National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

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No. NEPRA/TRF-WPT/2015/9512-9514
June 24, 2015

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

Dear Sir,

Please find enclosed herewith the subject Determination of the Authority along with Annexure-I, II, III, IV & V (66 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).

3. Order of the Authority along with attached Annexures (I to V) of the Determination needs to be notified in the official Gazette.

Enclosure: As above

24.06.15

(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.

DETERMINATION OF NATIONAL ELECTRIC POWER REGULATORY AUTHORITY IN THE MATTER OF UPFRONT TARIFF FOR WIND POWER GENERATION

1. National Electric Power Regulatory Authority (hereinafter referred to as the "Authority") was established under section 3 of the 'Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997' (hereinafter referred to as the "Act") and its responsibilities under the Act include, inter alia, determination of tariff, rates, charges and other terms and conditions for supply of electric power services by generation, transmission and distribution companies. In performing its functions under the Act, the Authority has to protect, as far as practicable, the interests of consumers and companies providing electric power services in accordance with the guidelines, not inconsistent with the provisions of the Act laid down by the Federal Government.

2. In order to facilitate development of wind power generation, the Authority in the past has been determining upfront tariff for generation of electricity from wind power. The most recent upfront tariff for wind power generation was determined by the Authority on April 24, 2013 (hereinafter referred to as the "upfront tariff, 2013") which has already lapsed. To provide consistent tariff regime for the development of wind power generation sector in the country, the Authority in exercise of its powers under the Act read with rule 3 (1) of the National Electric Power Regulatory Authority (Tariff Standards and Procedure) Rules, 1998 (hereinafter referred to as the "tariff rules") and regulation 3 of the National Electric Power Regulatory Authority Upfront Tariff (Approval & Procedure) Regulations, 2011 (hereinafter referred to as the "upfront tariff regulations") decided to initiate proceedings for determination of new upfront tariff for generation of electricity from wind power (hereinafter referred to as the "upfront tariff"). Accordingly a draft upfront tariff proposal was developed on the basis of data and information available with the Authority.

3. In line with the tariff setting process envisaged in the tariff rules, and with a view to arrive at a just and informed decision, notice of public hearing and salient features of the draft upfront tariff proposal were published in the national newspapers on April 03, 2015 inviting filing of intervention requests and comments. The Authority also served separate notices to various stakeholders for filing their comments, if any, on the draft upfront tariff proposal and its underlying terms and conditions. The advertised tariff, along with its salient features were as follows;

Years	With 100% local debt		With 100% foreign debt	
	Tariff (Rs. /kWh.)	Tariff (US cents /kWh.)	Tariff (Rs. /kWh.)	Tariff (US cents /kWh.)
1 to 10	13.2283	13.0328	10.8772	10.7165
11 to 20	5.3350	5.2562	5.1798	5.1032
Levelized	11.0319	10.8688	9.2918	9.1545

i. **Project Cost**: For the computation of tabulated above proposed tariff, project cost of USD 1.97 million per MW (foreign financing) and USD 2.08 million per MW (local financing) was considered.

ii. **Capacity Factor**: The annual net plant capacity factor of 38.44% was taken into account.

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iii. **Revenue Sharing Mechanism**: Net annual energy generation supplied to the power purchaser in a year, in excess of specified 38.44% net annual plant capacity factor, was proposed to be charged at the following tariffs:

Plant capacity factor	% of the prevalent tariff
Above 38.44% to 39.44%	75%
Above 39.44% to 40.44%	50%
Above 40.44% to 41.44%	25%
Above 41.44% to 42.44%	20%
Above 42.44%	10%

iv. **Applicability Period**: The applicability period of twenty years from the commencement of commercial operations was specified.

v. **Wind Risk**: Wind Power Generation Company was required to assume/borne wind risk.

vi. **Eligibility**: It was specified that wind power generation companies meeting the following conditions will be eligible to avail this tariff:

a. Companies recommended by the relevant agency for the grant of upfront tariff.
b. Companies whose proposed plant and machinery is new and of international standards.
c. Companies with installed capacity of up to 250 MW.
d. Companies having a certificate from the power purchaser regarding availability of power evacuation arrangement/capacity for absorption of power supplied into the national grid.

vii. **Adjustment**: Tariff components, i.e. O&M, return on equity, principal repayment, interest and insurance were proposed indexation/adjustment in line with the mechanism given in the upfront tariff, 2013 which is given as under;

Tariff Components	Indexations
O&M	PKR/USD & US CPI
Return on Equity	PKR/USD
Principal Repayment	**Foreign Financing**: PKR/USD
	Local Financing: None
Interest	**Foreign Financing**: PKR/USD & LIBOR
	Local Financing: KIBOR
Insurance	PKR/USD

viii. **Reference Numbers**: Following reference numbers were used for the computation of the advertised tariff;

PKR / US Dollar Parity	101.50
US CPI (all urban consumers for January 2015)	233.707
3 months KIBOR	8.22%
3 months LIBOR	0.2706%

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ix. **Time to Opt for Upfront Tariff**: Twelve months from the date of determination by the Authority for opting this tariff was proposed.

x. **Construction Period**: The targeted maximum construction period of 18 months after financial close was proposed.

xi. **Validity**: It was specified that upfront tariff granted to any wind power generation company will no longer remain applicable/valid on the occurrence of any of the following events:

a. if a generation license is declined to that wind power generation company;
b. if financial close is not achieved by that wind power generation company by September 30, 2016 or within 12 months of the grant of upfront tariff whichever is earlier;

xii. **Pass-Through Items**: It was stipulated that duties imposed up to Commercial Operations Date (hereinafter referred to as "COD") on the wind power generation company, not being of refundable nature, will be allowed as a pass through cost upon production of verifiable documentary evidence.

xiii. **Pre-COD sale of Electricity**: It was proposed that pre-COD sale of electricity will be allowed to the power producer, subject to the terms and conditions of Energy Purchase Agreement (hereinafter referred to as "EPA"), at the applicable tariff excluding principal repayment of debt component and interest component, without altering the required COD stipulated in EPA, in any manner.

4. In response to the notice of public hearing, following parties filed intervention requests which were accepted by the Authority;

Sr. No.	Name of Intervener	Sr. No.	Name of Intervener
1	Alternative Energy Development Board	12	Lakeside Energy (Pvt.) Limited
2	Anwar Kamal Law Associates	13	Lucky Energy (Private) Limited
3	Bridge Factor (Private) Limited	14	Master Green Energy Limited
4	Din Energy Limited	15	NASDA Energy (Pvt.) Ltd.
5	Emerald Energy Limited	16	NBT Wind Power Pakistan II (Pvt.) Limited
6	Frontier Renewable Energy (Private) Limited	17	NBT Wind Power Pakistan III (Pvt.) Limited
7	Harbin Electric International	18	Norinco International Cooperation Limited
8	Hartford Alternative Energy (Pvt.) Limited	19	Planning Commission, Government of Pakistan
9	Hydrochina Dawood Power (Pvt.) Limited	20	Vestas Wind Technology Pakistan (Pvt.) Limited
10	Indus Wind Energy Limited	21	Western Energy (Private) Limited
11	Iran-Pak Wind Power (Private) Limited	22	Wind Eagle Limited

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5. In addition to the intervention requests, comments in writing were also received by the Authority from the following stakeholders:

Sr. No.	Name of Commentator	Sr. No.	Name of Commentator
1	Mr. Arooj Asghar	4	Mayura Botejue
2	FFC Energy Limited	5	Nordex Pakistan (Private) Limited
3	Directorate of Alternative Energy, Government of Sindh	6	Osmani & Company (Pvt.) Limited

6. Public hearing in this regard was held on April 16, 2015 at NEPRA Tower, Islamabad, which was attended by Alternative Energy Development Board, Planning Commission, Government of Sindh, project developers, turbine suppliers, and various other stakeholders. Main submissions of the above interveners and commentators are as follows;

A. Alternative Energy Development Board

i. Alternative Energy Development Board (hereinafter referred to as "AEDB") in its initial submissions and during the hearing submitted that the foundation of upfront tariff proceedings is the data available with the Authority mentioned in the public advertisement dated April 03, 2015, however, such data has not been made public. The intervener submitted that the Authority's action to hold a full-fledged public hearing without first disseminating the underlying evidential basis and giving all parties a proper and meaningful opportunity to analyze and present their submissions on such evidence is not only contrary to international best practices for like regulatory decision-making initiatives, but also runs counter to the letter and spirit of the process-oriented tariff rules, that govern tariff proceedings and will tantamount to failure of due process enshrined in the tariff rules. Post hearing, AEDB vide letter No. B/3/5/Policy/Wind/14 dated April 22, 2015 and subsequently vide letter No. B/3/5/Policy/Wind/14 dated May 07, 2015 submitted that it is about to finalize a comprehensive study/additional comments along with relevant information/analysis for the perusal of the Authority which AEDB believes would be relevant for upfront tariff determination. Finally, AEDB vide letter No. B/3/5/Policy/Wind/14 dated May 14, 2015 submitted additional comments which are summarized below;

ii. **Capacity Factor**: AEDB submitted the results of annual energy yields/capacity factors for indicative and typical 50MW wind farms for both Jhimpir and Gharo regions, using eight different wind turbine generators models being installed in Pakistan. The submitted results were based on the estimates using the industry standard software namely Wind Atlas Analysis & Application Program developed by DTU/RISOE National Laboratory of Denmark. Further, the results were given both on the basis of the variables adopted by

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DTU/RISOE National Laboratory of Denmark and variables adopted by lenders/IPPs. The results conveyed by AEDB on the most efficient wind turbine model are summarized below;

Sites	Confidence levels	RISOE	LENDERS
Gharo	P90	27.36%	34.79%
	P75	32.47%	37.22%
	P50	38.09%	39.89%
Jhimpir	P90	26.66%	32.73%
	P75	31.04%	35.02%
	P50	35.84%	37.54%

iii. AEDB explained that the difference between the results of RISOE and the lenders was due to the accounting of different values of technical losses and standard error by them. Further, AEDB while referring to the international reports submitted that the same technology used in different geographic locations can exhibit remarkable variations in its capacity factor. The values of the capacity factors of different countries/regions were also submitted by AEDB. Based on above, AEDB submitted that capacity factor of 38%, as proposed by the Authority, may not be achieved at P90 probability exceedance level for the wind farm sites within the Gharo-Ketibandar wind corridor in Sindh. Lastly, AEDB submitted that it is expected that capacity factor between 31-33% may be achieved at p90 probability exceedance level using the assumptions of technical consultants of lenders/IPPs.

iv. **Project Cost**: In view of the international capital cost of wind onshore projects and the local factors as explained by different commentators during the hearing, AEDB submitted that it is of the view that the Authority may consider the project cost between USD 2-2.2 million per MW for new upfront tariff. AEDB also provided data regarding year-wise levelized cost of electricity by technology for various countries including China, India, Germany, etc.

B. Anwar Kamal Law Associates

i. With regard to induction of renewable power plants, the intervener submitted that it reiterates its earlier position that this power should only be inducted in the power sector of the country after ensuring its economic viability. The intervener submitted that it agrees with the policy statement of the Authority published in its annual report 2012-2013 where it is stated that:

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"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-a-vis the objective of affordable electric power for the 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 power plants on basket price of electricity in the Country, lower plant factor of these power 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 optimal level due to wide variation in plant load factor besides higher T&D losses in transmitting electricity to distant load centers."

ii. The intervener submitted that in view of the above, it is surprising that the Authority, contrary to its above stated policy statement, allowed sizeable capacity of wind and solar power plants, some of which have already achieved commercial operations and some of which are in pipeline; tariff of which will certainly affect the basket price adversely. The reasons for acting against its own policy statement must be known to the Authority but those reasons have not been shared with the consumers of electricity who will bear the cost of this uneconomic and therefore imprudent decision.

iii. The intervener reiterated its stance which was presented during the proceedings for the development of upfront tariff for solar power plants that this may not be a good time for the Pakistan power sector to induct renewable energy power plants (which are declared as 'must run plants' in the renewable energy policy) with long term power purchase agreements for the reason that efficiency of these power plants is on an increasing trend, thereby reducing the cost of electricity generated by these higher efficiency power plants. The intervener submitted that its request was turned down by the Authority and it allowed renewable energy power plants for a period of 20 to 25 years on the higher tariff through determination and subsequently by allowing extension in financial close deadline. If the Authority could have deferred its decision for the induction of renewable energy power plants for a period of only 2 to 3 years, it could have saved the nation from the burden of billions of rupees. The decreasing trend can easily be seen from the Authority's last three rates determined for solar and wind projects.

iv. The intervener stated that from the tariff figures, it is clear that the per unit cost allowed by the Authority to renewable energy power plants is even higher (or comparable) to those base load power plants which have already been commissioned and are available for operation but are not being operated to their full capacity

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due to their higher tariff. This aspect coupled with the higher cost of transmission in the case of non-base load Renewable Energy power plants should be given consideration.

v. The intervener submitted that the upfront tariff regime is only suitable if we have a well-established power market in our country and there is no concept of long term power purchase agreements. Since we do not have such market, hence, the upfront tariff regime needs to be discontinued till the establishment of the same. Lastly, the intervener highlighted the set-back suffered due to induction of more capacity than was required when an upfront tariff was announced under the 1994 Power Policy. The intervener emphasized that up till now, the electricity power generation in our country is under strict regulation where plants are commissioned after executing an EPA for a term of 25-30 years. Hence we need to be more careful as at the present we are making capacity payments to many power plants without taking electricity from them only due to the reason that we cannot afford high cost electricity.

C. Bridge Factor (Pvt.) Limited, Hartford Alternative Energy (Private) Limited and Wind Eagle Limited

i. The interveners submitted that as per the information provided in the notice, the Authority has assumed a total project cost of US$ 98.5 million for the projects financed solely through foreign financing and US$ 104 million for the projects backed only by local financing. Reverse working the project cost figures it is reasonable to approximate that an Engineering, Procurement and Construction (hereinafter referred to as "EPC") Cost of US$ 85 to 87 million has been assumed for the computations of the upfront tariff. The interveners submitted that it is undeniable that EPC prices have come down since the time of development of the first wind farm in Pakistan, however, not by that amount as has been taken into account in the proposed tariff by the Authority. One of the captioned intervener submitted that the indicative quotes as received by it from the potential EPC contractors are at least US$ 10 million to US$ 12 million higher than the EPC prices being assumed by the Authority as the same takes into account several factors such as country risk, expatriates insurance, transportation cost, Grid code requirements, etc.

ii. The interveners further submitted that besides the component of EPC cost, assumed project cost seemingly comprises of project development costs/Non-EPC costs, interest during construction, insurance during construction, financing costs etc. However, the interveners requested that following items should also be made part of the project costs;

- **Letter of Credit Confirmation Charges**: As per standard norms and requirement of the EPC contractors, 80% - 90% of the EPC prices are paid through letter of credit (hereinafter referred to as "LC"). Given the credit rating of Pakistan, contractors require the LC issued by local financial institutions to be confirmed by an international bank rated A- or above by Standard & Poor's. Quoting

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an example, the interveners submitted that said confirmation resulted in costs in excess of US$ I million for FFC Energy Limited.

- **Sinosure**: The interveners submitted that the project developers find it easy to obtain financing from the countries from where the machines are being sourced, however, financial institutions of those countries require that the same need to be secured by their respective export credit agencies. For instance, Chinese require Sinosure insurance, German financial institutions require Euler Hermes to provide insurance coverage etc. against all debt provided to projects/companies outside of their home country and these costs should also be made a part of the project cost.

- **Debt Service Reserve**: The financiers require the project to keep debt service reserve of six to nine months due to which sponsors have suffered significant reduction in their returns by providing such coverage on their books rather than on the "project's" books.

- **Contingencies**: No cushion was given to cater for contingencies as part of the project cost which are necessary for fluctuations in base rate and exchange rates, even though the same have been permitted as a pass-through under all other upfront tariffs. Therefore, the contingencies should be allowed either as part of project cost or allow interest and exchange rate variations as part of pass-through items under the upfront tariff.

iii. **Tariff Slabs**: The interveners submitted that the Authority in order to ensure fair treatment to all the stakeholders introduced the concept of the tariff slabs in the upfront tariff, 2013. The slabs were designed in a way that the energy generation more than the specified capacity factor would be charged at increasingly decreased rates, i.e. more the energy beyond the specified parameter of energy, the less the rates. However, that mechanism acted as a deterrent in a way that it discouraged the investors from opting for the efficient turbines, instead they were encouraged to go for the machines that produced energy only up to capacity factor of 31% or slightly higher. To cope with this issue, the interveners submitted that the Authority should, under the upfront tariff, reverse the tariff slabs in order to incentivize developers to opt for more efficient, higher energy yielding wind turbines. The interveners submitted that the tariff slabs can be reversed, as an example as follows:

Tier l:	Energy up to 31% capacity factor	- 100% of tariff
Tier 2:	Energy between 31% - 32% capacity	- 20% of tariff
Tier 3:	Energy between 32% - 33% capacity	- 40% of tariff
Tier 4:	Energy between 33% - 34% capacity	- 60% of tariff
Tier 5:	Energy beyond 35% capacity factor	- 80% of tariff

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By doing so, the consumers get instant relief as the tariff is slashed sharply immediately upon achievement of specified capacity factor. In addition, each additional percentage energy point would allow the developer to charge X% more up to a maximum of certain percentage of the original tariff. Hence, this method shall not only ensure that consumers reap benefits of the excess production but will also encourage the investors to go for the machines providing higher generation numbers.

iv. **Capacity Factor and Probability of Exceedance**: The interveners submitted that given the dynamics of all renewable energy projects, the probability of exceedance attached to each energy yield forecast plays a pivotal role in determining bankability of a project. As per standard practice adopted by all foreign financial institutions, project developers are required to ensure that the debt service coverage ratio i.e. ratio of the cash flow from operations (for a period) to the debt servicing (for the same period) at a P90 level should be maintained at 1.3:1 and on P99 basis this ratio should be 1:1 meaning thereby that at energy yield that is expected to be achieved 99% of the time the project remains able to service its debt. The interveners submitted that energy yields at P90 and P99 levels imply capacity factors between 26%-30% after taking into account various external factors such as historical wind speeds uncertainties, turbine technology, etc. On the other hand, the capacity factor assumed by the Authority i.e. 38.44% appears to have been determined based on a P40 or P50 level. From lenders perspective such projects would be deemed as non-bankable as the uncertainty associated with their cash flow i.e. 50%-60% chances of not achieving the energy yield is a risk no lender would be willing to take. In order to promote development of wind power projects it is necessary that bankability of the tariff is ensured. The interveners requested to reconsider the capacity factor assumed in the upfront tariff and reduce the same to a level meeting the P90 and P99 criteria applied by lenders for evaluating such projects. For that purpose, the interveners suggested the Authority to obtain data from the wind farms currently operational in the Jhimpir especially those that have been operational for almost two years in order to reach at the final figure of energy.

v. **Base Rates:** The interveners submitted that the base rates assumed for the purpose of upfront tariff were taken at a time when both the Karachi Interbank Offering Rate ("KIBOR") and London Interbank Offering Rate ("LIBOR") were at all-time low. The twelve month times to choose for the upfront tariff followed by eighteen month time of construction makes it unreasonable for the investors to assume this risk, therefore, true-up against KIBOR/LIBOR should be permitted upon achievement of commercial operations under the upfront tariff as is allowed for coal, liquefied natural gas and solar projects.

vi. **Spread over LIBOR**: The interveners submitted that in view of the circular debt issue coupled with the time delays within the regular payment cycle, the credit departments of various Development Financial Institutions are asking for risk adjusted spread of 5.00% - 5.50% for wind power projects in Pakistan. For that purpose, the interveners also highlighted that the Eurobond issued by the Government of Pakistan in

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April, 2014 carried a coupon rate of 7.25% with a maturity of five years and 8.25% with a maturity of ten years. The interveners were of the view that under the circumstances it is unreasonable to expect foreign financial institutions to invest funds in the local power sector at anything lower than that offered by the Government of Pakistan in the international bond market.

vii. **Duties and Taxes**: The interveners submitted that besides the duties and taxes applicable at import stage allowed as a pass-through under the upfront tariff, the Authority should also consider changes in tax rates applicable on EPC contracts and other project costs payable by the wind power projects. Further, sales tax chargeable pursuant to the Sindh Sales Tax Act, 2011 on all costs incurred by the project during the construction period can be adjusted during the operation phase, however, this time mismatch has a significant cost associated with it and for that working capital cost should be allowed as a part of the project cost.

viii. **Availability of Grid**: The interveners pointed out that as per the Policy for Development of Renewable Energy for Power Generation, 2006, the availability of grid/responsibility of evacuation of power is the responsibility of the off-taker and Government of Pakistan, therefore under the circumstances it is unreasonable to ask developers to obtain confirmation from the off-taker that the grid will be available for evacuation of power from their respective projects. The power acquisition request required pursuant to Interim Power Procurement (Procedure and Standards) Regulations, 2005 should suffice in this regard.

ix. **Requirement for achieving Financial Close by September 2016**: The interveners requested that the Authority should consider allowing financial close up to 1.5 years from the date of award of tariff, as the process for arrangement of financing (road shows, due diligence, preparation of financing documents, finalization of concession agreements. etc.) is expected to take at least a year and a half.

x. **Working Capital:** The interveners submitted that the standard EPA specifies a 60 days payment cycle, i.e. payment against an invoice is made 30 days after the last day of the month to which it relates. As per the existing practice, it takes the power purchaser approximately 60 days beyond the permitted period to actually settle its bills, therefore, the payment cycle stretches to 120 days. For that purpose, the interveners requested the Authority to allow cost of working capital as part of the operations and maintenance cost as the burden of this delay in payment should not impact the returns of the developer.

xi. **WPPF and WWF:** The interveners pointed out that this cost is being allowed in other upfront tariffs but not being considered in the upfront tariff for wind power projects.

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D. Din Energy Limited

i. The intervener submitted that the proposed project cost of USD 1.97 million per MW (foreign financing) and USD 2.08 million per MW (local financing) is at a significant variance, as compared to the costs allowed by the Authority in upfront tariff, 2013. He submitted that improvement in lending terms may cause the project cost to slightly fall down, but the market has not experienced any material change since the last assessment by the Authority as has been proposed in the public notice. The intervener added that the proposed project cost does not reflect the prevailing price and cost practices in material, man-power, wind turbines, etc.

ii. Regarding capacity factor as considered in the proposed upfront tariff, the intervener submitted that there is no significant technology advancement that has occurred which may necessitate an increase in capacity factor from 31% to 38.44%. The intervener submitted that upfront tariff, 2013 was based on a realistic capacity factor as the plant in operations are achieving roughly the same. The intervener submitted that the dynamics of wind market are such that the turbine manufacturer presents a power curve and guarantees that curve based on certain site conditions, which for all practical purposes is not implementable and therefore that is not the real guarantee. The power curve which turbine manufacturers present in their marketing documentation based on which RISOE confirms energy production is close to 36% capacity factor, but again that is not guaranteed and you cannot hold them accountable if target is not achieved at wind farms. He submitted that the developers and lenders are concerned with the number which is guaranteed. All the newer machines are talking of two things that is they are enhancing the capacity factor by larger blade diameters and better controls but even the top notch machines have so far not offered energy yield guarantee. The intervener submitted that if a chart guaranteeing certain energy yield on some specified wind speeds, a method by which variability of wind is taken out of the guarantee, gets integrated in the EPC contract that can definitely bring down the levelized cost of electricity. Therefore, if the Authority seeks to implement policies on the proposed parameters then our contracts need to reflect guarantees regarding those energy numbers.

iii. The intervener further submitted that renewable energy is the cornerstone parameter for attaining energy security and hence there should be consistency in the policies and operating parameters over the long term and this is the first and foremost thing which investors look for while putting their money. Minor tweaking to reflect changes in interest rates, etc. may be appropriately incorporated but any drastic and unrealistic change in policy direction will impose irreparable and irreversible constraints and will fundamentally damage future investments in this industry.

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iv. The intervener further submitted that there is a perception about deploy ability of wind energy that is the developers are waiting for their Letter of Intents to mature because there is a study which is trying to decide what would be the level of penetration of wind or the renewable energy in terms of the installed capacity in the national grid. He submitted that it is not a very valid limitation, as national development should not be held hostage to embedded inefficiencies.

v. The intervener submitted that tariffs should be affordable and should be as cheap as possible but we need to set the priorities as to which type of generation is more favorable. He quoted the most recent example of Re-gasified Liquefied Natural Gas (hereinafter referred to as "RLNG") where a recent tariff was announced on the basis of fuel price at 12 dollars per MMBTU which, according to his submissions, within a span of ten days has escalated to 14 dollars per MMBTU. The intervener requested that these normal/abnormal fuel price variations in other technologies should also be accounted for while setting the tariffs for renewable energy like wind power because that has the inherent advantage of no fuel and no escalation.

vi. Lastly, the intervener submitted that our country has an energy deficient grid as we are facing shortfall of more than 4000 MW. Our primary target should be to plug that shortfall and for that we need to have a policy and a regulatory mechanism whereby we encourage the growth of this sector. He was of the view that the determination should consider consistency, predictability and the impact on long term energy security of the country.

E. Emerald Energy Limited, Indus Wind Energy Limited, Lakeside Energy (Private) Limited and NASDA Energy (Private) Limited

i. **Project Costs**: The interveners submitted that the project cost of USD 1.97 million per MW (foreign financing) and USD 2.08 million per MW (local financing) as proposed by the Authority is at a significant variance compared to costs benchmarked by the Authority in the upfront tariff, 2013. They submitted that it is expected that improvements in lending terms may to a certain extent impact project costs but the market has not experienced any material change which can support the drastic decrease in project cost as proposed by the Authority.

ii. **Capacity Factor**: The interveners submitted that the Authority has proposed a capacity factor of 38.44% as compared to 31% allowed in the upfront tariff, 2013. The interveners added that the basis of this capacity factor is not known as there is no significant technology development and improvement that has taken place which may necessitate such a huge surge in the capacity factor benchmark. The interveners

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were of the view that since wind risk is being borne by the project developers, benchmarking such an impractical capacity factor places the present and future developers at a huge disadvantage.

iii. Stating all the above, the interveners requested the Authority to review its proposed costs by rationalizing them in line with earlier project cost parameters as determined by the Authority itself, both in case of upfront as well as cost plus tariff regimes. Regarding capacity factor, the interveners submitted that the same may be reviewed to reflect the ground realities of available technology, risk factors associated with wind regimes and the historic performance data as achieved by plants operating in the Gharo-Jhimpir corridor. The interveners further commented that policies and operating parameters should be consistent and long term. Minor tweaking to reflect changes in interest rates, etc. may be appropriately incorporated, however, completely changed business paradigm will fundamentally damage future investments. The interveners added that renewable energy is the cornerstone parameter of attaining energy security and any drastic and unrealistic change in policy direction will impose irreparable and irreversible constraints on achieving this objective.

F. Frontier Renewable Energy (Private) Limited

i. **Capacity Factor:** The intervener submitted that the proposed upfront tariff has changed the basis of annual plant capacity factor from 31% to 38.44% followed by slabs of capacity factor. The intervener added that even previously used 31% capacity factor was very tough to work with and that could also be verified from the data of the projects already in operations. The investors developing projects under upfront tariff, 2013 had developed their models in such a way so as to allow the capacity factor differential to be covered in the IRR, in order to make it workable through decreased returns. The intervener further submitted that no technical basis and logical reasoning of the assumption of 38.44% was shared by the Authority making it even harder for the serious investors to gauge and understand as to what factors have compelled the Authority to make such a substantial change, even though the wind power industry has experienced no change in Pakistan. Stating the consequences, the intervener submitted that such sudden change in a major technical assumption by the Authority without any basis is not considered by them as genuine and justified. The intervener added that it is virtually killing upcoming projects as the sponsors will not be able to demonstrate sufficient viability of their projects to the lenders with this basis. The intervener submitted that the Authority in light of the precedent AEDB's approved energy figures, as well as taking into account the real-time energy data from presently operating wind projects, must keep the annual plant capacity factor to 31%, which already was a compromised case in the upfront tariff, 2013.

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ii. **Debt to Equity Ratio:** The intervener submitted that there is no clarity on the debt to equity ratio. The debt facilities in the market are generally available at 70:30 or 75:25. Any equity component allowed by the Authority less than 30% is likely to close debt options for the project company.

iii. **Project Cost**: The intervener submitted that the project cost assumed in the upfront tariff proposal has been substantially reduced from upfront tariff, 2013 as well as from what has been allowed by the Authority to different projects under the cost plus tariff regime. Talking about the risk and difficulties involved in development of projects in Pakistan, the intervener submitted that lenders carry out a detailed due diligence which the project companies have to satisfy. The power producer has to install new equipment of highest quality and maximum efficiency that comply with the international standards as well as of the power purchaser while working with experienced and reputable EPC contractors. On site studies and due diligence require the engagement of international consultants to make bankable feasibilities. All of the above are the factors that contribute towards increased cost of development and construction but the floated proposal fails to address any of the practical difficulties. The basis of aforesaid differential is not known and understandable and can eventually seize the prosperity of wind industry in Pakistan and also the project company finds no way to be able to develop and construct the project in the project cost proposed by the Authority. In view of all the above, the intervener submitted that project costs and other parameters as used in the upfront tariff, 2013 for wind power projects be maintained. Further, new upfront tariff for wind power projects may be made flexible to allow the debt equity ratio up to 70:30 and cap on capacity factor may be removed.

G. Harbin Electric International

i. **Capacity Factor**: The intervener reiterated the submissions of Frontier Renewable Energy (Pvt.) Limited on this issue and stated that the proposed capacity factor will make the development of wind power projects un-bankable and no direct foreign investor/financial institution/lender would be willing to put their money; which will eliminate the chances of any development in this sector and shall further worsen the power shortfall situation.

ii. **Project Costs**: The intervener reiterated the submissions of Frontier Renewable Energy (Pvt.) Limited on this issue and stated that based on the accounted for costs, it is most certainly beyond any investor's capacity to build the project as that will yield no return to service the debts and will also be a loss for the complete project life.

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iii. The intervener submitted that project costs and other parameters as used in the upfront tariff, 2013 be maintained. Further, new upfront tariff for wind power projects be made flexible to allow the debt equity ratio up to 70:30 and the cap on capacity factor may be removed.

H. Hydrochina Dawood Power (Pvt.) Limited

i. **Capacity Factor:** The intervener submitted that theoretically capacity factor can be as high as considered by the Authority in its proposal, however, documentary support in favor of that should be provided. The intervener submitted that the previous capacity factor of 31% for Gharo Corridor was determined based on the wind data collected by National Renewable Energy Laboratory (hereinafter referred to as "NREL") from its own masts together with the wind data received from AEDB and Pakistan Meteorological Department. The World Bank's Energy Sector Management Assistance Program (hereinafter referred to as "ESMAP") Consultants (currently working with AEDB in the field to finally provide a bankable wind data) consider that the accuracy of NREL Gharo capacity factor is within a range of plus minus 8%. If even plus 8% is taken to be a true value, the capacity factor would increase to a maximum of 33.48% only. The latest study to determine a more accurate wind data (accuracy margin: plus minus 3%) is being carried out by 3E under ESMAP who have yet to set up their wind masts and first results will be available hopefully in one year's time. Presenting the above, the intervener submitted that the new capacity factor considered by the Authority cannot be of Gharo corridor as no previous or current studies conducted for this region known to the investors or available in the public domain support the floated figure. The intervener added that perhaps the Authority has taken the capacity factor of some other region in Pakistan based on some internal data collection and in that case it should reveal the supporting wind resource data of the region and other required details such as land availability, grid access, site access, evacuation possibility and network stability, etc. for the investors to come to a realistic per MW project cost. Stating the factors through which a higher capacity factor can be achieved at a relatively minimum increased cost, the intervener submitted the following options:

- **Hybridization of Wind Power Projects with PV Solar and conventional plants.** The intervener submitted that in Gharo corridor maximum wind is available during evening hours and sun is available during day time. In this way, wind and solar can complement each other in Gharo corridor. This can bring the capacity factor of a wind solar hybrid plant close to 50%.

- **Wind Power Projects are encouraged to bring in latest converters (full converters) which can supply reactive power to the network even when there is no wind.** If a wind power project is not running to its full capacity which happens during most of the year, the rest of the capacity can be supplied as the much required "reactive power" to the network that can be brought by purchasing state

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of the art equipment. The intervener submitted that the wind power projects are being asked to supply a substantial amount of reactive power to the network for which they are not being paid whereas the utility is charging its consumers for the reactive power being supplied to them. In all fairness, the Authority should issue a reactive power tariff to pay for the increase in per MW cost of Pakistani wind power projects for installing power factor improvement plants, within their wind farms.

- **Off-shore Wind Power Projects are encouraged**. The intervener further submitted that off-shore wind power projects face less shear and wake effects. Further swept area can be increased by utilizing large rotor diameters as less safety distance from the surface of the water to the tip of the blades is required. Per MW cost of offshore wind turbine generators is high due to complexities in installation, maintenance and power evacuation.

ii. **Interrelation between project cost and capacity factor**: Explaining the interrelation of the capacity factor and project cost, the intervener submitted the following;

- **Wind Speeds**: The capacity factor can be increased by increase in average wind speed, i.e. site specific conditions. Besides Gharo, there are sites of higher wind speeds available in Pakistan but in those areas infra-structure (communication such as transport etc.) does not exist. Planning the installation of projects in those areas would drastically increase the per MW cost of the project.

- **Better Turbines**: The intervener further submitted that increase in swept area of the turbine can also positively impact the capacity factor, however, that would mean bigger turbine, heavier foundation, bigger installation machinery and increase in transportation costs which generally increases the per MW cost.

- **Wind Density**: Increase in wind density can also impact the capacity factor of the plant but that is not possible in Pakistan rather the wind density would reduce with the time as the average temperatures in Pakistan are on the increase. The overall average temperature in Sindh has increased by 1 degree centigrade over the last 15 years. In the next 20 years (life of a wind power project), the temperatures will further increase by 1 to 1.5 degree centigrade, if substantial renewable energy is not generated.

- **Better O&M**: To have a better capacity factor requires drastic increase in the operations and maintenance costs as more skilled manpower and latest tools for carrying out preventive maintenance are required.

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- **Less wake and shear losses**: These figures are still unknown for Pakistan wind sites, however, for less shear and wake losses, hub height has to be increased which would again result in the substantial increase in per MW cost.

- **Less plant auxiliary losses**: High efficiency motors, transformers and cables would result in increased capital cost. The offset in increased capital costs and savings spread over the term of the project, barely balance each other out theoretically. An increase in per MW project cost is more likely.

iii. **Factors for higher project cost in Pakistan:** The intervener submitted that following factors affect the project cost being incurred by a developer to setup a wind power project in Pakistan.

- **Global warming**: Global warming is also resulting in extreme wind conditions and based on the recent data from Jhimpir and Gharo, it has been observed that the same effect can also occur in these regions. To cope with that, it is required to install IEC Class S wind turbine generators which of-course are expensive. This increase in per MW cost of future projects due to extreme winds can only be avoided if Government of Pakistan takes the "extreme wind risk" for the proposed upfront tariff.

- **Network performance:** The intervener submitted that the State of the Industry Report, 2014 gives SAIFI and SAIDI for Hyderabad Electric Supply Company limited as 230 Nos. (maximum allowed 13) and 16,678 minutes (maximum allowed 14 minutes) respectively. In addition to that, the short circuit levels of the utility network will increase due to the expected generation to be fed into the network over the term of the project which needs to be catered for by a wind power project by purchasing equipment having higher short circuit withstand capability. Furthermore, a wind power project has to account for the weak utility network by supplying it a certain amount of reactive power for which huge initial investment is made by the investor. The intervener submitted that the construction of new 220kV grid station and transmission lines, as planned by the power purchaser to offtake power from future wind power projects is not in sight and these kind of delays (which have been experienced by every power plant due to utility related issues) can cost only interest during construction of USD 1 million per month for a 50MW wind power project. The intervener submitted that all the stated above factors require the installation of a wind turbine generator which can cope reasonably with such miserable performance of a utility without getting seriously damaged. This requires huge investment in the protection system of the wind turbine generator including the insurance for machinery breakdown for some parts. As the utility performance is not likely to improve at least for the next 10 years, therefore, the investor should be compensated due to adverse impact of the utility's system on the life

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and performance of wind power generation equipment. Further the wind power producers should be paid for the reactive power which is being demanded by the utilities as is normally done throughout the world. The intervener submitted that the allowed cost for Pakistani projects was quite reasonable to cover all the mentioned above factors and the same can be reduced only if utility performance can be improved by strengthening their networks, i.e. at least the Authority prescribed standards of SAIFI & SAIDI are adhered to by the utilities, requirement of N-1 criteria is removed from the Grid Code, etc.

Discussing all the above, the intervener submitted that the above discussion clearly proves that for a wind power project, the increase in capacity factor directly increases the per MW cost significantly and that per MW cost of Pakistani wind power projects as was allowed in the upfront tariff, 2013 was quite reasonable. It can only be increased to get other tangible advantages such as yield per sq. kilometer of utilizable land, network stability and due reduction in the electrical losses.

iv. **Eligibility of companies for upfront tariff:** The intervener submitted that as per the proposed upfront tariff, it seems that only the companies with installed capacity of up to 250 MW are eligible to avail the tariff. The intervener added that it feels that there is a typographical error therein as there are only a couple of large investors which can meet this criterion. Even the Government of Sindh is finding it difficult to allot land for 100 MW wind power project in one piece to one investor.

v. **Construction period:** The 18 months maximum construction time after financial close would be sufficient for a 50 MW wind power project, however, a bigger wind power project will require more time for construction. After 18 month every additional 50 MW be granted at least 90 days. In this way, a 250 MW wind power project will be given time to complete in 30 months from financial close.

vi. **Deadline for financial close:** The intervener submitted that based on their experience, the proposed deadline is too difficult as after the grant of tariff, the developer negotiates and executes various contracts such as EPA, Implementation Agreement (hereinafter referred to as "IA"), site sub lease, direct EPA, direct IA, direct site sub lease, etc. and thereafter there are so many conditions from the lenders which have to be completed. The realistic time for financial close is 18 months from the grant of tariff by the Authority to the developer. The Authority should also ensure that the land is promptly allotted and power evacuation is ensured by the relevant agencies.

vii. The intervener submitted that the basic purpose of upfront tariff is to create an enabling environment for the investors to invest in a particular area in the shortest possible time frame. The proposed upfront tariff

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defeats this very purpose. Further, the drastic reduction in the proposed upfront tariff will render the wind projects in Pakistan un-viable and un-bankable. The basis of reduction is increased capacity factor and reduced per MW project cost at the same time which is not quite understandable. The Authority seems to have taken the average highest capacity factor of some region and average lowest per MW cost in some country to arrive at the new upfront levelized tariff. In view of all the above, the intervener requested the Authority to withdraw the proposed new upfront tariff and extend the previous upfront tariff which expired on March 31, 2015 till the time new capacity factors are worked out by an internationally acceptable third party and bankable wind resource data is available. In addition to that, the intervener requested to issue tariff for reactive power supply by wind power projects and for off-shore wind power plants. The intervener submitted that an investor would only go to a place where he can earn money. Nobody would undertake a loss proposition and this new upfront tariff is a "Loss Proposition".

I. Iran-Pak Wind Power (Private) Limited

i. The intervener submitted that project cost of USD 120 million (foreign financing) and USD 128 million (local financing) as was allowed in upfront tariff, 2013 has been decreased to USD 98.5 million (foreign financing) and USD 104 million (local financing) in the upfront tariff proposal. Energy production number has been increased from 136 GWh to 168 GWh. Basically, project cost has been decreased by 18%, annual energy production has been increased by 24% and consequently the tariff has decreased by 31%. Referring to a recent study by Bloomberg (New Energy Finance), H1 2015 Wind LCOE outlook; the intervener submitted that the mentioned study shows that on-shore wind power cost has increased slightly in HI 2015 and also states that in the last 5 years average LCOE has only dropped by less than 10%.

ii. The intervener submitted that there is a direct relation between the project cost and capacity factor, i.e. higher capacity factor requires more project cost, however, the proposal floated by the Authority is contrary to this principle. Stating the dynamics, the intervener submitted that the higher capacity factor can be achieved by higher wind speeds, higher efficiency and quality of turbine, larger swept area meaning longer blades and by reduction in production losses. Since wind speed over the past few years has not shown any increase, therefore, for achieving higher efficiency, better quality turbine and longer blades are needed which means higher costs. Moreover, the intervener with respect to the capacity factor submitted that it is not clear which probability of exceedance value has been used by the Authority in its proposal but if it is like upfront tariff, 2013, i.e. p70 then it is not bankable as banks consider p90 value for financing the project which in the wind corridor is expected to be between 30%-32% therefore a capacity factor of 38.44% is not bankable. While referring to the Bloomberg New Energy Finance updated half

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yearly report for the 1st half of 2015, the intervener submitted that countries having similar capacity factor and cost per MW as proposed by the Authority are Australia (capacity factor = 38% , project cost = 2.0 $ Million/ MW) Mexico (capacity factor = 39%, project cost = 2.03 Million $/ MW) and Panama (capacity factor = 37%, project cost = 1.99 $ Million/MW) which have respective tariffs of US 10 cents, US 15-16 cents and US 12.6 cents per kWh. He submitted that Australia can be ignored as they have a carbon pricing scheme of USD 24.15/ ton of CO2 and therefore it is subsidized. The intervener further submitted that even the tariffs of United States cannot be compared as it is a well mature market and have large subsidies (even hidden) in the shape of Wind Production Tax Credit of USD 2.1 cents per kWh and other grants. At the Authority's proposed parameters, the intervener submitted that the return on equity works out to be less than 1% and to get a return on equity of 17% with the proposed capacity factor, the tariff should be around US 15 cents per kWh.

iii. In addition to that, the intervener submitted that no provision with respect to Sinosure fees has been provided in the proposed upfront tariff and suggested that the same should be included in the upfront tariff. Moreover, provision for contingencies, Sindh sales tax impact and withholding tax to the extent of 8% on contractors should be taken into account. The capacity factor caps should be removed altogether and producer should be encouraged to procure high quality and high efficiency machines in order to generate maximum energy. The intervener further submitted that the base rates such as LIBOR 0.2706% and KIBOR 8.22% are quite on the lower side considering the fact that the Authority is not allowing adjustment of the same at COD. Moreover, the spreads should be raised in the range of 5.00- 5.5% over LIBOR keeping in view the uncertainties, externalities, country risk and circular debt.

iv. The intervener submitted that the time limit of achieving financial close by September 30, 2016 or within 12 months of the grant of upfront tariff is quite short and requested that the same should be increased. The intervener further submitted that 18 months of construction time from financial close is not feasible, as considerable time for commencement of the project from the time of financial close occurs because of various conditions under its EPA, therefore, the construction time should start from the date of EPC commencement and not from the financial close. Regarding pre-COD sale of electricity, the intervener requested that the same should be allowed on the same conditions as in the upfront tariff, 2013.

v. The intervener submitted that in the proposed upfront tariff, it has been specified that companies having a certificate from power purchaser regarding availability of power evacuation arrangement/capacity for absorption of power supplied into the national grid are eligible to avail this tariff. The intervener submitted that to meet the above condition a company must first complete the grid interconnection study (which is also an integral part of the bankable feasibility study) and submit the same to the power purchaser for their approval and grant of certificate. Carrying out grid interconnection study, requires the

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usage of power purchaser data for which no objection certificate has to be issued by the power purchaser. From the issuance of NoC by the power purchaser until completion, submission and issuance of certificate, it takes 4 to 5 months and by then the company may not have enough time left to achieve financial close within the stipulated time as set by the Authority. Further, it has been experienced by the intervener that NoC is not being given by the power purchaser for use of its data for the reason that the grid utilization at the Sindh wind corridor has been exhausted and the intervener was advised by the power purchaser to wait for the USAID funded up-gradation/energy mix study which was supposed to be completed by February, 2015. In view of the above, the intervener proposed that the condition of having certificate from the power purchaser should be removed. Further, it was requested by the intervener that the power purchaser should give sponsors the NOC to use the data to carry out the grid study and for that purpose gird utilization should not be counted by the number of NoC's issued but should be linked with the projects with whom power purchaser has signed EPA.

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vi. The intervener submitted that it has analyzed the data that were referred to by the Authority in the hearing as the basis, mainly the two studies i.e. Renewable Power Generation Cost 2014 by IRENA and 2013 Wind Technologies Market Report by Department of Energy, United States. The intervener submitted that one study has various contradictions within its report and second study is country specific, i.e. restricted to USA only.

vii. **Renewable Power Generation Costs in 2014 by IRENA:** The intervener submitted that this study while encompassing major wind markets of the world has not necessarily taken into account the conditions in Pakistan. As stated in the report "the financial structure of renewable generation projects and the cost of capital vary widely by technology, country, project developer and region". In the United States, required return on equity for wind projects ranges from a low of 9% to a high of 15%; while over the same period, the quarterly average cost of debt for wind projects ranged from a low of 4.9% to a high of 11%. This change has a dramatic impact on the LCOE of wind projects, as the LCOE of wind with a financial cost of 11% will be 45% higher than one with a cost of 5.8% assuming a 35% capacity factor and USD 0.015/kWh for O&M. The situation can be very different in developing countries, as various risks can often make it difficult for project developers to mobilize the funds necessary to bring a project to fruition, or if they can, the financing costs mean the economics of the project will not be sufficient to provide an adequate return on equity. Further, the report states that the assumptions in the study for calculation of levelized electricity were not derived from actual project data and rather these assumptions are average values, but the reality is that the cost of debt and the required return on equity, as well as the ratio of debt- to- equity, varies between individual projects and countries depending on a wide range of factors. The key factor that determines the cost of capital is risk. A project with greater risk (e.g. of non-payment of electricity sales, currency risk, inflation risk

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or country risk) will require a higher rate of return. The report further states that the LCOE is a useful tool for comparing technologies with similar characteristics and generation profiles in a specific market. However, it has limitations and is not definitive for discussing relative costs which means that the LCOE is not taking into account the return on equity that investor would need to make investment in a higher risk country; so risk factor and return on equity should also be factored in before making a decision.

Project Cost: The intervener further submitted that data provided in the report shows that from 2013 to 2014, the project cost has decreased in the range of 1.5% to 4%, however, the Authority has decreased the same by 18%. Therefore, there is no reason for the Authority to lower project cost by such high margin. The report further states that China and India have the lowest installed cost per MW however it should be noted that total installed cost ranges outside of China and India are very wide. China and India benefit from a low-cost local manufacturing base, some policy support for deployment and low materials/labor costs. Hence, it will be difficult, if not impossible, for other countries to replicate these cost advantages and Chinese or Indian markets should not be made a benchmark for Pakistan.

Capacity Factor: With regards to the capacity factor, the intervener submitted that the report states that data for the United States shows that capacity factors have risen less than technology advancements and suggest an average of 32.1% for 2006 to 2013 compared with 30.3% for 2000 to 2005 which means that in last 8 years the capacity factor in USA has only increased by 1.8% and the Authority wants to propose a rise of 24% in only 2 years. Even the capacity factor in Denmark are in the similar range as of USA and therefore Denmark being the leader in the world of wind generation and turbine technology itself, does not have as high capacity factor as being proposed by the Authority.

viii. **2013 Wind Technologies Market Report, Department of Energy, United States:** The intervener submitted that the captioned study cannot be made basis for Pakistan as it is specific to USA.

Capacity Factor: The report states that average capacity factors in 2013 were the highest in the Interior (38%) and the lowest in the West (26%). It further states that although capacity factors have generally been higher on average in more recent years (e.g. 32.1% from 2006-2013 versus 30.3% from 2000-2005), the trend is not as significant or consistent as expected. The report has taken a wide range; and it is not known why the Authority would want to take the highest side as the benchmark.

Project Costs: The report states that in USA in 2013 several projects had total costs between USD 2.0 million/MW to USD 2.6 million/MW and even a project had cost as high as USD 4.5 million/ MW. The report

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shows that half the projects of size 20- 50 MW cost between USD 2.0 million/ MW to USD 2.5 million/MW with one project costing as much as USD 3.0 million/MW.

Tariff: The report states that the wind EPA prices of USA indicated therein do not take into account the federal and, in some cases, state tax and financial incentives. Furthermore, these prices do not fully reflect integration, resource adequacy, or transmission costs. The report further defines various incentives to US wind industry and in addition to the production tax credit, which is a 10 years inflation adjusted credit of around US 2.3 cents/ kWh, there is also the investment tax credit of 30%. Moreover, the accelerated tax depreciation that enables wind project owners to depreciate the vast majority of their investments over a 5- to 6-year period for tax purposes. An even more attractive 50% 1st year "bonus depreciation" schedule was in place during 2008-2010 and legislation in mid December, 2010 further increased one year bonus depreciation to 100% for those projects placed in service between September 8, 2010 and the end of 2011, after which the 1 -year bonus reverted to 50% for projects placed in service during 2012.

The intervener submitted that above arguments suggest that these two reports cannot be made basis for Pakistan because they do not account for the country specific conditions that Pakistan faces such as the risk of non- payment of electricity sales (circular debt), country risk attributed to security situation, general perception and higher costs of lending.

The intervener suggested that the total project cost should be left at the same level as in the upfront tariff, 2013 as the studies show project cost has dropped merely between 1.7% to 4.4%. The benchmark capacity factor should remain between 31%-32% and the producers should be allowed 100% tariff up to 38% capacity factor to incentivize better quality and efficient machines. The study suggests no drop in tariff in USA in last two years; therefore the tariff in Pakistan should remain same as per upfront tariff, 2013, i.e. US $ 13.5244 cents/kwh. However, if the capacity factor upside limits are removed, then only that effect can be reflected in tariff adjustment.

Non-certification of Indian origin turbines by AEDB: The intervener submitted that it was observed during the hearing that lot of references have been given of costs and tariffs of wind in India. In order to make Pakistan market more competitive and realizing the fact that both India and Pakistan share similar wind, weather [temperature/dust etc.], ground conditions etc. and the fact that we are neighbors which will also reduce freight costs; it would be realistic to allow Indian turbines into Pakistan. As per the Trade Regime; Pakistan and India have at present moved to a negative list which has 1,209 items and the rest 5600+ products are allowed to be imported into Pakistan from India. The HS code of wind turbine i.e. 8412 is not in

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the negative list, but AEDB apparently will not certify Indian origin turbines; therefore they cannot be used in wind power projects in Pakistan.

J. Lucky Energy (Private) Limited

i. **Plant capacity factor**: The intervener submitted that the proposed plant capacity factor i.e. 38.44% translates into 168.37 GWh annually which has not been achieved so far in any of the operating projects. In various studies conducted previously by RISOE, the estimated energy was far below than the proposed number, even on P50 level and at the benchmark wind speed of 7.3 m/s. The intervener added that lenders finance such projects after evaluating revenues on a much lower number i.e. P90, based on which energy ranging from 130 to 140 GWh at different sites and on different wind turbine models can be generated. Any number over and above the P90 will either render the projects totally un-bankable or sponsors will be required to extend support in shape of bank guarantees that will shy away the investors. In case of non-achievement of proposed plant capacity factor, the shortfall in revenues will adversely impact not only the return on equity but also debt servicing of the projects.

ii. **Reduction in tariff**: The intervener submitted that the advertised upfront tariff has been decreased by around 31% compared to the upfront tariff, 2013. Quoting an example, the intervener submitted that Japan has announced a tariff of Yen 23.10 (equivalent to US cents 19.30) for wind power projects despite being a developed and business-friendly country with minimal risk, thereby encouraging investors to put their money in this clean energy sector. In contrast, Pakistan is severely affected by war on terror and is facing serious security concerns; investors both local and foreign have apprehensions and reservations in making investment in Pakistan. Inconsistency in Government policies will make the situation even worse.

iii. **Project cost**: The intervener submitted that project cost and capacity factor are directly related. To acquire more efficient, reliable and long lasting plant, one has to incur additional cost instead of reduced cost, as has been proposed by the Authority.

iv. **Indexation of rupee dollar parity**: The intervener submitted that the previously existing mechanism of allowing rupee dollar parity for an average of 270 days from the date of financial close, needs to be aligned with the recently announced RLNG upfront tariff, where it has been allowed for the entire construction period.

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v. Stating all the above, the intervener requested the Authority to maintain the upfront tariff, 2013 with one change that is to allow initial fixation of 20% of PKR-USD parity of project cost on the date of achieving financial close and rupee dollar parity of 80% of the project cost to be trued up on COD, at actual, in line with the recently determined upfront tariff for RLNG wherein one time true up of rupee dollar parity is allowed for the entire construction period instead of restricting it to 270 days average from the date of financial close.

K. Master Green Energy Limited

i. **Project costs**: Based on the Authority's proposed project cost, the intervener submitted that it has estimated an EPC cost of USD 85 million. The intervener stated that it has recently achieved financial close of a 49.5MW wind power project and is fully acquainted with the EPC costs available to the projects in Pakistan. The intervener added that proposed EPC cost is nowhere near the prices for the turn key EPC solutions of the wind power projects. The intervener submitted that projects are not sustainable at the project cost level being suggested by the Authority and therefore should be reconsidered so that this sector does not come to a halt.

ii. **O&M costs**: The intervener submitted that the advertised proposal makes no mention of the cost of working capital for delayed payments from the off-taker and requested the Authority to allow the same as part of costs.

iii. **Duties and taxes:** The intervener requested that any changes in tax rates and other project costs applicable on the wind power projects should be allowed as pass-through items in addition to the duties applicable at import.

iv. **Capacity factor**: The intervener submitted that the basis for determination by the Authority of the capacity factor i.e. 38.44% is unclear. The intervener added that the lenders universally apply probability factor of P90 as the base case scenario and P99 as the worst case scenario in all such project finance transactions. The P90 and P99 capacity factors, as revealed in bankable studies developed by accredited consultants and verified by lenders advisors, are in the range of 30% - 32% and 27% - 28% respectively. Even as per AEDB verified energy numbers, there is a similar situation in all wind power projects that have achieved financial close during 2014 and 2015. This can also be checked from the actual energy produced by quite a few wind power projects which are operational in the region. However, if there are any one or two exceptions, and

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the Authority has considered those as a reference to base the tariff for the entire industry, then this is not correct.

v. **Grid capacity**: The intervener submitted that it is known that grid capacity in the wind corridor of Pakistan is limited and wind projects have historically faced problems in securing slots for evacuation. Also, there is a message from the proposal that the wind sector is perhaps getting a push back on account of grid capacity and its share in the overall energy mix. In the present energy mix, renewable energy ratio is lowest at 5% of the base load. He submitted that the sequence to drive wind power based on a fixed percentage of base load is not logical. Instead, it should be other way round, that is, the total available wind potential should be captured by having appropriate measures to be taken by the power purchaser for improvement of grid system. The intervener added that it is worth noting that none of the countries in the world is leaving the potential of renewable resources (including wind) as unutilized. There are examples of even more than 40% (Denmark) installed capacity on wind in the world for which the grid systems were improved and adapted accordingly. Commenting on the point of energy security, the intervener submitted that in view of the cost trends of different power generating technologies and numerous other factors such as availability and price vulnerability of oil, diminishing gas reserves, long setup time for hydro, only day time availability of solar etc. wind power allows freedom from all these mentioned factors. Even among all the natural resources, wind is the only technology which has a 24 hours availability cycle throughout the year, though with intermittence. In view of all above, the intervener submitted that the Authority should stand up to an objective oriented approach by making a way forward which can harness maximum wind potential in Pakistan. The intervener submitted that the focus on evacuation issues should be realized in true sense by taking all necessary measures instead of hindering the way forward for generation. The project documents (generation license, tariff determination and EPA) should function without having a dependence on grid system capacity, while the issue of grid system capacity should be separately and aggressively dealt by the power purchaser under the Authority's regulations. Lastly, the intervener recommended that improvement of national grid system can be made by making wind projects three part based so that generation, evacuation and absorption are all completed in one go. For that purpose, new LOIs should be issued under three new sub agreements that is generation license agreement, evacuation of power agreement and power absorption system upgrade agreement. Reasonable tariff be announced accordingly for all three functions and distributed among all the projects.

vi. **KIBOR and LIBOR**: The intervener submitted that for the purpose of upfront tariff, the lowest values of KIBOR and LIBOR have been taken and requested to reflect their true values upon achievement of COD, as the same is being allowed in the upfront tariff for other technologies.

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vii. **Spread over LIBOR**: The intervener submitted that spread over LIBOR appears to have been maintained at the same level as was allowed in the upfront tariff, 2013, i.e. 4.75% which is irrational and unreasonable. Owing to the deteriorating circular debt situation which leads to substantial delays in payments from the power purchaser, various development financial institutions have quoted new prices at a spread of 5.00%-5.50%.

viii. **Achievement of financial close**: The intervener submitted that the proposed timeline for achieving financial close by September 30, 2016 or within twelve months of the grant of upfront tariff, whichever is earlier, is not realistic or commercially workable under the prevailing circumstances, as the envisioned projects are at a fairly early stage of development as opposed to the projects availing the upfront tariff, 2013. Hence, the intervener requested the Authority to extend the proposed timeline for achieving financial close up to one and a half year from the grant of upfront tariff.

ix. In view of all the above, the intervener requested the Authority to extend the upfront tariff, 2013 for another two years. The projects that could not achieve financial close but were 95% done be allowed with some penalty, to complete the projects in the next three months. The intervener submitted that currently, wind is just 2% out of 5% share of renewable energy in the country's energy mix, therefore it is not impacting the consumers. However, with each project coming online, sizeable cut will occur in the circular debt of the fuel based projects that has caused so much stress to our economy and industry.

L. NBT Wind Power Pakistan II (Pvt.) Limited and NBT Wind Power Pakistan III (Pvt.) Limited

i. The interveners submitted that the proposed upfront tariff is so low that it will make new wind power projects uneconomical and will stop the development of their 250MW wind farms. The interveners added that being a foreign investor, they will only discuss the proposed upfront tariff for foreign financing. The project cost of USD 1.97 million per MW has been assumed in the proposal, however, no basis has been provided for this assumption. The interveners submitted that their project costs are USD 586.67 million for each of their 249.6MW wind farms which makes it USD 2.35 million per MW. To substantiate that, the interveners submitted indicative mandate letter and term sheet signed with their bank syndicate for a USD 440 million facility agreement.

ii. With the proposed upfront tariff, the interveners submitted that only debt service for the first ten years and insurance and O&M for second ten years period can be paid, with zero return on equity for the whole life of the project, making the project uneconomical and unattractive for foreign investors. They

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submitted that the costs in Pakistan are higher than in China, but the proposed upfront tariff is so low during years 11 to 20 as to make wind power at the same price as the electricity from a dirty coal fired power plant in China. They submitted that the proposal does not provide any incentive to go into clean, renewable wind power in Pakistan given the much higher risk for foreign investors to invest in Pakistan.

iii. The interveners submitted that cap on capacity factor in the proposal has been increased which is a step in the right direction, however, efficient turbines need more investment. Based on the previous cap of 31%, wind developers had to choose between more costly but more efficient wind turbines versus less costly and less efficient wind turbines that do not produce significantly more than 31% capacity factor. This has already reduced capital expenditure on wind turbines but now with the cap being higher, developers have to consider using more efficient but more costly wind turbines. However, no provision to account for the higher cost by bringing efficient turbines for achieving the specified capacity factor has been provided in the proposal.

iv. The interveners further submitted that the Authority starts the prescribed indexation of tariff and other costs at a much later stage, i.e. COD of the project which further reduces the proposed upfront tariff.

v. Stating all the above, the interveners proposed to extend the upfront tariff, 2013 for six months so that additional projects can reach financial close which will help alleviate the energy crisis. They submitted that this time is required because banks will require additional time for due diligence on the allowed extension. Thereafter, the upfront tariff should be reduced by a maximum of 7% and the cap on capacity factor should be removed altogether as since 2013 capital cost of wind turbines worldwide has decreased by around 2% to 2.5% per year and efficiency improvements have occurred by around 1% per year, which makes the total decrease equal to 6%-7%. For this purpose, the interveners submitted that the Authority can also refer to its own tariff determinations under the cost plus tariff regime.

M. Norinco International Cooperation Limited

i. The intervener submitted that the proposed upfront tariff has been reduced by 32% compared to the upfront tariff, 2013. Further, the Authority has increased plant capacity factor to 38.44% from its earlier announced benchmark of 31%. The intervener requested that the proposed upfront tariff may be revised to US 13.5 cents per kWh, so that foreign investment in the wind industry may be confirmed. Further the intervener submitted that minimum plant capacity factor of 38.44% is not achievable and the project will have great difficulty in achieving financial close. The intervener proposed that the capacity factor be increased to not more than 32%. The intervener further added that the proposed upfront tariff must be

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reviewed positively and a realistic upfront tariff may be announced to ensure that the projects in pipe line are confirmed and promote wind energy industry.

N. Planning Commission, Government of Pakistan

i. The intervener submitted that the proposed project cost of USD 2 per watt of power is excessive than the prevailing rates of around one Euro per watt in Europe and one USD per watt in India and China. He submitted that Pakistan is offering the best terms for investors, i.e. 17% return on equity in foreign currency, tax exemptions etc. and therefore, he proposed to slash the proposed project cost by 25%. Based on suggested reduction in project cost and agreeing with all other parameters as proposed by the Authority, the intervener, along with workings, submitted that LCOE comes out to be Rs. 6.992 /kWh for foreign debt financed projects and Rs. 9.331/kWh for local debt financed ones. Proposing the mentioned numbers, the intervener submitted that these numbers are still higher than recent tariffs in many countries such as USA, India, Germany, Brazil, etc. The intervener also submitted details regarding CAPEX, OPEX and LCOE of several countries. The intervener added that there is apparently no reason that wind tariff in Pakistan be higher than elsewhere, as several projects have come on line. Adequate wind speed, high capacity factor, good site locations and conditions, low labor cost, efficient engineering and installation companies all indicate very competitive and conducive market conditions in Pakistan.

ii. The intervener further submitted that the Authority may consider announcing separate tariffs for European and Chinese origin turbines. The intervener added that in India, Suzlon is manufacturing wind turbines at USD 0.85 million/MW. Globally, Nordex and Vestas, the two leading wind turbine manufacturers, are selling wind turbines at USD 1.23 million/MW and USD 1.19 million/MW, respectively. A copy of the extracts from the annual report of the aforementioned three turbine manufacturing companies, quoted by the intervener, was also submitted. The intervener submitted that it is common knowledge that Chinese prices are lower than European ones which was witnessed by Planning Commission in the case of coal power plant in Jamshoro whereby changing the reference prices from European origin to China resulted in reduction of costs by 40%. However, that does not mean low quality as Chinese wind and solar power companies are amongst the top ten and they are selling in Europe and the USA.

iii. The intervener also recommended that at least in case of renewable energy (wind and solar), competitive tariff system based on reverse auction mechanism be given a chance which has resulted in dramatic reduction in tariffs in various countries such as India, Brazil, Turkey and South Africa and has resulted in market expansion as well.

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iv. The intervener further submitted that it is advisable to discourage local financing for energy projects, in general and may only be limited to local currency expenses. Finally, the intervener submitted that if the investor community finds its recommendations contentious then it is recommended that an independent foreign consultant be engaged to provide a satisfactory formula that may be acceptable to all for which Planning Commission would be glad to provide funds.

O. VESTAS Wind Technology Pakistan (Pvt.) Limited

i. **Proposed Tariff:** The intervener submitted that the proposed levelized tariff is far too low for the wind energy industry in Pakistan to continue to grow. The intervener added that it is committed in helping drive down the cost of wind energy, however, this should be done in small increments over a longer period of time in line with technology advancements so that owners, investors, lenders and suppliers continue to see Pakistan as an attractive destination to do business. The proposed sharp reduction in tariff over current levels is so severe that it has the potential to destroy the wind energy industry in Pakistan overnight and that would be a tremendous shame given the positive achievements made in the sector in recent years. Stating that, the intervener submitted that last tariff level should remain in place for at least another twelve months such that the impact on capacity factor of new technology can be properly assessed and measured. Further to this, the intervener questioned that why the Authority should continue to have a tariff scheme that is linked to plant capacity factor and submitted that there are better ways to structure a scheme whereby use of latest technology is encouraged while ensuring interest of all the stakeholders.

ii. **Project cost:** The intervener submitted that the assumed project cost is unrealistically low for 2 MW turbine models typically being installed in Pakistan today. At these levels, developers will simply apply further downward pressure on supplier's cost by maintaining their financial returns at the same level. This will quickly result in most suppliers losing interest in doing business in Pakistan. Therefore, the Authority should be focused on a scheme that instead encourages new competition from multiple suppliers focused on lowest cost of energy (not lowest CAPEX cost) through new technology and smarter project design.

iii. **Plant capacity factor**: The intervener submitted that it believes that the overall design of the scheme, whereby tariff has been linked to plant capacity factor should be reconsidered. However, under the current structure, they welcome an increase in plant capacity factor before a step-down in tariff starts to kick-in as this will certainly open the door for turbine suppliers to propose larger more efficient turbines

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(with increased rotor and/or generator sizing) to the Pakistan market where capacity factors higher than 31% are achievable. The intervener during the hearing also submitted that it supports the increase in plant capacity factor and stated that the proposed plant capacity factor is certainly achievable.

iv. **Installed capacity up to 250 MW:** The intervener submitted that it welcomes projects of up to 250 MW in size being eligible under the scheme since this will attract large scale development and investment that improves overall efficiency and speed of bringing more renewable energy to Pakistan in a shorter space of time. Economies of scale in both turbine size and project size will combine to help lower the cost of wind energy in the long run, but the current tariff level be maintained for the immediate future to ensure that this type of large scale investment happens and a 'snowball effect' starts to occur.

P. Western Energy (Private) Limited

i. The intervener submitted that through the proposed upfront tariff, the viability and bankability of its project has been seriously jeopardized, therefore, it is imperative that upfront tariff finally determined is commercially viable and in the interests of all the concerned parties.

ii. **Capacity factor**: The intervener submitted that the Authority has increased the benchmark capacity factor from previously used 31% to 38.44%, however, the grounds for such increase in the capacity factor are unclear. Until now many internationally acclaimed technically qualified professionals (including original equipment manufacturers and EPC contractors of various wind projects in Pakistan) have carried out wind resource analysis of major wind corridors in Pakistan and none of the analysis or projects based on the same have so far offered more than 153 GWH (i.e. 35% capacity factor) which is associated to projects located in highest wind availability areas. Further, the internationally acclaimed consultants, RISOE (who have also been engaged by AEDB to certify output declared by project companies in their feasibility), have verified maximum 36% as the capacity factor for projects located in the maximum wind areas of the Jhimpir wind corridor in Pakistan. Therefore, it is unclear how a capacity factor of 38.44% has been used for the purpose of the proposed upfront tariff, as none of the wind resource assessment studies supports such an ambitious capacity factor. To achieve higher capacity factor, the intervener submitted that wind turbine generators achieving higher power outputs or EPC contractors who are able to guarantee higher annual energy production values of up to 38.44%, would be required which would be more costly and will consequently increase the project cost. However, the Authority has reduced the same for achieving higher capacity factor. In addition to that, the operations and maintenance of wind projects will become more costly as higher guarantee thresholds will have to be negotiated with the O&M

contractors to match the tariff threshold set by the Authority, a concept that is contradictory to the Authority's notion of reducing the project costs and the tariff. The intervener submitted that lenders universally apply probability factors P90 and P99 whereas it is assumed that the Authority has applied a probability factor of P40/P50 to reach the threshold of 38.44% which has left the projects of such nature un-bankable. Stating all the above, the intervener submitted that the threshold of 38.44% is too high and should be rationalized so that the investor is incentivized to take-over the wind risk from the Government of Pakistan.

iii. **Project cost**: The intervener submitted that the project cost has been reduced from USD 2.45 million per MW in the upfront tariff, 2013 to USD 1.97 million per MW in the advertised upfront tariff proposal, i.e. 20%. The intervener added that even the project cost allowed in the upfront tariff, 2013 was not sufficient to fully accommodate the EPC costs, interest during construction, the usual non-EPC costs (i.e. duties, insurance etc.). Moreover, the international financing for power projects in Pakistan requires insurance cover from export credit agencies, besides the standard Government of Pakistan Guarantee, which they believe has not been taken into account by the Authority in the proposed project cost. This would discourage project companies from pursuing foreign currency loans from multilateral lenders who are comfortable in financing such projects only if export credit insurance has been taken by the project company and as a result will deprive Pakistan from much needed foreign direct investment. Further, the Authority has not included any cushion to cater for contingencies as part of the project cost and it is assumed that the Authority agrees to the project cost being allowed indexation at actual exchange rate and LIBOR rates after two hundred and seventy days of the financial close which should be reconsidered. Stating the aftermaths of low project cost, the intervener submitted that it will force the investors to use cheaper turbines that may not yield the maximum output from wind resource available and would substantially reduce the reliability of wind power in Pakistan.

iv. **O&M costs**: The intervener submitted that the standard EPA specifies a sixty days payment cycle, however, as per the current status of payments being made to wind power projects, it takes the power purchaser approximately sixty days beyond the permitted period to actually settle its invoices, which compels the project companies to obtain working capital lines. Given the vital need for working capital for the successful operation of a wind project, the intervener requested to account for the cost of the same in the upfront tariff. The intervener further submitted that the kind of guarantees required to secure the operations according to the EPA and with higher guarantee threshold of output will make O&M cost more expensive. Also, the regional conflicts together with the increasing risk from terrorist activities has actually increased the cost of insurance in the recent years. Whereas from the floated

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proposal, they understand that the Authority has perceived a substantial reduction in the O&M and insurance cost as against what was allowed to earlier projects.

v. **Debt service coverage**: The intervener submitted that given the standard lending norms of most power projects and past precedents in the local market, debt service reserve of six to nine months is a pre-requisite of all local financiers. This requirement is levied on a project by the financier and is not intended to be covered by sponsors out of their return. Sponsors have in the past suffered significant reduction in their returns by providing such coverage on their account rather than on project's account.

vi. **LIBOR true up**: The intervener submitted that unlike in case of upfront tariffs determined for other technologies, the proposal does not allow adjustment to reflect true value against LIBOR upon achievement of COD, therefore, it exposes the project companies to risks associated with fluctuating LIBOR.

vii. Stating all the above, the intervener submitted that the substantially reduced project cost and increased capacity factor in the proposed upfront tariff will certainly deter investors from investing in wind power projects and will kill their project as no EPC or Chinese financing will be available at the proposed project cost thresholds, unreasonable increase in dispatch threshold and reduction in tariff components attributed for the operational costs. The intervener recommended to maintain the upfront tariff, 2013 for another few years in order to attract further investment in this sector as many local and foreign financial institutions are familiar and comfortable with that and have shown keen interest in financing wind projects under the said tariff.

Q. Mr. Arooj Asghar

i. The commentator submitted that USD 1.97million per MW (foreign financing) has been considered as project cost in the upfront tariff proposal which is on the lower side and requested for the provision of documentary basis, along with draft terms sheet, for the same. The commentator further submitted that wind speed of entire Jhimpir-Gharo wind corridor is not the same and varies from location to location even within a certain area. A project getting 38.44% annual plant capacity factor does not mean that with the same machines, another project would also get annual plant capacity factor of 38.44% therefore annual plant capacity factor should be of such a level which can be applied on any site. Hence, the commentator suggested to take wind data from at least four different wind sites for calculating net annual plant capacity factor. The commentator also suggested to use 31% as net annual plant capacity factor as it was used earlier and was just and fair.

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ii. The commentator submitted that in addition to that, there are numerous wind farms under construction or starting construction in Jhimpir and Gharo wind corridor. Because of various wind farms in the vicinity, wake losses of new power plants will increase which will impact the capacity factor. Furthermore, the commentator stated that net annual plant capacity factor should be based on P90 as the sponsors are assuming the wind risk. The commentator submitted that the whole tariff, without any slabs, should be provided to the sponsors for the energy in excess of the specified plant capacity factor as the sponsor is also assuming the downward risk. The commentator further submitted that the Government of Sindh has issued new land lease policy and price of land is significantly different from old land lease price, therefore appropriate adjustments should be allowed for a project pursing under new land lease policy.

iii. The commentator further submitted that the time given for the financial close in the proposed upfront tariff should be fair and equal for all the projects. It should be straight twelve months from the award of tariff to a project instead of twelve months from the grant of tariff or September 30, 2016 whichever is earlier, as proposed in the notice. Lastly, the commentator submitted that the proposed upfront tariff will be applicable for a period of twenty years from COD, however, he requested to link this with the term of EPA thus any extension in EPA because of Force Majeure event under EPA would also be covered.

R. FFC Energy Limited

i. **Project and O&M costs:** The commentator submitted that for the computation of proposed tariff, the Authority has considered project cost of 1.97 million USD/MW (foreign financing) and 2.08 million USD/MW (local financing), which are significantly reduced project costs in comparison to the upfront tariff, 2013. The commentator added that it is understandable that the Authority in the best national interest intends to pass on to the end consumer the benefit of reduction in project cost due to decrease in market prices of wind turbines globally, yet they believe that there are several country specific parameters and market dynamics, which should be considered while applying global trends/values to the market of any specific country. The project cost of around 2 million USD/MW may be a fair approximation in countries which have mature wind power sector with huge indigenous support available in terms of infrastructure, established local turbine and other equipment suppliers, scores of EPC and O&M contractors, crane availability at competitive rates, secured environment, timely payments from power purchaser, etc. Additionally the geographic, climatic and geophysical features like less dusty environment, low temperatures and higher air density, etc. supplements the wind power plants to achieve higher production. However, temperatures in Sindh wind corridor often reach up to 45 degree Celsius at which wind turbines stop generation whereas the maximum temperature limit of wind turbine generators is usually 40 degree Celsius and the project owner has to invest more at each

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wind turbine to make them work till 45 degree Celsius. Dusty environment and frequent grid failures add on to the O&M costs. Therefore, in order to determine fair and realistic benchmarks for Pakistan, the commentator suggested that following factors should be factored in the upfront tariff;

- In the absence of indigenous turbine manufacturing facilities, wind turbines are imported which adds cost of import, shipment and transportation. Similarly, major balance of plant components like power transformers, medium and high voltage switchgear are also imported. The commentator emphasized that only in USA, there are 560 wind related manufacturing facilities spread over 44 states, including 28 wind turbine manufacturers, 10 research and development facilities, 13 blade and 12 tower factories which employ more than 25,000 people producing all 8,000 components of a wind turbine. Similar situation exists in European Union, China and India, therefore project cost for wind farms in Pakistan are not truly comparable with other countries.

- Owing to the adverse security situation together with consistent economic downturn in the country, turbine suppliers, EPC and O&M contractors, insurers and lenders add extra premium while considering wind power projects in Pakistan. The project owner has to spend huge cost on security of the assets and human resources throughout the life of the project.

- Local O&M market has not matured yet. In the absence of local manufacturing of wind turbines and major balance of plant components, there are supply chain and crane availability issues being faced by O&M contractors in providing services at par with the developed countries/regions like USA, European Union and China. This results in higher O&M costs and poses a challenge to maintain world class wind farm availability figures to ensure maximum power generation.

- Grid infrastructure is weak in the Sindh wind corridor and frequent grid failures are common, which result in higher O&M costs as is being experienced at their wind farm.

- Additional costs on civil works are needed in the tidal area of Gharo, Keti Bandar.

ii. **Capacity factor:** The commentator submitted that the Authority has enhanced the benchmark plant capacity factor drastically from 31% to 38.44% in its efforts to introduce most efficient wind turbine models in Pakistani wind power sector. The commentator added that the wind potential of Sindh wind corridor, as independently assessed, determined and documented by AEDB, their consultant RISOE, various project

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developers and their technical consultants, has not changed over time. AEDB, together with RISOE, had determined the benchmark annual average wind speed of 7.3 m/s for the Sindh wind corridor and highest benchmark capacity factor of 33.1% for FFC Energy Limited and 32.18% for Zorlu. With this benchmark wind speed and P75 probability of exceedance (a must for projects bankability), it is highly improbable to meet the target of 38.44% capacity factor, even with the most modern wind turbines, considering the ground realities of Sindh wind corridor. Moreover, the commentator argued that since wind risk is not taken by the power purchaser, the benchmark of 7.3 m/s should essentially be revised downward to mitigate wind risk exposure of the investors which is the logic that was taken in the upfront tariff, 2013 which expired only last month, where capacity factor of 31% was benchmarked instead of 32% or 33%. The commentator added that actual average capacity factor of the commissioned wind farms i.e. FFC Energy Limited and Zorlu is ranging between 30%-31% and the average of seven wind farms comes in the range of around 32%. It is possible that some quarters may have suggested that with latest large sized wind turbines with huge rotor size and taller towers, the capacity factor of 38% is theoretically plausible. However, it should also be appreciated that such turbine models are very expensive, which will surely enhance the project cost even above the benchmark of upfront tariff, 2013. Moreover, if some wind turbine manufacturers boast a theoretical 38% plant capacity factor in their specs then the literature on their energy production also needs to be referred. The commentator submitted that the turbine manufacturers give two kind of information regarding the energy that is the power curve and annual energy production. They say that their turbines can achieve 38%-40% benchmark of energy at certain wind speeds however based on some assumptions. The assumptions are that the specified energy numbers can be achieved for one turbine only meaning exclusion of all wake losses, 100% availability of that single turbine every single second of the year, no electrical losses, air density 1.225 and temperature of 15 degree centigrade. However, in actual the turbines are installed in clusters which are called wind farms and not only one wind farm but there are clusters of wind farms so any turbine in one wind farm is affected by the wind turbines of that wind farm as well as the wind turbines of other wind farms and those losses can range between 8 to 11 percent depending upon the geometry of the wind farm and the placement/location of the wind turbines. Regarding the availability, the commentator submitted that turbine manufacturers guarantee 94% rather than 100%, electrical losses can range between 2-3% and blade degradation losses are 0.2% due to dusty environment at Sindh wind corridor. In addition to that, high temperature de-rating losses are faced as even the modern wind turbines are designed for a maximum 40 degree centigrade but after 30 degree centigrade there is a de-rating factor in their generation.

iii. The commentator highlighted that the proposed significant reduction in project cost will defeat the very purpose of bringing in the best and latest wind turbine technology in the country as it would drive out all the top world class turbine manufacturers from the market and leave it wide open to low quality and cheap turbine manufacturers for whom it would be difficult to even deliver 31% plant capacity factor throughout project life, let alone 38.44%. A single low wind year during project life will inflict a loss to the project, which

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cannot be recovered in its entire life as there is no collateral with the project to offset this likely weather change pattern. Moreover, due to the previous supportive policy and tariff structures of wind power projects, local industry is developing by getting orders of manufacturing/services. This hard to achieve tariff will cease the chances of this budding industry to grow successfully. Unless we develop this local wind industry, we cannot move towards self-sufficiency, therefore depriving the country from the real gains.

iv. Proposing the solution, the commentator submitted that the project cost and plant capacity factor are two interrelated and interdependent parameters. In general, plant capacity factor can be enhanced with the selection of latest wind turbines with huge rotor diameter, higher hub height (taller towers) and very efficient drive train and power conversion system, which are costly equipment resulting in enhanced project cost, therefore, the expectation for a reduction of 19% in project cost with capacity factor increase of 24% is simply not achievable. Explaining the interrelation between these two parameters, the commentator submitted that both of them cannot be maximized concurrently. For example if we consider the proposed parameters of 38% capacity factor with 2.08 million US dollar per MW project cost then it is simply not achievable. Therefore, more cost, i.e. around USD 2.57 million/MW is needed to support this high capacity factor to make this thing in equilibrium position but this is an aggressive approach in view of the climatic conditions of Sindh corridor. The commentator submitted that the moderate approach that should be followed is to reduce the capacity factor to a level of 32% and enhance the project cost to 2.3 million USD per MW which is a manageable scenario. The commentator submitted that levelized cost of electricity will remain the same in both the above discussed cases but aggressive approach cannot be managed and the second suggested scenario is manageable. Regarding the suggested project cost, the commentator submitted that it is justified keeping in view the global wind turbine prices plus the local factors such as the import of plant & equipment, shipment, transportation, high debt rate due to country risk and additional investment in converting wind turbines to work at high temperatures.

v. **Construction period**: The commentator submitted that the upfront tariff is proposed for the plant size of 5 MW to 250 MW, however, the construction period of 18 months has been set for all sizes of the plants i.e. 5MW to 250 MW. The commentator requested the Authority to appropriately scale up the construction periods for higher capacity plants and scale down the construction period for lower capacity plants.

vi. **Financial close up to September 30, 2016**: The commentator submitted that the Authority has defined twelve months as the maximum duration for achieving financial close from the award of upfront tariff. This condition is stringent enough to bring in the projects in a timely manner. The condition of September 30, 2016 becomes an almost unrealistic target for any new project which gets the upfront tariff in the year 2016. This

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scenario is likely for many interested investors as they will apply for upfront tariff after getting land, approval of feasibility study by AEDB, grid interconnection study by NTDC, EIA report by SEPA, etc.

POST HEARING SUBMISSIONS

vii. The commentator submitted that it appreciates Authority's intent of introducing latest and efficient wind turbine models in Pakistani wind power sector, however, it is of the belief that increasing the benchmark plant capacity factor to a value which is technically questionable and financially non-viable would not help the cause rather it will stop any further growth in the wind power sector.

viii. From the public hearing, the commentator submitted that it had learnt that the Authority has based the proposed benchmark capacity factor on the P50 annual energy production (AEP) values calculated by a wind turbine manufacturer for a 50 MW wind power project in Sindh wind corridor. The commentator submitted that the said values cannot be taken as benchmark for all wind power projects being developed both on technical and financial grounds.

ix. Regarding the wind speed, the commentator submitted that technically speaking 7.3 m/s average annual wind speed in the Sindh wind corridor is determined by AEDB together with RISOE on the basis of five years data, which is further reinforced by succeeding eight years data and other international consultant's working on different wind projects in the said corridor. However, it is pertinent to mention that the average wind speed during last two years remained around 7.1 m/s which restricted FFC Energy Limited and Zorlu's wind farms generation to around 30% capacity factor.

x. They further requested the Authority's attention on following arguments supporting their contention that higher than 31% capacity factor is extremely challenging if not impossible:

- Latest wind turbines are specifically designed for European climatic conditions before its sales to other markets like North America, Brazil, China and South Asia. Pakistan is at the tail end of this supply chain due to unavailability of support service infrastructure, which hampers wind turbine generator manufacturers to fulfil their warranty obligations.

- The maximum ambient temperature the latest generators can operate is not higher than 40 degree Celsius, however, temperature reaches up to 47 degree Celsius in Jhimpir in summer season. In order

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to convert these generators to work up to 45 degree Celsius, it requires design & construction of special insulated enclosures with large sized industrial air conditioners to keep the vulnerable components within allowable temperature limits. Moreover, additional set of cooling fans are required for the nacelle, power transformers, etc. which warrants more investment.

- In addition to that, the dusty conditions and fewer rains in and around Jhimpir result in blade degradation, which results in reduction of annual energy production over the course of project's operational life.

- Unstable grid resulting in frequent grid tripping has adverse impact on critical and sensitive components of the wind turbines thereby reducing their efficiency and useful life. This entails increase in maintenance time and cost and reduction in wind turbine availability figures over life of the project.

- Dense cluster of wind farms around the project site considerably increase the extent of external wake losses.

- Banks require 90% surety, however, the proposed figure was based on benchmark capacity factor which corresponds with P50 meaning thereby that these values are not bankable for any financing deal.

xi. The commentator submitted that no wind turbine manufacturer is willing to give annual energy production guarantee anywhere above 31%. If the wind turbine manufacturer insists that capacity factor higher than 31% is attainable for wind power projects in Sindh wind corridor, it is beyond any doubt that procuring such latest/efficient wind turbines and investing further to convert them for high temperature operations is not possible in the proposed project cost of 2.08 million USD/ MW (local financing). Even the wind turbine manufacturer who is proclaiming that 38.4% capacity factor is achievable, has explicitly asked the Authority to keep the tariff figures unchanged from the upfront tariff, 2013, otherwise they would not be able to offer the latest wind turbine models with proclaimed higher capacity factors. This means that they are actually asking for project cost more than what was allowed in the upfront tariff, 2013 which defeats the very purpose of bringing down the LCOE of wind power projects.

xii. Lastly, the commentator submitted that the only reliable data which can guide the Authority in objectively benchmarking the plant capacity factor for new upfront tariff is the actual plant capacity factors of the operating wind farms and the benchmark annual energy production/capacity factor allowed by the Authority for different project developers under the cost plus tariff regime. The average of all approved

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and actual capacity factors comes out to be 31.9%, which the commentator submitted it believes is truly representative of the Sindh wind corridor and should be considered for benchmarking capacity factor for the new upfront tariff.

xiii. The commentator reiterated that the project cost of 1.97 million USD/MW (foreign financing) and USD 2.08 million USD / MW (local financing) considered by the Authority for new upfront tariff is too low to bring in investment for new wind power projects even at 31% capacity factor. The commentator added that though the global wind turbine prices have come down, yet it would not be prudent to simply assume that these global trends / values are valid for Pakistan without taking into account local market realities. The overall project cost of just above 2 million USD/MW may be the right benchmark in countries which have mature wind power sector with vibrant local manufacturing, EPC and O&M services sector, etc. However, for Pakistan we need to augment global benchmark project cost to cater for factors such as import of plant equipment, its shipment and transportation, high debt rate due to country risk, security of assets and manpower, additional investment in converting wind turbines to work at high temperatures, repeated grid failures affecting plant equipment, stringent EPA requirements, etc. The commentator opined that considering the aforesaid in tandem with their recommended capacity factor of 32%, project cost of at least 2.3 million USD/MW should be considered for computation of new upfront tariff. A value of 2.4 million USD/MW would be more reasonable to bear the wind speed risk.

xiv. The commentator reiterated that the Authority has considered maximum construction period of 18 months for projects ranging from 5 MW to 250 MW in size and different costs such as interest during construction, construction period insurance, return on equity during construction etc. all have been built in the proposed upfront tariff for the same duration. The commentator submitted that eighteen months construction period is essentially benchmarked for 50 MW wind power projects. Larger projects simply cannot be completed within 18 months; thus project developers opting for large sized (> 50 MW) wind power projects would effectively be taking a hit on their assured 17% IRR on account of interest during construction and other costs associated with the construction period extending beyond eighteen months. The commentator added that while it appears that the Authority desires to encourage investors/ developers in setting up larger size wind power projects, this issue will however deter all the investors from developing wind power projects bigger than 50 MW size. In view of above, the commentator requested to scale up the construction period for higher capacity plants such as up to 100 MW may be allowed eighteen months, twenty four months for the projects in the range of 101-150 MW and thirty months for the projects from 150-250 MW.

S. Directorate of Alternative Energy, Government Of Sindh

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i. The commentator submitted that detailed break-up and rationale of the proposed upfront tariff has neither been shared nor made available at the Authority's website. The proposed upfront tariff indicates a reduction of 32% in per unit cost of energy compared to upfront tariff, 2013 without giving reasons for such drastic change. It is also not clear whether any variations in the international prices of wind turbines and other peripheral accessories have been considered or it has been assumed that the local industry has developed enough to bring the cost of major components down. Stating that, the commentator suggested that gradual decrease or increase in project costs and other expenditures will help bring sustainability in the wind energy sector, keeping in view that limited finances are available in the world economy for the development of new projects and a discouraging tariff will surely affect the investor's morale.

ii. Regarding the technical parameters, the commentator submitted that based on the earlier tariff determinations of wind and third party validation reports, the proposed benchmark of 38.44% capacity factor has never been witnessed. Additionally, transferring wind risk towards the power producer is also against the Government of Pakistan's investor friendly policies and may severely damage the nascent wind industry in Pakistan and potential investment. The commentator requested the Authority to reconsider the capacity factor based on authentic and reputable studies or transfer the wind risk to the power purchaser. The commentator further submitted that the proposed financial close date deadline of September 30, 2016 is unrealistic and may be extended up to June, 2017 as the same requires achievement of several milestones.

iii. Lastly, the commentator submitted that it appreciates the decision of Authority of conducting the public hearings of solar power tariff in Lahore and requested that the same spirit may be replicated by conducting wind tariff hearings in Karachi, near the wind energy hub, so that larger participation of stakeholders can be materialized.

T. Mayura Botejue

i. The commentator submitted that the proposed approximately USD 2 million/MW project cost is low for the Pakistani market that has yet to enjoy the comforts of a firm foothold of the wind power industry in the country. The factors that affect the project cost in Pakistan include imported contents including wind turbine that account for around 80% of the project cost, transportation cost of imported heavy equipment, minimal local value addition related to equipment, lack of service providers, shortage of wind industry familiar manpower, etc. The above reflects the embryonic state of industry in Pakistan and therefore projects incur costs that are higher than global industry figures.

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ii. The commentator further submitted that proposed net capacity factor in excess of 38% reflects ambitious expectations on the energy yield of wind projects operating in Gharo corridor in Sindh. The hot summer period makes it challenging for a wind power plant to attain a 38% net capacity factor value even at P50 probability with high performance wind turbines. Further, the increased cost of high performance wind turbines and lenders demand of energy production at P90 probability are the factors that should be taken into consideration. The determination should be based keeping in view the internal factors not on data extracted from plants operating in USA, Europe, China or India where the industry is mature and local wind turbine manufacturing is prevalent.

iii. The commentator further submitted that the stipulated construction period should be tied to the project capacity, i.e. the figure of 18 months should be used as standard for a 50 MW project, twenty one months for 51-100MW, twenty four months for 101-150MW, twenty seven months for 151-200MW and thirty months for 201-250MW projects. Lastly, the commentator submitted that the projects should be allowed to earn revenue based on 100% tariff for the power generated before COD.

U. Nordex Pakistan (Private) Limited

i. The commentator submitted that the Authority has made a reduction in project cost of US$ 21.55 million (foreign financing) and US$ 24.5 million (local financing) for a 50MW project. With the said decrease in project cost, the Authority has also proposed an increase in the annual net plant capacity factor from 31% to 38.44%, which implies that the Authority envisages procurement of more efficient wind turbines.

ii. The commentator submitted that it may be possible to achieve a higher capacity factor by the application of the latest turbine technology with higher towers and increased rotor diameters to harness more from the wind, however, such equipment would be much more expensive. The arrangement, of paying less for higher capacity factor, as envisaged by the Authority is not achievable and to raise that bar (to which Nordex agrees), the project cost must increase.

iii. The commentator submitted that the average project cost as per the Global Wind Energy Association is US$ 2.16 million per MW for LIBOR based financed projects which excludes country specific constraints associated with projects being developed in Pakistan. These constraints of constructing wind farms in Pakistan include additional security arrangements, higher expat manpower requirements, higher insurance cost for expat manpower, complex technical compliance procedures, longer time and higher cost for customs clearance. Therefore, taking into account these constraints the project cost should be higher than US$ 2.16 million per MW.

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iv. The commentator further submitted that equipment's specifications and standards should be defined more clearly by reference to the IEC standards with a requirement for type certification in accordance with IEC 61400.

v. The commentator submitted that the lenders, in view of the particular risks that they perceive for such projects in Pakistan, go through additional checks and more thorough procedures than they do for other countries. This tends to mean disbursement of funds to the EPC contractor only when construction can start which occurs several weeks after financial close, therefore, the commentator submitted that it would be preferable to measure this period from disbursement of funds rather than financial close. The commentator also submitted that the construction period should also be increased to compensate for reliability run test requirement and also to account for slower pace of work during Eid and Ramadan which potentially occurs twice during the project construction period.

vi. The commentator submitted that allowing sale of pre-COD electricity is a good policy, however, compensation for this power should be made at 100% of the tariff. To support its point, the commentator submitted that the power purchaser here requires a reliability run test of the whole wind farm before COD. Due to the nature of construction of a wind farm, this requirement results in several wind turbines needing to wait until the final turbine is commissioned. During this waiting period the EPC contractor is exposed to the risk of delay LDs on the full capacity of the wind farm, despite the fact that up to 95% of the wind farm may have been completed and be able to evacuate power. This risk ultimately increases the EPC contractor's costs. By allowing payment of pre-COD electricity sales at the full tariff, the Authority would reduce this risk element for the EPC contractors and thereby allow them to offer lower project costs.

V. Osmani & Company (Pvt.) Limited

i. The commentator submitted that Pakistan is facing acute shortage of financing for energy projects, more so in renewable energy projects. Wind power projects have started attracting financing due to foresight of the Authority in complimenting the efforts of AEDB, the power purchaser and other stakeholders.

ii. In Pakistan, the wind power industry is still in infancy with 250 MW of installed generation capacity and another 500 MW under construction through ten years of developmental efforts. Strangulating influx of financing through sudden drop in tariff will badly impact the developmental efforts of past ten years. The commentator

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suggested that the tariff should be reduced gradually may be by 10 percent for every 1,000 MW of installed wind power capacity.

iii. The commentator also submitted that Pakistan's long term energy security lies only in renewable energy sector whose environmental benefits also need due financial recognition. Dependence on fuel whose cost is borne by consumers through pass through items also needs to be taken into account while comparing tariff with conventional fuel resources.

7. Based on submissions of the interveners/commentators, information available with the Authority and proceedings of the case, the Authority has deliberated in detail on the subject of determination of upfront tariff. The major issues deliberated by the Authority are as follows:

- Capacity factor
- Project cost
- Revenue sharing mechanism for excess generation
- Adjustment for variations in KIBOR/LIBOR
- Spread over LIBOR
- Sharing in savings in spread over KIBOR/LIBOR
- Sinosure fees
- Time to opt for upfront tariff and achieving financial close
- Construction period
- Power evacuation certificate
- Withholding tax on dividend
- Other issues

i. **Capacity factor**: In the advertised proposal, net annual plant capacity factor of 38.44% was considered i.e. 24% higher than the net annual plant capacity factor allowed in the upfront tariff, 2013, in view of technological advancements in wind power generation. Before proposing the capacity factor parameter and publication of advertisement, the Authority vide letter no. NEPRA/R/SAT-1/WPT-2013/15634 dated November 26, 2014 requested AEDB to convey impact of improvement in technology on the plant capacity factor/energy generation of wind power generation projects in Pakistan, for facilitating the Authority in deciding about the future upfront tariff. This letter was followed up by a reminder, however, AEDB neither responded to the aforesaid letters nor provided any information/data for assisting the Authority in formulating the upfront tariff proposal.

Majority of the interveners/commentators through their oral and written submissions stated that the proposed net annual plant capacity factor of 38.44% is on the higher side and suggested to keep that in the range of 31%-32%. Several stakeholders also submitted that the net annual energy generation corresponding to P90 confidence level should be considered, since the lenders analyze wind power projects on the said level, and consideration of capacity factor below that level makes the projects un-bankable. Few stakeholders

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also stated that certain turbine manufacturers theoretically assert that their machines can achieve 38%-40%, however, that is not possible after taking into account practical factors such as wake losses, availability losses, electrical losses, blade degradation losses, dusty environment, high temperature de-rating losses, etc. Planning Commission agreed with the advertised capacity factor, whereas Vestas Wind Technology Pakistan (Pvt.) Limited and Nordex Pakistan (Pvt.) Limited submitted that the advertised capacity factor is achievable but not with the proposed project cost.

AEDB through its post hearing follow on comments, conveyed the results of annual energy yields/capacity factors at different probability levels for both Jhimpir and Gharo regions based on eight different wind turbine generators being installed in Pakistan. AEDB submitted that the provided results were estimated using the industry standard software and two different set of assumptions i.e. under the variables adopted by DTU/RISOE National Laboratory of Denmark and under the variables adopted by lenders/IPPs. AEDB explained that the difference between the results of both analyses was due to the accounting of different values of technical losses, standard error, etc. by the mentioned parties. Based on the results, AEDB in the summary of its comments submitted that the proposed capacity factor of 38.44% may not be achieved at P 90 probability level for the wind farm sites within the Gharo-Ketibandar wind corridor in Sindh and added that it is expected that 31%-33% may be achieved at P90 probability level using the assumptions of technical consultants of lenders/IPPs.

Examining the aforementioned post hearing comments of AEDB, the Authority noted that there were variations in the results of energy yields of two areas i.e. Jhimpir and Gharo at each confidence level. The Authority also noted that on the basis of variables adopted by lenders/IPPs, the capacity factor at a lower confidence level in Jhimpir approximately corresponds with the capacity factor of the Gharo at the next higher confidence level. Further, the Authority also considered the capacity factors conveyed in AEDB study for various wind turbine generators at different confidence levels.

It was noted by the Authority that the capacity factor of 31% considered for the upfront tariff, 2013 was based on the information provided by AEDB at P 70 confidence level. For the current upfront tariff, the Authority has decided to review the advertised capacity factor and base the same on the study submitted by AEDB. Based on the results shown in the submitted study, and taking into consideration number of factors including probability level, technological advancements, different values of technical losses, standard error, area wise difference in results, etc. the Authority has decided to consider and approve 35% net annual plant capacity factor for upfront tariff allowed through this determination.

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ii. **Project cost:** For the computation of proposed upfront tariff, after taking into consideration international trend of decline in project costs of wind power generation projects, project cost of USD 1.97 million per MW (foreign financing) and USD 2.08 million per MW (local financing) was considered by the Authority. Majority of stakeholders objected to project cost considered in the upfront tariff proposal. The stakeholders contended that the proposed project cost is too low and has been reduced substantially from the project cost considered for the upfront tariff, 2013. It was also submitted by most of the stakeholders that the proposed project cost is not in tandem with the proposed plant capacity factor. Further, some of the stakeholders contended that the project cost of any other part of the world cannot be taken as a reference for Pakistan due to various factors such as absence of local manufacturing base in Pakistan, transportation cost of heavy machinery into Pakistan, country risk, expatriates insurance, Grid code requirements, etc. Most of the stakeholders suggested to take into account the project cost allowed in the upfront tariff, 2013, few recommended to just reflect the impact of improved lending terms in the project cost of upfront tariff, 2013 and one commentator submitted that USD 2.3 million per MW may be considered as the project cost.

Planning Commission submitted that the advertised project cost may be slashed by 25% and submitted some workings based on project cost of USD 1.6 million/MW (foreign financing) for consideration of the Authority. Supporting its contention, the intervener submitted that the project cost in India and China is around one million USD per MW. Discussing major component of the project cost i.e. wind turbines, the intervener submitted that in India Suzlon is manufacturing wind turbines at USD 0.85 million per MW. Globally, Nordex and Vestas, the two leading wind turbine manufacturers, are producing wind turbines at USD 1.23 million per MW and USD 1.19 million per MW respectively.

AEDB in its post-hearing follow on comments discussed the region wise variations in project costs and the feature of low cost manufacturing base in India and China, explaining that project costs of other countries cannot be used as a reference for Pakistan. AEDB proposed that:

> *"In view of the international capital cost value for wind onshore and considering the other local factors described in FFC Energy Limited and Bridge Factor presentations to Authority, which impact the overall cost of the project; AEDB is of the view that the Authority may consider the project cost between USD 2 - 2.2 million/MW for the new upfront tariff for wind power projects."*

The Authority has considered submissions of the stakeholders and project costs for wind power projects in various other countries of the World. The Authority agrees with the submission of AEDB that the cases of India and China cannot be made a reference for Pakistan owing to their comparatively mature markets and local manufacturing bases. Further, the Authority noted that turbine price details as provided by Planning

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Commission can only be used to work out average prices of turbines. However, these do not distinguish between the prices of wind turbines of various name plate capacity, model, etc. Further, turbine prices are only a certain part of total project cost, and turbine prices as a percentage of total project cost can vary substantially. The Authority noted that local factors like engagement of EPC contractor, withholding tax deduction required on payments to EPC contractor, transportation costs, etc. also affect the project cost of a wind farm in Pakistan, however, these do not appear to have been accounted for by the Planning Commission.

The Authority is of the view that local factors as submitted by different stakeholders and supported by AEDB should be factored in the allowed project cost. The Authority, after due consideration of input of all stakeholders and information/data available on record, has decided to consider USD 2.15 million per MW (rounded up to two decimal places) as project cost for projects based on 100% foreign financing. By application of local financing interest rates, the project cost works out to USD 2.26 million per MW (rounded up to two decimal places) which has been considered as project cost based on 100% local financing for this upfront tariff.

iii. **Revenue sharing mechanism for excess generation**: In the advertised proposal, net annual energy generation supplied to the power purchaser in a year, in excess of specified net annual plant capacity factor was proposed to be charged at tariff rates which were to decrease with the increase in generation i.e. more the energy beyond the specified capacity factor, lower the tariff.

Some of the stake holders were of the view that revenue sharing mechanism for excess generation be abolished as the investor is taking the full downside risk i.e. risk of generation lower than the benchmark energy. Few interveners/commentators in this regard submitted that the mechanism of progressively decreasing tariff rates did not encourage investors to opt for the most efficient turbines, rather it encouraged them to go for the machines that produced energy only up to the specified capacity factor or slightly higher. To cope with this issue, the stakeholders suggested that Authority should, under the upfront tariff, reverse the revenue sharing mechanism for excess generation to progressively increasing rates. They contended that by doing so, the consumers will get instant relief as the tariff is slashed, immediately upon achievement of specified capacity factor, as well as the developers get incentivized to opt for more efficient, higher energy yielding wind turbines as each additional percentage point energy generation above the benchmark energy, would allow the developers to charge more.

The Authority noted that revenue sharing mechanism is necessary, as the power producer is getting full recovery of its tariff at a higher confidence level than P50. The Authority also noted that the suggestion to charge excess generation to progressively increasing rates is a better option, than the advertised mechanism and in decision of the Authority in the matter of motion for leave for review against upfront

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tariff determination for solar PV power plants, the mechanism proposed by the stakeholders has already been allowed by the Authority.

The Authority after due consideration has decided to modify the advertised revenue sharing mechanism for excess generation and has decided that the net annual energy generation supplied to the power purchaser in a year, in excess of 35% net annual plant capacity factor will be charged at the following tariffs;

Net annual plant capacity factor	**% of the prevalent tariff**
Above 35% to 36%	75%
Above 36% to 37%	80%
Above 37%	100%

iv. **Adjustment for variations in KIBOR/LIBOR:** Some of the stakeholders requested the Authority to allow true-up against variations in KIBOR/LIBOR upon achievement of COD, as risk of variations in KIBOR/LIBOR should not be passed on to the power producers. The requested adjustment was not allowed in the upfront tariff, 2013. To support their point of view, the stakeholders added that the requested adjustment has been allowed by the Authority in the upfront tariffs for small hydro, solar, coal and liquefied natural gas. Keeping in view that the captioned adjustment has been allowed in the upfront tariffs of various other technologies, the Authority has decided to allow the adjustment for variations in KIBOR/LIBOR.

For the purposes of clarity, the interest during construction and phasing for debt injection considered by the Authority for computation of interest during construction is reproduced below:

	Foreign financing USD in millions/MW	Local financing USD in millions/MW
Interest during construction	0.080	0.192

Phasing for debt injection

Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 5	Quarter 6
40%	25%	20%	5%	5%	5%

The interest during construction will be re-computed after COD for the allowed construction period of eighteen months starting from the date of financial close of the relevant company, on the same computation basis as already adopted, by applying 3 months KIBOR/LIBOR of last day of the preceding quarter (plus allowed spread thereon), on the basis of phasing for debt injection detailed above and the tariff will be revised accordingly.

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v. **Spread over LIBOR:** Some of the stakeholders including the representative from International Finance Corporation requested the Authority to allow spread over LIBOR in the range of 5%-5.5% keeping in view the uncertainties, externalities, country risk and circular debt. The Authority has noted that credit rating of Pakistan has improved during the recent past. The Authority has also noted that spread of 4.5% over LIBOR has been allowed by the Authority in the upfront tariff for various other technologies. Keeping in view the aforesaid facts, the Authority has decided to allow 4.50% spread over 3 months LIBOR.

vi. **Sharing in savings in spread over KIBOR/LIBOR:** The Authority has noted that in case of upfront tariffs for various other technologies, if negotiated spread over KIBOR/LIBOR is less than the reference limits, benefit of savings in spread over KIBOR/LIBOR is being allowed sharing between the power purchaser and the power producer in the ratio of 60:40 respectively. In the upfront tariff, 2013 no such adjustment was allowed. The Authority has decided to allow sharing of benefit of savings in the spread over KIBOR/LIBOR, between the power purchaser and the power producer in the ratio of 60:40 respectively, to make the upfront tariff fair for both the consumers as well as investors.

The Authority hereby also clarifies that 3 months LIBOR plus a premium of 450 basis points for foreign financing and 3 months KIBOR plus a premium of 300 basis points for local financing has been considered in the computation of upfront tariff allowed through this determination. In case the spread on KIBOR/LIBOR is higher than that mentioned above, no adjustment on the basis of actual higher spread will be allowed.

vii. **Sinosure fees:** Some of the stakeholders raised the issue of allowing Sinosure/other agencies fees, as international lenders require insurance coverage for the debt provided to projects/companies outside of their home country. In support of their contention, they submitted that the requested for adjustment has been allowed by the Authority in upfront tariffs of various other technologies. The Authority has considered the issue in detail and has noted that although Sinosure/other agencies fees were not allowed in the upfront tariff, 2013, however, in spite of that, many projects were able to achieve financial close under the same. The Authority after due deliberation has decided to continue the decision taken in the upfront tariff, 2013 in this regard. Accordingly Sinosure/other agencies fees is not allowed as a separate cost head/pass through item in this upfront tariff.

viii. **Time to opt for upfront tariff and achieving financial close:** It was advertised that upfront tariff can be opted within 12 months of its determination by the Authority and the wind power companies opting for upfront tariff will have to achieve financial close by September 30, 2016 or within 12 months of the grant of upfront tariff, whichever is earlier. Some of the stakeholders have submitted that the proposed timeline for achieving financial close is not realistic or commercially workable under the prevailing circumstances, as

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the envisioned projects are at a fairly early stage of development as opposed to the projects availing the upfront tariff, 2013. A commentator has opined that the time line for achieving financial close should be straight 12 months from the award of tariff. The Authority observed that this upfront tariff is intended for projects that can achieve financial close in a short period of time and therefore has decided to modify the advertised terms in this regard. The Authority has decided that the choice to opt for this tariff will only be available up to 180 days from the date of issuance of this determination by the Authority and companies opting for this tariff will have to achieve financial close within one year from the date of decision of the Authority awarding upfront tariff to them.

ix. **Construction period:** In the advertised proposal, maximum construction period of eighteen months was specified. Few interveners/commentators requested the Authority to increase the allowed construction period for bigger capacity projects. The Authority has noted that same issue was also raised during the proceedings of the upfront tariff, 2013 and upfront tariff, 2011. The Authority after consideration of the issue has already decided that by fixing the maximum construction period to eighteen months, irrespective of the size of the project, the impact of economies of scale will be largely offset. The Authority has reconsidered the issue and finds no reason to change its earlier decision on this issue.

x. **Power evacuation certificate:** It was specified in the advertised proposal that companies having a certificate from the power purchaser regarding availability of power evacuation arrangement/capacity for absorption of power supplied into the national grid will be eligible for this upfront tariff. Most of the interveners opposed this condition and stated that under the Policy For Development Of Renewable Energy For Power Generation, 2006, the availability of grid is the responsibility of off-taker and Government of Pakistan, therefore, it is unreasonable to ask project developers to obtain confirmation from the off-taker that the grid will be available for evacuation of power from their respective projects. The Authority has considered this issue in the light of grid constraints and stipulations of the Grid code. The Authority is of the view that for ensuring alignment of activities of construction of wind power plants with power evacuation arrangement/capacity for absorption of power supplied into the national grid, this requirement is necessary and therefore the advertised condition does not need any change.

xi. **Withholding tax on dividend:** The Authority has noted that withholding tax on dividend was allowed as a pass through item in the upfront tariff, 2013. However, in case of upfront tariffs for various other technologies recently determined, withholding tax on dividend has not been allowed as a pass through item by the Authority. The Authority in accordance with its recent in principle decision on this issue, has decided not to allow withholding tax on dividend as a pass through item in this upfront tariff.

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xii. **Other issues:** The Authority has considered the proposal of Planning Commission regarding introduction of reverse auction mechanism for deciding tariffs for renewable energy sources. The Authority has noted that in the upfront tariff, 2013 the Authority had observed that proposal regarding auctioning of wind power projects needs to be considered by AEDB. The Authority further observed that AEDB has not reverted to the Authority on this issue. The Authority has deliberated on the issue and has found that number of countries in the world have followed the path of allowing upfront tariffs for development of their renewable energy sector. The Authority has concluded that at this juncture changing the future direction i.e. going from determined tariff regime to reverse auction mechanism is not prudent. The Authority also observed that the Planning Commission has proposed announcing separate tariffs for European and Chinese origin turbines and for that, is of the view that this upfront tariff is energy based and gains or losses due to quality of machinery will be passed on to the power producer, except to the extent of impact of revenue sharing mechanism for excess generation. Accordingly no change on this account is required in the upfront tariff.

The Authority has also considered the worldwide data on operations and maintenance costs available with it and after due deliberation has decided to allow the gross indexed amount of operations and maintenance costs allowed in the upfront tariff, 2013 through this determination. Further, mechanism for indexation of insurance during operations has also been brought in line with the mechanism for indexation of insurance given in the upfront tariff for solar.

One of the intervener has submitted that this may not be a good time for the Pakistani power sector to induct renewable energy power plants with long term EPAs' for the reason that efficiency of these power plants is increasing thereby reducing cost of electricity. The Authority has considered the issue and has decided that keeping in view the time required for development of relevant know how/infrastructure in Pakistan, energy security and clean energy provided by renewable energy, energy shortfall faced by the country, etc. it cannot bring the entire development in the renewable energy sector to a halt, while waiting for further improvement in technologies to be done by the developed countries and the establishment of consistent tariff regime is necessary for development of renewable energy in the country. The Authority also noted that the upfront tariff allowed though this determination is quite comparable to the tariffs allowed for various other technologies.

ORDER

8. The Authority hereby determines and approves the following upfront tariff for wind power generation, for delivery of electricity to the power purchaser:

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REFERENCE TARIFF ON BOO BASIS (BASED ON 100% FOREIGN LOAN)

Years	O & M	Insurance	Return on equity	Principal repayment of debt	Interest	Total tariff
1	1.5039	0.6349	3.6070	4.2656	2.4669	12.4782
2	1.5039	0.6349	3.6070	4.4727	2.2597	12.4782
3	1.5039	0.6349	3.6070	4.6900	2.0425	12.4782
4	1.5039	0.6349	3.6070	4.9177	1.8147	12.4782
5	1.5039	0.6349	3.6070	5.1566	1.5759	12.4782
6	1.5039	0.6349	3.6070	5.4070	1.3255	12.4782
7	1.5039	0.6349	3.6070	5.6696	1.0629	12.4782
8	1.5039	0.6349	3.6070	5.9450	0.7875	12.4782
9	1.5039	0.6349	3.6070	6.2337	0.4988	12.4782
10	1.5039	0.6349	3.6070	6.5364	0.1960	12.4782
11 to 20	1.5039	0.6349	3.6070	-	-	5.7458
Levelized – Rs./kWh.						10.6048
Indexation	PKR/US $ & US CPI	PKR/US $	PKR/US $	PKR/US $	PKR/US $ & LIBOR	

Levelized tariff discounted at 10% per annum works out to US cents 10.4481/kWh.

i) This tariff is applicable for wind power generation only.

ii) This tariff will be limited to the extent of net annual energy generation supplied to the power purchaser up to 35% net annual plant capacity factor. Net annual energy generation supplied to the power purchaser in a year, in excess of 35% net annual plant capacity factor will be charged at the following tariffs:

Net annual plant capacity factor	**% of the prevalent tariff**
Above 35% to 36%	75%
Above 36% to 37%	80%
Above 37%	100%

iii) The power purchaser will not take the wind risk; relevant wind power generation company (hereinafter referred to as the "company") will be required to account for this risk.

iv) Only wind power generation companies (hereinafter referred to as the "companies") meeting the following conditions will be eligible for this tariff:

- Companies recommended by the relevant agency for the grant of upfront tariff.
- Companies who certify that all the plant and machinery to be installed will be new and of international standards in the format attached as Annex-IV.
- Companies with installed capacity of up to 250 MW.

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- Companies who have a certificate from the power purchaser regarding availability of power evacuation arrangement/capacity for absorption of power supplied into the national grid in the format attached as Annex-V.

v) The plant and machinery of the company, will be certified as new and of international standard by an independent engineer, appointed in accordance with the terms of energy purchase agreement before any payment under this tariff is made. The said certificate shall be obtained and retained by the power purchaser.

vi) The choice to opt for this tariff will only be available up to 180 days from the date of issuance of this determination by the Authority.

vii) The companies opting for this tariff will have to achieve financial close within one year from the date of decision of the Authority awarding upfront tariff to them. The upfront tariff granted to any company will no longer remain applicable/valid, if financial close is not achieved by the relevant company in the abovementioned timeline or a generation license is declined to that company.

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

ix) In the tabulated above tariff no adjustment for certified emission reductions has been accounted for. However, upon actual realization of carbon credits, the same shall be distributed between the power purchaser and the power producer in accordance with the applicable GOP Policy for Development of Renewable Energy for Power Generation, 2006, as amended from time to time.

x) The targeted maximum construction period after financial close is 18 months. No adjustment will be allowed in this tariff to account for financial impact of any delay in project construction. However, the failure of a project to complete construction within 18 months of financial close will not invalidate the tariff granted to it.

xi) This tariff will be applicable for a period of twenty (20) years from the commencement of commercial operations.

xii) The terms and conditions specified herein form an integral part of this tariff.

xiii) Adjustment on account of savings in cost of debt:

This upfront tariff has been worked out on the basis of 3 months LIBOR of 0.2706% plus a premium of 450 basis points for foreign financing and 3 months KIBOR of 8.22% plus a premium of 300 basis points for local financing. In case negotiated spread is less than the said limits, the savings in the spread over LIBOR/KIBOR shall be shared by the power purchaser and the power producer in the ratio of 60:40 respectively. The power producer shall submit relevant authentic documentary evidence to the Authority, for the aforesaid adjustment within 15 days of commercial operations date of the relevant company. In case the premium on LIBOR/KIBOR is higher than that mentioned above, no adjustment on the basis of actual higher premium will be allowed.

xiv) Adjustment on account of variations in LIBOR/KIBOR

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The Authority has assessed interest during construction of USD 0.080 million per MW for foreign financing and USD 0.192 million per MW for local financing. The interest during construction will be reassessed after commercial operations date for the allowed construction period of eighteen months, starting from the date of financial close of the relevant company, on the same computation basis as already adopted, by applying 3 months KIBOR/LIBOR of last day of the preceding quarter (plus allowed spread thereon), on the basis of phasing for debt injection considered in the computation of upfront tariff. The power producer shall submit relevant authentic documentary evidence to the Authority, for the aforesaid adjustment within fifteen days of the commercial operations date of the relevant company.

xv) Adjustment for loan structure

The company will have to provide its loan structure to the Authority, along with its application opting for upfront tariff in the format attached as Annex-IV. The Authority will allow tariff to the company on the basis of its proposed loan structure. The tariff once allowed (i.e. on the basis of 100% foreign loan, 100% local loan or mixture of foreign and local loan) will not be subject to any further change, except for the adjustments in accordance with the mechanisms detailed herein, where applicable, and the application of relevant indexations as detailed in this order.

Tariffs detailed in this order have been calculated on the basis of project financing structure of equity plus 100% foreign loan and equity plus 100% local loan (Annex-I). For proposed loan composition other than the one mentioned above i.e. 100% foreign/local, the Authority after consideration will allow two part tariff on the basis of request as follows:

Part 1	=	Tariff calculated on the basis of project financing structure of equity plus 100% foreign loan x foreign debt of the relevant company as a percentage of its total debt
Part 2	=	Tariff calculated on the basis of project financing structure of equity plus 100% local loan (Note 1) x local debt of the relevant company as a percentage of its total debt

Note 1 : Upfront tariff calculated on the basis of project financing structure of equity plus 100% local loan, along with its applicable onetime adjustment, is attached as **Annex-I.**

All the terms and conditions detailed in this order will, with due alteration of details, also apply to two part tariff allowed to any company.

In case of two part tariff, part 2 initially granted, in addition to adjustments applicable on part 1, will also be subsequently adjusted, after commercial operations date of the relevant company, in accordance with the onetime adjustment mechanism stipulated in Annex-I. The relevant company shall make a request for allowing onetime adjustment within 15 days of commercial operations date of the relevant company.

Indexations/adjustment for part 1 will be allowed in accordance with the mechanism for indexations/ adjustment applicable for tariff calculated on the basis of project financing structure of equity plus 100% foreign loan as detailed in xvii (A) below.

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Indexations/adjustment for part 2 will be allowed in accordance with the mechanism for indexations/adjustment for tariff calculated on the basis of project financing structure of equity plus 100% local loan as detailed in xvii (B) below.

xvi) Pass-through items

If the company is obligated to pay any tax on its income from generation of electricity from wind, or any duties and/or taxes, not being of refundable nature, are imposed on the company up to the commencement of its commercial operations for import of its plant, machinery and equipment, the exact amount paid by the company on these accounts shall be reimbursed by the power purchaser on production of original receipts. This payment should be considered as a pass-through payment spread over a twelve months period. Furthermore, in such a scenario, the company shall also submit to the power purchaser details of any tax savings and the power purchaser shall deduct the amount of these savings from its payment to the company on account of taxation.

The adjustment for duties and/or taxes will be restricted only to the extent of duties and/or taxes directly imposed on the company. No adjustment for duties and/or taxes imposed on third parties such as contractors, suppliers, consultants, etc., will be allowed. Further, withholding tax on dividend will also not be allowed as a pass through item.

xvii) Indexations/adjustment

The tariff allowed to any company, after adjustments according to the mechanisms provided herein, will remain unchanged throughout the tariff control period, except for the adjustments due to indexations/adjustment detailed in this order. The indexations of O & M, return on equity, principal repayment of debt and interest will be allowed on quarterly basis on 1st July, 1st October, 1st January and 1st April. Insurance component will be adjusted annually. The mechanism of indexations/adjustment will be as under:

A) INDEXATIONS/ADJUSTMENT APPLICABLE FOR TARIFF CALCULATED ON THE BASIS OF PROJECT FINANCING STRUCTURE OF EQUITY PLUS 100% FOREIGN LOAN

a) Indexations applicable to O & M:

$$OM_{(FREV)} = OM_{(FREF)} * US\ CPI_{(REV)} / US\ CPI_{(REF)} * ER_{(REV)} / ER_{(REF)}$$

Where:

$OM_{(FREV)}$ = The revised applicable O&M tariff component indexed with US CPI and exchange rate parity

$OM_{(FREF)}$ = The reference O&M tariff component for the relevant period

$US\ CPI_{(REV)}$ = The revised US CPI (all urban consumers) based on latest available information with respect to US CPI (notified by US Bureau of Labor Statistics)

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$US\ CPI_{(REF)}$	=	Reference US CPI (all urban consumers)–current reference 233.707 US CPI (all urban consumers) for the month of January, 2015 as notified by the US Bureau of Labor Statistics
$ER_{(REV)}$	=	Revised TT & OD selling rate of US Dollar as notified by the National Bank of Pakistan as at the last day of the preceding quarter
$ER_{(REF)}$	=	Reference TT & OD selling rate of US dollar – current reference 101.50

b) Adjustment of insurance component

The actual insurance cost for the minimum cover required under contractual obligations with the power purchaser not exceeding 1% of Rs. 194.67 million per MW (US $ 1.9179 million per MW) 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 Rs.194.67 million
$P_{(Act)}$	=	Actual premium per MW of installed capacity or 1% of US $ 1.9179 million converted into Pak Rupees on exchange rate prevailing on the 1st day of the insurance coverage period, whichever is lower

c) Indexations applicable to return on equity

$$ROE_{(FREV)} = ROE_{(FREF)} * ER_{(REV)} / ER_{(REF)}$$

Where:

$ROE_{(FREV)}$	=	The revised applicable return on equity tariff component indexed with exchange rate parity
$ROE_{(FREF)}$	=	The reference return on equity tariff component for the relevant period
$ER_{(REV)}$	=	Revised TT & OD selling rate of US Dollar as notified by the National Bank of Pakistan as at the last day of the preceding quarter
$ER_{(REF)}$	=	Reference TT & OD selling rate of US dollar – current reference 101.50

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d) Indexations applicable to debt

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

e) Indexations applicable to interest after achieving COD

$$\Delta I = P_{(REV)} * (LIBOR_{(REV)} - 0.2706\%) /4$$

Where:

ΔI = The variation in interest charges applicable corresponding to variation in 3 months LIBOR. ΔI can be positive or negative depending upon whether 3 months $LIBOR_{(REV)}$ per annum > or < 0.2706%. The interest payment obligation will be enhanced or reduced to the extent of ΔI for each quarter under adjustment.

$P_{(REV)}$ = is the outstanding principal (as indicated in the attached debt service schedule to this order at Annex II), on a quarterly basis at the relevant quarterly calculations date. Quarter 1 shall commence on the commercial operations date (i.e. the first figure will be used for the purposes of calculation of interest for the first quarter after commercial operations date).

$LIBOR_{(REV)}$ = Revised 3 months US $ LIBOR as at the last day of the preceding quarter

B) INDEXATIONS/ADJUSTMENT APPLICABLE FOR TARIFF CALCULATED ON THE BASIS OF PROJECT FINANCING STRUCTURE OF EQUITY PLUS 100% LOCAL LOAN

a) Indexations applicable to O & M:

$$OM_{(LREV)} = OM_{(LREF)} * US\ CPI_{(REV)} / US\ CPI_{(REF)} * ER_{(REV)} / ER_{(REF)}$$

Where:

$OM_{(LREV)}$ = The revised applicable O & M tariff component indexed with US CPI and exchange rate parity

$OM_{(LREF)}$ = The reference O & M tariff component for the relevant period

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US CPI $_{(REV)}$	=	The revised US CPI (all urban consumers) based on latest available information with respect to US CPI (notified by US Bureau of Labor Statistics)
US CPI $_{(REF)}$	=	Reference US CPI (all urban consumers) – current reference 233.707 US CPI (all urban consumers) for the month of January 2015 as notified by the US Bureau of Labor Statistics
$ER_{(REV)}$	=	Revised TT & OD selling rate of US Dollar as notified by the National Bank of Pakistan as at the last day of the preceding quarter
$ER_{(REF)}$	=	Reference TT & OD selling rate of US dollar – current reference 101.50

b) Adjustment of insurance component

The actual insurance cost for the minimum cover required under contractual obligations with the power purchaser not exceeding 1% of Rs. 194.67 million per MW (US $ 1.9179 million per MW) 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 Rs.194.67 million
$P_{(Act)}$	=	Actual premium per MW of the installed capacity or 1% of US $ 1.9179 million converted into Pak Rupees on exchange rate prevailing on the 1st day of the insurance coverage period whichever is lower

c) Indexations applicable to return on equity

$ROE_{(LREV)} = ROE_{(LREF)} * ER_{(REV)} / ER_{(REF)}$

Where:

$ROE_{(LREV)}$	=	The revised applicable return on equity tariff component indexed with exchange rate parity
$ROE_{(LREF)}$	=	The reference return on equity tariff component for the relevant period
$ER_{(REV)}$	=	Revised TT & OD selling rate of US Dollar as notified by the National Bank of Pakistan as at the last day of the preceding quarter

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$ER_{(REF)}$ = Reference TT & OD selling rate of US dollar - current reference 101.50

d) Indexation applicable to interest after achieving COD

$\Delta I = P_{(REV)} * (KIBOR_{(REV)} - 8.22\%) /4$

Where:

ΔI = The variation in interest charges applicable corresponding to variation in 3 months KIBOR. ΔI can be positive or negative depending upon whether 3 months $KIBOR_{(REV)}$ per annum > or < 8.22%. The interest payment obligation will be enhanced or reduced to the extent of ΔI for each quarter under adjustment.

$P_{(REV)}$ = is the outstanding principal (as indicated in the attached debt service schedule to this order at Annex III), on a quarterly basis at the relevant quarterly calculations date. Quarter 1 shall commence on the commercial operations date (i.e. the first figure will be used for the purposes of calculation of interest for the first quarter after commercial operations date).

$KIBOR_{(REV)}$ = Revised 3 months KIBOR as at the last day of the preceding quarter

Note: Above described indexations/adjustments will be approved and announced by the Authority within fifteen days of the applicant's request for indexations/adjustments in tariff in accordance with the requisite mechanisms stipulated herein.

xviii) **Other Terms and Conditions of Tariff:**

a. Design & Manufacturing Standards:

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

b. Emissions Trading/Carbon Credits:

The company granted this tariff shall process and obtain emissions/carbon credits expeditiously and credit the proceeds to the power purchaser in accordance with the

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applicable GOP Policy for Development of Renewable Energy for Power Generation, 2006, as amended from time to time.

c. General:

- The power purchaser before signing the Energy Purchase Agreement shall satisfy itself that the plant and machinery proposed to be installed is of a quality acceptable to it.
- Pre COD sale of electricity is allowed to the power producer, subject to the terms and conditions of Energy Purchase Agreement, at the applicable tariff excluding principal repayment of debt component and interest component. However, pre COD sale will not alter the required commercial operations date stipulated by the Energy Purchase Agreement in any manner.
- 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.

9. The above order of the Authority, along with attached annexures (I to V), are recommended for notification by the Federal Government, in the Official Gazette, in accordance with Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

AUTHORITY

(Khawaja Muhammad Naeem)
Member

(Himayat Ullah Khan)
Member

(Syed Masood ul Hassan Naqvi)
Member

(Maj. (R) Haroon Rashid)
Member

(Brig. (R) Tariq Saddozai)
Chairman

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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24.06.15

Annex-I

UPFRONT TARIFF CALCULATED ON THE BASIS OF PROJECT FINANCING STRUCTURE OF EQUITY PLUS 100% LOCAL LOAN ALONG WITH ITS APPLICABLE ONETIME ADJUSTMENT

1. Reference tariff on BOO basis

Years	O & M	Insurance	Return on equity	Principal repayment of debt	Interest	Total tariff
1	1.5039	0.6349	3.7820	3.2424	6.1594	15.3226
2	1.5039	0.6349	3.7820	3.6218	5.7800	15.3226
3	1.5039	0.6349	3.7820	4.0456	5.3561	15.3226
4	1.5039	0.6349	3.7820	4.5190	4.8828	15.3226
5	1.5039	0.6349	3.7820	5.0478	4.3540	15.3226
6	1.5039	0.6349	3.7820	5.6384	3.7634	15.3226
7	1.5039	0.6349	3.7820	6.2981	3.1036	15.3226
8	1.5039	0.6349	3.7820	7.0351	2.3666	15.3226
9	1.5039	0.6349	3.7820	7.8583	1.5435	15.3226
10	1.5039	0.6349	3.7820	8.7778	0.6241	15.3226
11 to 20	1.5039	0.6349	3.7820	-	-	5.9208
Levelized – Rs./kWh.						12.7064
Indexation	PKR/US $ & US CPI	PKR/US $	PKR/US $	-	KIBOR	

2. This tariff is calculated on the basis of project financing structure of equity plus 100% local loan.

3. Onetime adjustment for PKR / US $ exchange rate variation

The base amount for quarter 1 (as indicated in Annex-III) will be adjusted for exchange rate variation, for 270 days after financial close of the relevant company, in accordance with the onetime adjustment mechanism stipulated below:

$$B_{(LFIN)} = (B_{(LREF)} \times 20\%) + (B_{(LREF)} \times 80\% \times ER_{(REV)} / ER_{(REF)})$$

Where:

$B_{(LFIN)}$ = The revised base amount for the first quarter after allowing onetime adjustment for exchange rate parity

$B_{(LREF)}$ = The reference base amount (as indicated in Annex–III) for the first quarter

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$ER_{(REV)}$	=	The average, for a period of 270 days after financial close, of TT & OD selling rate of US dollar as notified by the National Bank of Pakistan
$ER_{(REF)}$	=	Reference TT & OD selling rate of US dollar i.e. 101.50

Note: After the revision of the base amount of quarter 1, in accordance with the onetime adjustment mechanism stipulated above, the debt service schedule at Annex-III will be recalculated, on the same computation basis as already adopted, and revised principal repayment and interest tariff components will be worked out for subsequent indexations, where applicable.

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UPFRONT TARIFF FOR WIND POWER PROJECTS

Debt Servicing Schedule based on 100% foreign financing for the purpose of Indexation of debt component only

Relevant Quarters	Base amount (USD)	Principal Repayment (USD)	Interest (USD)	Balance Principal (USD)	Annual Principal Repayment (USD/kWh)	Annual Interest (USD/kWh)
1	1,609,855	31,642	19,200	1,578,213		
2	1,578,213	32,019	18,823	1,546,194	4.2656	2.4669
3	1,546,194	32,401	18,441	1,513,792		
4	1,513,792	32,788	18,054	1,481,005		
5	1,481,005	33,179	17,663	1,447,826		
6	1,447,826	33,574	17,267	1,414,252	4.4727	2.2597
7	1,414,252	33,975	16,867	1,380,277		
8	1,380,277	34,380	16,462	1,345,897		
9	1,345,897	34,790	16,052	1,311,107		
10	1,311,107	35,205	15,637	1,275,902	4.6900	2.0425
11	1,275,902	35,625	15,217	1,240,278		
12	1,240,278	36,050	14,792	1,204,228		
13	1,204,228	36,480	14,362	1,167,748		
14	1,167,748	36,915	13,927	1,130,834	4.9177	1.8147
15	1,130,834	37,355	13,487	1,093,479		
16	1,093,479	37,800	13,041	1,055,678		
17	1,055,678	38,251	12,591	1,017,427		
18	1,017,427	38,707	12,134	978,720	5.1566	1.5759
19	978,720	39,169	11,673	939,551		
20	939,551	39,636	11,206	899,914		
21	899,914	40,109	10,733	859,805		
22	859,805	40,587	10,254	819,218	5.4070	1.3255
23	819,218	41,071	9,770	778,147		
24	778,147	41,561	9,281	736,585		
25	736,585	42,057	8,785	694,529		
26	694,529	42,559	8,283	651,970	5.6696	1.0629
27	651,970	43,066	7,776	608,904		
28	608,904	43,580	7,262	565,324		
29	565,324	44,099	6,742	521,225		
30	521,225	44,625	6,216	476,599	5.9450	0.7875
31	476,599	45,158	5,684	431,442		
32	431,442	45,696	5,146	385,745		
33	385,745	46,241	4,601	339,504		
34	339,504	46,793	4,049	292,712	6.2337	0.4988
35	292,712	47,351	3,491	245,361		
36	245,361	47,916	2,926	197,445		
37	197,445	48,487	2,355	148,958		
38	148,958	49,065	1,777	99,893	6.5364	0.1960
39	99,893	49,650	1,191	50,243		
40	50,243	50,243	599	-		

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UPFRONT TARIFF FOR WIND POWER PROJECTS

Debt Servicing Schedule based on 100% local financing for the purpose of Indexation of debt component only

Relevant Quarter	Base amount (Rs.)	Principal Repayment (Rs.)	Interest (Rs.)	Balance Principal (Rs.)	Principal Repayment of debt Rs./KWh	Interest Rs./KWh
1	171,954,445	2,383,165	4,823,322	169,571,280	3.2424	6.1594
2	169,571,280	2,450,013	4,756,474	167,121,267		
3	167,121,267	2,518,736	4,687,752	164,602,531		
4	164,602,531	2,589,386	4,617,101	162,013,145		
5	162,013,145	2,662,019	4,544,469	159,351,126	3.6218	5.7800
6	159,351,126	2,736,688	4,469,799	156,614,438		
7	156,614,438	2,813,452	4,393,035	153,800,986		
8	153,800,986	2,892,370	4,314,118	150,908,616		
9	150,908,616	2,973,501	4,232,987	147,935,116	4.0456	5.3561
10	147,935,116	3,056,907	4,149,580	144,878,208		
11	144,878,208	3,142,654	4,063,834	141,735,555		
12	141,735,555	3,230,805	3,975,682	138,504,750		
13	138,504,750	3,321,429	3,885,058	135,183,321	4.5190	4.8828
14	135,183,321	3,414,595	3,791,892	131,768,726		
15	131,768,726	3,510,374	3,696,113	128,258,351		
16	128,258,351	3,608,840	3,597,647	124,649,511		
17	124,649,511	3,710,068	3,496,419	120,939,442	5.0478	4.3540
18	120,939,442	3,814,136	3,392,351	117,125,307		
19	117,125,307	3,921,122	3,285,365	113,204,184		
20	113,204,184	4,031,110	3,175,377	109,173,074		
21	109,173,074	4,144,183	3,062,305	105,028,892	5.6384	3.7634
22	105,028,892	4,260,427	2,946,060	100,768,465		
23	100,768,465	4,379,932	2,826,555	96,388,533		
24	96,388,533	4,502,789	2,703,698	91,885,744		
25	91,885,744	4,629,092	2,577,395	87,256,652	6.2981	3.1036
26	87,256,652	4,758,938	2,447,549	82,497,714		
27	82,497,714	4,892,426	2,314,061	77,605,288		
28	77,605,288	5,029,659	2,176,828	72,575,629		
29	72,575,629	5,170,741	2,035,746	67,404,888	7.0351	2.3666
30	67,404,888	5,315,780	1,890,707	62,089,108		
31	62,089,108	5,464,888	1,741,599	56,624,220		
32	56,624,220	5,618,178	1,588,309	51,006,042		
33	51,006,042	5,775,768	1,430,719	45,230,274	7.8583	1.5435
34	45,230,274	5,937,778	1,268,709	39,292,496		
35	39,292,496	6,104,333	1,102,155	33,188,163		
36	33,188,163	6,275,559	930,928	26,912,604		
37	26,912,604	6,451,589	754,899	20,461,015	8.7778	0.6241
38	20,461,015	6,632,556	573,931	13,828,460		
39	13,828,460	6,818,599	387,888	7,009,861		
40	7,009,861	7,009,861	196,627	0		

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Annexure - IV

Date: _____

The Registrar,
National Electric Power Regulatory Authority,
Islamabad

SUBJECT:-- Certifications in respect of application opting for upfront tariff for wind power generation

I, [NAME, DESIGNATION], being the duly Authorized representative of [NAME OF APPLICANT COMPANY] by virtue of [BOARD RESOLUTION/POWER OF ATTORNEY DATED], hereby confirm that for our project of [GROSS INSTALLED CAPACITY OF THE PROJECT] MW installed capacity to be located at [ADDRESS OF THE PROJECT SITE]:

1. All the plant and machinery to be installed will be brand new and of international standards.

2. [NAME OF APPLICANT COMPANY] may be granted upfront tariff based on the following loan structure:

	%
Foreign loan	
Local loan	
TOTAL	100

Signature: _____

Name: _____

Designation: _____

Company Stamp

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AUTHORITY

[On letter head of power purchaser]

Annexure - V

Date: _____

The Registrar,
National Electric Power Regulatory Authority,
Islamabad

SUBJECT:-- Certification in respect of availability of power evacuation arrangement/absorption of power

We hereby confirm that necessary arrangements will be in place, to evacuate and absorb power in the national grid, supplied by wind power generation project of [NAME OF THE COMPANY], having [GROSS INSTALLED CAPACITY OF THE PROJECT] MW gross installed capacity to be located at [ADDRESS OF THE PROJECT SITE]. The Authority may accordingly grant upfront tariff to [NAME OF THE COMPANY] for the aforesaid project.

Signature:_____

Name: _____

Designation:_____

Company Stamp

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