



# National Electric Power Regulatory Authority

## Islamic Republic of Pakistan

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No. NEPRA/TRF-52/GPPL-2006/6476-78  
August 23, 2006

**Subject: Intimation of Determination of Tariff of Green Power (Pvt.) Ltd. (GPPL) for sale of electricity to the Central Power Purchasing Agency within NTDC (Case No. NEPRA/TRF-52/GPPL-2006) pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997)**

Dear Sir,

Please find enclosed the subject determination of the Authority along with Annex-I, & II (35 pages) in Case No. NEPRA/TRF-52/GPPL-2006.


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

3. Please note that only Order of the Authority at para 104 of the determination relating to the Reference Tariff and allowed adjustments & indexation (06 pages) along with Annex-I & II (02 pages) needs to be notified in the official gazette. The Order is reproduced for the purpose of clarity and is attached herewith.

DA/As above.

The Secretary,  
Cabinet Division,  
Government of Pakistan  
Cabinet Secretariat,  
Islamabad



  
23.08.06.  
(Mahjoob Ahmad Mirza)

CC:

1. Secretary, Ministry of Water & Power, Islamabad.
2. Secretary, Ministry of Finance, Islamabad.

**ORDER OF THE AUTHORITY  
IN CASE NO. NEPA/TRF-52/GPPL-2006  
TO BE NOTIFIED IN THE OFFICIAL GAZETTE**

Pursuant to Rule 6 of the NEPA Licensing (Generation) Rules 2000, Green Power (Pvt) Ltd. (GPPL) is allowed to charge the following specified/approved tariff for delivery of electricity to CPPA of NTDC for procurement on behalf of Ex-WAPDA Distribution Companies:

Tariff Components	Reference Tariff		
	Year 1-2	Year 3-10	Year 11-20
	Rs./kWh		
<b>Fixed Charges</b>			
Fixed O&M Foreign	0.2196	0.4224	0.4224
Fixed O&M Local	0.1370	0.1370	0.1370
Insurance	0.3146	0.3146	0.3146
Debt Service	4.0196	4.0196	-
Return on Equity	1.1162	1.1162	1.1162
<b>Variable O&amp;M</b>	0.0354	0.0708	0.0708
<b>Levelized Tariff</b>	<b>8.3287 US Cents</b>		

(The levelized tariff of 8.3287 US Cents translates into levelized tariff of 9.5 US Cents if LIBOR + 2.5% is replaced with KIBOR + 3%.)

- i) The reference tariff has been calculated on the basis of 30% Capacity Factor.
- ii) The above charges will be limited to the extent of annual generation of 127.1 GWh. Any annual generation in excess of 127.1 GWh would be charged on 10% of the above sale rate.
- iii) The above tariff is applicable for a period of 20 years commencing from the date of the Commercial Operation.

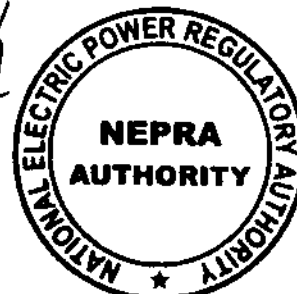
Component wise tariff is indicated at Annex-I.

The following indexations shall be applicable to reference tariff;

I. One Time Adjustment

(i) Cost of Debt

- a. The Principal repayment and the cost of debt shall be adjusted at Financial Closing as per actual borrowing composition i.e Foreign and Local.
- b. Interest During Constructions (IDC) shall be adjusted at COD according to actual disbursement based on actual Interest.



c. After COD, Interest part of the tariff component shall be adjusted for variation in LIBOR on quarterly basis.

ii) Adjustment for variation during construction

Debt Service and Return on Equity shall be adjusted on account of actual variation in drawdown and Interest. GPPL shall submit the relevant documents to NEPRA within 7 days of COD for adjustment of relevant tariff components.

iii) Adjustment in project cost due to variation in Dollar/Rupee parity

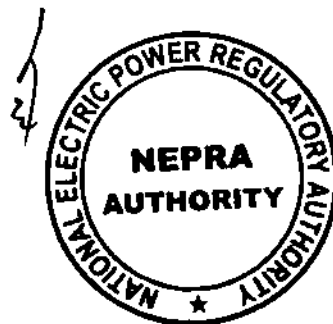
Any variation in project cost during construction period on account of variation in dollar/Rupee parity shall be allowed through adjustment in the project cost. For the purpose of this adjustment petitioner shall provide actual payment along with the exchange rate prevalent on the date of particular transaction. GPPL's final reference tariff table shall be revised on COD to incorporate all the permissible adjustment during construction period.

II. Pass-Through Items

No provision for income tax has been accounted for in the tariff. If GPPL is obligated to pay any tax on its ROE, the exact amount paid by the company may be reimbursed by CPPA to GPPL on production of original receipts. This payment may be considered as pass-through payment (as Rs./kWh) spread over a 12 months period in addition to the capacity purchase price proposed in the Reference Tariff. Furthermore, in such a scenario, GPPL may also submit to CPPA details of any tax shield savings and CPPA will deduct the amount of these savings from its payment to GPPL on account of taxation.

Withholding tax is also a pass through item just like other taxes as indicated in the government guidelines for determination of tariff for new IPPs. Withholding tax shall be paid @ 15% of the reference equity. CPPA (NTDC) shall make payment on account of withholding tax at the time of actual payment of dividend subject to maximum of 7.5% of 15% equity according to the following formula:

$$\text{Withholding Tax Payable} = \{15\% * (E_{(Ref)} - E_{(Red)}) \times 7.5\%$$



Where:

- $E_{(Ref)}$  = Reference Equity (US\$ 14.799 million x 60)  
 $E_{(Red)}$  = Equity Redeemed

In case Company does not declare a dividend in a particular year or only declares a partial dividend, then the difference in the withholding tax amount (between what is paid in that year and the total entitlement as per the Net Return on Equity) would be carried forward and accumulated so that the Company is able to recover the same as a pass through from the Power Purchaser in future on the basis of the total dividend pay out.

III. Indexations:

The following indexation shall be applicable to the reference tariff;

a) Indexation applicable to O&M

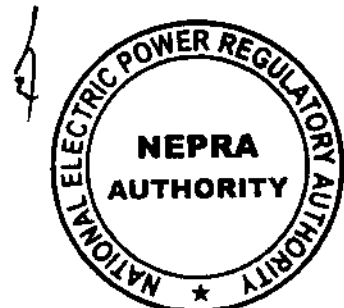
The Fixed O&M local part of Capacity Charge will be adjusted on account of Inflation (WPI) and Fixed O&M foreign will be adjusted on account of variation in dollar/Rupee exchange rate and US CPI. Quarterly Adjustment for local inflation, foreign inflation and exchange rate variation will be made on 1<sup>st</sup> July, 1<sup>st</sup> October, 1<sup>st</sup> January & 1<sup>st</sup> April respectively on the basis of latest available information with respect to WPI (notified by the Federal Bureau of Statistics), US CPI issued by US Bureau of Labour Statistics and revised TT & OD Selling rate of Us Dollar as notified by the National Bank of Pakistan. The mode of indexation will be as under:

(i) Fixed O&M

- a)  $F O\&M_{(LRev)} = 0.1370 * WPI_{(REV)} / 118.89$   
b)  $F O\&M_{(FRev)} = 0.2196(\text{for first 2 years}) * US CPI_{(REV)} / 199.8 * ER_{(REV)} / 60$   
c)  $F O\&M_{(FRev)} = 0.4224(\text{remaining 18 years}) * US CPI_{(REV)} / 199.8 * ER_{(REV)} / 60$

Where:

- $F O\&M_{(LRev)}$  = the revised applicable Fixed O&M Local Component of the Capacity Charge indexed with WPI  
 $F O\&M_{(FRev)}$  = the revised applicable Fixed O&M Foreign Component of the Capacity Charge indexed with US CPI and Currency fluctuation



- $WPI_{(REV)}$  = the Revised wholesale Price Index (manufactures)
- $WPI_{(REF)}$  = 118.89 wholesale price index (manufactures) of June 2006 notified by the Federal Bureau of Statistics
- $US\ CPI_{(REV)}$  = the revised US CPI (All Urban Consumers)
- $US\ CPI_{(REF)}$  = 199.8 US CPI (All Urban Consumers) for the month of March 2006 as notified by the US Bureau of Labour Statistics
- $ER_{(REV)}$  = the Revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan

(ii) Variable O&M

The formula for indexation of Variable O & M component will be as under:

- a)  $V\ O\&M_{(REV)} = 0.0354_{(for\ first\ 2\ years)} * US\ CPI_{(REV)} / 199.8 * ER_{(REV)} / 60$
- b)  $V\ O\&M_{(REV)} = 0.0708_{(remaining\ 18\ years)} * US\ CPI_{(REV)} / 199.8 * ER_{(REV)} / 60$

Where:

- $V\ O\&M_{(REV)}$  = The revised applicable Variable O&M Component of Energy Charge indexed with US CPI and currency fluctuation.
- $US\ CPI_{(REV)}$  = the revised US CPI (All Urban Consumers)
- $US\ CPI_{(REF)}$  = 199.8 US CPI (All Urban Consumers) for the month of March 2006 as notified by the US Bureau of Labour Statistics
- $ER_{(REV)}$  = The Revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan

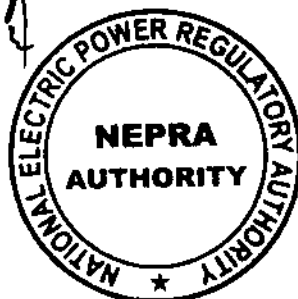
b) Adjustment for LIBOR variation

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

$$\Delta I = P_{(REV)} * (LIBOR_{(REV)} - 5.5\%) / 4$$

Where:

- $\Delta I$  = the variation in interest charges applicable corresponding to variation in LIBOR.  $\Delta I$  can be positive or negative depending upon whether  $LIBOR_{(REV)} >$  or  $<$  5.5%. The interest payment obligation will be enhanced or reduced to the extent of



$\Delta I$  for each quarter under adjustment applicable on quarterly

$P_{(REV)}$  = is the outstanding principal (as indicated in the attached debt service schedule to this order at Annex-II) on a quarterly basis on the relevant quarterly calculations date. Period 1 shall commence on the date on which the 1<sup>st</sup> installment is due after availing the grace period.

- iii). Adjustment on account of inflation, local inflation, US CPI, foreign exchange variation and LIBOR variation will be approved and announced by the Authority within seven working days after receipt of GPPL's request for adjustment in accordance with the requisite indexation mechanism stipulated herein.

**Terms and Conditions of Tariff:**

**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, un-used and of the latest model.

**Power Curve of Wind Farm:**

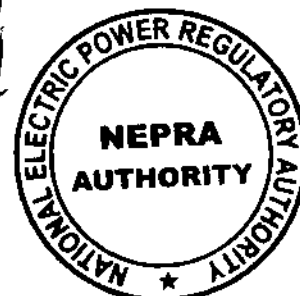
The power curve of the Wind Farm shall be verified as part of the Commissioning tests according to the latest IEC standards and shall be used to measure the performance of the wind turbines.

**Wind Speed:**

GPPL shall be responsible for the correct assessment and recording of the wind speed in the proposed wind farm and the Power Purchaser shall verify and approve the same.

**Wind Power Plant's Performance Data:**

GPPL shall install monitoring masts with properly calibrated automatic computerized wind speed recording meters at the same height as that of the Wind Turbine Generators and a compatible Communication/SCADA system both at the Wind Farm and Power Purchaser's control room for transmission of wind speed and power output data to the Power Purchaser's control room for record of data.



**Delivery Point:**

As per Article 11 of the Generation Licence, GPPL shall deliver power at 132 kV at the door step of its wind farm. Up-gradation of generation voltage up to 132 kV will be the responsibility of the GPPL.

**Emissions Trading/ Carbon Credits:**

GPPL would process and obtain emissions /carbon credits expeditiously and credit the proceeds to the Power Purchaser on actual basis. In case GPPL fails to obtain the CEC, the power purchaser shall be entitled to adjust and deduct the payments to GPPL @ 1 Cent per kWh.

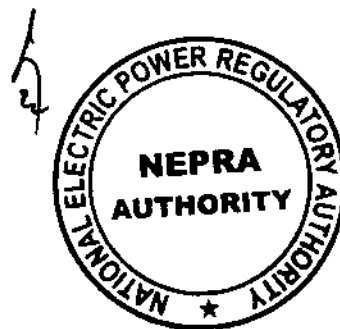
**Power Purchase Agreement:**

Power Purchase Agreement between the power purchaser and the wind power IPPs shall be in accordance with the GOP Guidelines and international prudent utility practices.

The above tariff and terms and conditions be incorporated as the specified tariff approved by the Authority pursuant to Rule 6 of the Licencing (Generation) Rules, in a Power Purchase Agreement between GPPL and CPPA.

The reference tariff table and debt service schedule are attached herewith for notification by the Federal Government in the official gazette in accordance with the Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).

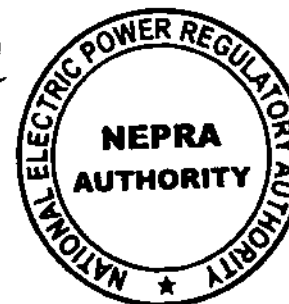
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**GREEN POWER (PVT) LTD  
REFERENCE TARIFF**

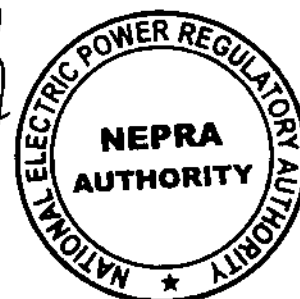
Year	Variable O&M Cost	Fixed O&M Cost Foreign	Fixed O&M Cost Local	Insurance	Return on Equity	Withholding Tax @7.5%	Loan Repayment	Interest Charges	Tariff *	
	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	¢ / kWh
1	0.0354	0.2196	0.1370	0.3146	1.1162	0.0837	1.8758	2.1438	5.9262	9.8769
2	0.0354	0.2196	0.1370	0.3146	1.1162	0.0837	2.0304	1.9892	5.9262	9.8769
3	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	2.1978	1.8218	6.1643	10.2738
4	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	2.3789	1.6407	6.1643	10.2738
5	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	2.5751	1.4446	6.1643	10.2738
6	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	2.7873	1.2323	6.1643	10.2738
7	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	3.0171	1.0025	6.1643	10.2738
8	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	3.2658	0.7538	6.1643	10.2738
9	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	3.5350	0.4846	6.1643	10.2738
10	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	3.8264	0.1932	6.1643	10.2738
11	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
12	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
13	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
14	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
15	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
16	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
17	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
18	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
19	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
20	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
<b>Levelized Tariff</b>	<b>0.0636</b>	<b>0.3810</b>	<b>0.1370</b>	<b>0.3146</b>	<b>1.1162</b>	<b>0.0837</b>	<b>1.8650</b>	<b>1.0361</b>	<b>4.9972</b>	<b>8.3287</b>

\* The above rate is limited to an annual energy production up to 127.1 GWh. Any generated energy beyond 127.1 GWh in a year will be charged at 10% of the Reference Tariff for that year.



**GREEN POWER (Pvt) LTD (GPPL)**  
**Debt Servicing Schedule**

Period	Foreign Debt					Annual Principal Repayment Rs./kWh	Annual Interest Rs./kWh	Annual Debt Servicing Rs./kWh
	Principal	Repayment	Mark-Up	Balance	Debt Service			
	Million \$	Million \$	Million \$	Million \$	Millin \$			
	58.23	0.96	1.16	57.27	2.13			
	57.27	0.98	1.15	56.28	2.13			
	56.28	1.00	1.13	55.28	2.13			
	55.28	1.02	1.11	54.26	2.13			
1	58.23	3.97	4.54	54.26	8.51	1.88	2.14	4.02
	54.26	1.04	1.09	53.21	2.13			
	53.21	1.06	1.06	52.15	2.13			
	52.15	1.09	1.04	51.06	2.13			
	51.06	1.11	1.02	49.96	2.13			
2	54.26	4.30	4.21	49.96	8.51	2.03	1.99	4.02
	49.96	1.13	1.00	48.83	2.13			
	48.83	1.15	0.98	47.67	2.13			
	47.67	1.18	0.95	46.50	2.13			
	46.50	1.20	0.93	45.30	2.13			
3	49.96	4.66	3.86	45.30	8.51	2.20	1.82	4.02
	45.30	1.22	0.91	44.08	2.13			
	44.08	1.25	0.88	42.83	2.13			
	42.83	1.27	0.86	41.56	2.13			
	41.56	1.30	0.83	40.26	2.13			
4	45.30	5.04	3.48	40.26	8.51	2.38	1.64	4.02
	40.26	1.32	0.81	38.94	2.13			
	38.94	1.35	0.78	37.59	2.13			
	37.59	1.38	0.75	36.21	2.13			
	36.21	1.40	0.72	34.81	2.13			
5	40.26	5.45	3.06	34.81	8.51	2.58	1.44	4.02
	34.81	1.43	0.70	33.37	2.13			
	33.37	1.46	0.67	31.91	2.13			
	31.91	1.49	0.64	30.42	2.13			
	30.42	1.52	0.61	28.90	2.13			
6	34.81	5.90	2.61	28.90	8.51	2.79	1.23	4.02
	28.90	1.55	0.58	27.35	2.13			
	27.35	1.58	0.55	25.77	2.13			
	25.77	1.61	0.52	24.16	2.13			
	24.16	1.65	0.48	22.51	2.13			
7	28.90	6.39	2.12	22.51	8.51	3.02	1.00	4.02
	22.51	1.68	0.45	20.83	2.13			
	20.83	1.71	0.42	19.12	2.13			
	19.12	1.75	0.38	17.37	2.13			
	17.37	1.78	0.35	15.59	2.13			
8	22.51	6.92	1.60	15.59	8.51	3.27	0.75	4.02
	15.59	1.82	0.31	13.78	2.13			
	13.78	1.85	0.28	11.92	2.13			
	11.92	1.89	0.24	10.03	2.13			
	10.03	1.93	0.20	8.11	2.13			
9	15.59	7.49	1.03	8.11	8.51	3.53	0.48	4.02
	8.11	1.97	0.16	6.14	2.13			
	6.14	2.01	0.12	4.13	2.13			
	4.13	2.05	0.08	2.09	2.13			
	2.09	2.09	0.04	-	2.13			
10	8.11	8.11	0.41	-	8.51	3.83	0.19	4.02



**NATIONAL ELECTRIC POWER REGULATORY AUTHORITY  
NEPRA**

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Case No. NEPRA/TRF-52/GPPL-2006  
August 22, 2006

**Petitioner**

Green Power (Pvt) Ltd. (GPPL)

**Authority**


Nasiruddin Ahmed  
Member



Zafar Ali Khan  
Member



Abdul Rahim Khan  
Member



Saeed uz Zafar  
Chairman



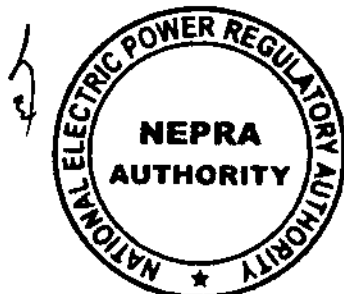
### **Background**

Green Power (Pvt.) Ltd (GPPL) special purpose company created in 2004 to develop, own and operate a 49.5MW Wind Farm IPP project in Sindh, Pakistan. GPPL is a joint venture between Tapal Group and Metco Group. Tapal Group is previously running a thermal IPP project in Karachi while Metco Group is involved in Ship Breaking and import/exports.

2. GPPL filed a petition on March 27, 2006 with the Authority for determination of its tariff for sale of electricity to the Central Power Purchase Agency (CPPA) within National Transmission and Dispatch Company (NTDC) under the Tariff Standards and Procedure Rules-1998 (Tariff Rules).
3. The Authority admitted the petition on March 30, 2006. Salient features of the petition were advertised in the newspapers to inform all the interested persons and stakeholders and invite participation in the tariff-setting proceedings through their comments or becoming a party to the proceedings as interveners. Individual letters were also written to the concerned government ministries and professional bodies. A hearing on the case was conducted on May 10, 2006 in Karachi.

### **Submission of Petitioner (GPPL)**

4. GPPL seeks determination of reference tariff to remain effective for a period of 20 years from the Date of Commercial Operation, as set out in Annex-I of the tariff petition. The petitioner has also requested for approval of proposed tariff indexation as set out in Annex-III of the petition.
5. It is estimated that the project will produce a gross output of about 136.8 GWh per annum. The average annual electricity sales to NTDC net of auxiliary consumption (about 2.5%), is then estimated to be about 133.4 GWh. This is based on a gross capacity of 49.5 MW, consisting of 33 turbines (1.5 MW each). The net capacity is estimated at 48.3 MW with an annual plant factor of 31.5%.
6. Input from the project will vary from the estimated 136.8 GWh, based on the wind flow pattern in a particular year. The levelized tariff over



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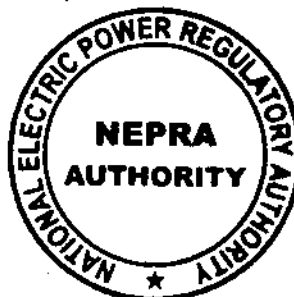
the 20 year life of the project is expected to be 10.023 Us Cents per kWh.

#### Carbon Credits

7. The project may be able to benefit from receiving carbon credits under the Clean Development Mechanism (CDM), one of the mechanisms established by the Kyoto Protocol to meet an objective of stabilizing greenhouse gas concentrations in the atmosphere. Pakistan is eligible to participate in the CDM. Project eligibility is based on meeting a number of criteria, two of which need to be reviewed further:
  - Emission reductions need to be "additional", i.e. emissions must be reduced below what would have occurred in the absence of the activity.
  - The project must meet any sustainable development criteria and/or other criteria that the Government of Pakistan may defined.
8. While it appears possible that the project may be able to realize monetary gains from such carbon credits schemes, the actual timing, amount and other details of the outcome are quite uncertain at this point. (and it may remain uncertain until after the plant become operational). It is thus proposed that tariff for this pilot project be approved independent of the outcome of the carbon credits. Green Power intends to pass the full benefit of carbon credits to the consumers. After the completion of the construction of the project, GPPL will enter into a forward sales contract with IFC-Netherlands Carbon Facility (INCaF) or another similar facility.

#### **Tariff Structure**

9. The proposed tariff is set to cover the estimated revenue requirement for the project including the debt service coverage and a reasonable Return on Equity (ROE). In particular the revenue requirement for this project includes; the debt service; O&M (Fixed & Variable) and other expenses; and a Return on Equity (ROE).
10. To properly match the actual tariff revenue with the project revenue requirement, the proposed tariffs would need to; i) reflect the actual cost structure (Fixed & Variable) of the project; and ii) include the appropriate escalable component, so that the tariffs are properly



adjusted to account for any change in the project's revenue requirement (with regards to inflation, foreign exchange, etc).

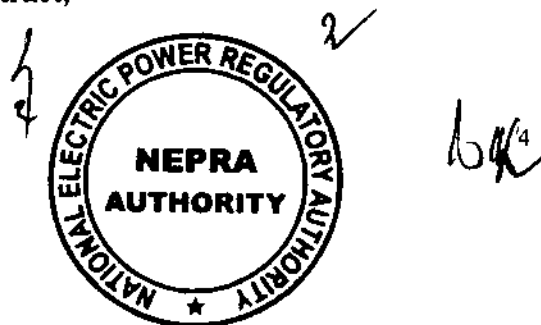
11. The total tariff is comprised of:
  - The fixed annual Capacity Charge, paid per kW installed, which consists of non-debt and debt service component; and
  - The variable Energy Charge paid per kWh of energy produced which consists of variable O&M costs.
12. The non-debt escalable component of the Capacity Charge component covers the fixed O&M (including salaries, wages and other expenses); insurance expenses; and ROE consisting of the portion funded in; i) local currency rupees and ii) foreign currency US dollars.
13. The debt service component of the Capacity Charge covers the repayment of the principal amount; and payment of interest charges.

#### **Tariff Control Period**

14. A 20 year period of Power Purchase Arrangement is proposed for this project. The tariff during this period would specify different rates for the first 10 years and the remaining 10 years, in accordance with the Rule (6) of the NEPA Licensing (Generation Rules 2000). A 20 year tariff control period is particularly consistent with the 20 year design life of GE-manufacturer wind turbines. The design life time concept simply means that all components used in the wind turbine are designed to have a very small probability of failure within 20 years. While the actual life of any particular wind installation generation may be longer than this, depending on factors, such as turbine quality and local climatic conditions.

#### **Project Cost**

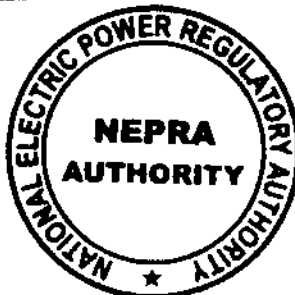
15. GPPL sought proposals from wind generation equipment providers that net number of defined criteria:
  - i) Provision of a turnkey EPC contract;
  - ii) Provision of Mw-class machines;
  - iii) Ability to ship by the first quarter of 2006;
  - iv) Provision of an O&M contract;



- v) Reference base of over 5 years for the selected turbines, operational in a farm size greater than 30 MW; and
  - vi) Offer of a competitive price.
16. The proposals were received from international manufacturers in response to the request for proposal. Two of the proposals met the first five of the criteria listed above, and offered comparable quotations. Following a review of these two proposals against the criteria, GE was selected as the preferred equipment provider for the Project (details of this choice can be found in the Feasibility Study submitted to NEPRA).
17. GPPL in its original petition stated that it based its project costs on the GE quotation, the cost of the EPC contract for the project is expected to be about EURO 59 million or US Dollar 1429 per kW. The plant and equipment cost constitute about 77% of this amount. The detail of EPC cost as per original petition is indicated in the following table.

**EPC COSTS**

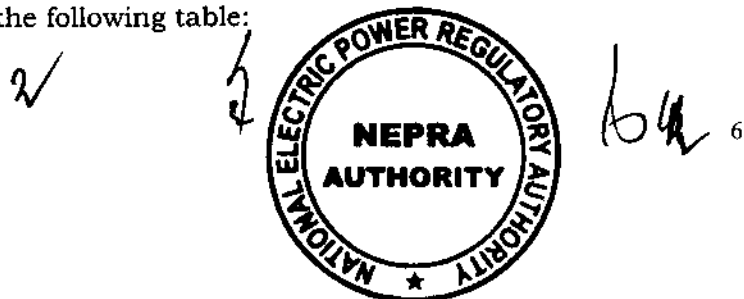
	Million Rupees			MM-EUR MM-US\$		Ratio
	Local	Foreign	Total			
Plant and Equipment (WTG + Blades + Towers)	0	3267	3267	45.375	54.450	76.98%
Civil Works	0	247	247	3.435	4.122	5.83%
Electrical (incl. Substation and control building)	0	293	293	4.073	4.888	6.91%
Contingencies	0	72	72	1.005	1.206	1.70%
Engineering/ Design and Consultancy	0	9	9	0.124	0.148	0.21%
Miscellaneous	0	324	324	4.500	5.400	7.63%
Project Management & Construction Supervision	0	31	31	0.433	0.520	0.74%
	0	4244	4244	58.945	70.734	100.00 %
<b>EPC Cost per kW</b>	<b>US\$ 1429 per kW</b>					



18. The estimated total cost of the project including EPC contract cost, road development, insurance and administrative costs, financial charges during construction and other related project cost is about US dollar 80.9 million or US dollar 1634 per kW. Details of the total project are summarized in the following table:

	PKR	US\$	-
EPC Contract Costs	4,244.1	70.734	87.5%
Project Development Cost	105.0	1.750	2.2%
Cost of Land	7.0	0.117	0.1%
Land Development and Approach Roads	15.0	0.250	0.3%
Additional Civil Works (Residential & Boundary Wall)	5.0	0.083	0.1%
Spares	30.0	0.500	0.6%
With-holding Tax @ 5% on local services	5.0	0.083	0.1%
Insurance during Construction	63.7	1.061	1.3%
Admin. Charges during Construction	12.5	0.208	0.3%
NEPRA Fees	5.0	0.083	0.1%
Working Capital	50.0	0.833	1.0%
Financial Charges during Construction	250.9	4.181	5.2%
Other Contingencies	60.0	1.000	1.2%
<b>Total Project Cost</b>	<b>4853.1</b>	<b>80.885</b>	<b>100.0%</b>

19. Subsequently in May 2006 GP submitted a revised tariff petition according to which EPC cost under the new GE/SKODA proposal was revised to EURO 63 million or USD 1523 per kW; the offer to remain valid for 6 month until September 2006. This cost was 7% higher than the previous quotation of EURO 59 million. According to GPPL the increase in cost was attributed to increased prices for Wind Turbine Generators (WTG) and associated electrical during to increase in production cost and world wide demand for WTGs. The plant and equipment cost of the current bid constitute about 75% of the current amount. The details of the EPC cost for the current bid are summarized in the following table:



**EPC COSTS**

	Local Rs.	Foreign Rs.	Total Rs.	Euros	Dollars	Ratio
Plant and Equipment (WTG + Blades + Towers)	0	3,375	3,375	46.87	56.25	74.6%
Civil Works	0	247	247	3.43	4.12	5.5%
Electrical (incl. Substation and control building)	0	534	534	7.41	8.89	11.8%
Contingencies	0	317	317	4.40	5.28	7.0%
Engineering/ Design and Consultancy	0	9	9	0.13	0.16	0.2%
Miscellaneous	0	11	11	0.15	0.18	0.2%
Project Management & Construction Supervision	0	31	31	0.42	0.51	0.7%
<b>Total</b>	0	4,523	4,523	62.82	75.39	100.0%

20. Based upon the revised EPC costs the GPPL's estimated total revised cost of the project is about USD 86.7 million or USD 1,751 per kW. Details of the total project costs are summarized in the following table:

	PKR	US\$	-
EPC Contract Costs	4,523	75.39	87.0%
Project Development Cost	120	2.00	2.3%
Cost of Land	7	0.12	0.1%
Land Development and Approach Roads	45	0.75	0.9%
Additional Civil Works (Residential & Boundary Wall)	5	0.08	0.1%
Spares	30	0.500	0.6%
With-holding Tax @ 5% on local services	5	0.08	0.1%
Insurance during Construction	68	1.13	1.3%
Admin. Charges during Construction	13	0.21	0.2%
NEPRA Fees	5	0.08	0.1%
Working Capital	50	0.83	1.0%
Financial Charges during Construction	269	4.48	5.2%
Other Contingencies	60	1.000	1.2%
<b>Total Project Cost</b>	<b>5199</b>	<b>86.65</b>	<b>100.0%</b>

21. As this project is the first of its kind in Pakistan, no local wind generation cost information is available for comparison. Due to



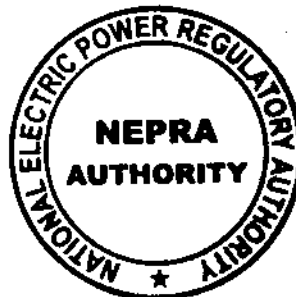
information scarcity two approaches were used for assessment of project cost;

- i) The estimated total Project cost of US\$ 1,751 per kW installed was compared with those for several projects recently undertaken in other emerging economies like China, Philippines and Brazil. The project costs per kW installed for wind farms in these countries was US\$1,256, US\$1,432 and US\$1,826 respectively.
- ii) The assessment of Project Cost was also made on the basis of information from different sources. The information available from Wind Power Monthly (February 2006) reveals that the turbine costs have substantially increased recently since 2005 due to a world wide surge in demand for Wind Power Turbines. Per installed MW cost vary widely from Euro 1.2 million to Euro 1.8 million as per the recent transactions; the average European cost per installed MW is around Euro 1.5 million.

22. GPPL converted the cost of EPC contract quoted above into USD figures based on exchange rate of 1.20 Euro/Dollar. The actual EPC cost is subject to the possible fluctuation in the exchange rate between the Euro (which is the currency of the EPC price) and the Dollar (which is the primary currency for the funding of the EPC contract) at the time of the project financial closing. GPPL thus proposed that the reference tariff be adjusted to the appropriate exchange rate at the time of financial closing. GPPL also proposed adjustment for Euro/Dollar for the fixed and variable O&M costs which are denominated in Euros. As the Euro- denominated cost of these underline contracts change they will first need to be adjusted for Euro/Dollar changes and then for Dollar/Rupee changes based on the conversion rates used at the time of the tariff determination.

### **Project Financing**

23. The project is proposed to be financed by 80% debt and 20% equity. The total amount of debt financing is expected to be about USD 69.2 million or Rs. 4.15 billion. A one year grace period followed by 10 year repayment period is envisaged for the projects debt which reflects the



typical terms for similar IPP projects. The project is expected to be financed from foreign currency borrowing at an annual interest rate of LIBOR plus 3.5%.

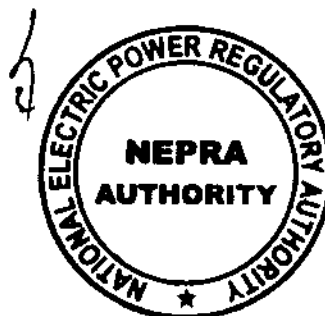
24. A premium of 3% over KIBOR has been established as precedence for local currency financing of thermal power projects in Pakistan. The same premium would not necessarily apply for foreign currency financing of pilot wind project due to the reasons; i) the LIBOR does not reflect some of the country specific macroeconomic risks that may be reflected in the KIBOR; and ii) the financial risks of a pilot project may be perceived differently from thermal IPP project that already have an established track record in the country. The table below summarized the detail of the debt profile quoted by the lenders:

**Debt Profile of Project**

Annual Interest Rate (LIBOR + 3.5%)	8.50%
Semi-Annual Interest Rate	4.25%
Front End Commission	2.00%
Annual Commitment Fee	0.50%
Year of Commitment	2006
Year of First Draw down	2007
Repayment Period (in years excl. grace period)	10
Grace Period (in years)	1
Year of First Repayment	2008
Loan Drawn in Million Rs	4,159
Loan Drawn in Million \$US	69.3

**Rate of Return**

25. The proposed tariffs reflect an IRR of 15% in real terms, net of any withholding tax on dividends. Although NEPRA appears to have preferred to an application of 15% of nominal rate for some of the recent thermal IPPs, a 15% real rate, properly adjusted by inflation (or nominal exchange rate for the foreign currency funded portion), is proposed for this new Wind IPP to reflect its higher risk of pilot nature. After the first 10 years the ROE component of the tariff is set to also reflect an annual redemption of equity (straight line redemption in year 11 and 20). It is estimated that 15% of the equity



will be funded in foreign currency (USD) the remaining 85% would be funded in local currency (Rupees).

**Withholding Tax on Dividends**

26. According to the Income Tax Ordinance 2001, income from dividends is subject to withholding tax (7.5% for power generation projects). Pursuant to international norm the rate of return of 15% has been considered on the basis of dividends received after withholding tax. To ensure a 15% IRR after accounting for the compensation for the withholding tax. GPPL proposed that the withholding be reimbursed in accordance with NEPRA's recent decision on new IPPs.

**Operating Costs**

**Insurance**

27. Based of indicative course of international insurance brokers the fixed annual insurance expense during the initial phase is estimated as USD 0.87 million or Rs. 0.52 million. The cost of the insurance is expected to be denominated in foreign currency (Euros).

**O&M**

28. Most of the personal and other O&M costs for Wind Power Projects are fixed. Variable components are mostly limited spare parts and consumables. The operation and maintenance function for this project will be handled by GE through an O&M contract. The cost of GE's O&M contract (including spares and consumables) is expected to be Euro 33000 per turbine i.e. Euro 25000 fixed and Euro 8000 variable or about USD 1.2 million per year. Details of O&M costs are as follows:

<u>Fixed O&amp;M</u>	<u>Million PKR</u>
Fixed O&M contract	59.4
Corporate & Plant Personnel	26.0
Administrative Expenses	24.0
<b>Total</b>	<b>109.4</b>
<u>Variable O&amp;M</u>	<u>Million PKR</u>
Spares and Consumables	20.9
<b>Total</b>	<b>20.9</b>

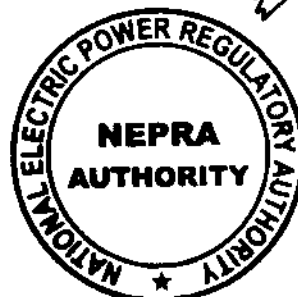
29. The estimated O&M costs for the project are comparable with the life time cost benchmark provided by European Wind Energy Association



(EWEA) for O&M costs. According to EWEA the O&M costs ranges between Euro 0.012-0.015 (USD 0.014-0.018) per kWh over the life time of the turbines. This includes insurance regular maintenance repair spare parts and administration subtracting the insurance cost result in USD 0.012-0.015 per kWh. The total O&M costs for the project Rs. 0.95 (USD 0.0158) per kWh is consistent with the EWEA cost range.

**Indexation**

- a) Foreign Exchange
30. GPPL proposed the following components of tariff structure to be indexed to variations in foreign exchange rate (Rs. per USD):
- Portions of the O&M number that are nominated in foreign currency
  - The debt service component which is intended to be entirely foreign funded
  - The insurance component which will be incurred in US dollars
  - The portion of ROE component that reflects the equity investment in foreign currency US dollars.
31. Indexation for these components should be applied quarterly on July 1<sup>st</sup>, April 1, July 1 and October 1 on the basis of TT & OD selling rate as notified by the National Bank of Pakistan.
- b) LIBOR
32. The interest portion of tariff should be adjusted for variation in the three month dollar LIBOR as published by the British Bankers Association on quarterly basis.
- c) Local Inflation
33. GPPL proposes the following components to be indexed to the local CPI:
- Portions of the O&M components that are denominated in local currency (rupees)
  - The portion of the ROE component that reflects equity investment in local currency (rupees)
34. Indexation for these components should be applied quarterly on the basis of CPI as notified by the Federal Bureau of Statistics for the month of February, August and November.



- d) Eurozone Harmonized Index of Consumer Prices (HICP)
35. The O&M and insurance cost are partially denominated in Euros. These are recurrent costs whose amount will be affected by the home country inflation. GP proposed that these costs should be adjusted for Eurozone inflation for Harmonized Index of Consumer Prices (HICP) as published by the European Central Bank (ECB). The indexed is published on monthly basis by ECB.
36. Based upon the discussions and assumptions in the preceding paragraphs GPPL proposes an average tariff of US Cents 11.808 for first ten years and 4.610 US Cents for 11 years onward with the levelized tariff of 10.023 for the 20 years time period.

**Commentators**

**Central Power Purchasing Agency**

37. CPPA has submitted following comments:
- a) **Confirmation of Wind Data**
38. As per feasibility report of GPPL, wind data has not been collected from actual project site but from 10 m and 30 m masts having less than required heights and from 50 m Khalili mast at 13 km away from site which is required within 2 km vicinity. Therefore wind data is not reliable. 60 m mast is installed on site by GPPL only in November 2005. Actual data for minimum one year is must for reliable analysis.
39. Cost/kWh depends upon energy generated, which on turn depends directly on wind data. As wind data is not reliable as such, the tariff calculations are not realistic. Tariff determination be based on actual data as 5% error at the wind speed will give approx. 10% error at the production values indicating that it is crucial to estimate the wind speed as precise as possible (Ref: Page 33, 34, 35, 36, 37 of Feasibility Study).
- b) **Conditional Power Purchase Authorization by HESCO**
40. HESCO, vide letter No. CEO/HESCO/CE/1673-75 dated 14.10.2005 has authorized NTDC to purchase power from wind power plants at a



rate not exceeding the cost/kWh at which energy is being sold by NTDC to DISCOs.

41. Since tariff offered by GPPL is high, so NTDC is obliged to take care of the reservations of HESCO.

**c) Suitable Purchaser of GPPL's Power**

42. KESC can be the most suitable Power Purchaser because the project site is located within KESC area and there is acute shortage of power at Karachi.

**d) Ambiguities at Project Cost Break-up in Feasibility Report**

**Miscellaneous Expenditure**

43. At page 47 of feasibility report an amount US\$ 5.400 million shown for miscellaneous expenditure is not justified unless details of expected/possible expenditure are given.

**Contingency**

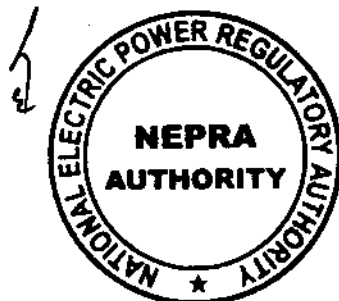
44. At page 46 an amount of US\$ 1.206 million are shown as contingency of EPC contract.
45. At page 52, at total project cost break-up, again US\$ 1.000 million is shown as for other contingencies.
46. In this way a total amount of US\$ 2.206 million for the purpose is not justified until details are provided.

**e) Financial Charges During Construction**

47. An amount of US\$ 4.183 million, as shown at page 52, as the financial charges, is not justified.

**f) Plant Factor**

48. GPPL has declared a plant factor of 31.5% in Feasibility Report whereas they have mentioned 32% in the generation licence notice.
49. The plant factor is based on energy generated during the year, which in turn depends on yearly wind speed curve.
50. Since wind data is based on assumption, as such, declared plant factor of 31.5% is not a true representative figure.



51. It is also worth noting that variation in plant factor by 2% results in variation in tariff by 1 ¢/kWh.

**g) Effective Period for Power Purchase**

52. As at page 4 of Tariff Petition, GPPL has based tariff calculations at a period of 20 years, which seems to be on lower side. It is therefore suggested that, the project life may be taken as 25 years.

**h) High Cost of Project**

**Repeated Increases in Project Cost**

53. On 07.12.2005 at applying Generation Licence GPPL declared project cost as US\$78.353.million.

54. On 20.03.2006 while submitting Tariff petition GPPL revised project cost as US\$80.885 million.

55. At hearing for tariff petition on 10.05.2006 it was learnt that GPPL has again revised the project cost as US\$86.65 million.

56. These repeated increases of project cost with such a high rate of rise are not justified.

57. A project cost of more than US\$ 1634/kWh is very high.

58. Joint Tariff Committee has suggested a construction cost of 1000-1100 US\$/kWh.

59. International Competitive Bidding may reduce the project costs to realistic values.

**i) O&M Cost**

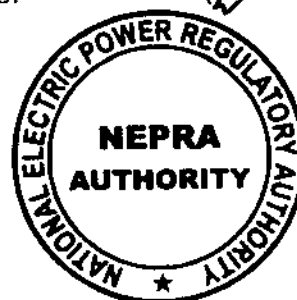
60. O&M cost/kWh for the project has been shown as Rs. 0.95/kWh, which is 5 times higher than a realistic value.

61. At a thermal power plant the operating speed is 3000 RPM but average O&M cost is only about Rs. 0.10/kWh which includes costs for establishment, lubricants, maintenance, chemicals and miscellaneous expenditures.

62. A wind power plant with a prime mover speed of only 9 RPM would not cost higher than the thermal power plant for O&M.

**j) Indexation/ Reference Table**

63. It is suggested that a mechanism in the light of GOP guidelines for indexation may be provided on the Reference tariff in line with 2002 power Policy and Guidelines issued by GOP for determination of tariff for Wind Power Generation -2006.



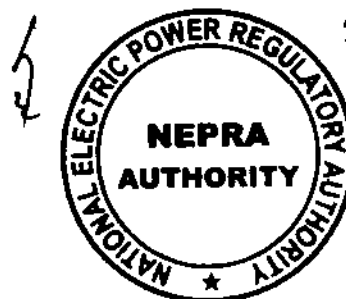
64. Each of the tariff components in reference Tariff Table may be segregated in its local and foreign components clearly identifying portions subject to indexation for local inflation or exchange rate variations to avoid any ambiguity.
65. The indexation for inflationary impacts and exchange rate variations may be provided on quarterly basis respectively.
66. Local cost components may be indexed in terms of Pakistan whole sales price Index WPI instead of CPI.

**k) Suggestion for Pilot Wind Power Project**

67. It will be very helpful if GOP develops a model wind power plant as first wind power project for introduction of technology authentication of wind data and awareness about wind power project in general as also recommended by joint Committee.

**SHEHRI**

68. SHEHRI has raised certain question:
- ii) Why has the tenure of the debt been limited to 10 years?
  - iii) Is the project located in an ecologically sensitive/critical area as defined in PEPA 1997 guidelines? Please provide a map of the location.
  - iv) How will a 20-year tariff affect the operation and viability of the upcoming electricity open market?
  - v) Under what conditions could the sponsors of the project not make a profit?
69. M/s SHEHRI has also submitted additional comments after hearing of the GPPL in Karachi, which are as follows:
- We are in favour of renewable energy electricity generation, and believe that it is necessary to reduce the dependence of Pakistan on fossil fuels.
  - The slide presentation made by the petitioner has different figures to the ones given in the written petition distributed to us.
  - There seems to be a contradiction between the approval of a 20-year tariff commencing in 2006 and the establishment of an electricity open/competitive market by 2012.
70. There is also a contradiction between what the petitioner's states:



“Output from the project will vary from the estimated [136.8] GWh per annum, based on the wind resource in a particular year. However, it is noted that this will not affect the project economics or associated tariff, as the Government of Pakistan has proposed to provide funds if necessary to make the investor and NTDC neutral to the plant capacity factor that is experienced in a particular year.”

71. And what the GoP “Policy for Development of Renewable Energy in Pakistan 2006” states:

“Wind Risk: Wind risk is defined as the risk of variability of wind speed, and therefore of the effective energy output of the wind IPP. This risk shall be absorbed by the power purchaser.”

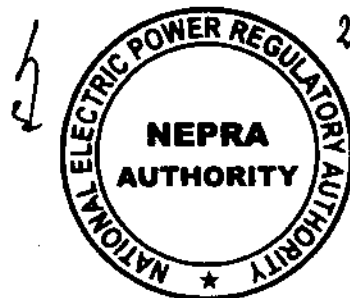
72. Is the risk to be absorbed by GOP or NTDC? If the latter, an independent analysis of the wind energy available must be made by NEPRA in order to confirm the petitioner’s stated 31.5% plant capacity factor, and consequently the allowable tariff.

- Utilities abroad have special “Green Tariff” where consumers can actually choose to pay a premium for renewable energy electricity. Can this structure be incorporated into the consumer tariff in Pakistan?
- The tariff should not be approved by NEPRA until the EPA has approved the EIA.
- A special grid code will have to be established for wind-power.

### **Response of the Petitioner**

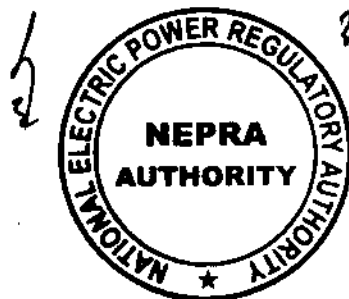
73. Petitioner has given reply in response of M/s SHEHRI’s requests:

- i) The EIA is under preparation and will be handed over to NEPRA as soon as it is complete. As Green Power has signed a mandate with International Finance Corporation (IFC), GPPL will need to adhere to strict environmental requirement of IFC. As this is a fuel free source of energy the environmental impacts are negligible.
- ii) There is no subsidy in place by the GoP to compensate for reduction in plant capacity factor. The tariff has been determined on purely commercial terms. The GoP is



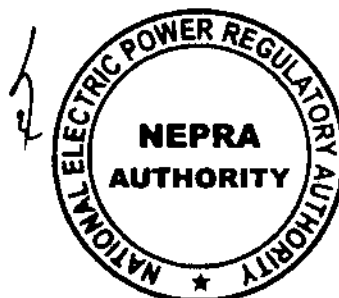
undertaking the 'wind risk' whereby in a given year if the average wind speed is below the benchmark reference wind speed for the GPPL site based on the wind data provided by GOP/AEDB, and if it is proven that the plant availability and efficiency has not been compromised based on the average wind speed experienced in that particular year then the GoP will make payments to GPPL as per the agreed tariff based on GoP data.

- iii) The tenure of the debt has been limited to 10 years as financial institutions are not willing to finance private wind projects beyond 10 years.
- iv) The project is not located in an ecologically sensitive/critical area. The project is located about 70 Kms south east of Karachi on a barren flat area of coastal terrain at approximately 2-5 m above sea level. There are no local inhabitants within 10 kms of the site.
- v) The affect of a 20-year tariff on the operation and viability of the upcoming open market can best be addressed by NEPRA. In the sponsor's opinion this will be a very positive step and DISCOs should be required to purchase 'X' percent of their power from renewable energy sources.
- vi) The sponsors of the project cannot make a profit under the following conditions:
  - a) Inefficient running of the plant (liquidated damages in place of non-performance)
  - b) The turbines within the power curve limits for 20 years. As most of this class of turbines has only been in the field of 5-6 years there is no real experience of the operation of the plant beyond this period.
  - c) Operational performance within the harsh environmental conditions.
  - d) Risk of turbines running efficiently for 20 years is on owner.



**Senior Citizens Foundation**

74. At the very first glance the tariffs of Rs. 6.58 per kWh for first 10 years and average of Rs. 4.65 per kWh for 20 years are unbelievably high. (If capacity charges are also included there will a further increase of App. 20%)
- a) On what rate the power will be supplied to end-consumer if NTDC is purchasing power on this rate and adding the transmission and distribution losses and cost of transmission and distribution losses which will be approximately Rs. 12/kWh. With these tariffs M/s GPPL may become greener and greener but power consumer will become yellow.
  - b) The cost of project is very high/excessive. The total cost of the project cost indicated by M/s GPPL is \$81.16 million i.e. \$1640 per kW. According to American Wind Energy Association, the cost of such project was only \$790 per kW in the year 2000. Thus the total cost of such project should be \$39.39 million against their indicated cost of \$81.16 million. In these 6 years due to improved design of plants, the cost has further gone down.
  - c) M/s GPPL has taken plant factor as only 30.7% whereas internationally it is not less than 34%.
  - d) M/s GPPL has assumed the wind speed as 7 m/s which is very low even with this wind speed cost of production should not be more than \$0.048 per kWh against their reported cost of production as \$0.1096. (According to data provided by American Wind Energy Association).
  - e) India is using the same wind tunnel, which is passing through Pakistan and entering Rajasthan (India). If the wind speed in Pakistan is only 7m/s then in India it will much less and their cost of production should be much higher than the cost of production in Pakistan.
  - f) All such projects in Pakistan should be re-examined and cost should be reduced to make them practicable.



- g) The present proposed tariffs are not acceptable to the poor and users and appear to be an attempt to sabotage the national economy.

**Ministry of Industries, Production & Special Initiatives**

75. Ministry of Industries, Production & Special Initiatives has submitted following comments:
- i) The project is on turnkey basis and does not include any technology transfer component,
  - ii) It is not clear that the vendor (P-13) for O&M, contract shall also be of foreign origin or shall be locally based.
  - iii) The proposed tariffs are independent of the outcome of carbon credits; however a comparison needs to be provided for tariff with or without carbon credits.
76. Issues arising out of the preceding paragraphs:

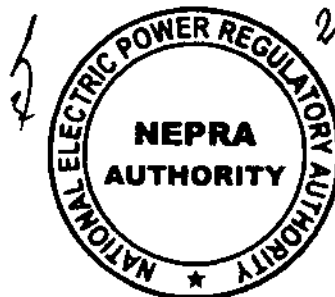
**ISSUES**

- Project Cost
- Cost of Debt
- O&M Cost
- Indexation
- Generation Data
- Wind Risk
- Carbon Credits

77. The Authority's determination is set out in following paragraphs:

▪ **Project Cost**

78. In the Wind Energy Project about 70-75% of the total project constitutes the cost of Wind Turbines and generation equipment. CPPA has raised concerns regarding the comparatively high project cost and has objected to the changes made by GPPL in the project cost subsequent to filing of the tariff petition. CPPA has also pointed out ambiguity in some items of the project cost. GPPL based its petition on the feasibility study submitted in March 2006. In the feasibility study it is stated that two offers from Vestas and GE were received in response to the request of the proposal. Since the feasibility study was completed recently; therefore the EPC contractor



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must have already included the impact of price hike as a result of global increase in demand of wind turbines.

79. GPPL's revision in project cost by about 22% is not supported by documentary evidence. GPPL was accordingly, asked to provide justification of the EPC cost claimed in the Feasibility Report and increased later. GPPL has not been able to provide any actual documentary evidence or cogent justification in support of its claim. In order to assess the reasonability of the project cost, the Authority relied on the information available from the following different sources in addition to the report of the committee constituted by the Authority to assess tariff for wind based electricity;

- AEDB's communication dated September 6, 2005;
- Wind Power Monthly(Journal) issue of January 2005;
- Wind Power Monthly (Journal) issue of May 2006;

Committee's Report on Wind Energy Tariff

80. The committee in its report of October 20, 2005 recommended that project cost for wind energy should be around US\$ 1000 to 1100 per kW.

AEDB's communication dated September 6, 2005

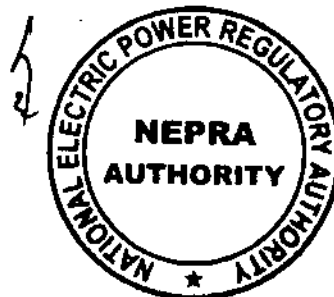
81. AEDB vide its communication dated September 6, 2005 indicated a project cost of US\$ 1,289 per kW, based upon the technical and financial details submitted by the GPPL.

Wind Power Monthly (Journal) Issue of January 2005

82. The cost of wind projects in 2004 as reported in Wind Power Monthly (Journal) Issue of January 2005 was in the range of Euro 660 per kW in India to Euro 1,350 per kW in Japan with an average of about 970 Euro per kW.

Wind Power Monthly (Journal) Issue of May, 2006

83. In Wind Power Monthly (Journal) Issue of May 2006 installation cost for the projects, which are under construction and nearing completion or to be set up in future is indicated an average of US\$ 1,247 per kW.



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84. GPPL in response to Information Direction attached an article of Mr. David Milborrow Technical Consultant Windpower Monthly (Journal) Issue of January 2006.
85. The information provided to us indicates a wide variation in project cost under various regions and countries. However an increasing cost trend has been observed due to increase in demand during the past two years. Based upon the available information, the Authority considers project cost of US\$ 1,495 per kW for a wind power plant installation in the coastal area of Pakistan as a fair assessment for tariff calculation.

**Cost of Debt**

86. GPPL had requested a cost of debt equal to LIBOR + 3.5%. The Authority believes this cost to be excessive and based on available information and considering the nature of the project, considers LIBOR + 2.5% to be a reasonable cost of debt. Accordingly the tariff has been determined using LIBOR + 2.5%.

▪ **O&M Cost**

87. GPPL has stated that its operation and maintenance functions for this project would be handled by GE through O&M Contract. According to GPPL the cost of GE's O&M Contract (including spares and consumables) is expected to be about €33,000 per turbine (€25,000 fixed and €8,000 variable, or about US\$ 1.2 million per year. GPPL has further stated that the O&M costs for the first two years of operations are expected to be reduced to a fixed cost of €13,000 per turbine and a variable cost of €4,000 per turbine. Details of the O&M costs as per GPPL are indicated as under:

**Fixed O&M**

Fixed O&M Contract	Rs. 59.4 Million
Corporate & Plant Personnel	Rs. 26.0 Million
Administrative Expenses	<u>Rs. 24.0 Million</u>
Total Fixed O&M	Rs.109.4 Million

**Variable O&M**

Rs. 20.9 Million

88. GPPL has compared its estimated O&M costs of Rs.0.98 or US\$ 0.0163 per kWh with life time benchmark for O&M costs of € 0.012-



0.015 (US\$0.014-0.018) per kWh established by European Wind Energy Association (EWEA). GPPL has stated that its revised petition includes an increase of 10% in the cost of spare parts. GPPL has further stated that the variable O&M portion denominated in foreign currency would need to be adjusted in case of any change in GOP Policy or additional taxes are levied.

89. O&M cost as estimated by GPPL works out as US\$43.87 per kW per annum. In order to assess the reasonability of the O&M cost estimated by GPPL information available from the different sources was gathered and analyzed.
90. Nuclear Energy Agency, International Energy Agency and Organization for Economic Co-Operation and Development jointly carried out a study which was conducted by a group of experts from nineteen member countries and two international organizations, International Atomic Energy Agency (IAEA) and the European Commission. The plants included in the study rely on technologies available today and considered by participating countries as candidates for commissioning by 2010-2015 or earlier.
91. The report presents and analyses projected costs of generating electricity calculated with input data provided by participating experts and generic assumptions adopted by the group. According to the study annual specific O&M costs (USD per kWe) for wind power plants in 2010 are projected as per the following table;

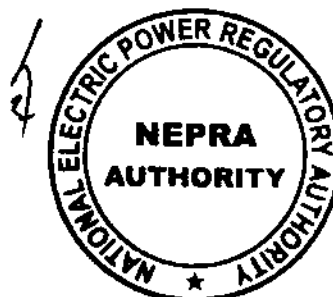
USA-W	27
AUT-W	26.31
BEL-W	14.3
CZE-W	22.87
DNK-W1	67.8
DNK-W2	43.15
DNK-W3	16.2
DEU-W1	66.47
DEU-W2/3	38.67
GRC-W1	14.91
GRC-W2	19.1
GRC-W3/4	20.94
GRC-5	28.83
ITA-W1	28.6
ITA-W2	15.9
NLD-W	131.56
PRT-W	28.83



92. The annual specific O&M cost for twelve out of seventeen plants as per the above table ranges between USD 14.30-28.83 per kWe. The O&M cost for seven plants was projected above 20 USD per kWe. Excluding the exceptionally low or high outliers in the data, the Authority considers that a reasonable annual O&M cost should be around USD 25 per kWe. If the O&M cost of €33,000 per turbine per annum indicated by GPPL as per its O&M contractor is converted into USD per kWe (assuming €/US\$ conversion rate of 1.2544) works out as 27.60. The Authority agrees to accept and adopt the overall O&M cost of US\$ 27.60 per kW per month for tariff calculations.

▪ **Indexation**

93. GPPL has proposed indexation mechanism vide para 31-33 of tariff petition is in line with the "Guidelines for determination of Wind Power Generation 2006". The same is accepted as requested.
94. GPPL's request for indexation for local component of O&M and ROE with local CPI is not appropriate. WPI adjustment is allowed for variation on account of local inflation which is applicable only to local O&M component. The Authority has also considered GPPL's request for allowing CPI indexation to local ROE and found that the request is not in accordance with the internationally accepted principles. This request is not justified and therefore not accepted.
95. GPPL has requested for allowing adjustment for Eurozone inflation for Harmonized Index of Consumer Prices (HICP) in O&M and insurance cost which is denominated in Euros. No foreign CPI indexation was allowed under Power Policy 2002. PPIB through its communication No. 1(102)PPIB-IPP.EXP/06/FIN dated August 19, 2006 has informed regarding ECC's recent decision according to which *"the foreign component of O&M Cost (variable and fixed) be allowed indexation with US CPI effective from the month of application by IPP for tariff determination, if it is demonstrated by the IPP to NEPA that the inflation indexation is not already covered in the O&M contract."*
96. The foreign portion of fixed and variable O&M cost of GPPL is therefore allowed to be indexed with US CPI. GPPL filed its tariff



petition in March 2006. The US CPI (All Urban Consumers) for March 2006 was 199.8 and this is used as reference for future indexation.

▪ **Generation Data**

Description of the Proposed Wind Farm

97. The basic parameters of turbine model which is under consideration of the GPPL are as follows:

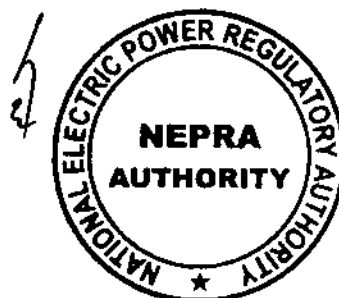
- The power used in the analysis has been taken from standard GE Wind sales documentation and is based on an air density of 1.16 Kg per m<sup>3</sup>, and a turbulence intensity of 10% to 15%;
- The power curve is based on calculations and exhibits a peak power coefficient, Cp of 0.44;
- The long term mean air density at the site has been estimated as 1.165 Kg per m<sup>3</sup> at an average hub elevation of 70 meter above sea level by using historical pressure and temperature record from nearby meteorological stations and standard lapse rate assumptions;
- The power curves used in the analysis have been adjusted to the predicted site air density;

Wind Farm Layout

98. In order to optimize the energy output of the Wind Farm the following constraints have been used by GPPL;

- 33 GE Wind 1.5sle turbines have been considered, giving a total wind farm rated capacity of 49.5MW;
- 3 rotor diameter spacing between turbines within each row
- 5 rotor diameter spacing between the rows in the prevailing wind directions;
- The only siting constraint was that no turbine could be placed within 2 rotor diameter of the northern edge of the site boundary.

99. GPPL has assumed that no additional wind farms are proposed in immediate proximity to the GPPL site. GPPL has further assumed that the only available land for neighboring developments would be to the north, south or east of the site and any additional wake effects



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incurred due to other wind farms in these areas would be small, due to the low frequency of winds from these directions.

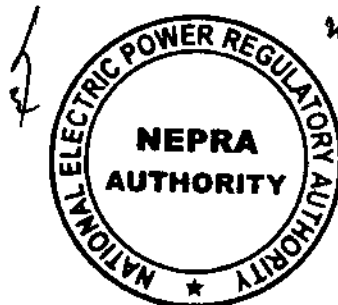
Turbine	Easting* [m]	Northing** [m]	Mean Hub-Height Wind Speed*** [m/s]	Energy Output [GWh/annum]
1	342989	2719710	6.9	4.9
2	343003	2719473	6.9	4.9
3	343029	2719233	7.0	4.9
4	343270	2719082	7.0	4.8
5	343300	2718841	7.0	4.8
6	343320	2718600	7.0	4.8
7	343335	2718354	7.0	4.8
8	343350	2718112	6.9	4.8
9	343370	2717871	6.9	4.8
10	343363	2717621	6.9	4.7
11	343963	2718595	6.9	4.3
12	343963	2718354	6.9	4.2
13	344029	2718122	6.9	4.3
14	344064	2717886	6.9	4.4
15	344059	2717645	6.9	4.5
16	343835	2719699	6.9	4.5
17	343993	2719510	6.9	4.4
18	344124	2719306	6.9	4.4
19	344292	2719120	6.9	4.3
20	344501	2718957	6.9	4.3
21	344662	2718756	6.9	4.2
22	344747	2718529	6.9	4.2
23	344757	2718278	6.9	4.2
24	344767	2718037	6.9	4.2
25	344812	2717781	6.9	4.4
26	344905	2719629	6.9	4.4
27	345137	2719464	6.9	4.3
28	345369	2719300	6.9	4.3
29	345543	2719113	6.9	4.3
30	345501	2718846	6.9	4.2
31	345471	2718590	6.9	4.2
32	345431	2718318	6.9	4.2
33	345399	2718059	6.9	4.3

Notes

- \* Co-ordinate system is UTM/UPS, WGS84 datum
- \* Wind speed at the location of the turbine, not including wake effects
- \* Individual turbine output figures include topographic, array and air density adjustments only

100. The analysis of the wind farm involved several steps, which are summarized below:

- The wind speed and direction frequency distribution at the Gharo mast at 30 m was derived for the period from August 2002 to September 2005.
- Data recorded at the Khalili mast at 50 m were correlated to data recorded at the same mast at 30 m. This correlation was used to

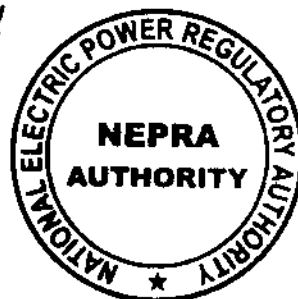


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derive the long-term wind speed and direction frequency distribution at the Khalili mast at 50 m.

- The mean wind speed at each proposed hub height was predicted, based on the measured wind shear profile at the Khalili mast. The long-term wind speed and direction frequency distribution at the Khalili mast at 50 m was factored to the predicted mean wind speed for each proposed hub heights.
- Wind flow modeling was carried out to predict the wind speed variation across the site area at the proposed heights.
- The energy production of the wind farm was calculated taking account of array losses, topographic effects, availability, electrical transmission efficiency, air density effects and other potential losses.
- An assessment of uncertainty in the wind speed estimate and predicted wind farm energy production was undertaken.

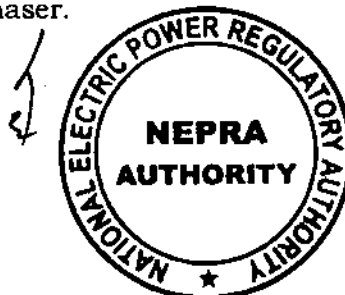
101. The Authority is of the view that in the instant case reliability of data for assessment of expected wind speeds and expected annual generation is not confirmed. It is evident from the discussion in the preceding paragraphs that there are inherited deficiencies in the recording of data forming the basis for estimating the energy output. The Authority considers that for making reasonable assessment of tariff at least 3 years reliable data is required. In the absence of reliable area specific data the Authority is constrained to rely on the data provided by the petitioner duly confirmed by the AEDB through letter No.B/3/1/2006 dated August 16, 2006. Adjusting the same for a credible error factor in estimation and extrapolation of data the Authority considers that an overall annual factor of 30% should be used to evaluate a kWh price such that the annual fixed and variable charges are recovered through kWh expected to be sold. In line with the policy an incentive is being provided to the applicant in allowing 10% of the price to be retained by it for sale in excess of the expected annual sales calculated on the basis of 30% plant factor.



▪ **Carbon Credits**

102. According to the Policy issued by the Ministry of Environment the recipients of the Carbon Emissions Credits would be Sponsors of Wind Farm Energy Projects. The Authority keeps in view the prevalent policies and guidelines pertaining to tariff issues. Ministry of Water and Power in this regard has very clearly at para 4.2.2(b) of the "Guidelines for Determination of Tariff for Wind Power Generation Year 2006" provided for treatment of Carbon Emissions Credits (CEC) while determining the tariff. In the Guidelines it is stated that tariff should be determined allowing reasonable Internal Rate of Returns (IRR) on equity investment while taking into account the carbon credit which the IPP may get. In order to account for the impact of CEC fair market value should be assessed. Since, in Pakistan presently there is no such trading being done therefore a fair assessment cannot be made in the instant case.

103. In the study jointly carried out by the IEA/NEA the cost of carbon emission has been estimated as €8.2 per MWh for CCGT plant and €18.4 per MWh for coal plant. The assessment has been made on the basis of hypothetical merit order based on the total European installed capacity and facilities' operating costs. This allowance has been worked out at an assumed price of €20 per ton of CO<sub>2</sub>. The Authority considers that although this provides a reference for assessment of CEC but it would not be fair to use this as adjustment for determining IRR. The Authority is therefore constrained to determine tariff on the basis of recovery of full cost without considering the impact of CEC. The Carbon Emission Credits would be passed on entirely to the power purchaser. In such an arrangement there is a possibility that the sponsor may not make serious effort to cash the CEC earned. In order to ensure realization of CEC the Authority considers that the sponsor should be penalized to the extent of 50% of unrealized CEC, therefore, a one cent/kWh penalty would be applicable for unrealized CEC in the shape of deduction by the purchaser.



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**ORDER**

104. Pursuant to Rule 6 of the NEPA Licensing (Generation) Rules 2000, Green Power (Pvt) Ltd. (GPPL) is allowed to charge the following specified/approved tariff for delivery of electricity to CPPA of NTDC for procurement on behalf of Ex-WAPDA Distribution Companies:

Tariff Components	Reference Tariff		
	Year 1-2	Year 3-10	Year 11-20
	Rs./kWh		
<b>Fixed Charges</b>			
Fixed O&M Foreign	0.2196	0.4224	0.4224
Fixed O&M Local	0.1370	0.1370	0.1370
Insurance	0.3146	0.3146	0.3146
Debt Service	4.0196	4.0196	-
Return on Equity	1.1162	1.1162	1.1162
<b>Variable O&amp;M</b>	0.0354	0.0708	0.0708
<b>Levelized Tariff</b>	<b>8.3287 US Cents</b>		

*(The levelized tariff of 8.3287 US Cents translates into levelized tariff of 9.5 US Cents if LIBOR + 2.5% is replaced with KIBOR + 3%.)*

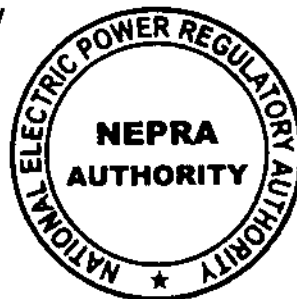
- i) The reference tariff has been calculated on the basis of 30% Capacity Factor.
- ii) The above charges will be limited to the extent of annual generation of 127.1 GWh. Any annual generation in excess of 127.1 GWh would be charged on 10% of the above sale rate.
- iii) The above tariff is applicable for a period of 20 years commencing from the date of the Commercial Operation.
- iv) Component wise tariff is indicated at Annex-I.

The following indexations shall be applicable to reference tariff;

I. One Time Adjustment

(i) Cost of Debt

- a. The Principal repayment and the cost of debt shall be adjusted at Financial Closing as per actual borrowing composition i.e Foreign and Local.
- b. Interest During Constructions (IDC) shall be adjusted at COD according to actual disbursement based on actual Interest.
- c. After COD, Interest part of the tariff component shall be adjusted for variation in LIBOR on quarterly basis.



ii) Adjustment for variation during construction

Debt Service and Return on Equity shall be adjusted on account of actual variation in drawdown and Interest. GPPL shall submit the relevant documents to NEPRA within 7 days of COD for adjustment of relevant tariff components.

iii) Adjustment in project cost due to variation in Dollar/Rupee parity

Any variation in project cost during construction period on account of variation in dollar/Rupee parity shall be allowed through adjustment in the project cost. For the purpose of this adjustment petitioner shall provide actual payment along with the exchange rate prevalent on the date of particular transaction. GPPL's final reference tariff table shall be revised on COD to incorporate all the permissible adjustment during construction period.

II. Pass-Through Items

No provision for income tax has been accounted for in the tariff. If GPPL is obligated to pay any tax on its ROE, the exact amount paid by the company may be reimbursed by CPPA to GPPL on production of original receipts. This payment may be considered as pass-through payment (as Rs./kWh) spread over a 12 months period in addition to the capacity purchase price proposed in the Reference Tariff. Furthermore, in such a scenario, GPPL may also submit to CPPA details of any tax shield savings and CPPA will deduct the amount of these savings from its payment to GPPL on account of taxation.

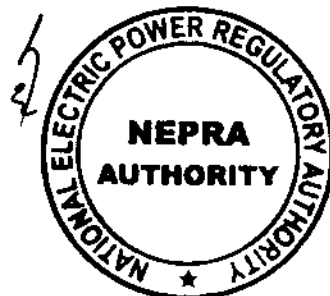
Withholding tax is also a pass through item just like other taxes as indicated in the government guidelines for determination of tariff for new IPPs. Withholding tax shall be paid @ 15% of the reference equity. CPPA (NTDC) shall make payment on account of withholding tax at the time of actual payment of dividend subject to maximum of 7.5% of 15% equity according to the following formula:

$$\text{Withholding Tax Payable} = [15\% * (E_{(Ref)} - E_{(Red)}) \times 7.5\%]$$

Where:

$E_{(Ref)}$  = Reference Equity (US\$ 14.799 million x 60)

$E_{(Red)}$  = Equity Redeemed



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In case Company does not declare a dividend in a particular year or only declares a partial dividend, then the difference in the withholding tax amount (between what is paid in that year and the total entitlement as per the Net Return on Equity) would be carried forward and accumulated so that the Company is able to recover the same as a pass through from the Power Purchaser in future on the basis of the total dividend pay out.

III. Indexations:

The following indexation shall be applicable to the reference tariff;

a) Indexation applicable to O&M

The Fixed O&M local part of Capacity Charge will be adjusted on account of Inflation (WPI) and Fixed O&M foreign will be adjusted on account of variation in dollar/Rupee exchange rate and US CPI. Quarterly Adjustment for local inflation, foreign inflation and exchange rate variation will be made on 1<sup>st</sup> July, 1<sup>st</sup> October, 1<sup>st</sup> January & 1<sup>st</sup> April respectively on the basis of latest available information with respect to WPI (notified by the Federal Bureau of Statistics), US CPI issued by US Bureau of Labour Statistics and revised TT & OD Selling rate of Us Dollar as notified by the National Bank of Pakistan. The mode of indexation will be as under:

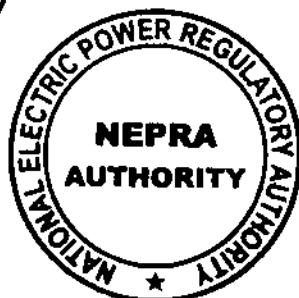
(i) Fixed O&M

- a)  $F O\&M_{(LRev)} = 0.1370 * WPI_{(REV)} / 118.89$
- b)  $F O\&M_{(FRev)} = 0.2196(\text{for first 2 years}) * US CPI_{(REV)} / 199.8 * ER_{(REV)} / 60$
- c)  $F O\&M_{(FRev)} = 0.4224(\text{remaining 18 years}) * US CPI_{(REV)} / 199.8 * ER_{(REV)} / 60$

Where:

$F O\&M_{(LRev)}$  = the revised applicable Fixed O&M Local Component of the Capacity Charge indexed with WPI

$F O\&M_{(FRev)}$  = the revised applicable Fixed O&M Foreign Component of the Capacity Charge indexed with US CPI and Currency fluctuation



*Weth*

- $WPI_{(REV)}$  = the Revised wholesale Price Index (manufactures)
- $WPI_{(REF)}$  = 118.89 wholesale price index (manufactures) of June 2006 notified by the Federal Bureau of Statistics
- $US\ CPI_{(REV)}$  = the revised US CPI (All Urban Consumers)
- $US\ CPI_{(REF)}$  = 199.8 US CPI (All Urban Consumers) for the month of March 2006 as notified by the US Bureau of Labour Statistics
- $ER_{(REV)}$  = the Revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan

(ii) Variable O&M

The formula for indexation of Variable O & M component will be as under:

- a)  $V\ O\&M_{(REV)} = 0.0354_{(for\ first\ 2\ years)} * US\ CPI_{(REV)} / 199.8 * ER_{(REV)} / 60$
- b)  $V\ O\&M_{(REV)} = 0.0708_{(remaining\ 18\ years)} * US\ CPI_{(REV)} / 199.8 * ER_{(REV)} / 60$

Where:

- $V\ O\&M_{(REV)}$  = The revised applicable Variable O&M Component of Energy Charge indexed with US CPI and currency fluctuation.
- $US\ CPI_{(REV)}$  = the revised US CPI (All Urban Consumers)
- $US\ CPI_{(REF)}$  = 199.8 US CPI (All Urban Consumers) for the month of March 2006 as notified by the US Bureau of Labour Statistics
- $ER_{(REV)}$  = The Revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan

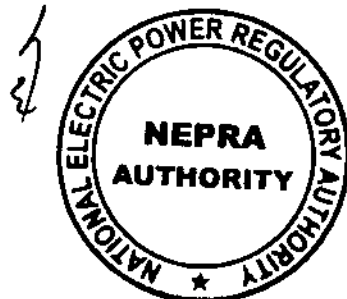
b) Adjustment for LIBOR variation

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

$$\Delta I = P_{(REV)} * (LIBOR_{(REV)} - 5.5\%) / 4$$

Where:

- $\Delta I$  = the variation in interest charges applicable corresponding to variation in LIBOR.  $\Delta I$  can be



✓  
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positive or negative depending upon whether  $LIBOR_{(REV)} >$  or  $<$  5.5%. The interest payment obligation will be enhanced or reduced to the extent of  $\Delta I$  for each quarter under adjustment applicable on quarterly

$P_{(REV)}$  = is the outstanding principal (as indicated in the attached debt service schedule to this order at Annex-II) on a quarterly basis on the relevant quarterly calculations date. Period 1 shall commence on the date on which the 1<sup>st</sup> installment is due after availing the grace period.

- iii). Adjustment on account of inflation, local inflation, US CPI, foreign exchange variation and LIBOR variation will be approved and announced by the Authority within seven working days after receipt of GPPL's request for adjustment in accordance with the requisite indexation mechanism stipulated herein.

**Terms and Conditions of Tariff:**

**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, un-used and of the latest model.

**Power Curve of Wind Farm:**

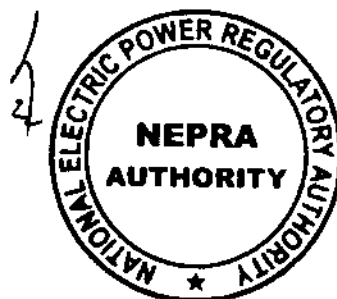
The power curve of the Wind Farm shall be verified as part of the Commissioning tests according to the latest IEC standards and shall be used to measure the performance of the wind turbines.

**Wind Speed:**

GPPL shall be responsible for the correct assessment and recording of the wind speed in the proposed wind farm and the Power Purchaser shall verify and approve the same.

**Wind Power Plant's Performance Data:**

GPPL shall install monitoring masts with properly calibrated automatic computerized wind speed recording meters at the same height as that of the Wind Turbine Generators and a compatible Communication/SCADA system both at the Wind Farm and Power



Purchaser's control room for transmission of wind speed and power output data to the Power Purchaser's control room for record of data.

**Delivery Point:**

As per Article 11 of the Generation Licence, GPPL shall deliver power at 132 kV at the door step of its wind farm. Up-gradation of generation voltage up to 132 kV will be the responsibility of the GPPL.

**Emissions Trading/ Carbon Credits:**

GPPL would process and obtain emissions /carbon credits expeditiously and credit the proceeds to the Power Purchaser on actual basis. In case GPPL fails to obtain the CEC, the power purchaser shall be entitled to adjust and deduct the payments to GPPL @ 1 Cent per kWh.

**Power Purchase Agreement:**

Power Purchase Agreement between the power purchaser and the wind power IPPs shall be in accordance with the GOP Guidelines and international prudent utility practices.

The above tariff and terms and conditions be incorporated as the specified tariff approved by the Authority pursuant to Rule 6 of the Licencing (Generation) Rules, in a Power Purchase Agreement between GPPL and CPPA.

The reference tariff table and debt service schedule are attached herewith for notification by the Federal Government in the official gazette in accordance with the Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).

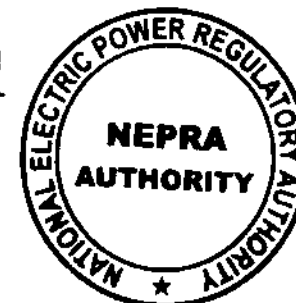
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**GREEN POWER (PVT) LTD  
REFERENCE TARIFF**

Year	Variable O&M Cost	Fixed O&M Cost Foreign	Fixed O&M Cost Local	Insurance	Return on Equity	Withholding Tax @7.5%	Loan Repayment	Interest Charges	Tariff *	
	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	¢ / kWh
1	0.0354	0.2196	0.1370	0.3146	1.1162	0.0837	1.8758	2.1438	5.9262	9.8769
2	0.0354	0.2196	0.1370	0.3146	1.1162	0.0837	2.0304	1.9892	5.9262	9.8769
3	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	2.1978	1.8218	6.1643	10.2738
4	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	2.3789	1.6407	6.1643	10.2738
5	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	2.5751	1.4446	6.1643	10.2738
6	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	2.7873	1.2323	6.1643	10.2738
7	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	3.0171	1.0025	6.1643	10.2738
8	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	3.2658	0.7538	6.1643	10.2738
9	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	3.5350	0.4846	6.1643	10.2738
10	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	3.8264	0.1932	6.1643	10.2738
11	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
12	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
13	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
14	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
15	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
16	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
17	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
18	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
19	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
20	0.0708	0.4224	0.1370	0.3146	1.1162	0.0837	-	-	2.1447	3.5745
<b>Levelized Tariff</b>	<b>0.0636</b>	<b>0.3810</b>	<b>0.1370</b>	<b>0.3146</b>	<b>1.1162</b>	<b>0.0837</b>	<b>1.8650</b>	<b>1.0361</b>	<b>4.9972</b>	<b>8.3287</b>

\* The above rate is limited to an annual energy production up to 127.1 GWh. Any generated energy beyond 127.1 GWh in a year will be charged at 10% of the Reference Tariff for that year.



**GREEN POWER (Pvt) LTD (GPPL)**  
**Debt Servicing Schedule**

Period	Foreign Debt					Annual Principal Repayment Rs./kWh	Annual Interest Rs./kWh	Annual Debt Servicing Rs./kWh
	Principal	Repayment	Mark-Up	Balance	Debt Service			
	Million \$	Million \$	Million \$	Million \$	Millin \$			
	58.23	0.96	1.16	57.27	2.13			
	57.27	0.98	1.15	56.28	2.13			
	56.28	1.00	1.13	55.28	2.13			
	55.28	1.02	1.11	54.26	2.13			
1	58.23	3.97	4.54	54.26	8.51	1.88	2.14	4.02
	54.26	1.04	1.09	53.21	2.13			
	53.21	1.06	1.06	52.15	2.13			
	52.15	1.09	1.04	51.06	2.13			
	51.06	1.11	1.02	49.96	2.13			
2	54.26	4.30	4.21	49.96	8.51	2.03	1.99	4.02
	49.96	1.13	1.00	48.83	2.13			
	48.83	1.15	0.98	47.67	2.13			
	47.67	1.18	0.95	46.50	2.13			
	46.50	1.20	0.93	45.30	2.13			
3	49.96	4.66	3.86	45.30	8.51	2.20	1.82	4.02
	45.30	1.22	0.91	44.08	2.13			
	44.08	1.25	0.88	42.83	2.13			
	42.83	1.27	0.86	41.56	2.13			
	41.56	1.30	0.83	40.26	2.13			
4	45.30	5.04	3.48	40.26	8.51	2.38	1.64	4.02
	40.26	1.32	0.81	38.94	2.13			
	38.94	1.35	0.78	37.59	2.13			
	37.59	1.38	0.75	36.21	2.13			
	36.21	1.40	0.72	34.81	2.13			
5	40.26	5.45	3.06	34.81	8.51	2.58	1.44	4.02
	34.81	1.43	0.70	33.37	2.13			
	33.37	1.46	0.67	31.91	2.13			
	31.91	1.49	0.64	30.42	2.13			
	30.42	1.52	0.61	28.90	2.13			
6	34.81	5.90	2.61	28.90	8.51	2.79	1.23	4.02
	28.90	1.55	0.58	27.35	2.13			
	27.35	1.58	0.55	25.77	2.13			
	25.77	1.61	0.52	24.16	2.13			
	24.16	1.65	0.48	22.51	2.13			
7	28.90	6.39	2.12	22.51	8.51	3.02	1.00	4.02
	22.51	1.68	0.45	20.83	2.13			
	20.83	1.71	0.42	19.12	2.13			
	19.12	1.75	0.38	17.37	2.13			
	17.37	1.78	0.35	15.59	2.13			
8	22.51	6.92	1.60	15.59	8.51	3.27	0.75	4.02
	15.59	1.82	0.31	13.78	2.13			
	13.78	1.85	0.28	11.92	2.13			
	11.92	1.89	0.24	10.03	2.13			
	10.03	1.93	0.20	8.11	2.13			
9	15.59	7.49	1.03	8.11	8.51	3.53	0.48	4.02
	8.11	1.97	0.16	6.14	2.13			
	6.14	2.01	0.12	4.13	2.13			
	4.13	2.05	0.08	2.09	2.13			
	2.09	2.09	0.04	-	2.13			
10	8.11	8.11	0.41	-	8.51	3.83	0.19	4.02

