



# National Electric Power Regulatory Authority

## Islamic Republic of Pakistan

Registrar

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

No. NEPRA/R/DL/LAG-228/ 2289-96

February 25, 2015

Mr. Mustafa Tapal  
Director  
Tapal Wind Energy (Private) Limited  
Ameejee Chambers,  
Campbell Street, Karachi-74200

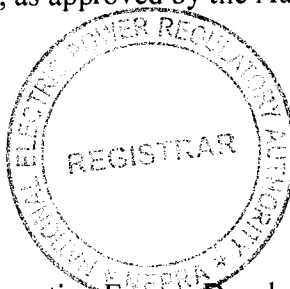
Subject: **Modification-I in Generation Licence No. WPGL/23/2013 —  
Tapal Wind Energy (Private) Limited (TWEPL)**

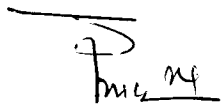
Reference: *Your letter No. nil, dated January 05, 2015*

It is intimated that the Authority has approved "Licensee Proposed Modification" in Generation Licence No. WPGL/23/2013 (issued on November 26, 2013) in respect of TWEPL pursuant to Regulation 10(11) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999.

2. Enclosed please find herewith determination of Authority in the matter of Licensee Proposed Modification in the Generation Licence of TWEPL along with Modification-I in the Generation Licence No. WPGL/23/2013, as approved by the Authority.

**Encl:/As above**



  
(Syed Safeer Hussain) 25/2/15

Copy to:

1. Chief Executive Officer, Alternative Energy Development Board (AEDB), 2<sup>nd</sup> Floor, OPF Building, G-5/2, Islamabad.
2. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore
3. Chief Operating Officer, CPPA, 107-WAPDA House, Lahore
4. Chief Executive Officer, Hyderabad Electric Supply Company (HESCO), WAPDA Water Wing Complex, Hussainabad, Hyderabad
5. Director General, Sindh Environmental Protection Agency, Plot No. ST 2/1, Sector 23, Korangi Industrial Area, Karachi

**National Electric Power Regulatory Authority**  
**(NEPRA)**

**Determination of Authority**  
**in the Matter of Licensee Proposed Modification of**  
**Tapal Wind Energy (Private) Limited**

**February 24, 2015**  
**Case No. LAG-228**

**(A). Background**

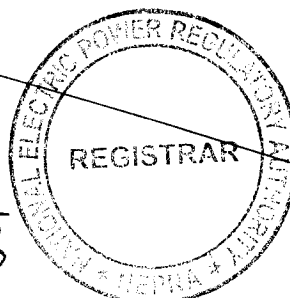
(i). The Authority granted a Generation Licence (No. WPGL/23/2013 dated November 26, 2013) to Tapal Wind Energy (Private) Limited (TWEPL), in terms of Section-15 of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the NEPRA Act).

(ii). According to the above Generation Licence, the Generation Facility/Wind Power Plant (WPP)/Wind Farm (WF) is to be located at Jhampir, Nooriabad, District Thatta in the Province of Sindh, based on twelve (12) Wind Turbine Generator-WTG, each of 2.50 MW of Goldwind-GW 109/2500.

**(B). Communication of Modification**

(i). TWEPL in accordance with Regulation-10(2) of the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 (the Regulations), communicated a Licensee Proposed Modification (LPM) in its existing Generation Licence on January 12, 2015.

(ii). In the "Text of the Proposed Modification", TWEPL submitted that it intends to change WTG from GW 109/2500 to GW 82/1500. Now, the project will be implemented with twenty (20) WTGs each of 1.50 MW. The proposed change will not affect the total Installed Capacity of the generation facility which will remain at 30.00 MW.



(iii). Regarding the "Statement of Reasons in Support of the Modification", it was submitted that GW 109/2500 is a new WTG as compared to GW 82/1500. However, due to lack of its performance profile worldwide, the lenders are not comfortable and have insisted that the project must be implemented with WTGs having required certification which is available in the case of GW 82/1500. In view of the said, the sponsors of TWEPL have decided implementing the project with GW 82/1500 WTGs.

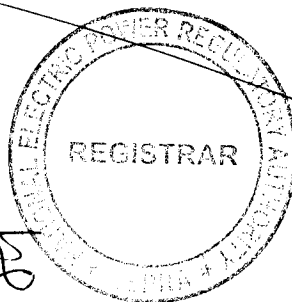
(iv). About the "Statement of the Impact on the Tariff, Quality of Service (QoS) and the Performance by the Licensee of its Obligations under the Licence", TWEPL submitted that the proposed change of WTG will not have any adverse impact on tariff, QoS and its Performance under the Licence.

**(C). Processing of LPM**

(i). After completion of all the required information as stipulated under the Regulation 10 (2) and 10 (3) of the Regulations by TWEPL, the Registrar accepted the LPM for further processing as stipulated in the Regulations.

(ii). The Registrar published the communicated LPM on January 22, 2015 in one (01) English and one (01) Urdu Newspaper, informing the general public, interested/affected parties and other stakeholders about the said modification and for submitting their views in favor or against the same.

(iii). Apart from the said, letters were also sent to Individual Experts, Government Ministries, different Departments and Various Representative Organization etc., conveying about the communicated LPM and publication of its notice in the press. Further, the said individuals and entities were invited to assist the Authority by submitting their views and comments in the matter.



**(D). Comments of Stakeholders**

(i). In reply to the above, the Authority received comments of two (02) stakeholders. These included Pakistan Council of Renewable Energy Technologies (PCoRET) and Alternative Energy Development Board (AEDB). The salient points of the comments offered by the above mentioned stakeholders are summarized in the following paragraphs: -

(a). PCoRET expressed its no objection for the communicated LPM. Further, PCoRET stated that it cannot comment on the financial or other aspects of the Project or its communicated LPM;

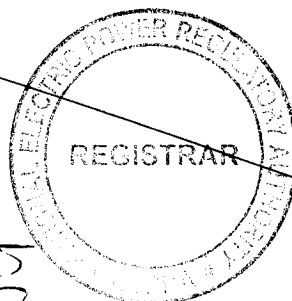
(b). AEDB submitted that TWEPL intends implementing the project with GW 82/1500 instead GW 109/2500. The proposed WTG is an internationally certified as per IEC Standards. AEDB confirmed that it has accepted the change in the WTGs from GW109/2500 to GW 82/1500.

(ii). The Authority examined the above comments of the stakeholders and found the same in favor of the communicated LPM except the observations of PCoRET on financial aspects of the project. The Authority had granted TWEPL an Up-Front Tariff allowing certain projects costs which are fixed and are not linked with the selection of any type of WTGs. In consideration of the said, the Authority did not find the comments of PCoRET on financial aspects of the project relevant.

(iii). In view of the said, the Authority considered it appropriate to proceed further with the communicated LPM as stipulated in the Regulations and the NEPRA Licensing (Generation) Rules, 2000 (the Rules).

**(E). Approval of LPM**

(i). In terms of Regulation-10(5) of the Regulations, the Authority is entitled to modify any licence subject to and in accordance with such further changes as the Authority may deem fit if, in the opinion of the Authority such modification (a). does not adversely affect the performance by the licensee of its obligations; (b).

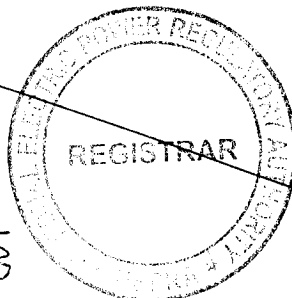


does not cause the Authority to act or acquiesce in any act or omission of the licensee in a manner contrary to the provisions of the Act or the rules or regulations made pursuant to the Act; (c). is or is likely to be beneficial to the consumers; (d). is reasonably necessary for the licensee to effectively and efficiently perform its obligations under the licence; and (e). is reasonably necessary to ensure the continuous, safe and reliable supply of electric power to the consumers keeping in view the financial and technical viability of the licensee.

(ii). The Authority has observed that the existing Generation Licence (No. WPGL/23/2013 dated November 26, 2013) is with an installed capacity of 30.00 MW (consisting of 12 x 2.50 MW WTGs of GW 109/2500). Whereas, now TWEPL intends to install twenty (20) GW 82/1500 WTGs each of 1.50 MW without any change in the installed capacity of the Generation Facility/WPP/WF. The Authority has observed that the proposed GW 82/1500 WTG has the same class as that of GW 109/2500 (i.e. IEC-IV Class). As both GW 109/2500 and GW 82/1500 belong to the same class of WTG therefore, there will be no impact on the already carried out, approved Interconnection, Transient and Stability Study of the project.

(iii). About the Impact on Tariff of the communicated LPM, as explained at Para D(ii) above, the Authority had granted an Up-Front Tariff to TWEPL in terms of its determinations dated April 23, 2014 and May 02, 2014 which is energy based tariff and is not dependent on the selection of any particular size and type of WTG. In view of the said, the Authority is satisfied that the communicated LPM will not have any adverse impact on its existing Tariff. Further, as explained at Para E(ii) above, being of the similar class the change of WTG will not have any adverse impact on the performance of the Generation Facility/WPP/WF. In view of the said, the Authority is satisfied that the change of WTG will not have any adverse impact on the QoS and Performance of the Licensee under its existing Generation Licence.

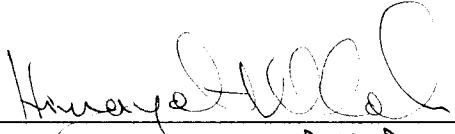
(iv). The Authority is satisfied that TWEPL/Licensee has complied with all the requirements of the Regulations pertaining to the modification. Accordingly, the Authority in terms of Regulation-10(11)(a) of the Regulations approves the communicated LPM without any changes. Accordingly, the already granted



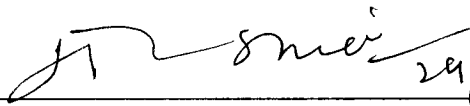
Generation Licence (No. WPGL/23/2013 dated November 26, 2013) in the name of TWEPL is hereby modified. The changes in "Face Sheet", "Articles of the Generation Licence", "Schedule-I" and "Schedule-II" of the Generation Licence are attached as annexure to this determination. The grant of the LPM will be subject to the provisions contained in the NEPRA Act, relevant rules framed there under, terms & conditions of the Generation Licence and other applicable documents.

### Authority

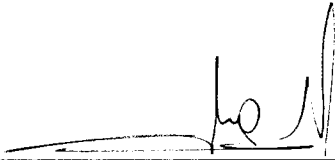
Himayat Ullah Khan  
Member

  
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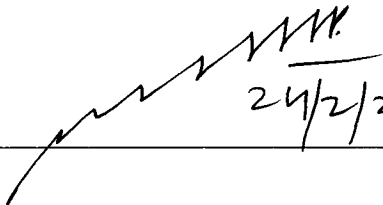
Maj. (R) Haroon Rashid  
Member

  
24/2/15

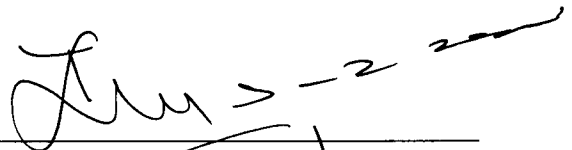
Khawaja Muhammad Naeem  
Member

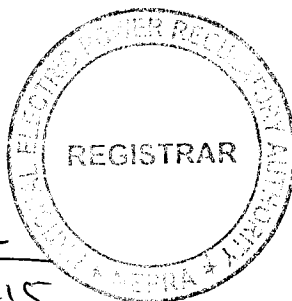
  
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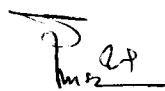
Habibullah Khilji  
Member/Vice Chairman

  
24/2/2015

Brig. (R) Tariq Saddozai  
Chairman

  
24/2/15



  
25.02.15

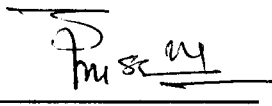
**National Electric Power Regulatory Authority  
(NEPRA)  
Islamabad – Pakistan**

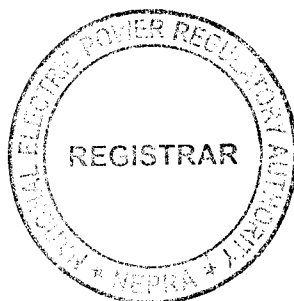
**GENERATION LICENCE  
No. WPGL/23/2013**

In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section-26 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby modifies the Generation Licence granted to TAPAL WIND ENERGY (PRIVATE) LIMITED (issued on November 26, 2013 and expiring on June 29, 2035), to the extent of changes mentioned as here under:-

- (i). the Installed Capacity of the Licensee appearing on the Face Sheet of the Original Licence will remain unchanged as 30.00 MW;
- (ii). The validity date of the Generation Licence will remain unchanged (i.e. on June 29, 2035);
- (iii). Changes in Articles of the Generation Licence attached as Revised/Modified Articles of Generation Licence;
- (iv). Changes in Schedule-I attached as Revised/Modified Schedule-I; and
- (v). Changes in Schedule-II attached as Revised/Modified Schedule-II.

This **Modification-I** is given under my hand this 25 of **February Two Thousand & Fifteen.**

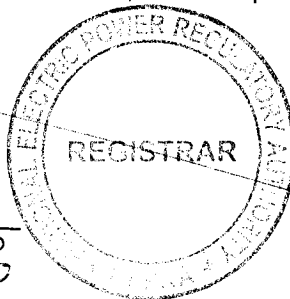
  
\_\_\_\_\_  
**Registrar**



**Article-1**  
**Definitions**

1.1 In this Licence

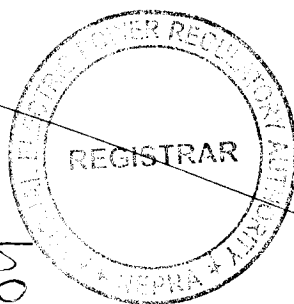
- (a). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997";
- (b). "Authority" means "the National Electric Power Regulatory Authority constituted under Section-3 of the Act";
- (c). "Bus Bar" means a system of conductors in the generation facility/Wind Farm of the Licensee on which the electric power of all the Wind Turbine Generators or WTGs is collected for supplying to the Power Purchaser;
- (d). "Carbon Credits" mean the amount of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases not produced as a result of generation of energy by the generation facility/Wind Farm, and other environmental air quality credits and related emissions reduction credits or benefits (economic or otherwise) related to the generation of energy by the generation facility/Wind Farm, which are available or can be obtained in relation to the generation facility/Wind Farm after the COD;
- (e). "Commercial Operations Date (COD)" means the day immediately following the date on which the generation facility of the Licensee is Commissioned;
- (f). "CPPA" means the Central Power Purchasing Agency of NTDC or any other entity created for the like purpose;
- (g). "Energy Purchase Agreement" means the energy purchase agreement, entered or to be entered into by and between the Power Purchaser and the Licensee, for the purchase and sale of electric





energy generated by the generation facility/Wind Farm, as may be amended by the parties thereto from time to time

- (h). "Grid Code" means the grid code prepared by NTDC and approved by the Authority, as it may be revised from time to time by NTDC with any necessary approval by the Authority;
- (i). "HESCO" means Hyderabad Electric Supply Company Limited and its successors or permitted assigns;
- (j). "IEC" means "the International Electrotechnical Commission and its successors or permitted assigns;
- (k). "IEEE" means the Institute of Electrical and Electronics Engineers and its successors or permitted assigns;
- (l). "Licensee" means Tapal Wind Energy (Pvt.) Limited and its successors or permitted assigns;
- (m). "NTDC" means National Transmission and Despatch Company Limited and its successors or permitted assigns;
- (n). "Policy" means "the Policy for Development of Renewable Energy for Power Generation, 2006" of Government of Pakistan as amended from time to time;
- (o). "Power Purchaser" means NTDC (through CPPA) on behalf of XW-DISCOs which purchases electricity from the Licensee, pursuant to an Energy Purchase Agreement for procurement of electricity;
- (p). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000";



- (q). "Wind Farm" means "a cluster of Wind Turbines in the same location used for production of electric power";
- (r). "Wind Turbine Generator" or "WTG" means the machines installed at the generation facility/Wind Farm with generators for conversion of wind energy into electric power/energy;
- (s). "XW DISCO" means "an Ex-WAPDA distribution company engaged in the distribution of electric power"

1.2 Words and expressions used but not defined herein bear the meaning given thereto in the Act or in the Rules.

**Article-2**  
**Application of Rules**

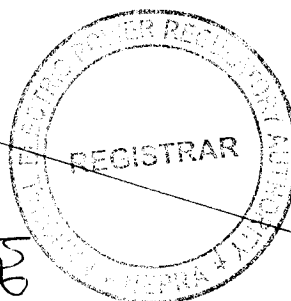
This Licence is issued subject to the provisions of the Rules, as amended from time to time.

**Article-3**  
**Generation Facilities**

3.1 The location, size (capacity in MW), technology, interconnection arrangements, technical limits, technical and functional specifications and other details specific to the generation facility/Wind Farm of the Licensee are set out in Schedule-I of this Licence.

3.2 The net capacity of the generation facility/Wind Farm of the Licensee is set out in Schedule-II hereto.

3.3 The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility/Wind Farm before its COD.



**Article-4**  
**Term of Licence**

4.1 This Licence is valid from the date of its issuance (i.e. November 26, 2013) and will remain valid for a term of twenty (20) years after the COD of the generation facility/Wind Farm.

4.2 Unless suspended or revoked earlier, the Licensee may within ninety (90) days prior to the expiry of the term of the Licence, apply for renewal of the Licence under the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time.

**Article-5**  
**Licence fee**

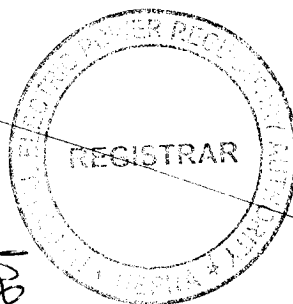
After the grant of the Generation Licence, the Licensee shall pay to the Authority the Licence fee, in the amount, manner and at the time set out in the National Electric Power Regulatory Authority (Fees) Rules, 2002.

**Article-6**  
**Tariff**

The Licensee shall charge only such tariff which has been determined, approved or specified by the Authority in terms of Rule-6 of the Rules.

**Article-7**  
**Competitive Trading Arrangement**

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement. The Licensee shall in good faith work towards implementation and operation of the aforesaid Competitive Trading Arrangement in the manner and time period specified by the Authority. Provided that any such participation shall be subject to any contract entered into between the Licensee and another party with the approval of the Authority.



7.2 Any variation or modification in the above-mentioned contracts for allowing the parties thereto to participate wholly or partially in the Competitive Trading Arrangement shall be subject to mutual agreement of the parties thereto and such terms and conditions as may be approved by the Authority.

**Article-8**  
**Maintenance of Records**

For the purpose of sub-rule (1) of Rule-19 of the Rules, copies of records and data shall be retained in standard and electronic form and all such records and data shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

**Article-9**  
**Compliance with Performance Standards**

The Licensee shall comply with the relevant provisions of the National Electric Power Regulatory Authority Performance Standards (Generation) Rules 2009 as amended from time to time.

**Article-10**  
**Compliance with Environmental Standards**

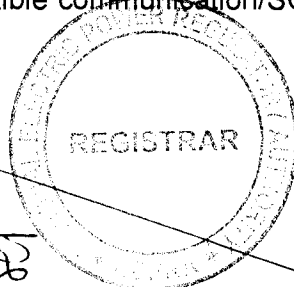
The Licensee shall comply with the environmental standards as may be prescribed by the relevant competent authority from time to time.

**Article-11**  
**Power off take Point and Voltage**

The Licensee shall deliver electric power to the Power Purchaser at the outgoing Bus Bar of its 132KV grid station. The up-gradation (step up) of generation voltage up to 132 KV will be the responsibility of the Licensee.

**Article-12**  
**Performance Data of Wind Farm**

The Licensee shall install monitoring mast 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 its Wind



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

**Article-13**  
**Provision of Information**

13.1 The obligation of the Licensee to provide information to the Authority shall be in accordance with Section-44 of the Act.

13.2 In addition to 13.1 above, the Licensee shall supply information to the Power Purchaser regarding the wind data specific to the site of the Licensee and other related information on a regular basis and in a manner required by it.

13.3 The Licensee shall be subject to such penalties as may be specified in the relevant rules made by the Authority for failure to furnish such information as may be required from time to time by the Authority and which is or ought to be or has been in the control or possession of the Licensee.

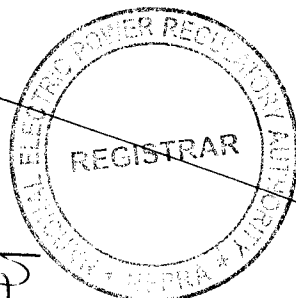
**Article-14**  
**Carbon Credits**

The Licensee shall process and obtain Carbon Credits expeditiously and credit the proceeds to the Power Purchaser as per the Policy.

**Article-15**  
**Design & Manufacturing Standards**

15.1 The Wind Turbine Generator or WTG and other associated equipments of the generation facility/Wind Farm shall be designed, manufactured and tested according to the latest IEC, IEEE standards or other equivalent standards in the matter.

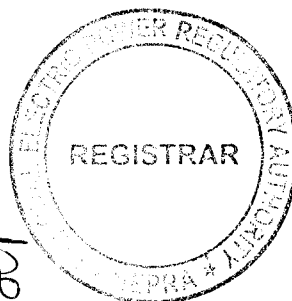
15.2 All the plant and equipment of the generation facility/Wind Farm shall be unused and brand new.



**Article-16**  
**Power Curve**

The power curve for the individual Wind Turbine Generator or WTG provided by the manufacturer and as mentioned in Schedule-I of this Generation Licence, shall form the basis in determining the cumulative Power Curve of the generation facility/Wind Farm.

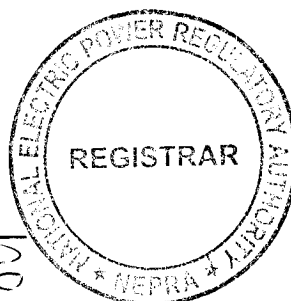
Modification-I



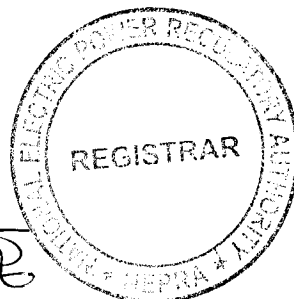
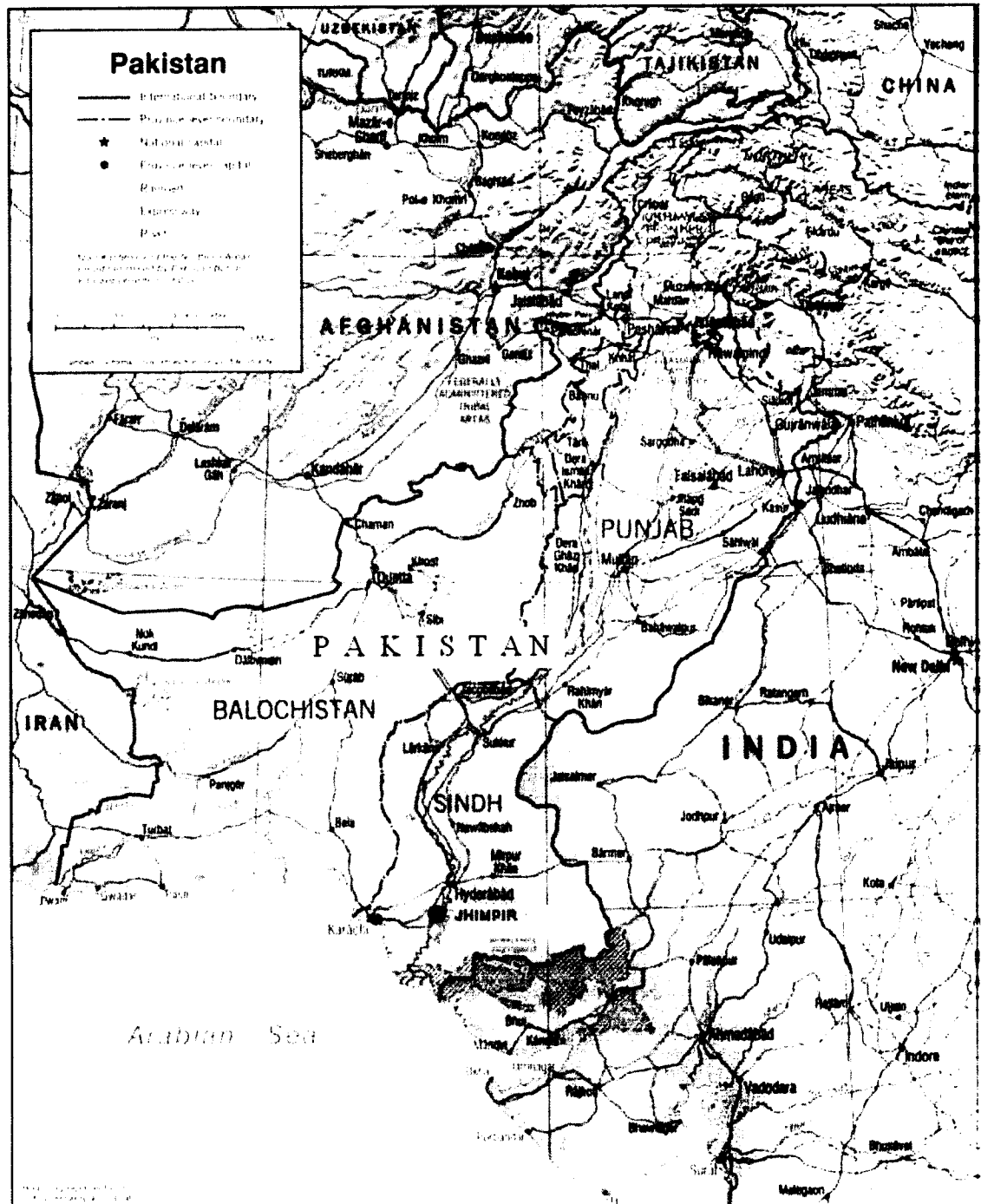
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**Revised/Modified**  
**SCHEDULE-I**

The Location, Size (i.e. Capacity in MW), Type of Technology,  
Interconnection Arrangements, Technical Limits,  
Technical/Functional Specifications and other details specific to  
the Generation Facility of  
the Licensee are described in this Schedule.

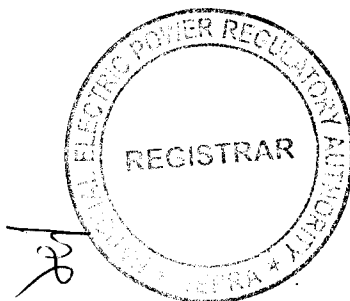


Location of the  
Generation Facility/Wind Power Plant/  
Wind Farm





Location of the  
Generation Facility/Wind Power Plant/  
Wind Farm

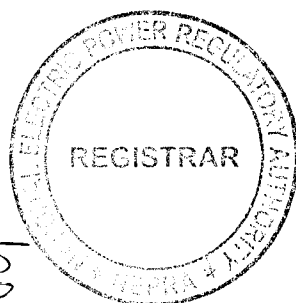


## Location Coordinates of the Generation Facility/Wind Power Plant/ Wind Farm

Site Coordinates					
Ref Point	Area	Easting (m)	Northing (m)	Latitude	Longitude
01	69 acres	385103.7206	2759226.42	24.94398226	67.86195921
02		384891.1821	2759137.244	24.94316854	67.86085221
03		386125.53	2757588.52	24.92926999	67.87221326
04		386226.4171	2757701.727	24.93029989	67.87322278

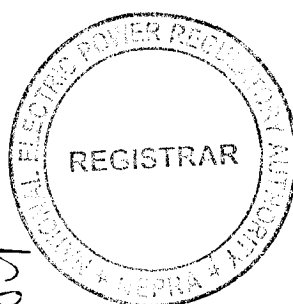
Site Coordinates					
Ref Point	Area	Easting (m)	Northing (m)	Latitude	Longitude
01	66 acres	384915.3395	2759481.798	24.94627389	67.86007238
02		384802.0389	2759395.497	24.94548605	67.85895748
03		383667.6164	2760944.337	24.95938449	67.84759257
04		383775.7397	2761026.684	24.96013641	67.84865657

Site Coordinates					
Ref Point	Area	Easting (m)	Northing (m)	Latitude	Longitude
01	62.34 acres	382349.98	2762743.32	24.97552634	67.83438894
02		382446.8374	2762828.218	24.97630042	67.83534117
03		383590.3659	2761277.996	24.96239127	67.84679936
04		383477.8813	2761203.384	24.96170894	67.84589151

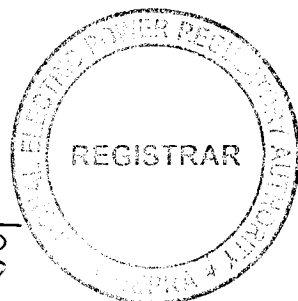
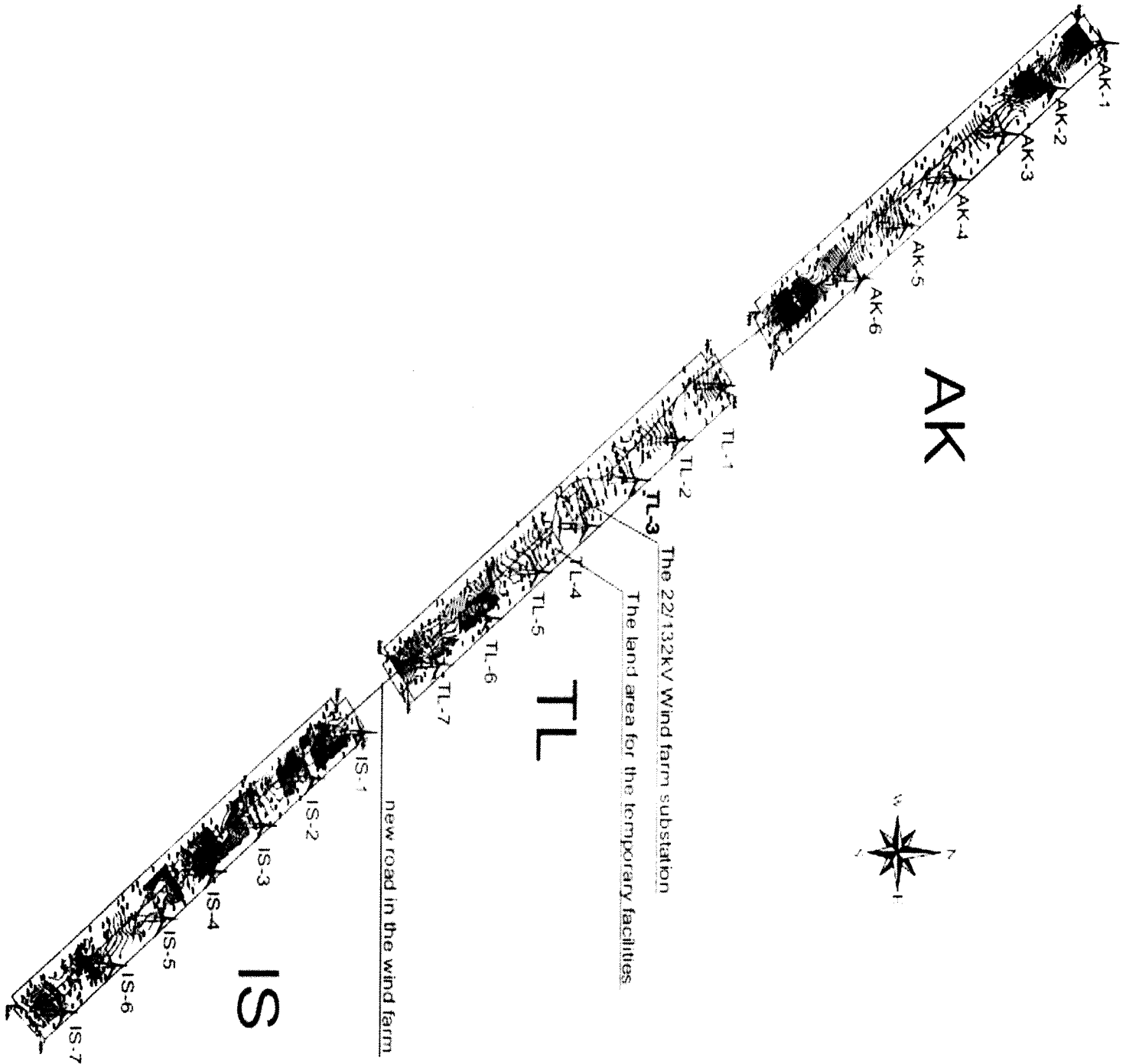


Micro-Sitting of the  
Generation Facility/Wind Power Plant/  
Wind Farm

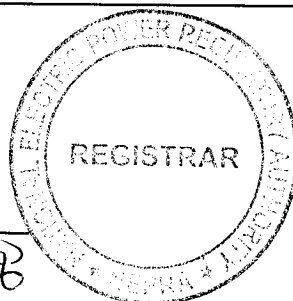
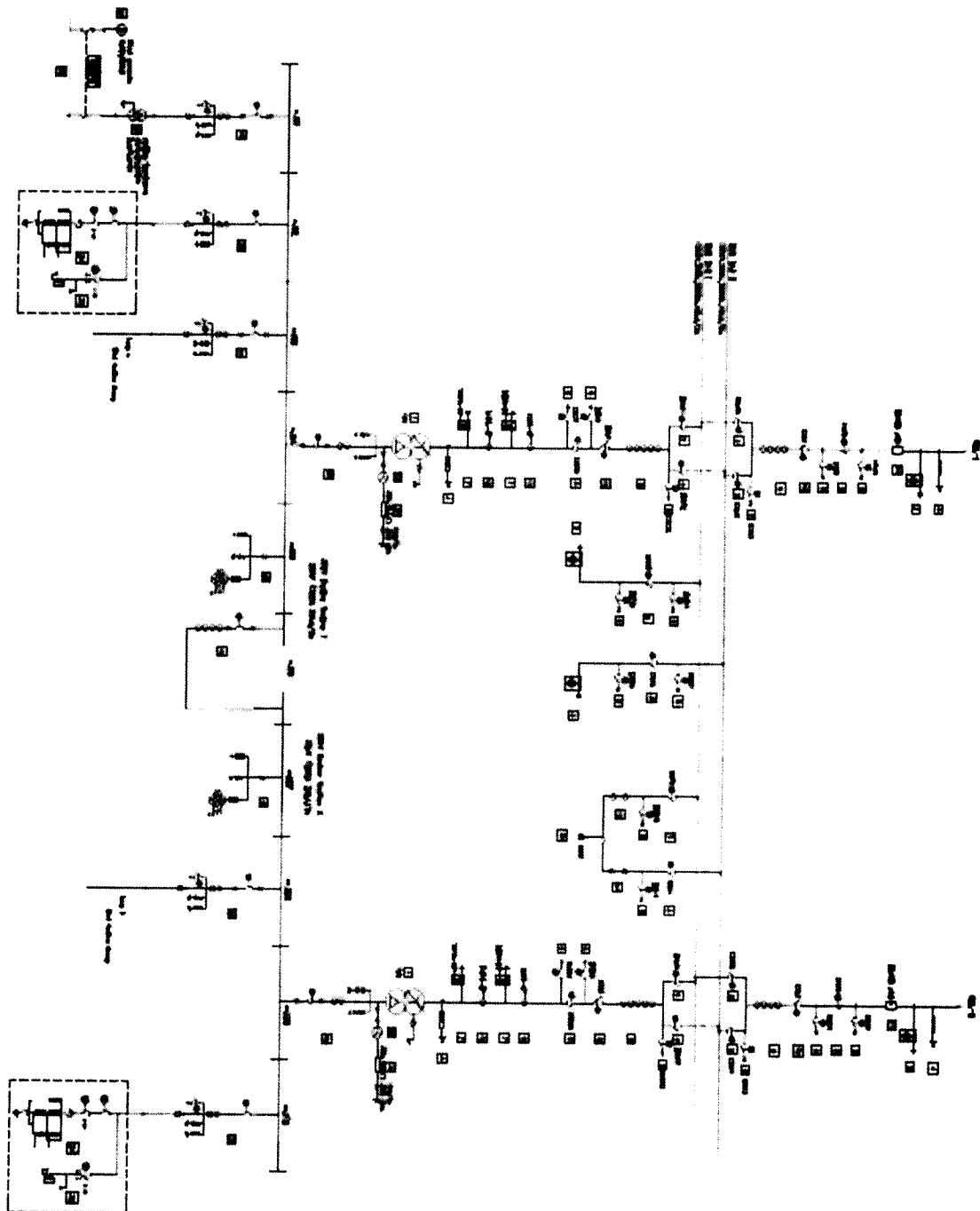
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382609.6	2762497
382786.9	2762255
382964.2	2762013
383141.4	2761771
383307.2	2761621
383796	2760824
383942.7	2760707
384119.9	2760465
384297.2	2760223
384474.5	2759981
384651.7	2759739
384829	2759497
385088.8	2759131
385266.1	2758889
385443.3	2758647
385620.6	2758405
385797.9	2758163
385975.2	2757921
386152.4	2757679



Micro-Sitting of the  
Generation Facility/Wind Power Plant/  
Wind Farm



Single line Diagram (Electrical) of the  
Generation Facility/Wind Power Plant/  
Wind Farm



**Interconnection**  
**Arrangement/Transmission Facilities for Dispersal of**  
**Power from the Generation Facility/Wind Power**  
**Plant/Wind Farm of Tapal Wind Energy (Pvt.) Limited**  
**(TWEPL)**

The power generated from the Generation Facility/Wind Power Plant (WPP)/Wind Farm (WF) of TWEPL shall be dispersed to the load center of HESCO.

(2). The proposed Interconnection Arrangement/Transmission Facilities for dispersal will consist of the following:-

(a). The Generation facility of TWEPL would be connected by looping in-out Jhampir-FINA-Thatta 132kV circuit at substation of TWEPL. In this arrangement, TWEPL would be connected to Thatta on one end and FINA WPP at the other end

(3). The scheme of interconnection of TWEPL proposes the following reinforcement already in place in Jhampir cluster by 2014:

(a). 220/132 kV Jhampir-New collector substation at suitable location in Jhampir cluster;

(b). 75 Km Long 132 kV double circuit from Jhampir-New collector substation to T.M Khan 132 kV Substation.

(c). 120 Km long 220 kV double circuit from NTDC Gharo to T.M Khan Road 220 kV substation in Hyderabad, which is in-out at Jhampir-New 220/132 kV substation.

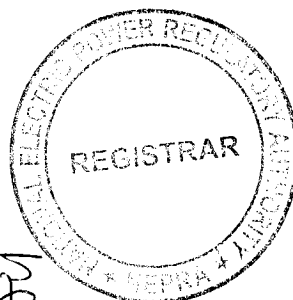
(d). 132 kV D/C from Gharo cluster to Thatta (55 Km) using Greeley conductor constructed from the first wind farm in Gharo cluster.

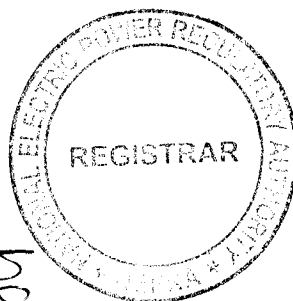
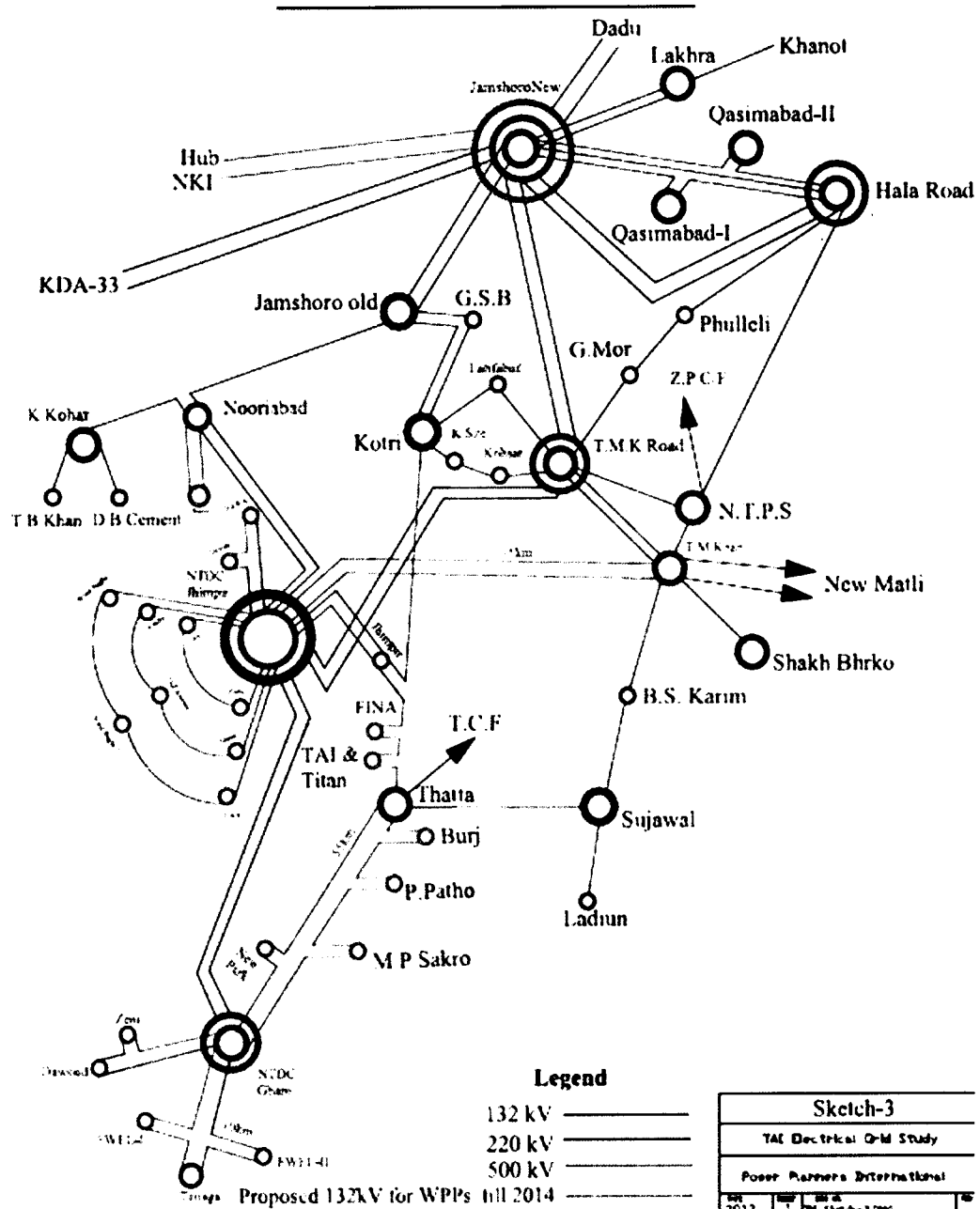
(e). 220/132kV NTDC Gharo substation at suitable location in Gharo cluster that may be constructed in stages for 132 kV and 220 kV levels

depending on the respective quantum of wind power going to be added in this cluster.

- (f). Reconductoring of Nooriabad - Jamshoro Old 132 kV single circuit with Greeley Conductor.

(4). Any change in the above mentioned Interconnection Arrangement/Transmission Facilities duly agreed by TWEPL, NTDC and HESCO, shall be communicated to the Authority in due course of time.







## Detail of Generation Facility/Wind Power Plant/ Wind Farm

### (A). General Information

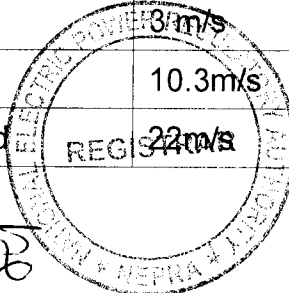
(i).	Name of Applicant/ Company	Tapal Wind Energy (Pvt.) Ltd.
(ii).	Registered/Business Office	2 <sup>nd</sup> Floor, Ameejee Chamber, Campbell Street, Karachi.
(iii).	Plant Location	Jhampir, Near Nooriabad, District Thatta, Sindh.
(iv).	Type of Generation Facility	Wind Power Plant

### (B). Wind Farm Capacity & Configuration

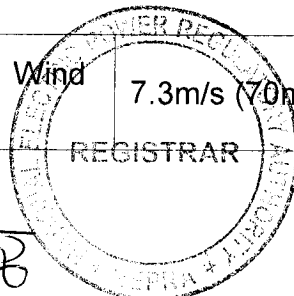
(i).	Wind Turbine type, Make & Model	Goldwind Permanent Magnet Direct Drive GW82/1500
(ii).	Installed Capacity of Wind Farm (MW)	30.00 MW
(iii).	Number of Wind Turbine Units/Size of each Unit (MW)	20 x 1.50 MW

### (C). Wind Turbine Details

(a).	<u>Wind Turbine</u>	
(i).	Quantity	20 Each
(ii).	Rated Power	1.50 MW
(iii).	Number of Blades	3 Each
(ii).	Diameter of Blades	82 Meter
(iv).	Rotor Swept Area	5390 Meter <sup>2</sup>
(v).	Cut-in Wind Speed	3 m/s
(vi).	Rated Wind Speed	10.3 m/s
(vii).	Cut-out Wind Speed	22 m/s



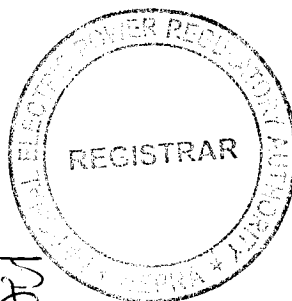
(viii).	Survival Wind Speed	52.5 m/s
(ix).	Hub Height	70Meter
(x).	Rotational Speed	9-17.3 r.p.m.
(b).	<b><u>Generator</u></b>	
(i).	Generator Capacity	1500kW
(ii).	Power Factor of Generators	0.95 Leading to 0.95 Lagging
(iii).	Rated Voltage	620V
(c).	<b><u>Compact Pre Fabricated Substation</u></b>	
(i).	Quantity	20Each
(ii).	Voltage Level	33kV $\pm$ 2x2.5%/0.62kV
(d).	<b><u>132kV Substation</u></b>	
(i).	Main Transformer	2 Each
(ii).	Type	132/33kV, 25/31.5 MVA ONAN/ONAF, 132 kV $\pm$ 8x1.25%/33kV
(e).	<b><u>WTGs Foundation</u></b>	
(i).	Quantity	20Each
(ii).	Type	Reinforced concrete foundation on Natural Ground
(iii).	Natural Foundation Features	Highly-weathered limestone, moderately - weathered limestone, highly weathered sandy shale bed
(f).	<b><u>Compact Pre Fabricated Substation Foundation</u></b>	
(i).	Quantity	20Each
(ii).	Type	Reinforced concrete foundation on Natural Ground
(iii).	Natural Foundation Features	Highly-weathered limestone, moderately - weathered limestone, highly weathered sandy shale bed
(g).	<b><u>Wind Resource</u></b>	
(i).	Annual Average Wind Speed	7.3m/s (70m height)



(ii).	Prevailing Winds	WSW
(iii).	Annual Expected Energy	81.47GWh

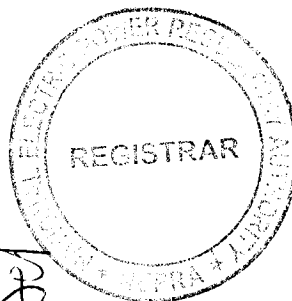
**(D). Other Details**

(i).	Expected COD of the generation facility	June 30, 2015
(ii).	Expected useful Life of the generation facility from the COD	20 Years

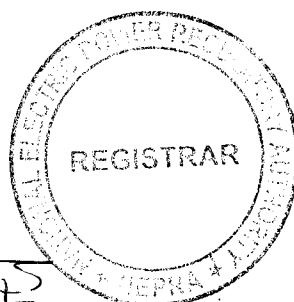
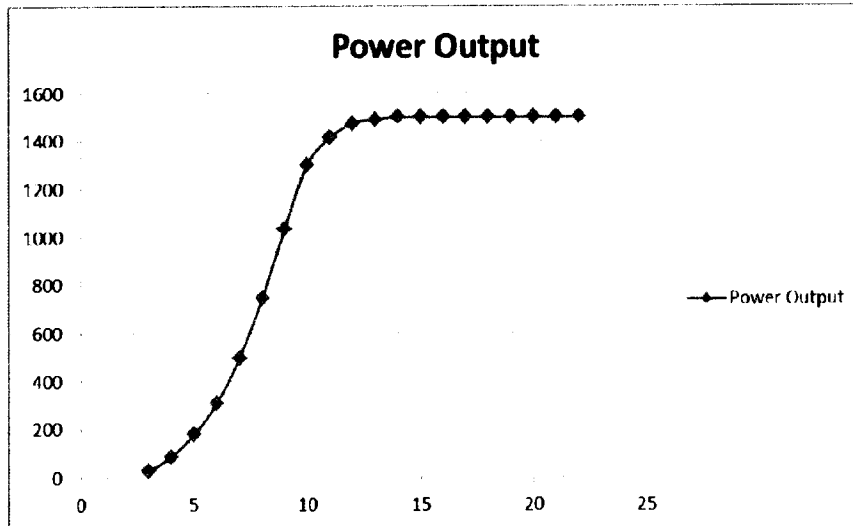


**Power Curve of Wind Turbine Generator**  
**(GW82/1500 @ 1.225 Kg/m<sup>3</sup>)**  
**Tabular**

Wind Speed at Hub Height(m/s)	Power Output(kW)
3	28
4	89
5	181
6	309
7	497
8	744
9	1035
10	1302
11	1414
12	1475
13	1491
14	1500
15	1500
16	1500
17	1500
18	1500
19	1500
20	1500
21	1500
22	1500



**Power Curve of Wind Turbine Generator**  
**(GW82/1500 @ 1.225 Kg/m<sup>3</sup>)**  
**Graphic**



**Revised/Modified**  
**SCHEDULE-II**

The Total Installed/Gross ISO Capacity (MW), Total Annual Full Load Hours, Average Wind Turbine Generator (WTG) Availability, Total Gross Generation of the Generation Facility/Wind Farm (in GWh), Array & Miscellaneous Losses (GWh), Availability Losses (GWh), Balance of Plant Losses (GWh) and Annual Energy Generation (GWh) of the Generation Facility /Wind Farm of Licensee is given in this Schedule



## SCHEDULE-II

(1).	Total Installed Gross ISO Capacity of the Generation Facility /Wind Farm (MW/GWh)	30.00 MW
(2).	Total Annual Full Load Hours	2715.6Hrs
(3).	Average Wind Turbine Generator (WTG)Availability	95%
(4).	Total Gross Generation of the Generation Facility/Wind Power Plant/Wind Farm (in GWh)	97.2GWh
(5).	Array & Miscellaneous Losses GWh	7.93 GWh
(6).	Availability Losses GWh	4.61GWh
(7).	Balance of Plant Losses GWh	3.23 GWh
(8).	Annual Energy Generation (20 year equivalent Net Annual Energy Production-AEP) GWh	81.47GWh
(9).	Net Capacity Factor	31.00%

### Note

All the above figures are indicative as provided by the Licensee. The Net energy available to Power Purchaser for dispatch will be determined through procedures contained in the Energy Purchase Agreement.

