during construction will be reestablished at the time of COD on the basis of actual financing of the project and actual average quarterly LIBOR/KIBOR with applicable premiums.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Summary of Project Cost

9.13 The summary of the project cost approved for different sizes of projects without rebate/discount of taxes is provided hereunder:

Description	>1MW≤20MW	>20MW≤50MW	>50MW≤100MW
	USD/MW	USD/MW	USD/MW
EPC Cost	1,411,325	1,385,095	1,358,865
Other Costs:			
Non EPC Cost	47,850	45,675	43,500
Project Development Cost	40,323	38,490	36,658
Insurance during construction	10,191	10,191	10,191
CAPEX	**1,509,690**	**1,479,452**	**1,449,214**
Financial Charges:			
Financing Fees & Charges	39,629	38,836	38,042
Interest During Construction	13,450	20,385	27,058
Total Project Cost	**1,562,770**	**1,538,673**	**1,514,314**

Insurance During Operation

9.14 In the previous solar upfront tariff, actual insurance cost subject to maximum of 1% of the EPC cost was provided during the operation period and the same is being approved for the instant upfront solar tariff.

O&M Cost

9.15 QA Solar initially provided O&M cost of US$ 73.786 million for its 100 MW project for a period of 25 years on the basis of its agreement with the O&M contractor which is equivalent to US$ 29,514/MW. QA Solar vide its intervention request submitted that its O&M cost in addition to O&M contract includes local O&M of US$ 884,000/annum, operator taxes of US$ 4.598 million, asset replacement fund of 1.7459 million and company asset replacements of US$ 4 million which is equivalent to US$ 42,492/MW (US$ 4.25 million/annum). The benchmark established by the Authority in the previous upfront solar tariff was 1.5% of the EPC cost which was equal to US$ 25,391/MW. Mr. Anwar Kamal in its comments submitted that O&M @1.5% of the EPC cost is not justified as there are no moving parts and the O&M should be much lower. ET Solar suggested O&M cost at 1.75%, 1.95%, 2.3% and 2.5% of the EPC cost for 100MW, 50MW, 25MW and 10MW respectively. According to Asia Petroleum, defining the same percentage for all sizes of plants does not seems to be justified and according to its estimate, O&M cost for a 30 MW plant will be approximately 3% of the of the EPC cost.

According to comments from Energy Department, Government of Sindh, O&M cost @1.5% of the EPC cost is reasonable and justified. According to Zhenfa Energy Group Company Limited, Annual O & M cost of 1.5% of EPC cost is reasonable, considering that there is higher insurance rate during O & M period in Pakistan and keep certain stock components available due to long distance of importing procedure. PPDB in its comments suggested maintaining the existing O&M benchmarks.

9.16 The Authority has considered the comments of different stakeholders and examined the evidence placed on record during the proceedings. In the opinion of the Authority, EPC cost and O&M cost arrived at through bidding process by QA Solar is a package and choosing EPC and not allowing the O&M will not be justified. Accordingly the Authority has decided to allow the foreign O&M of US$ 31,114/MW on the basis of 25 year O&M contract of US$ 73.786 million and company asset replacement cost of US$ 4 million. However, in the opinion of the Authority, the estimated cost of local O&M is on the higher side and needs to be adjusted. Accordingly, the Authority has decided to allow annual local O&M of US$ 5,000/MW. The approved O&M component of tariff is Rs. 2.4736/kWh for South Zone and Rs. 2.5797/kWh for North Zone for all sizes of solar PV power projects.

Financing of the Project

9.17 The projects will be financed through debt and equity. Minimum equity requirement is 20%. There will be no limit on the maximum amount of equity; however, equity exceeding 30% of the total project cost will be treated as debt. Debt may be raised in local as well as foreign currency and mix of local/foreign debt financing may also be allowed. The approved upfront tariff has been worked out on the basis of debt-equity ratio of 75:25 and 100% on foreign loans.

Cost of Capital

9.18 LIBOR 0.31% plus a premium of 4.5% for foreign loans have been used for calculating the cost of debt. In case of local loans KIBOR plus a premium of 3.50% will be the reference cost of debt. The savings, if any, in the premium will be shared between the power purchaser and the power producer in the ratio of 60:40. For calculation of return on equity component of tariff IRR of 17% on equity has been employed. Return on equity and return on equity during construction has been combined into one component in the tariff table. In line with the previous upfront tariff withholding tax on dividend will not be passed through.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

Summary of Tariffs

9.19 The component wise tariffs are provided hereunder:

North Region

Description	>1≤20MW	>20≤50MW	>50≤100MW
	Rs./kWh	Rs./kWh	Rs./kWh
O&M	2.5797	2.5797	2.5797
Insurance	1.0081	0.9894	0.9707
ROE	5.0186	5.0087	4.9959
Debt Servicing (1-10 Years only)	10.5960	10.4327	10.2675
Total Tariff 1-10 Years	19.2025	19.0105	18.8138
Total Tariff 11-25 Years	8.6065	8.5779	8.5463
Levelized	15.7793	15.6401	15.4967
Levelized US¢/kWh	15.0279	14.8953	14.7588

South Region

Description	>1≤20MW	>20≤50MW	>50≤100MW
	Rs./kWh	Rs./kWh	Rs./kWh
O&M	2.4736	2.4736	2.4736
Insurance	0.9667	0.9487	0.9307
ROE	4.8121	4.8027	4.7903
Debt Servicing (1-10 Years only)	10.1601	10.0034	9.8451
Total Tariff 1-10 Years	18.4125	18.2284	18.0397
Total Tariff 11-25 Years	8.2524	8.2250	8.1947
Levelized	15.1301	14.9966	14.8591
Levelized US¢/kWh	14.4096	14.2825	14.1516

Indexations

9.20 The following indexation will apply on the reference components the determined tariff:

Component	Indexation
O&M-Local	Local CPI (General)
O&M-Foreign	PKR/US$, US CPI
Insurance	Actual with maximum of 1% of EPC cost
Return on Equity	PKR/US$
Principal Repayments (Foreign Loan)	PKR/US$ or the applicable currency
Interest Payments	LIBOR/KIBOR, PKR/US$

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

10. Whether the sharing mechanism of excess energy, provided in the existing Upfront Tariff, is justified?

10.1 Almost all the stakeholders except Anwar Kamal Law Associates, who suggested that the entire benefit should go to the consumers, objected the sharing mechanism. According to QA solar, proposed cap on the upside will be an unwelcome addition if included in the upfront tariff as the developer is exposed to 100% solar risk and secondly, such a cap will discourage developers from investing in efficient technology. According to RIAA Law and Janpur Energy, If a similar adjustment mechanism were to be included in the proposal, it would discourage project sponsors to opt for more efficient technology and solutions, such as mono-crystalline silicon cells and single access tracker system, which are capable of higher energy output over longer period of time as compared to low energy yielding cheaper solar PV technology options (with high annual performance degradation).Furthermore, such a provision would also limit attractive foreign currency financing options available to project sponsors as they would be unable to tap financing from US or European multi-lateral agencies, export credit agencies, and other international lenders who often only extend credit to projects where equipment and services are being sourced from their country of domicile. Total Energies Nouvelles Ventures has submitted that if a similar adjustment mechanism was to be included, Total/SunPower would not be in a position to consider investment in Pakistan's solar sector under the Upfront Solar Tariff regime. According to ET Solar, since the government is not guaranteeing any minimum energy production and the downside risk is entirely on sponsor / investor, the benefit of upside, if any, should also go to the investor. However, we can see the merit that if there is significant upside then the Pakistan consumers should share some benefit. We, therefore, feel that upside benefit up to 4% should be to the account of the investor and anything above it can be shared. Asia Petroleum suggested that both the profit and the loss should be shared and benchmark plant factor should be set over the 25 years period. Government of Sindh suggested no sharing. GoS also suggested that the option of sharing mechanism may be postponed for at least three to five years, as the country facing severe energy crisis and the heavy FDIs are required for energy sector rehabilitation. According to StormHarbour, the precedent cap on the upside is particularly problematic if the project company produces excess energy in one year (receiving a reduced tariff) followed by other years where generation is below benchmarks (not receiving an inflated tariff to compensate). If NEPRA truly intends to develop a mechanism for reducing the tariff for excess energy generation, then the determination of 'excess energy' should be made over the life of the plant (i.e. the term of the Energy Purchase Agreement). If the cumulative energy generation over the life of the plant exceeds a predefined level (associated with an agreed capacity factor), any excess energy would attract a lower tariff, similar to the tiered structure under the upfront wind tariff structure. This mechanism will not penalize the project company from year to year and balances the interests of both the consumers and the developer.

10.2 As per the existing sharing mechanism, power producer is entitled following tariff for extra energy produced beyond 17.5% for south (16.78% for North):

First 1% increase	75% of the applicable tariff
Next 1% increase	50% of the applicable tariff
Next 1% increase	25% of the applicable tariff
Next 1% increase	20% of the applicable tariff
Exceeding above	10% of the applicable tariff

10.3 Analysis of excess energy shows that with the existing sharing mechanism and levelized tariff of US Cents 14.15/kWh for 100 MW project, the effective tariff for each 1% increase (up to 5%) in the capacity factor beyond 17.5% will be ¢14.76/kWh, ¢15.16/kWh, ¢15.36/kWh, ¢15.53/kWh and ¢15.61/kWh respectively. If there is no sharing for the excess energy, the effective tariff will be ¢14.96/kWh, ¢15.77/kWh, ¢16.58/kWh, ¢17.39/kWh and ¢18.19/kWh respectively.

10.4 The Authority has considered the comments of the stakeholders particularly of those who are willing to bring efficient equipment at higher cost. In the opinion of the Authority levelized tariff of ¢15.61/kWh can be achieved with the existing sharing mechanism and difference of ¢1.46/kWh is an attractive incentive to bring more efficient equipment. Further in terms of section 7(6) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority has to protect the interests of the consumers and the companies providing electric power services and it has to adopt a balanced approach which in view of the Authority would be to incentivize the investor in case of better efficiency and sharing some fraction of that efficiency gain with the consumers In the opinion of the Authority, existence of sharing mechanism would create a balance between the interests of the companies opting for upfront tariff and interests of the consumers and its removal would pull the pendulum in favor of one party hence case does not exist for removal of the sharing mechanism. Therefore, the Authority has decided to maintain the existing sharing mechanism beyond 17.5% for South and 16.78% for North.

11. Whether the issue raised by intervener regarding the affordability of high tariff of solar power plants is reasonable and justified?

11.1 According to Anwar Kamal Law Associates, the most critical issue is the affordability. The proposed Upfront Tariff is loaded for the first ten years. The survival of Pakistan is now dependent on the electric power sector. Front loading for the first ten years may mean that we will not be able to survive these first ten years. According to the intervener, the consumers are already paying the cost of idle capacity to IPPs and GENCOs at almost the same Tariff rate as is being proposed to be given to Solar Power Plants that is Rs. 20 to Rs. 22. The intervener submitted that without first determining how much idle capacity is available in Pakistan and why it is not being utilized, it is not prudent to bring in more expensive technology and power plants in the system. It is not affordable as parallel Investment in Base Load Plants is a must.

11.2 According to ET Solar, Solar plants will have minimal impact on overall average basket price and induction of 1,000 MW of solar will still have less than 1 Paisa (PKR 0.096/kWh) on

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

average price. ET Solar erroneously mentioned the impact as less than 1 Paisa while in actuality PKR 0.096/kWh is equal to Paisa 9.6/kWh. The comparison submitted by ET Solar suggest that the financial impact ranges Paisa 0.5/kWh to Paisa 9.6/kWh for induction of 50MW to 1000MW solar energy into the system. The representatives from RIAA Law and Burj Capital UAE claimed in the 2nd hearing that the financial impact of solar energy in the system is less than 1 Paisa in the overall basket price. The representative from Burj Capital referred that this information has already been provided to NEPRA. The record was rechecked and found that such a comparison was presented by Access Solar in its tariff hearing dated 7th May 2013, however, the petitioner presented that the financial impact of 200MW solar energy in the system was Paisa 6/kWh.

11.3 According to Asia Petroleum, country is facing colossal losses due to severe power deficit and solar energy plants with their short construction period will help in reducing some of the deficit in a shorter period of time. Further the cost of generation of solar power is well below the inefficiently run GENCO's running on furnace oil where the cost per units goes up to more than Rs 30 per unit with only the fuel cost component being more than Rs 23. Moreover, generation cost of furnace oil plants is heavily dependent upon fuel prices which considering the past trends have increased manifolds. Whereas, solar plants, with no fuel requirement will not shut down due to fuel non availability nor is there any chance of fuel theft. Furthermore, fuel based plants which are dependent on imported fuel result in continuous outflow of foreign exchange throughout their life. Asia Petroleum further added that solar power is environment friendly with zero emissions and is supported by most multilateral funding agencies. Furthermore, introduction of solar plants will also help in propagating the clean technology in the country especially in the far flung areas where national grid is not available.

11.4 Government of Sindh has also supported the induction of solar energy and supplemented that over the period of time, the unit cost of fossil fuel power plants will increase and the unit cost of solar power plants will remain stable. According to IPS Private Limited, if Pakistan installs more solar and wind projects it will reduce foreign exchange outflow and keep CO2 emission low, thus providing more opportunity to install coal based projects where funding is selectively available for countries with lower emission level and lack of alternative energy sources.

11.5 The financial impact of induction of 1000MW solar energy (front loaded tariff of 1st 10 years) into the system has been calculated which is approximately Paisa 20/kWh {(FCC Rs.729,781 million+Solar Cost Rs.29,784million)/(92,787GWh+1,453GWh)} in the overall average basket price as per the power generation. However this financial impact after 10th year will be less than Paisa 1/kWh {(FCC Rs.729,781million+Solar Cost Rs.11,912million)/(92,787GWh+1,453GWh)}. The Authority has considered the intervener's observation with respect to affordability and stakeholders response thereof. Although the stakeholder's response reasonably addresses the intervener's concern but the most important factor which has not been highlighted is the country's energy security. The solar being indigenes resource has to be encouraged even if initially little extra cost is to be paid. This would also provide wider sources of generation along with transfer of technology in the country mitigating power shortage to some extent.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

12. What should be the reasonable level of induction of solar energy in the system in accordance with the Notified Grid Code?

12.1 QA Solar in its intervention request requested that if there is to be a MW cap, it should not be counter-intuitive and should reflect the energy needs of Pakistan. According to Janpur Energy, there are in excess of 1,000 MW worth of LOIs issued and under evaluation / process by AEDB and various provincial power boards and in order to provide equal opportunity to all project sponsors, NEPRA should take this reality in to its consideration when deciding on a cap on total approvals. ET Solar submitted that that a reasonable limit would be 1,000 MW in 18 months throughout the country. They have also suggested that it should be disbursed throughout the country preferable as per provincial load/demand and not concentrated at one location /area. They have also recommended that in order to eliminate performance risk of the sponsors and allow healthy completion among larger number of sponsors, no single sponsor should be allowed more than 50 MW

12.2 According to Burj Capital, The total generation capacity should not be less than 1000 MW and should not be limited to one province with maximum 100 MW per Sponsor. According to Government of Sindh, keeping in view the limited fossil fuel resources and international trend of increase in RE share ,the grid code may be amended to absorb 10% of RE in the total energy mix. This share may be increased gradually.

12.3 In order to establish the upper limit as to how much solar- based power can be connected to the national grid, detailed simulation studies have been initiated by NTDC for proposing a modification in the Grid Code. Till the completion of studies and approval of modified Grid Code by NEPRA, NTDC will carry out such studies for every proposed solar-based project and make its recommendations to NEPRA for suitability or other wise to the national grid. As a condition precedent for opting the upfront solar tariff, approval of NTDC for power evacuation and interconnection will be mandatory. NEPRA will consider only those projects for approval of upfront tariff, which submit NTDC's explicit approval in this respect.

13. <u>Bifurcation of Regions</u>

13.1 In accordance with the previous upfront solar tariff, the country has been divided in to two regions South and North. Plant factor of 17.5% for South Region and 16.78% for North Region has been used in calculation of tariff. Sough region will comprise of Sindh Province, Baluchistan Province and Southern Punjab. All other parts of country will be included in the North Region. The following districts will be included in the Southern Punjab:

- Rahim Yar Khan
- Bahawalpur (Cholistan)
- Rajanpur
- Dera Ghazi Khan
- Muzaffargarh
- Multan
- Lodhran
- Vehari
- Bahawalnagar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

14. Order

I. The Authority hereby determines and approves the following upfront tariff and adjustments/indexations for solar power generation for delivery of electricity to the power purchaser based on solar PV power plants:

Specified Reference Tariff

NORTH REGION

Description	>1≤20MW	>20≤50MW	>50≤100MW	Indexations
	Rs./kWh	Rs./kWh	Rs./kWh	
O&M	2.5797	2.5797	2.5797	CPI , US CPI, US$/PKR
Insurance	1.0081	0.9894	0.9707	Actual on annual basis
ROE	5.0186	5.0087	4.9959	US$/PKR & LIBOR
Debt Servicing (1-10 Years only)	10.5960	10.4327	10.2675	US$ /PKR
Total Tariff 1-10 Years	19.2025	19.0105	18.8138	
Total Tariff 11-25 Years	8.6065	8.5779	8.5463	
Levelized	15.7793	15.6401	15.4967	
Levelized US¢/kWh	15.0279	14.8953	14.7588	

SOUTH REGION

Description	>1≤20MW	>20≤50MW	>50≤100MW	Indexations
	Rs./kWh	Rs./kWh	Rs./kWh	
O&M	2.4736	2.4736	2.4736	CPI , US CPI, US$/PKR
Insurance	0.9667	0.9487	0.9307	Actual on annual basis
ROE	4.8121	4.8027	4.7903	US$/PKR & LIBOR
Debt Servicing (1-10 Years only)	10.1601	10.0034	9.8451	US$ /PKR
Total Tariff 1-10 Years	18.4125	18.2284	18.0397	
Total Tariff 11-25 Years	8.2524	8.2250	8.1947	
Levelized	15.1301	14.9966	14.8591	
Levelized US¢/kWh	14.4096	14.2825	14.1516	

The detailed tariff tables and debt service schedules for each project size are attached as Annexes.

II. One Time Adjustment at COD

i) Since the exact timing of payment to EPC contractor is not known at this point of time, therefore, an adjustment for relevant foreign currency fluctuation for the portion of payment in the relevant foreign currency will be made against the reference exchange rate of Rs. 105/US$. In this regard the sponsor will be required to provide all the necessary relevant details along with documentary evidence. The adjustment shall be made only for the currency fluctuation against the reference parity values except the discount on EPC cost. The amount of

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

discount, if available to any project will be accounted for and EPC cost will be adjusted downward.

ii) The approved taxes and duties of US$ 47,365/MW in the EPC cost will be adjusted as per actual at the time of COD stage adjustment of tariff on the basis of verifiable documentary evidence.

iii) Interest during construction will be reestablished at the time of COD on the basis of actual project financing and actual average LIBOR/KIBOR and applicable premiums.

III. Adjustment in Insurance as per actual

The actual insurance cost for the minimum cover required under contractual obligations with the Power Purchaser not exceeding 1% 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 1% of the EPC cost at Rs. 105/US$.
$P_{(Act)}$	=	Actual Premium or 1% of the EPC cost in Pak Rupees on exchange rate prevailing on the 1st day of the insurance coverage period which ever is lower

IV. Indexations:

The following indexations shall be applicable to the reference tariff;

i) Indexation of Return on Equity (ROE)

After COD, ROE component of tariff will be quarterly indexed on account of variation in PKR/US$ parity according to the following formula:

$ROE_{(Rev)}$	=	$ROE_{(Ref)} * ER_{(Rev)} / ER_{(Ref)}$
Where;		
$ROE_{(Rev)}$	=	Revised ROE Component of Tariff
$ROE_{(Ref)}$	=	ROE Component of Tariff established at the time of COD
$ER_{(Rev)}$	=	The revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan
$ER_{(Ref)}$	=	Reference Exchange Rate at the time of COD

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

ii) Indexation applicable to O&M

The O&M component of tariff will be adjusted on account of local Inflation (CPI) and 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:

$L\ O\&M_{(REV)}$	=	$L\ O\&M_{(REF)} * CPI_{(REV)} / CPI_{(REF)}$
$F\ O\&M_{(REV)}$	=	$F\ O\&M_{(REF)} * US\ CPI_{(REV)} / US\ CPI_{(REF)} * ER_{(REV)}/ER_{(REF)}$
Where:		
$L\ O\&M_{(REV)}$	=	the revised applicable O&M Local Component of tariff
$F\ O\&M_{(REV)}$	=	the revised applicable O&M Foreign Component of tariff
$L\ O\&M_{(REF)}$	=	the reference local O&M component of tariff for North Region Rs. 0.3572/kWh and for South Region Rs. 0.3425/kWh
$F\ O\&M_{(REF)}$	=	the reference foreign O&M component of tariff for North Region Rs. 2.2226/kWh and for South Region Rs. 2.1311/kWh
$CPI_{(REV)}$	=	the revised Consumer Price Index (General) published by Pakistan Bureau of Statistics.
$CPI_{(REF)}$	=	the reference Consumer Price Index (General) of 198.700 for the month of August 2014
$US\ CPI_{(REV)}$	=	the revised US CPI (All Urban Consumers) published by US Bureau of Labor Statistics
$US\ CPI_{(REF)}$	=	the reference US CPI (All Urban Consumers) of 237.852 for the month of August 2014
$ER_{(REV)}$	=	the revised TT & OD selling rate of US dollar published by National Bank of Pakistan
$ER_{(REF)}$	=	the reference TT & OD selling rate of RS. 105/US dollar

iii) Indexation for LIBOR Variation

The interest part of fixed charge component will remain unchanged throughout the term except for the adjustment due to variation in interest rate as a result of variation in 3 months LIBOR according to the following formula;

ΔI	=	$P_{(REV)}$* (LIBOR$_{(REV)}$ - 0.31%) /4
Where:		
ΔI	=	the variation in interest charges applicable corresponding to variation in 3 months LIBOR. Δ I can be positive or negative depending upon whether LIBOR$_{(REV)}$ is > or < 0.31%. The interest payment obligation will be enhanced or reduced to the extent of ΔI for each quarter under adjustment applicable on quarterly basis.
$P_{(REV)}$	=	The outstanding principal (as indicated in the attached debt service schedule to this order) on a quarterly basis on the relevant quarterly calculation date. Period 1 shall commence on the date on which the 1st installment is due after availing the grace period.

V. Terms and Conditions of Tariff:

The above tariff and terms and conditions, stipulated hereunder, shall be incorporated in the Energy Purchase Agreement between the Power Purchaser and the Power Producer:

i. All plant and equipment shall be new and shall be designed, manufactured and tested in accordance with the latest IEC standards or other equivalent standards.

ii. The verification of the new machinery will be done by the independent engineer at the time of the commissioning of the plant duly verified by the power purchaser.

iii. The Energy Purchase Agreement should stipulate terms and conditions, regarding periodic physical inspection of the plant and equipment, ensuring that the power plant is properly maintained and continues to supply energy for the entire tariff control period of 25 years.

iv. The companies interested in availing upfront tariff will submit unconditional formal application to NEPRA for approval by the Authority in accordance with the NEPRA Upfront Tariff (Approval and Procedure) Regulations 2011.

v. Plant Capacity factors for north and south regions will be 16.78% and 17.5% respectively.

vi. In case the actual output exceeds the minimum output, the excess energy will be charged in accordance with the following mechanism:

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Net Annual Plant Capacity Factors	% of the prevalent tariff
Above 16.78%/17.50% to 17.78%/18.50%	75%
Above 17.78%/18.50% to 18.78%/19.50%	50%
Above 18.78%/19.50% to 19.78%/20.50%	25%
Above 19.78%/20.50% to 20.78%/21.50%	20%
Above 20.78%/21.50%	10%

vii. The risk of lower solar irradiation will be on the power producer.

viii. The choice to opt for upfront tariff will only be available up to 6 months from the date of its notification in the Official Gazette.

ix. The applicant will have to achieve financial close within one year from the date of opting the upfront tariff. The upfront tariff granted to the applicant will no longer remain applicable/valid, if financial close is not achieved by the applicant within the stipulated time or generation license is declined to the applicant.

x. The tariff control period will be 25 years from the date of commercial operation.

xi. The dispatch will be at appropriate voltage level from 11kV to 220kV mutually agreed between the power purchaser and the power producer.

xii. The targeted maximum construction period after financial close is 8 months, 10 months and 12 months for >1MW≤20MW, >20MW≤50MW and >50MW≤100MW projects respectively. No adjustment will be allowed in this tariff to account for financial impact of any delay in project construction. However, the failure of the applicant to complete construction within the stipulated time will not invalidate the tariff granted to it.

xiii. The eligibility criteria for opting upfront solar tariff will be as under:

a. The projects holding valid Letter of Intent (LOI) from AEDB/provincial Government agencies.

b. The projects whose proposed plant & machinery is confirmed to be new as per undertaking/affidavit to be provided by the project sponsors along with their applications to the Authority for acceptance of upfront tariff.

c. The projects having obtained the approval of NTDC for Grid connectivity and simulation studies to the effect that solar based power will be evacuated in accordance with the project timeline and further that the power injected through the project will not have any adverse effect on the national grid as required under the Grid Code.

xiv. On the basis of IfE Germany validation of the energy estimates, the degradation not exceeding 0.7%/annum of initial power will be provided in the Energy Purchase Agreement. The adjustment on this account will apply if it is within the manufacturers

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

prescribed technical limits. This shall not be allowed if the generation remains in excess of the benchmark plant capacity factors.

xv. Pre COD sale of electricity to the power purchaser, if any, shall be allowed subject to the terms and conditions of EPA, at the applicable tariff excluding principal repayment of debt component and interest component.

xvi. In the Upfront 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 Policy for Development of Renewable Energy for Power Generation 2006, as amended from time to time.

xvii. The decision to opt for upfront tariff once exercised will be irrevocable.

xviii. Debt part of the project financing has been assumed on foreign financing. However, the debt part of the project can also be financed through local financing or mix of local and foreign financing and the debt servicing component will be adjusted accordingly.

xix. The adjustment/indexation of upfront tariff will be made on the basis of benchmarks assumed by the Authority for Upfront Tariff in accordance with the indexation mechanism stipulated hereinabove and respective Upfront Tariff will be applicable to the solar PV projects coming under the Upfront Tariff regime. No project specific adjustments shall be taken into account.

xx. No provision for income tax, workers profit participation fund and workers welfare fund, any other tax, custom/excise duty or other duty, levy, charge, surcharge or other governmental impositions, payable on the generation, sales, exploration has been accounted for in the tariff. If the company is obligated to pay any tax the exact amount will be reimbursed by CPPA/DISCO on production of original receipts. However, withholding tax on dividend will not be passed through under the upfront solar tariff in line with the previous upfront solar tariff and coal upfront tariff.

xxi. General assumptions, which are not covered in this determination and National Electric Power Regulatory Authority Upfront Tariff (Approval & Procedure) Regulations, 2011, may be dealt with as per the standard terms of the Energy Purchase Agreement.

VI. The above Order of the Authority along with 12 Annexes will be notified in the Official Gazette in terms of Section 31(4) of the Regulations of Generation, Transmission and Distribution of Electric Power Act, 1997.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Annex-I

Upfront Solar Tariff >1MW≤20MW
Reference Tariff Table (North Region)

Year	O&M	Insurance	Return on Equity	Debt Servicing	Total Tariff	
	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs. per kWh	¢ per kWh
1	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
2	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
3	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
4	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
5	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
6	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
7	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
8	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
9	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
10	2.5797	1.0081	5.0186	10.5960	19.2025	18.2881
11	2.5797	1.0081	5.0186	-	8.6065	8.1967
12	2.5797	1.0081	5.0186	-	8.6065	8.1967
13	2.5797	1.0081	5.0186	-	8.6065	8.1967
14	2.5797	1.0081	5.0186	-	8.6065	8.1967
15	2.5797	1.0081	5.0186	-	8.6065	8.1967
16	2.5797	1.0081	5.0186	-	8.6065	8.1967
17	2.5797	1.0081	5.0186	-	8.6065	8.1967
18	2.5797	1.0081	5.0186	-	8.6065	8.1967
19	2.5797	1.0081	5.0186	-	8.6065	8.1967
20	2.5797	1.0081	5.0186	-	8.6065	8.1967
21	2.5797	1.0081	5.0186	-	8.6065	8.1967
22	2.5797	1.0081	5.0186	-	8.6065	8.1967
23	2.5797	1.0081	5.0186	-	8.6065	8.1967
24	2.5797	1.0081	5.0186	-	8.6065	8.1967
25	2.5797	1.0081	5.0186	-	8.6065	8.1967
Levelized	**2.5797**	**1.0081**	**5.0186**	**7.1728**	**15.7793**	**15.0279**

Installed Capacity (MWp)	20.000
Minimum Annual Energy (GWh)	29.399
CPI (General) August 2014	198.700
US CPI (All Urban Consumers) August 2014	237.852
Exchange Rate (Rs./US$)	105.000

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Upfront Solar Tariff >1MW≤20MW
Debt Servicing Schedule

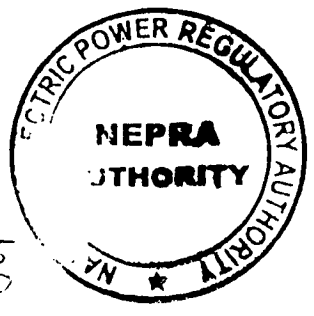
Period	Foreign Debt					Annual Principal Repayment	Annual Interest	Annual Debt Servicing
	Principal	Repayment	Mark-up	Balance	Debt Service			
	US$/MW	US$/MW	US$/MW	US$/MW	US$/MW	Rs./kWh	Rs./kWh	Rs./kWh
	1,172,077	22,990	14,094	1,149,087	37,084			
	1,149,087	23,267	13,818	1,125,821	37,084			
	1,125,821	23,546	13,538	1,102,274	37,084			
	1,102,274	23,829	13,255	1,078,445	37,084			
1	1,172,077	93,632	54,705	1,078,445	148,337	6.69	3.91	10.5960
	1,078,445	24,116	12,968	1,054,329	37,084			
	1,054,329	24,406	12,678	1,029,923	37,084			
	1,029,923	24,699	12,385	1,005,223	37,084			
	1,005,223	24,997	12,088	980,227	37,084			
2	1,078,445	98,218	50,119	980,227	148,337	7.02	3.58	10.5960
	980,227	25,297	11,787	954,930	37,084			
	954,930	25,601	11,483	929,328	37,084			
	929,328	25,909	11,175	903,419	37,084			
	903,419	26,221	10,864	877,199	37,084			
3	980,227	103,028	45,309	877,199	148,337	7.36	3.24	10.5960
	877,199	26,536	10,548	850,663	37,084			
	850,663	26,855	10,229	823,807	37,084			
	823,807	27,178	9,906	796,629	37,084			
	796,629	27,505	9,579	769,125	37,084			
4	877,199	108,074	40,263	769,125	148,337	7.72	2.88	10.5960
	769,125	27,836	9,249	741,289	37,084			
	741,289	28,170	8,914	713,119	37,084			
	713,119	28,509	8,575	684,610	37,084			
	684,610	28,852	8,232	655,758	37,084			
5	769,125	113,367	34,970	655,758	148,337	8.10	2.50	10.5960
	655,758	29,199	7,885	626,559	37,084			
	626,559	29,550	7,534	597,009	37,084			
	597,009	29,905	7,179	567,104	37,084			
	567,104	30,265	6,819	536,839	37,084			
6	655,758	118,919	29,418	536,839	148,337	8.49	2.10	10.5960
	536,839	30,629	6,455	506,210	37,084			
	506,210	30,997	6,087	475,213	37,084			
	475,213	31,370	5,714	443,843	37,084			
	443,843	31,747	5,337	412,096	37,084			
7	536,839	124,743	23,594	412,096	148,337	8.91	1.69	10.5960
	412,096	32,129	4,955	379,967	37,084			
	379,967	32,515	4,569	347,452	37,084			
	347,452	32,906	4,178	314,545	37,084			
	314,545	33,302	3,782	281,244	37,084			
8	412,096	130,852	17,485	281,244	148,337	9.35	1.25	10.5960
	281,244	33,702	3,382	247,541	37,084			
	247,541	34,108	2,977	213,434	37,084			
	213,434	34,518	2,567	178,916	37,084			
	178,916	34,933	2,151	143,983	37,084			
9	281,244	137,261	11,077	143,983	148,337	9.80	0.79	10.5960
	143,983	35,353	1,731	108,630	37,084			
	108,630	35,778	1,306	72,852	37,084			
	72,852	36,208	876	36,644	37,084			
	36,644	36,644	441	(0)	37,084			
10	143,983	143,983	4,354	(0)	148,337	10.28	0.31	10.5960

Annex-II

Upfront Solar Tariff >20MW≤50MW
Reference Tariff Table (North Region)

Year	O&M	Insurance	Return on Equity	Debt Servicing	Total Tariff	
	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs. per kWh	¢ per kWh
1	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
2	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
3	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
4	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
5	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
6	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
7	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
8	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
9	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
10	2.5797	0.9894	5.0087	10.4327	19.0105	18.1053
11	2.5797	0.9894	5.0087	-	8.5779	8.1694
12	2.5797	0.9894	5.0087	-	8.5779	8.1694
13	2.5797	0.9894	5.0087	-	8.5779	8.1694
14	2.5797	0.9894	5.0087	-	8.5779	8.1694
15	2.5797	0.9894	5.0087	-	8.5779	8.1694
16	2.5797	0.9894	5.0087	-	8.5779	8.1694
17	2.5797	0.9894	5.0087	-	8.5779	8.1694
18	2.5797	0.9894	5.0087	-	8.5779	8.1694
19	2.5797	0.9894	5.0087	-	8.5779	8.1694
20	2.5797	0.9894	5.0087	-	8.5779	8.1694
21	2.5797	0.9894	5.0087	-	8.5779	8.1694
22	2.5797	0.9894	5.0087	-	8.5779	8.1694
23	2.5797	0.9894	5.0087	-	8.5779	8.1694
24	2.5797	0.9894	5.0087	-	8.5779	8.1694
25	2.5797	0.9894	5.0087	-	8.5779	8.1694
Levelized	2.5797	0.9894	5.0087	7.0622	15.6401	14.8953

Installed Capacity (MWp)	50.000
Minimum Annual Energy (GWh)	73.496
CPI (General) August 2014	198.700
US CPI (All Urban Consumers) August 2014	237.852
Exchange Rate (Rs./US$)	105.000



Upfront Solar Tariff >20MW≤50MW
Debt Servicing Schedule

Period	Foreign Debt					Annual Principal Repayment	Annual Interest	Annual Debt Servicing
	Principal	Repayment	Mark-up	Balance	Debt Service			
	US$/MW	US$/MW	US$/MW	US$/MW	US$/MW	Rs./kWh	Rs./kWh	Rs./kWh
	1,154,005	22,636	13,877	1,131,369	36,513			
	1,131,369	22,908	13,605	1,108,462	36,513			
	1,108,462	23,183	13,329	1,085,278	36,513			
	1,085,278	23,462	13,050	1,061,816	36,513			
1	1,154,005	92,189	53,861	1,061,816	146,050	6.59	3.85	10.4327
	1,061,816	23,744	12,768	1,038,072	36,513			
	1,038,072	24,030	12,483	1,014,042	36,513			
	1,014,042	24,319	12,194	989,724	36,513			
	989,724	24,611	11,901	965,113	36,513			
2	1,061,816	96,704	49,346	965,113	146,050	6.91	3.52	10.4327
	965,113	24,907	11,605	940,206	36,513			
	940,206	25,207	11,306	914,999	36,513			
	914,999	25,510	11,003	889,489	36,513			
	889,489	25,816	10,696	863,673	36,513			
3	965,113	101,440	44,610	863,673	146,050	7.25	3.19	10.4327
	863,673	26,127	10,386	837,546	36,513			
	837,546	26,441	10,071	811,105	36,513			
	811,105	26,759	9,754	784,346	36,513			
	784,346	27,081	9,432	757,265	36,513			
4	863,673	106,408	39,642	757,265	146,050	7.60	2.83	10.4327
	757,265	27,406	9,106	729,859	36,513			
	729,859	27,736	8,777	702,123	36,513			
	702,123	28,069	8,443	674,054	36,513			
	674,054	28,407	8,105	645,647	36,513			
5	757,265	111,619	34,431	645,647	146,050	7.97	2.46	10.4327
	645,647	28,749	7,764	616,898	36,513			
	616,898	29,094	7,418	587,804	36,513			
	587,804	29,444	7,068	558,359	36,513			
	558,359	29,798	6,714	528,561	36,513			
6	645,647	117,085	28,965	528,561	146,050	8.36	2.07	10.4327
	528,561	30,157	6,356	498,405	36,513			
	498,405	30,519	5,993	467,885	36,513			
	467,885	30,886	5,626	436,999	36,513			
	436,999	31,258	5,255	405,742	36,513			
7	528,561	122,820	23,231	405,742	146,050	8.77	1.66	10.4327
	405,742	31,633	4,879	374,108	36,513			
	374,108	32,014	4,499	342,094	36,513			
	342,094	32,399	4,114	309,695	36,513			
	309,695	32,788	3,724	276,907	36,513			
8	405,742	128,835	17,215	276,907	146,050	9.20	1.23	10.4327
	276,907	33,183	3,330	243,724	36,513			
	243,724	33,582	2,931	210,143	36,513			
	210,143	33,986	2,527	176,157	36,513			
	176,157	34,394	2,118	141,763	36,513			
9	276,907	135,144	10,906	141,763	146,050	9.65	0.78	10.4327
	141,763	34,808	1,705	106,955	36,513			
	106,955	35,226	1,286	71,729	36,513			
	71,729	35,650	863	36,079	36,513			
	36,079	36,079	434	(0)	36,513			
10	141,763	141,763	4,287	(0)	146,050	10.13	0.31	10.4327

Annex-III

Upfront Solar Tariff for >50MW≤100MW
Reference Tariff Table (North Region)

Year	O&M	Insurance	Return on Equity	Debt Servicing	Total Tariff	
	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs. per kWh	¢ per kWh
1	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
2	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
3	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
4	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
5	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
6	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
7	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
8	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
9	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
10	2.5797	0.9707	4.9959	10.2675	18.8138	17.9179
11	2.5797	0.9707	4.9959	-	8.5463	8.1393
12	2.5797	0.9707	4.9959	-	8.5463	8.1393
13	2.5797	0.9707	4.9959	-	8.5463	8.1393
14	2.5797	0.9707	4.9959	-	8.5463	8.1393
15	2.5797	0.9707	4.9959	-	8.5463	8.1393
16	2.5797	0.9707	4.9959	-	8.5463	8.1393
17	2.5797	0.9707	4.9959	-	8.5463	8.1393
18	2.5797	0.9707	4.9959	-	8.5463	8.1393
19	2.5797	0.9707	4.9959	-	8.5463	8.1393
20	2.5797	0.9707	4.9959	-	8.5463	8.1393
21	2.5797	0.9707	4.9959	-	8.5463	8.1393
22	2.5797	0.9707	4.9959	-	8.5463	8.1393
23	2.5797	0.9707	4.9959	-	8.5463	8.1393
24	2.5797	0.9707	4.9959	-	8.5463	8.1393
25	2.5797	0.9707	4.9959	-	8.5463	8.1393
Levelized	**2.5797**	**0.9707**	**4.9959**	**6.9504**	**15.4967**	**14.7588**

Installed Capacity (MWp)	100.000
Minimum Annual Energy (GWh)	146.993
CPI (General) August 2014	198.700
US CPI (All Urban Consumers) August 2014	237.852
Exchange Rate (Rs./US$)	105.000

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Annex-IIIa

Upfront Solar Tariff for >50MW≤100MW
Debt Servicing Schedule

Period	Foreign Debt					Annual Principal Repayment	Annual Interest	Annual Debt Servicing
	Principal	Repayment	Mark-up	Balance	Debt Service			
	US$/MW	US$/MW	US$/MW	US$/MW	US$/MW	Rs./kWh	Rs./kWh	Rs./kWh
	1,135,736	22,277	13,657	1,113,459	35,934			
	1,113,459	22,545	13,389	1,090,913	35,934			
	1,090,913	22,816	13,118	1,068,097	35,934			
	1,068,097	23,091	12,844	1,045,007	35,934			
1	1,135,736	90,729	53,009	1,045,007	143,738	6.48	3.79	10.2675
	1,045,007	23,368	12,566	1,021,638	35,934			
	1,021,638	23,649	12,285	997,989	35,934			
	997,989	23,934	12,001	974,055	35,934			
	974,055	24,221	11,713	949,834	35,934			
2	1,045,007	95,173	48,565	949,834	143,738	6.80	3.47	10.2675
	949,834	24,513	11,422	925,321	35,934			
	925,321	24,807	11,127	900,514	35,934			
	900,514	25,106	10,829	875,408	35,934			
	875,408	25,408	10,527	850,000	35,934			
3	949,834	99,834	43,904	850,000	143,738	7.13	3.14	10.2675
	850,000	25,713	10,221	824,287	35,934			
	824,287	26,022	9,912	798,264	35,934			
	798,264	26,335	9,599	771,929	35,934			
	771,929	26,652	9,282	745,277	35,934			
4	850,000	104,723	39,015	745,277	143,738	7.48	2.79	10.2675
	745,277	26,973	8,962	718,305	35,934			
	718,305	27,297	8,638	691,008	35,934			
	691,008	27,625	8,309	663,383	35,934			
	663,383	27,957	7,977	635,425	35,934			
5	745,277	109,852	33,886	635,425	143,738	7.85	2.42	10.2675
	635,425	28,293	7,641	607,132	35,934			
	607,132	28,634	7,301	578,498	35,934			
	578,498	28,978	6,956	549,520	35,934			
	549,520	29,327	6,608	520,193	35,934			
6	635,425	115,232	28,506	520,193	143,738	8.23	2.04	10.2675
	520,193	29,679	6,255	490,514	35,934			
	490,514	30,036	5,898	460,478	35,934			
	460,478	30,397	5,537	430,081	35,934			
	430,081	30,763	5,172	399,318	35,934			
7	520,193	120,875	22,863	399,318	143,738	8.63	1.63	10.2675
	399,318	31,133	4,802	368,186	35,934			
	368,186	31,507	4,427	336,679	35,934			
	336,679	31,886	4,049	304,793	35,934			
	304,793	32,269	3,665	272,523	35,934			
8	399,318	126,795	16,943	272,523	143,738	9.06	1.21	10.2675
	272,523	32,657	3,277	239,866	35,934			
	239,866	33,050	2,884	206,816	35,934			
	206,816	33,448	2,487	173,368	35,934			
	173,368	33,850	2,085	139,519	35,934			
9	272,523	133,005	10,733	139,519	143,738	9.50	0.77	10.2675
	139,519	34,257	1,678	105,262	35,934			
	105,262	34,669	1,266	70,593	35,934			
	70,593	35,086	849	35,508	35,934			
	35,508	35,508	427	(0)	35,934			
10	139,519	139,519	4,219	(0)	143,738	9.97	0.30	10.2675

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

Annex-IV

Upfront Solar Tariff for >1MW≤20MW
Reference Tariff Table (South Region)

Year	O&M	Insurance	Return on Equity	Debt Servicing	Total Tariff	
	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs. per kWh	¢ per kWh
1	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
2	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
3	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
4	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
5	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
6	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
7	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
8	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
9	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
10	2.4736	0.9667	4.8121	10.1601	18.4125	17.5357
11	2.4736	0.9667	4.8121	-	8.2524	7.8594
12	2.4736	0.9667	4.8121	-	8.2524	7.8594
13	2.4736	0.9667	4.8121	-	8.2524	7.8594
14	2.4736	0.9667	4.8121	-	8.2524	7.8594
15	2.4736	0.9667	4.8121	-	8.2524	7.8594
16	2.4736	0.9667	4.8121	-	8.2524	7.8594
17	2.4736	0.9667	4.8121	-	8.2524	7.8594
18	2.4736	0.9667	4.8121	-	8.2524	7.8594
19	2.4736	0.9667	4.8121	-	8.2524	7.8594
20	2.4736	0.9667	4.8121	-	8.2524	7.8594
21	2.4736	0.9667	4.8121	-	8.2524	7.8594
22	2.4736	0.9667	4.8121	-	8.2524	7.8594
23	2.4736	0.9667	4.8121	-	8.2524	7.8594
24	2.4736	0.9667	4.8121	-	8.2524	7.8594
25	2.4736	0.9667	4.8121	-	8.2524	7.8594
Levelized	2.4736	0.9667	4.8121	6.8777	15.1301	14.4096

Installed Capacity (MWp)	100.000
Minimum Annual Energy (GWh)	153.300
CPI (General) August 2014	198.700
US CPI (All Urban Consumers) August 2014	237.852
Exchange Rate (Rs./US$)	105.000

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

Annex-IVa

Upfront Solar Tariff for >1MW≤20MW
Debt Servicing Schedule

Period	Foreign Debt					Annual Principal Repayment	Annual Interest	Annual Debt Servicing
	Principal	Repayment	Mark-up	Balance	Debt Service			
	US$/MW	US$/MW	US$/MW	US$/MW	US$/MW	Rs./kWh	Rs./kWh	Rs./kWh
	1,172,077	22,990	14,094	1,149,087	37,084			
	1,149,087	23,267	13,818	1,125,821	37,084			
	1,125,821	23,546	13,538	1,102,274	37,084			
	1,102,274	23,829	13,255	1,078,445	37,084			
1	1,172,077	93,632	54,705	1,078,445	148,337	6.41	3.75	10.1601
	1,078,445	24,116	12,968	1,054,329	37,084			
	1,054,329	24,406	12,678	1,029,923	37,084			
	1,029,923	24,699	12,385	1,005,223	37,084			
	1,005,223	24,997	12,088	980,227	37,084			
2	1,078,445	98,218	50,119	980,227	148,337	6.73	3.43	10.1601
	980,227	25,297	11,787	954,930	37,084			
	954,930	25,601	11,483	929,328	37,084			
	929,328	25,909	11,175	903,419	37,084			
	903,419	26,221	10,864	877,199	37,084			
3	980,227	103,028	45,309	877,199	148,337	7.06	3.10	10.1601
	877,199	26,536	10,548	850,663	37,084			
	850,663	26,855	10,229	823,807	37,084			
	823,807	27,178	9,906	796,629	37,084			
	796,629	27,505	9,579	769,125	37,084			
4	877,199	108,074	40,263	769,125	148,337	7.40	2.76	10.1601
	769,125	27,836	9,249	741,289	37,084			
	741,289	28,170	8,914	713,119	37,084			
	713,119	28,509	8,575	684,610	37,084			
	684,610	28,852	8,232	655,758	37,084			
5	769,125	113,367	34,970	655,758	148,337	7.76	2.40	10.1601
	655,758	29,199	7,885	626,559	37,084			
	626,559	29,550	7,534	597,009	37,084			
	597,009	29,905	7,179	567,104	37,084			
	567,104	30,265	6,819	536,839	37,084			
6	655,758	118,919	29,418	536,839	148,337	8.15	2.01	10.1601
	536,839	30,629	6,455	506,210	37,084			
	506,210	30,997	6,087	475,213	37,084			
	475,213	31,370	5,714	443,843	37,084			
	443,843	31,747	5,337	412,096	37,084			
7	536,839	124,743	23,594	412,096	148,337	8.54	1.62	10.1601
	412,096	32,129	4,955	379,967	37,084			
	379,967	32,515	4,569	347,452	37,084			
	347,452	32,906	4,178	314,545	37,084			
	314,545	33,302	3,782	281,244	37,084			
8	412,096	130,852	17,485	281,244	148,337	8.96	1.20	10.1601
	281,244	33,702	3,382	247,541	37,084			
	247,541	34,108	2,977	213,434	37,084			
	213,434	34,518	2,567	178,916	37,084			
	178,916	34,933	2,151	143,983	37,084			
9	281,244	137,261	11,077	143,983	148,337	9.40	0.76	10.1601
	143,983	35,353	1,731	108,630	37,084			
	108,630	35,778	1,306	72,852	37,084			
	72,852	36,208	876	36,644	37,084			
	36,644	36,644	441	(0)	37,084			
10	143,983	143,983	1,354	(0)	148,337	9.86	0.30	10.1601

Annex-V

Upfront Solar Tariff for >20MW≤50MW
Reference Tariff Table (South Region)

Year	O&M	Insurance	Return on Equity	Debt Servicing	Total Tariff	
	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs. per kWh	¢ per kWh
1	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
2	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
3	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
4	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
5	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
6	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
7	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
8	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
9	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
10	2.4736	0.9487	4.8027	10.0034	18.2284	17.3604
11	2.4736	0.9487	4.8027	-	8.2250	7.8333
12	2.4736	0.9487	4.8027	-	8.2250	7.8333
13	2.4736	0.9487	4.8027	-	8.2250	7.8333
14	2.4736	0.9487	4.8027	-	8.2250	7.8333
15	2.4736	0.9487	4.8027	-	8.2250	7.8333
16	2.4736	0.9487	4.8027	-	8.2250	7.8333
17	2.4736	0.9487	4.8027	-	8.2250	7.8333
18	2.4736	0.9487	4.8027	-	8.2250	7.8333
19	2.4736	0.9487	4.8027	-	8.2250	7.8333
20	2.4736	0.9487	4.8027	-	8.2250	7.8333
21	2.4736	0.9487	4.8027	-	8.2250	7.8333
22	2.4736	0.9487	4.8027	-	8.2250	7.8333
23	2.4736	0.9487	4.8027	-	8.2250	7.8333
24	2.4736	0.9487	4.8027	-	8.2250	7.8333
25	2.4736	0.9487	4.8027	-	8.2250	7.8333
Levelized	**2.4736**	0.9487	**4.8027**	6.7717	14.9966	**14.2825**

Installed Capacity (MWp)	100.000
Minimum Annual Energy (GWh)	153.300
CPI (General) August 2014	198.700
US CPI (All Urban Consumers) August 2014	237.852
Exchange Rate (Rs./US$)	105.000

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

Annex-Va

Upfront Solar Tariff for >20MW≤50MW
Debt Servicing Schedule

Period	Foreign Debt					Annual Principal Repayment	Annual Interest	Annual Debt Servicing
	Principal	Repayment	Mark-up	Balance	Debt Service			
	US$/MW	US$/MW	US$/MW	US$/MW	US$/MW	Rs./kWh	Rs./kWh	Rs./kWh
	1,154,005	22,636	13,877	1,131,369	36,513			
	1,131,369	22,908	13,605	1,108,462	36,513			
	1,108,462	23,183	13,329	1,085,278	36,513			
	1,085,278	23,462	13,050	1,061,816	36,513			
1	1,154,005	92,189	53,861	1,061,816	146,050	6.31	3.69	10.0034
	1,061,816	23,744	12,768	1,038,072	36,513			
	1,038,072	24,030	12,483	1,014,042	36,513			
	1,014,042	24,319	12,194	989,724	36,513			
	989,724	24,611	11,901	965,113	36,513			
2	1,061,816	96,704	49,346	965,113	146,050	6.62	3.38	10.0034
	965,113	24,907	11,605	940,206	36,513			
	940,206	25,207	11,306	914,999	36,513			
	914,999	25,510	11,003	889,489	36,513			
	889,489	25,816	10,696	863,673	36,513			
3	965,113	101,440	44,610	863,673	146,050	6.95	3.06	10.0034
	863,673	26,127	10,386	837,546	36,513			
	837,546	26,441	10,071	811,105	36,513			
	811,105	26,759	9,754	784,346	36,513			
	784,346	27,081	9,432	757,265	36,513			
4	863,673	106,408	39,642	757,265	146,050	7.29	2.72	10.0034
	757,265	27,406	9,106	729,859	36,513			
	729,859	27,736	8,777	702,123	36,513			
	702,123	28,069	8,443	674,054	36,513			
	674,054	28,407	8,105	645,647	36,513			
5	757,265	111,619	34,431	645,647	146,050	7.65	2.36	10.0034
	645,647	28,749	7,764	616,898	36,513			
	616,898	29,094	7,418	587,804	36,513			
	587,804	29,444	7,068	558,359	36,513			
	558,359	29,798	6,714	528,561	36,513			
6	645,647	117,085	28,965	528,561	146,050	8.02	1.98	10.0034
	528,561	30,157	6,356	498,405	36,513			
	498,405	30,519	5,993	467,885	36,513			
	467,885	30,886	5,626	436,999	36,513			
	436,999	31,258	5,255	405,742	36,513			
7	528,561	122,820	23,231	405,742	146,050	8.41	1.59	10.0034
	405,742	31,633	4,879	374,108	36,513			
	374,108	32,014	4,499	342,094	36,513			
	342,094	32,399	4,114	309,695	36,513			
	309,695	32,788	3,724	276,907	36,513			
8	405,742	128,835	17,215	276,907	146,050	8.82	1.18	10.0034
	276,907	33,183	3,330	243,724	36,513			
	243,724	33,582	2,931	210,143	36,513			
	210,143	33,986	2,527	176,157	36,513			
	176,157	34,394	2,118	141,763	36,513			
9	276,907	135,144	10,906	141,763	146,050	9.26	0.75	10.0034
	141,763	34,808	1,705	106,955	36,513			
	106,955	35,226	1,286	71,729	36,513			
	71,729	35,650	863	36,079	36,513			
	36,079	36,079	434	(0)	36,513			
10	141,763	141,763	4,287	(0)	146,050	9.71	0.29	10.0034

Annex-VI

Upfront Solar Tariff for >50MW≤100MW
Reference Tariff Table (South Region)

Year	O&M	Insurance	Return on Equity	Debt Servicing	Total Tariff	
	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs. per kWh	¢ per kWh
1	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
2	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
3	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
4	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
5	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
6	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
7	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
8	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
9	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
10	2.4736	0.9307	4.7903	9.8451	18.0397	17.1807
11	2.4736	0.9307	4.7903	-	8.1947	7.8044
12	2.4736	0.9307	4.7903	-	8.1947	7.8044
13	2.4736	0.9307	4.7903	-	8.1947	7.8044
14	2.4736	0.9307	4.7903	-	8.1947	7.8044
15	2.4736	0.9307	4.7903	-	8.1947	7.8044
16	2.4736	0.9307	4.7903	-	8.1947	7.8044
17	2.4736	0.9307	4.7903	-	8.1947	7.8044
18	2.4736	0.9307	4.7903	-	8.1947	7.8044
19	2.4736	0.9307	4.7903	-	8.1947	7.8044
20	2.4736	0.9307	4.7903	-	8.1947	7.8044
21	2.4736	0.9307	4.7903	-	8.1947	7.8044
22	2.4736	0.9307	4.7903	-	8.1947	7.8044
23	2.4736	0.9307	4.7903	-	8.1947	7.8044
24	2.4736	0.9307	4.7903	-	8.1947	7.8044
25	2.4736	0.9307	4.7903	-	8.1947	7.8044
Levelized	**2.4736**	**0.9307**	**4.7903**	**6.6645**	**14.8591**	**14.1516**

Installed Capacity (MWp)	100.000
Minimum Annual Energy (GWh)	153.300
CPI (General) August 2014	198.700
US CPI (All Urban Consumers) August 2014	237.852
Exchange Rate (Rs./US$)	105.000

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

Upfront Solar Tariff for >50MW≤100MW
Debt Servicing Schedule

Period	Foreign Debt					Annual Principal Repayment	Annual Interest	Annual Debt Servicing
	Principal	Repayment	Mark-up	Balance	Debt Service			
	US$/MW	US$/MW	US$/MW	US$/MW	US$/MW	Rs./kWh	Rs./kWh	Rs./kWh
	1,135,736	22,277	13,657	1,113,459	35,934			
	1,113,459	22,545	13,389	1,090,913	35,934			
	1,090,913	22,816	13,118	1,068,097	35,934			
	1,068,097	23,091	12,844	1,045,007	35,934			
1	1,135,736	90,729	53,009	1,045,007	143,738	6.21	3.63	9.8451
	1,045,007	23,368	12,566	1,021,638	35,934			
	1,021,638	23,649	12,285	997,989	35,934			
	997,989	23,934	12,001	974,055	35,934			
	974,055	24,221	11,713	949,834	35,934			
2	1,045,007	95,173	48,565	949,834	143,738	6.52	3.33	9.8451
	949,834	24,513	11,422	925,321	35,934			
	925,321	24,807	11,127	900,514	35,934			
	900,514	25,106	10,829	875,408	35,934			
	875,408	25,408	10,527	850,000	35,934			
3	949,834	99,834	43,904	850,000	143,738	6.84	3.01	9.8451
	850,000	25,713	10,221	824,287	35,934			
	824,287	26,022	9,912	798,264	35,934			
	798,264	26,335	9,599	771,929	35,934			
	771,929	26,652	9,282	745,277	35,934			
4	850,000	104,723	39,015	745,277	143,738	7.17	2.67	9.8451
	745,277	26,973	8,962	718,305	35,934			
	718,305	27,297	8,638	691,008	35,934			
	691,008	27,625	8,309	663,383	35,934			
	663,383	27,957	7,977	635,425	35,934			
5	745,277	109,852	33,886	635,425	143,738	7.52	2.32	9.8451
	635,425	28,293	7,641	607,132	35,934			
	607,132	28,634	7,301	578,498	35,934			
	578,498	28,978	6,956	549,520	35,934			
	549,520	29,327	6,608	520,193	35,934			
6	635,425	115,232	28,506	520,193	143,738	7.89	1.95	9.8451
	520,193	29,679	6,255	490,514	35,934			
	490,514	30,036	5,898	460,478	35,934			
	460,478	30,397	5,537	430,081	35,934			
	430,081	30,763	5,172	399,318	35,934			
7	520,193	120,875	22,863	399,318	143,738	8.28	1.57	9.8451
	399,318	31,133	4,802	368,186	35,934			
	368,186	31,507	4,427	336,679	35,934			
	336,679	31,886	4,049	304,793	35,934			
	304,793	32,269	3,665	272,523	35,934			
8	399,318	126,795	16,943	272,523	143,738	8.68	1.16	9.8451
	272,523	32,657	3,277	239,866	35,934			
	239,866	33,050	2,884	206,816	35,934			
	206,816	33,448	2,487	173,368	35,934			
	173,368	33,850	2,085	139,519	35,934			
9	272,523	133,005	10,733	139,519	143,738	9.11	0.74	9.8451
	139,519	34,257	1,678	105,262	35,934			
	105,262	34,669	1,266	70,593	35,934			
	70,593	35,086	849	35,508	35,934			
	35,508	35,508	427	(0)	35,934			
10	139,519	139,519	4,219	(0)	143,738	9.56	0.29	9.8451

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