# 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/LAG-260/6239-44 April 24, 2015

Lt General (Rtd) Hamid Rab Nawaz
Chief Executive Officer
NBT Wind Power Pakistan III (Pvt.) Limited
D-94, B-Street, 5th Avenue,
Block 5, Kehkashan, Clifton
Karachi

Subject: **Modification-I in Generation Licence No. WPGL/27/2014 — NBT Wind Power Pakistan III (Pvt.) Limited (NBTWPPPL-III)**

*Reference: Your letter No. NBT/21/NEPRA-NBT-III, dated December 22, 2014*

It is intimated that the Authority has approved "Licensee Proposed Modification" in Generation Licence No. WPGL/27/2014 (issued on September 16, 2014) in respect of NBTWPPPL-III 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 NBTWPPPL-III along with Modification-I in the Generation Licence No. WPGL/27/2014, as approved by the Authority.

**Encl:/As above**

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24.04.15
**(Syed Safeer Hussain)**

Copy to:

1. Chief Executive Officer, Alternative Energy Development Board (AEDB), 2nd 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 NBT Wind Power Pakistan-III (Private) Limited

**April 22, 2015**
**Case No. LAG-260**

## (A). Background

**(i).** The Authority granted a Generation Licence (No. WPGL/27/2014 dated September 16, 2014) to NBT Wind Power Pakistan-III (Private) Limited (NBTWPPPL-III), 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 Deh Kohistan 7/1 Tappo Jhampir, District Thatta in the Province of Sindh, based on one hundred and fifty six (156) Wind Turbine Generators-WTGs, each of 1.60 MW of General Electric-G.E.

## (B). Communication of Modification

**(i).** NBTWPPPL-III 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 December 26, 2014.

**(ii).** In the "Text of the Proposed Modification", NBTWPPPL-III submitted that it intends to change WTG from G.E 1.6-82.5m to Gamesa-G97. Now, the project will be implemented with one twenty five (125) WTGs each of 2.00 MW. This will change the Installed Capacity to 250.00 MW instead of 249.60 MW.

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**(iii).** Regarding the "Statement of the Reasons in Support of the Modification", it was submitted that the sponsors are undertaking two projects namely NBTWPPPL-III and NBT Wind Power Pakistan-II (Private) Limited (NBTWPPPL-II). The total requirement of both projects was earlier envisaged to be three hundred and twelve (312) WTGs. The sponsors of the projects feel that due to stringent deadline for the Financial Close, it is very difficult to arrange WTGs from a single manufacturer/supplier. In view of the said, NBTWPPPL-III is proposing implementing the project with Gamesa G97 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", NBTWPPPL-III submitted that the proposed change of WTG will not have any adverse impact on the 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 NBTWPPPL-III, the Registrar accepted the LPM for further processing as stipulated in the Regulations.

**(ii).** The Registrar published the communicated LPM on January 10, 2015 in one (01) English and one (01) Urdu News Paper, informing the general public, interested/affected parties and other stakeholders about the communicated LPM 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 entities were invited to assist the Authority by submitting their views and comments in the matter.

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## (D). Comments of Stakeholders

**(i).** In reply to the above, the Authority received comments of from four (04) stakeholders. These included Karachi Shipyard and Engineering Works Limited (KSY&EWL), Pakistan Council of Renewable Energy Technologies (PCoRET), Central Power Purchasing Agency (CPPA) of National Transmission and Despatch Company Limited (NTDC) and Ministry of Science and Technology (MoST). The salient points of the comments offered by KSY&EWL are summarized in the following paragraphs: -

**(a).** KSY&EWL expressed its no objection for the communicated LPM. However, KSY&EWL expressed that its facilities are capable of manufacturing tower. Therefore, NBTWPPPL-III may considerer its facilities for the same;

**(b).** PCoRET communicated its no objection for the communicated LPM. Further, PCoRET stated that it could not comment on the financial or other aspects of the Project or its communicated LPM;

**(c).** CPPA remarked that the sponsors should have opted for Gamesa-G114 (2.00 MW) WTG which is reported to have a 20% higher yield as compared to the Gamesa-G97(2.00 MW). CPPA emphasized that the proposed Gamesa-G97(2.00 MW) WTG must comply with the relevant provisions of the Grid Code in vogue. Despite the said, CPPA supported the communicated LPM of NBTWPPPL-III; and

**(d).** MoST endorsed the comments of PCoRET as explained above.

**(ii).** The Authority examined the above comments of the stakeholders and generally found the same in favor of the communicated LPM. However, the Authority observed that KSY&EWL, PCoRET and CPPA had raised certain which required clarification for NBTWPPPL-III. In view of the said, the Authority decided seeking perspective of NBTWPPPL-III on the comments of the above

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stakeholders.

**(iii).** In its rejoinder on the observations of KSY&EWL, it was submitted that the project is being executed through the Engineering, Procurement and Construction for installing Gamesa WTGs. Although, it is difficult to guarantee at this stage however, maximum effort will be made to use the indigenous available resources and facilities including KSY&EWL. On the comments of PCoRET, it was clarified that the Authority had granted it 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 this, the change of WTG will not have any impact on the cost of the project. Regarding the observations of CPPA, the project company i.e. NBTWPPPL-III, submitted that proposed Gamesa WTG (of G97/2.00 MW) has been selected as the same are readily available. However, if suggestion of CPPA is considered and the project is implemented using Gamesa WTG (of G114/2.00 MW) then considering the lead time for these WTGs, it will not be possible to adhere to the tight timelines of the project for Financial Close etc. NBTWPPPL-III confirmed that the proposed WTG will comply with the provisions of the Grid Code in vogue.

**(iv).** The Authority considered the above submissions of NBTWPPPL-III and found the same appropriate. Accordingly, 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 NEPRA Act or the rules or regulations made pursuant to the NEPRA Act; (c). is or is likely to be beneficial to the consumers; (d). is reasonably necessary for the licensee to effectively and

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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/27/2014 dated September 16, 2014) is with an installed capacity of 249.60 MW (consisting of 156 x 1.60 MW WTGs of General Electric-GE). Whereas, now NBTWPPPL-III intends to install 125 x 2.00 MW WTGs of Gamesa G97. In view of the said, the total Installed Capacity of the Generation Facility/WPP/WF will be changed to 250.00 MW from 249.60 MW. The Authority has observed that the proposed Gamesa (G97/2.00) WTG has the same class as that of GE/1.6 (i.e. IEC-III Class). Because, both the G97/2.00 MW and GE /1.6 MW xle 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. Further, the already planned interconnection Scheme and the surrounding transmission network would be sufficient to evacuate the additional 0.40MW.

**(iii).** About the Impact on Tariff of the communicated LPM, as explained at Para D(iii) above, the Authority had granted an Up-Front Tariff to NBTWPPPL-III 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, the Authority is convinced 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 NBTWPPPL-III/the 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/27/2014 dated September 16, 2014) in the name of NBTWPPPL-III 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

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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

23.4.15.

Khawaja Muhammad Naeem
Member

23/4/15

Maj. (R) Haroon Rashid
Member/Vice Chairman

24/4/15

Brig. (R) Tariq Saddozai
Chairman

24/4/15

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24.04.15

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

## GENERATION LICENCE
## No. WPGL/27/2014

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 NBT WIND POWER PAKISTAN-III (PRIVATE) LIMITED (issued on September 16, 2014 and expiring on January 30, 2037), 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 may be read as 250.00 MW instead of 249.60MW;

(ii). The validity date of the Generation Licence will remain unchanged (i.e. on January 30, 2037);

(iii). Changes in Articles of the Generation Licence attached as Revised/Modified Articles of the 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 24th of **April Two Thousand & Fifteen.**

**Registrar**

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## 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 ($CO_2$) 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;

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(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 NBT Wind Power Pakistan III (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;

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(p). "Regulation" means "the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999" as amended or replaced from time to time;

(q). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000";

(r). "Wind Farm" means "a cluster of Wind Turbine Generators (WTGs) in the same location used for production of electric power";

(s). "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;

(t). "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.

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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 original date of its issuance (i.e. September 16, 2014) 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 apply for renewal of the Licence within ninety (90) days prior to the expiry of the term of the Licence, as stipulated in the Regulations.

## 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

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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 220 KV grid station. The up-gradation (step up) of generation voltage up to 220 KV will be the responsibility of the Licensee.

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## 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.

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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.

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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.

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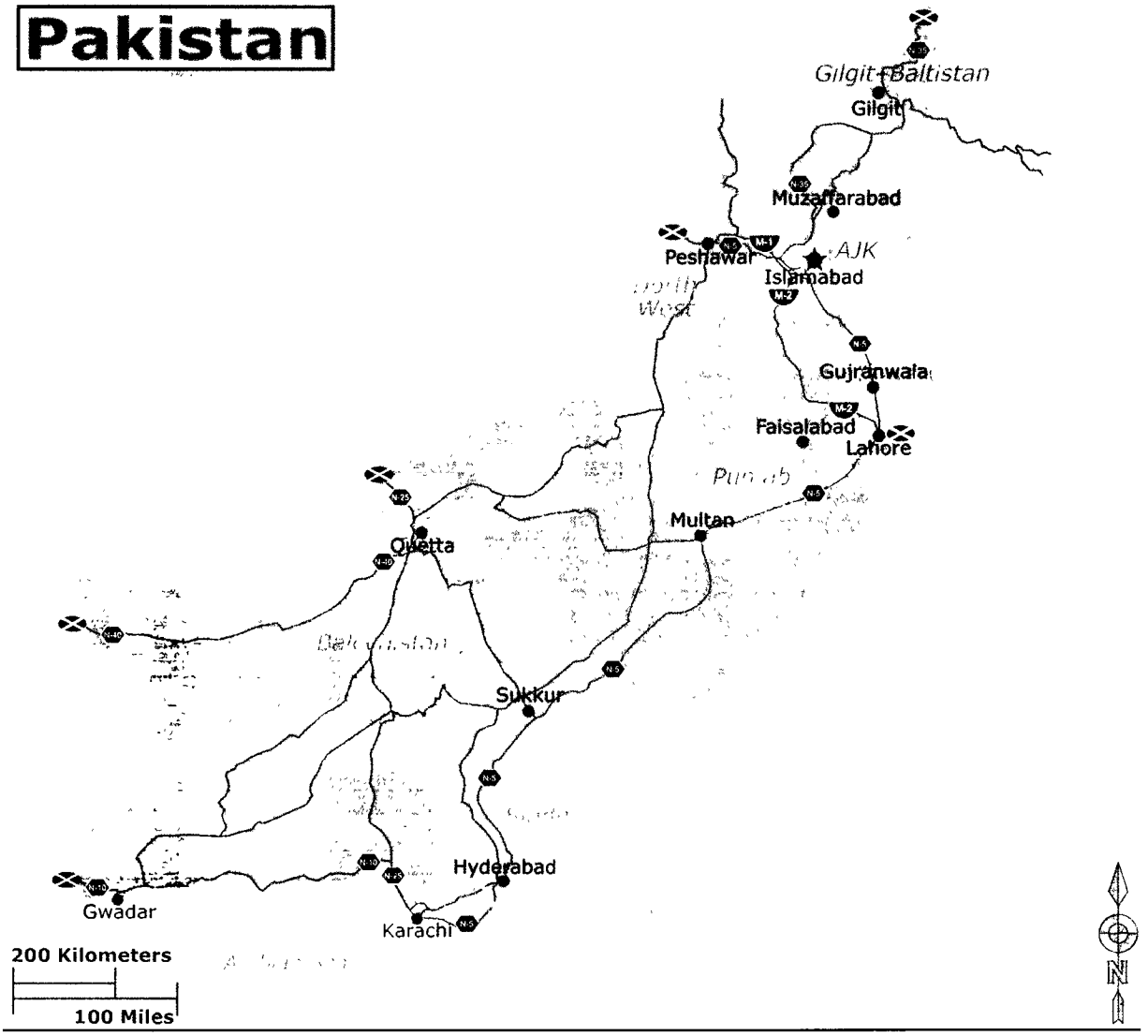
# Location of the Generation Facility/ Wind Farm

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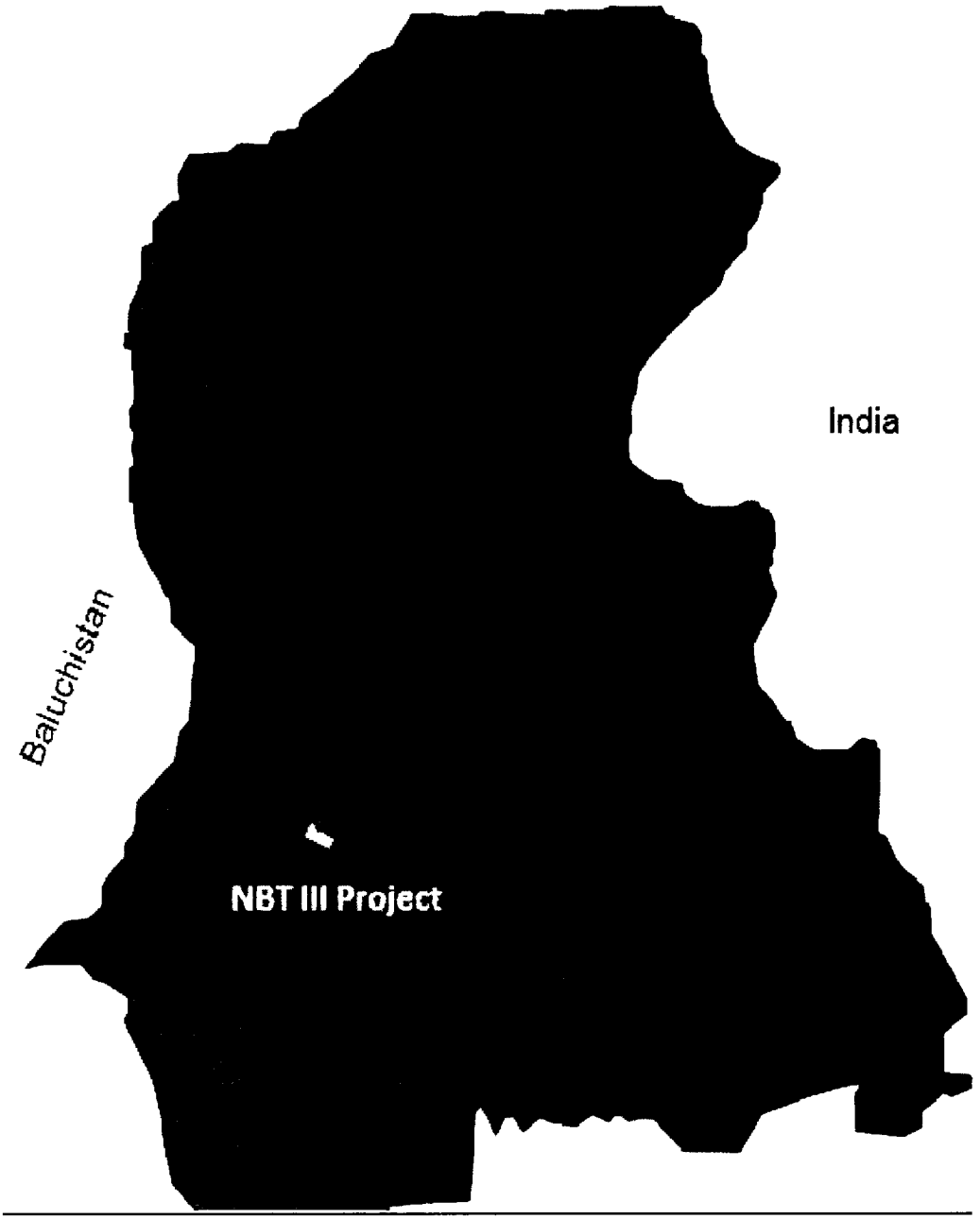
# Location of the Generation Facility/ Wind Farm

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# Land Co-ordinates of the Generation Facility/ Wind Farm

| ID | UTM WGS84 Z42 | |
|---|---|---|
| | X | Y |
| 1 | 399992 | 2808167 |
| 2 | 400995 | 2806256 |
| 3 | 401263 | 2805829 |
| 4 | 401675 | 2805641 |
| 5 | 402595 | 2804999 |
| 6 | 405132 | 2805000 |
| 7 | 405134 | 2805431 |
| 8 | 408767 | 2802861 |
| 9 | 405770 | 2798567 |
| 10 | 395670 | 2804371 |
| 11 | 399100 | 2809702 |
| 12 | 399741 | 2809249 |
| 13 | 399706 | 2809051 |

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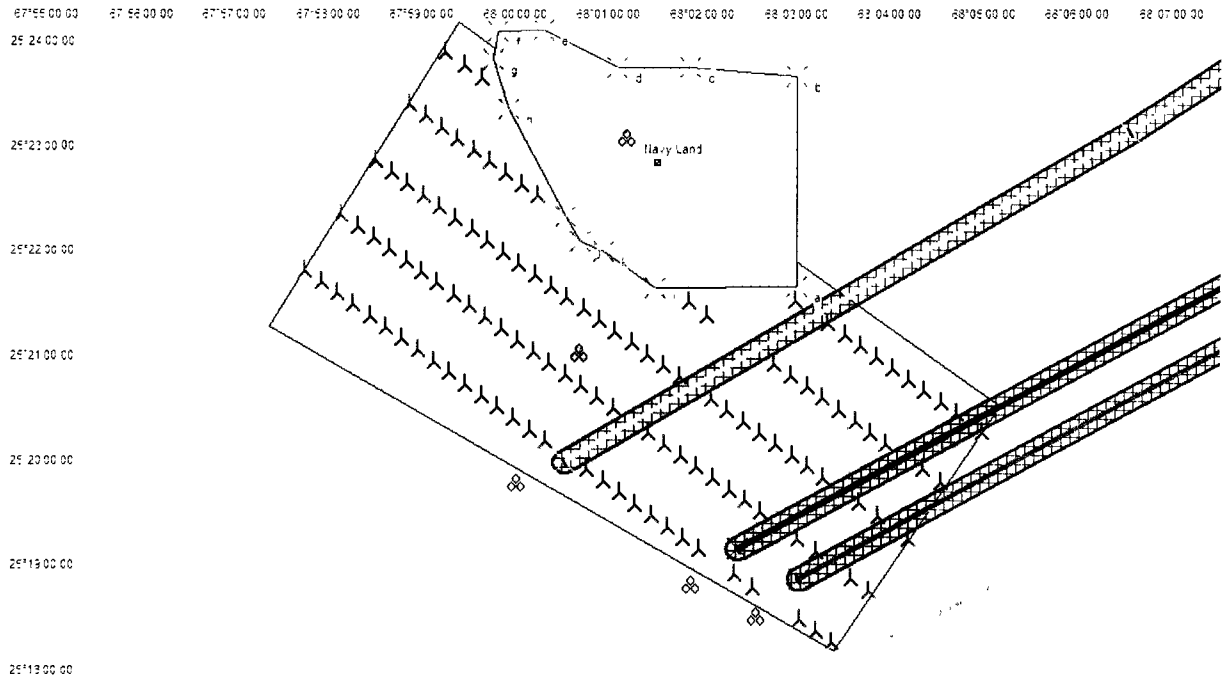
# Micro-Sitting of the Generation Facility/ Wind Farm

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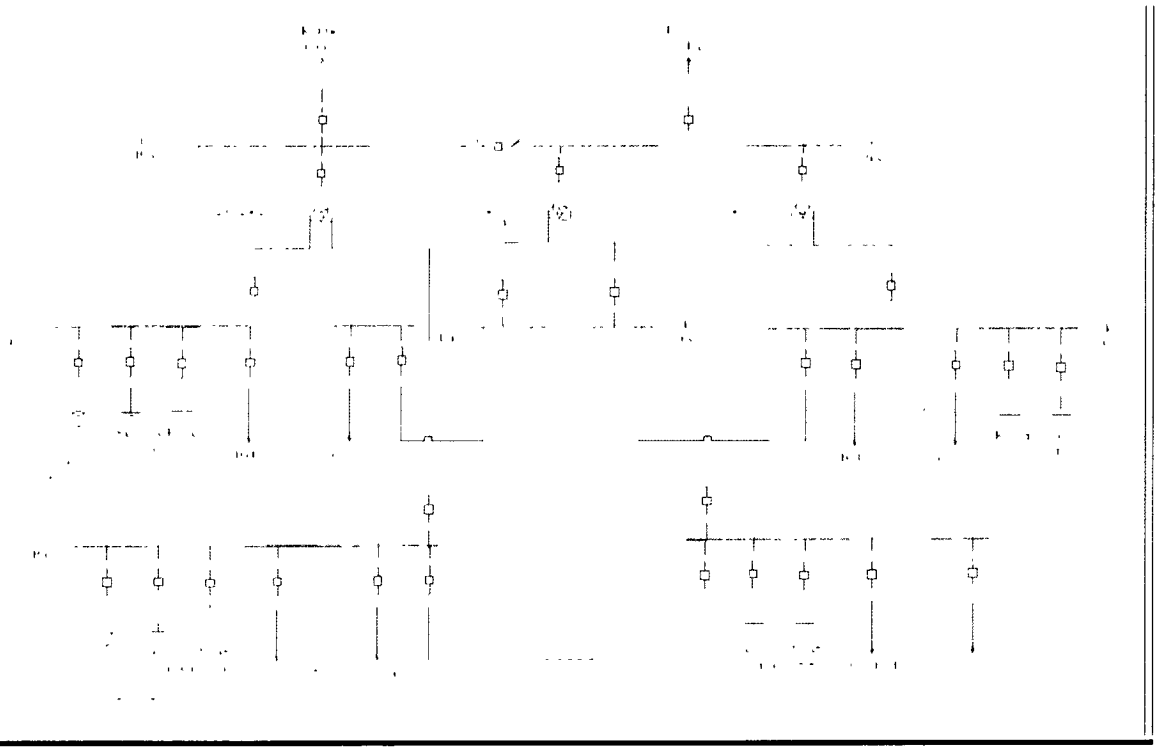
# Single Line Diagram of Electrical System of the Generation Facility/ Wind Farm



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# Interconnection Arrangement/Transmission Facilities for Dispersal of Power from the Generation Facility/Wind Power Plant/Wind Farm of NBT Wind Power Pakistan III (Pvt.) Limited (NBTWPPPL-III)

The power generated from the Generation Facility/Wind Power Plant/Wind Farm of NBTWPPPL-III shall be dispersed to the load center of HESCO.

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

(a). The Generation facility of NBTWPPPL-III will be connected by Making an In-Out of one circuit of 220 kV Double Circuit Jamshoro–KDA-33 Transmission Line;

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

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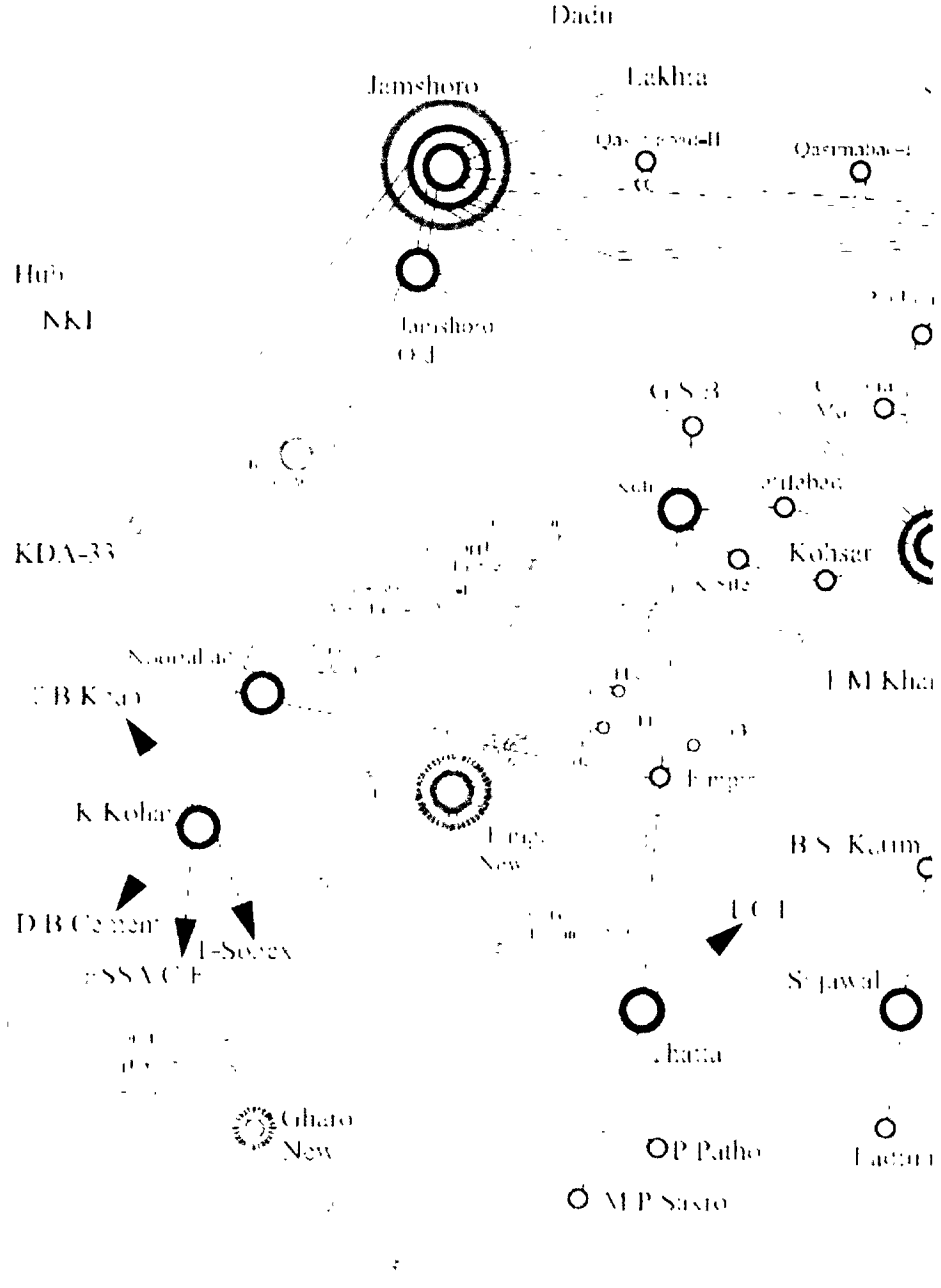
# Schematic Diagram for Interconnection/Transmission Arrangement for Dispersal of Electric Power from the Generation Facility/Wind Power Plant/Wind Farm of the Licensee




**Legend**

| | Existing | Proposed |
|---|---|---|
| 132 kV | ——— | - - - - - |
| 220 kV | ——— | - - - - - |
| 500 kV | - - - - | |

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

## (A). General Information

| | | |
|---|---|---|
| (i). | Name of Company/Licensee | NBT Pakistan III (Pvt.) Limited |
| (ii). | Registered/Business Office | D-94, B Street, 5th Avenue, Block 5, Kehkashan Clifton, Karachi |
| (iii). | Location of the Generation Facility/Wind Farm | Deh Kohistan 7/1 Tappo Jhampir, District, in the Province of Sindh |
| (iv). | Type of Generation Facility | Wind Power |

## (B). Wind Farm Capacity & Configuration

| | | |
|---|---|---|
| (i). | Wind Turbine Type, Make & Model | Gamesa G97 |
| (ii). | Installed Capacity of Wind Farm (MW) | 250.00 MW |
| (iii). | Number of Wind Turbine Units/Size of each Unit (KW) | 125 x 2.00 MW |

## (C). Wind Turbine Details

| | | |
|---|---|---|
| **(a).** | **Rotor** | |
| (i). | Number of blades | 3 |
| (ii). | Rotor speed | 9~19rpm |
| (iii). | Rotor diameter | 97m |
| (iv). | Swept area | 7389.8$m^3$ |
| (v). | Power regulation | Pitch control and variable speed. |
| (vi). | Cut-in wind speed | 3m/s |
| (vii). | Cut-out wind speed | 25m/s |

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| | | |
|---|---|---|
| (viii) | Survival wind speed | 37.5m/s(10min) |
| (ix) | Pitch regulation | Hydraulic |
| **(b).** | **Blades** | |
| (i). | Blade length | 47.5m |
| (ii). | Material | Glass fiber reinforced with epoxy |
| **(c).** | **Gearbox** | |
| (i). | Type | 1 stage planetary and 2parallel |
| (ii). | Gear ratio | 1:106.8 |
| (iii). | Main shaft bearing | 2 spherical roller bearings |
| **(d).** | **Generator** | |
| (i). | Power | 2070kW |
| (ii). | Voltage | 690V |
| (iii). | Type | DFIG |
| (iv). | Enclosure class | IP54 |
| (v). | Coupling | Flexible coupling |
| (vi). | Power factor | -0.95~+0.95 |
| **(e).** | **Yaw System** | |
| (i). | Yaw bearing | Friction bearings |
| (ii). | Brake | 5 Active brake |
| (iii). | Yaw drive | 4x2.5Kw motors |
| (iv). | Speed | 0.42Degree/s ; 1 turn every 15 min |
| **(f).** | **Control System** | |
| (i). | Type | PLC |
| (ii). | Scope of monitoring | Wind speed data, pitch control, yaw control, internal temperature control, remote control |

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| | | |
|---|---|---|
| (iii). | Recording | WTG operation data |
| **(g).** | **Brake** | |
| (i). | Design | Aerodynamic brake and Mechanical brake |
| (ii). | Operational brake | Aerodynamic brake |
| (iii). | Secondary brake | Mechanical brake in High speed shaft |
| **(h).** | **Tower** | |
| (i). | Type | Trunk-conical tubular |
| (ii). | Hub heights | 78m |

## (D). Other Details

| | | |
|---|---|---|
| (i). | Expected COD of the generation facility/Wind Farm | January 31, 2017 |
| (ii). | Expected useful Life of the generation facility/Wind Farm from the COD | 20 Years |

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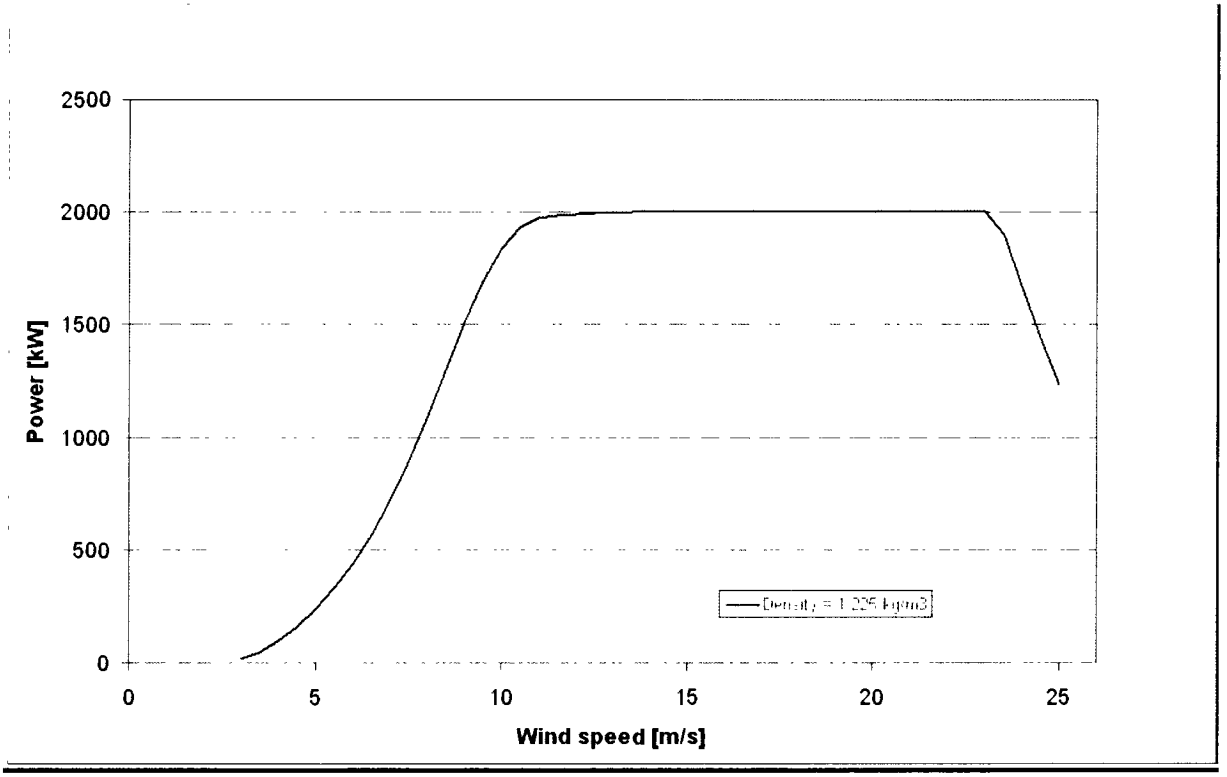
# Power Curve of Wind Turbine Generator (Gamesa G97) Graphic

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# Power Curve
# of Wind Turbine Generator-WTG (Gamesa G97)
# Tabular
# [At Air Density of 1.225kg/m3]

| Wind Speed (m/s) | Electric power [KW] |
|---|---|
| 3 | 14 |
| 4 | 94 |
| 5 | 236 |
| 6 | 438 |
| 7 | 714 |
| 8 | 1084 |
| 9 | 1508 |
| 10 | 1836 |
| 11 | 1973 |
| 12 | 1992 |
| 13 | 1998 |
| 14 | 2000 |
| 15 | 2000 |
| 16 | 2000 |
| 17 | 2000 |
| 18 | 2000 |
| 19 | 2000 |
| 20 | 2000 |
| 21 | 2000 |
| 22 | 2000 |
| 23 | 2000 |
| 24 | 1676 |
| 25 | 1234 |

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# 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

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# SCHEDULE-II

| | | |
|---|---|---|
| (1). | Total Installed Gross ISO Capacity of the Generation Facility /Wind Farm (MW/GWh) | 250.00MW |
| (2). | Total Annual Full Load Hours | 2875 Hrs |
| (3). | Average Wind Turbine Generator (WTG) Availability | 97.0 % |
| (4). | Total Gross Generation of the Generation Facility/Wind Farm (in GWh) | 896.0 GWh |
| (5). | Array & Miscellaneous Losses GWh | 96.64 GWh |
| (6). | Availability Losses GWh | 26.88 GWh |
| (7). | Balance of Plant Losses GWh | 54.66GWh |
| (8). | Annual Energy Generation (20 year equivalent Net AEP) GWh | 717.5 GWh |
| (9). | Net Capacity Factor | 32.8% |

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.

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