National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Ataturk Avenue(East), G-5/1, Islamabad
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Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/R/DL/LAG-202/ 6232-37

April 24, 2015

Mr. Nadeem Abdullah
Chief Executive Officer
Sapphire Wind Power Company Limited
212-Cotton Exchange Building,
I. I. Chundrigar Road,
Karachi

Subject: **Modification-I in Generation Licence No. WPGL/18/2012 — Sapphire Wind Power Company Limited (SWPCL)**

Reference: Your letter No. nil, dated November 19, 2014.

It is intimated that the Authority has approved "Licensee Proposed Modification" in Generation Licence No. WPGL/18/2012 (issued on July 27, 2012) in respect of SWPCL 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 SWPCL along with Modification-I in the Generation Licence No. WPGL/18/2012, 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 Sapphire Wind Power Company Limited

April 22, 2015
Case No. LAG-202

(A). Background

(i). The Authority granted a Generation Licence (No. WPGL/18/2012 dated July 27, 2012) to Sapphire Wind Power Company Limited (SWPCL), 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/Wind Farm is to be located at Jhampir, District Thatta, in the Province of Sindh, based on thirty three (33) Wind Turbine Generator-WTG, each of 1.50 MW of General Electric-GE.

(B). Communication of Modification

(i). SWPCL 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 November 21, 2014.

(ii). SWPCL in the "Text of the Proposed Modification" submitted that it had planned installing WTGs of GE (i.e. 33 x 1.5 MW xle). However, now a new Version/Model of the same class of WTG with a capacity of 1.6 MW is available. The sponsors of the project intends installing this new WT instead of the older Version/Model. Resultantly, the Project Installed Capacity will be increased to 52.80 MW (33 x 1.6 MW) from existing 49.50 MW. Regarding "Statement of the

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Reasons in Support of the Modification", SWPCL submitted that GE the Original Equipment Manufacturer (OEM), has informed that due to software upgrades, the overall Project design can be updated and developed with an inherent flexibility by seamlessly changing the WTG model from 33 x 1.5MW xle to 33 x 1.6MW xle thereby increasing the overall Project capacity to 52.8 MW. The enhancement in capacity will enable the Company/Licensee to operate the Project at its maximum available capacity thereby making the plant more efficient.

(iii). Regarding the "Statement of the Impact on the Tariff, Quality of Service (QoS) and the Performance by the Licensee of its Obligations under the Licence", SWPCL 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 SWPCL, the Registrar accepted the LPM for further processing.

(ii). The Registrar published the communicated LPM on December 16, 2014 in one English and one Urdu daily news papers, seeking comments of the general public and other stakeholders, in favor or against the communicated LPM.

(iii). Apart from the said notice in the press, separate letters were also sent to experts, government ministries and representative organization etc. inviting their views and comments in the matter.

(D). Comments of Stakeholders

(i). In reply to the above, the Authority received comments from of six (06) stakeholders. These included Central Power Purchasing Agency (CPPA) of National Transmission & Despatch Company Limited (NTDCL), Board of Investment (BoI), Directorate of Alternative Energy, Energy Department Govt. of Sindh (DoAEEDGoS), Pakistan Counsel of Renewable Energy Technologies,

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Ministry of Science and Technology Ministry (PCoRET) and Ministry of Water and Power (MoW&P).

(ii). The salient points of the comments offered by AEDB are summarized in the following paragraphs: -

(a). CPPA commented that a higher MW capacity of WTG i.e. 1.6 MW instead of the selected one (i.e. 1.5 MW-GE 1.50MW xle) would result into greater energy yield. Such an option would not require increase in the hub height besides occupying lesser wind farm space and complementing with other technological improvements in terms of efficiency and life of the WTGs. It is clarified that the already planned Interconnection Arrangement and the surrounding transmission network would be sufficient to evacuate the additional 3.3MW as a result of increase in total capacity from 49.5MW to 52.8MW. However, SWPCL needs to ensure that their proposed plant complies with the provisions of the Grid Code. Further, CPPA/NTDCL clarified that increase in the contract capacity should not result in increase in the payment slabs as finalized in the Energy Purchase Agreement (EPA). CPPA supported the modification in Generation Licence from 49.50 MW to 52.80MW Wind Power Project based on renewable energy technology;

(b). BoI remarked that tapping alternate sources for generation of power is dire need of the country. Being an investment promoting agency, BoI understands that affordable and smooth supply of energy is backbone for industrial growth as well as attracting FDI in the country. Therefore, BoI supports the LPM of SWPCL proposal subject to fulfillment of all codal and technical formalities in this regard;

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(c). DoAEEDGoS submitted that it is actively supporting the project sponsors for early development of environmental friendly and fuel free power project in line with the Renewable Energy (RE) policy. Keeping in view the current energy crisis in the country, the request of the sponsors for change in WTG is supported;

(d). PCoRET stated that contents of LPM have been examined and it has no objection on approval of LPM of SWPCL. However, PCoRET cannot comment on the financial or other TOR's of the project;

(e). MoS&T endorsed the above comments of PCoRET; and

(f). MoW&P commented that the Authority may process the request of the SWPCL as per provision of NEPRA Act, relevant rules, regulations and policy guidelines of the Govt.

(iii). The Authority examined the above comments of the stakeholders and found the same in favor of the communicated LPM except a few observations made by CPPA and PCoRET. In view of the said, the Authority decided seeking perspectives of SWPCL on the comments of the above stakeholders.

(iv). On the observations of CPPA, the sponsor company/SWPCL submitted that the proposed change of WTG will not increase the hub height and exercising this option will ensure technological improvements of the WTG. It is also confirmed that the proposed WTG will comply with the provisions of the Grid Code in vogue. SWPCL explained that the formulae and slabs for calculating the tariff will remain the same whereas the base number will be amended to reflect the revised Contract Capacity and the Authority is considering this matter separately as a request in this regard had already been made. 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

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cost of the project.

(v). The Authority considered the above submission of SWPCL 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 a 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 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/18/2012 dated July 27, 2012) is based on G.E. 1.5 MW (xle-82.5 Meter). Whereas, SWPCL now intends installing WTG of 1.6 MW (xle-82.5 Meter) of G.E. In this regard, the Authority has examined the technical data provided by SWPCL and has observed that the proposed WTG of 1.6 MW xle is an upgraded version of GE1.5xle machines for improved performance and output. The Authority has noted that the output power of the proposed new WTG is more than the earlier one. Further, the Authority has found that the proposed GE1.6xle WTG contains an upgraded version of machine control software (Wind SCADA) that makes it more efficient and productive having Enhanced Controls Technology (ECT) with Advanced Load Control (ALC) utilizing physics-based models & Estimator-model design. The benefits of ALC Includes (a). Rotor imbalance compensation, tower damping, and drive train damping (b). Addressing higher-order rotor harmonics,

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gain scheduling, power/loads optimization, resulting up to 20% fatigue loads reduction.

(iii). The Authority has examined the communicated LPM and has observed that despite increase in the size of the individual WTG from 1.50 MW to 1.60 MW, SWPCL is maintaining the quantity of the WTGs to thirty three (33) as per the original scheme. This will increase the Installed Capacity of the Generation Facility of SWPCL to 52.80 MW to 49.50 MW. In this regard, the Authority has examined the comments of NTDC confirming that the already planned interconnection Scheme and the surrounding transmission network would be sufficient to evacuate the additional 3.30MW.

(iv). In view of the above, the Authority is satisfied that the communicated LPM is reasonably necessary for SWPCL/the Licensee to effectively and efficiently perform its obligations under its Generation Licence. The communicated LPM will not adversely affect the performance of SWPCL/the Licensee of its obligations under the existing Generation Licence. Further, the communicated LPM will be beneficial to the consumers. In fact, the communicated LPM will ensure the continuous, safe and reliable supply of electric power to the Power Purchaser and consumers keeping in view the financial and technical viability of the licensee. The Authority has also examined the Impact of Tariff that the communicated LPM may have. In this regard, the Authority has observed that SWPCL/the Licensee was granted an Up-Front Tariff in terms of its determinations dated April 23, 2014 and May 02, 2014 which is equipment/technology neutral. Therefore, the Authority is satisfied that the communicated LPM of SWPCL /Licensee will not have any adverse impact on its existing Tariff. The Authority is convinced that SWPCL /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.

(v). Accordingly, the already granted Generation Licence (No. WPGL/18/2012 dated July 27, 2012) in the name of SWPCL is hereby modified. The changes in "Face Sheet", "Articles of the Generation Licence", "Schedule-I"

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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 and conditions of the Generation Licence and other applicable documents.

Authority

Himayat Ullah Khan
Member

Khawaja Muhammad Naeem
Member

Maj. (R) Haroon Rashid
Member/Vice Chairman

Brig. (R) Tariq Saddozai
Chairman

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24.04.15

National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE
No. WPGL/18/2012

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 Sapphire Wind Power Company Limited (issued on July 27, 2012 and expiring on December 30, 2033), to the extent of changes mentioned as here under:-

(i). the Installed Capacity of the Licensee/ Sapphire Wind Power Company Limited appearing on the Face Sheet of the Original Licence may be read as 52.80 MW instead of 49.50 MW;

(ii). The validity date of the Generation Licence may be read as November 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 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 Sapphire Wind Power Company 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 issue (i.e. July 27, 2012) 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 132 KV grid station. The up-gradation (step up) of generation voltage up to 132 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 The Licensee shall in addition to 13.1 above, 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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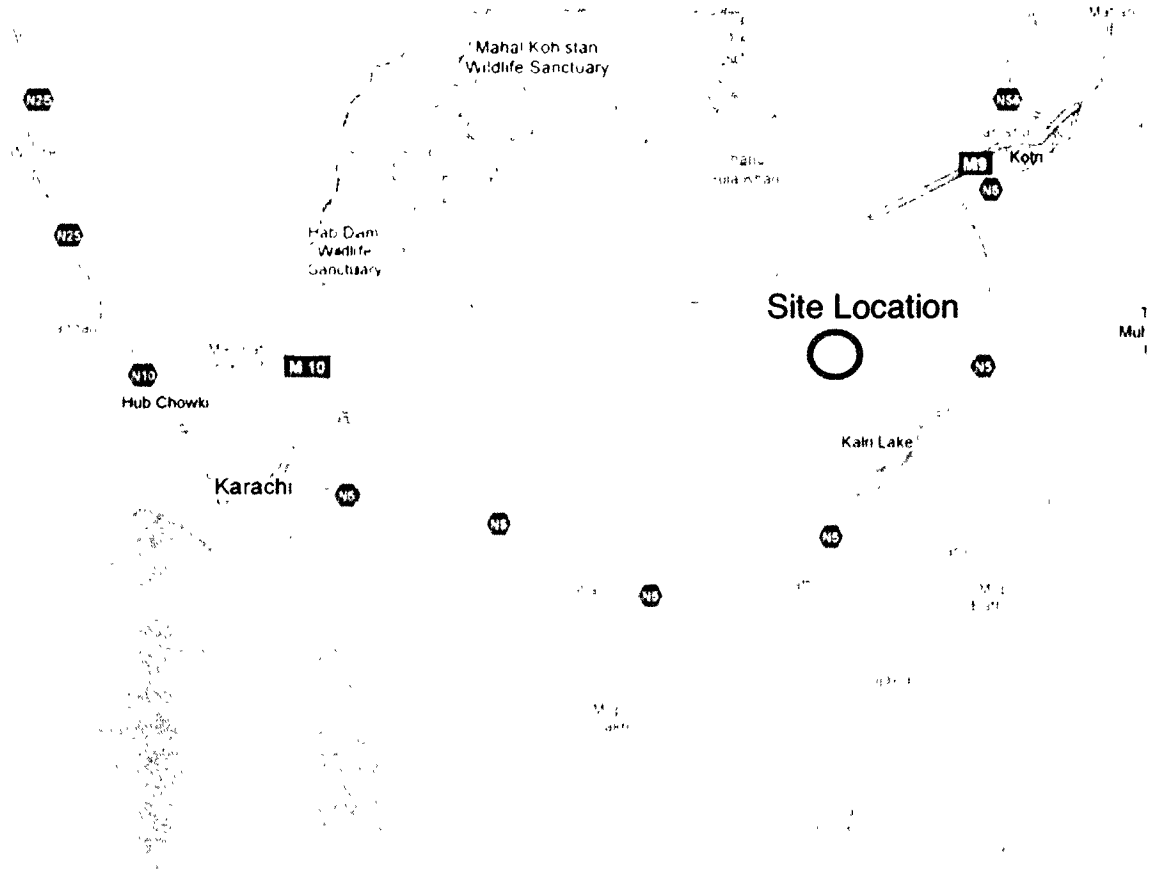
Location of the Generation Facility/ Wind Farm



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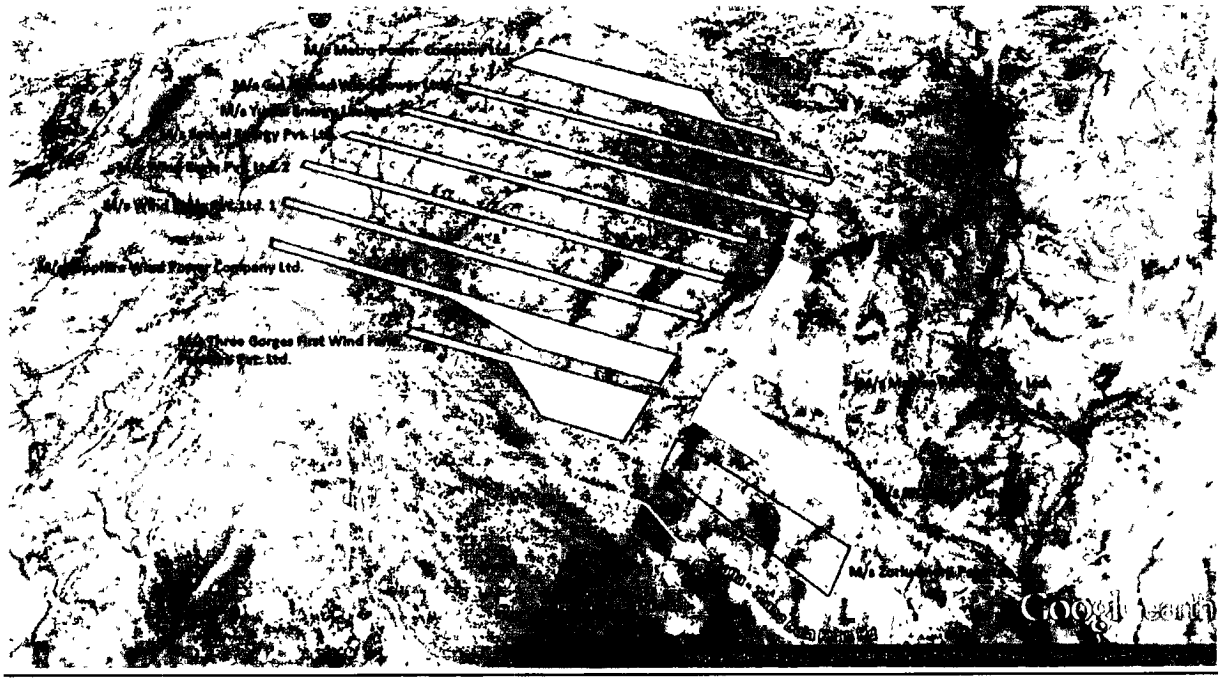
Layout of the Generation Facility/ Wind Farm



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Land Co-ordinates of the Generation Facility/ Wind Farm

Sr. No.	Longitude	Latitude
1.	25°07'18.40"	67°51'48.33"
2.	25°07'10.59"	67°51'48.03"
3.	25°06'20.95"	67°54'40.46"
4.	25°05'35.46"	67°56'01.05"
5.	25°05'03.55"	67°57'53.13"
6.	25°05'28.90"	67°58'08.95"

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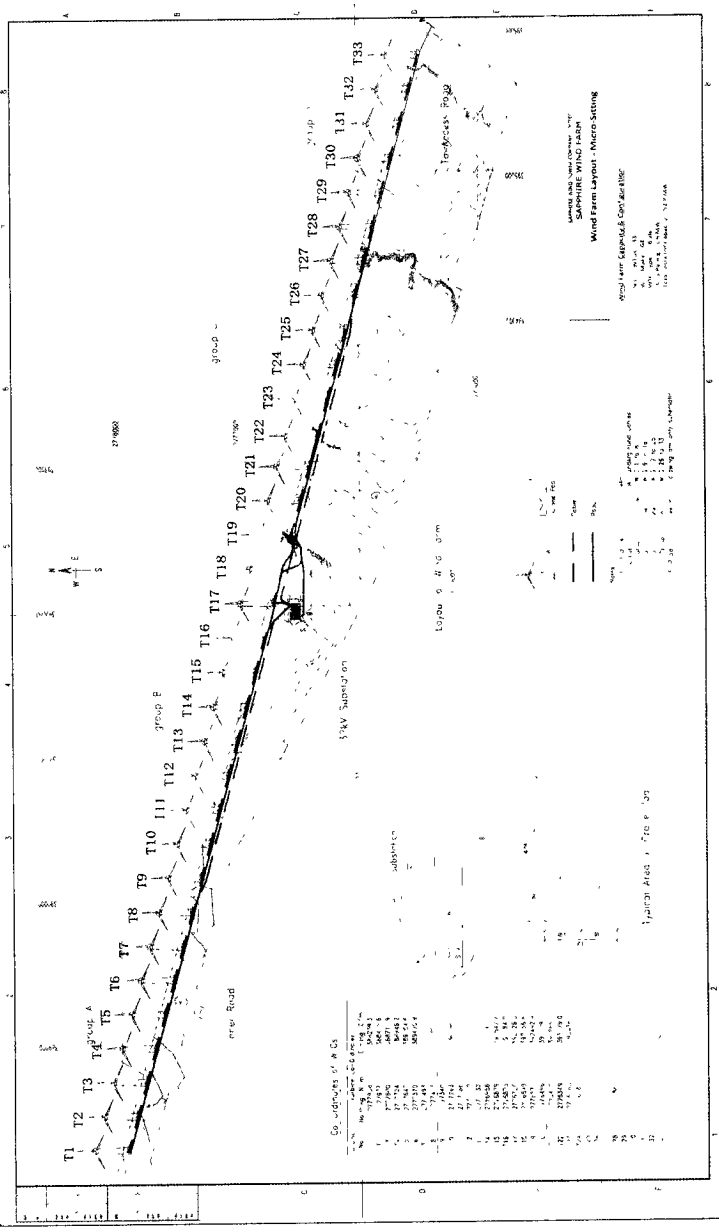
Micro-Sitting of the Generation Facility/ Wind Farm



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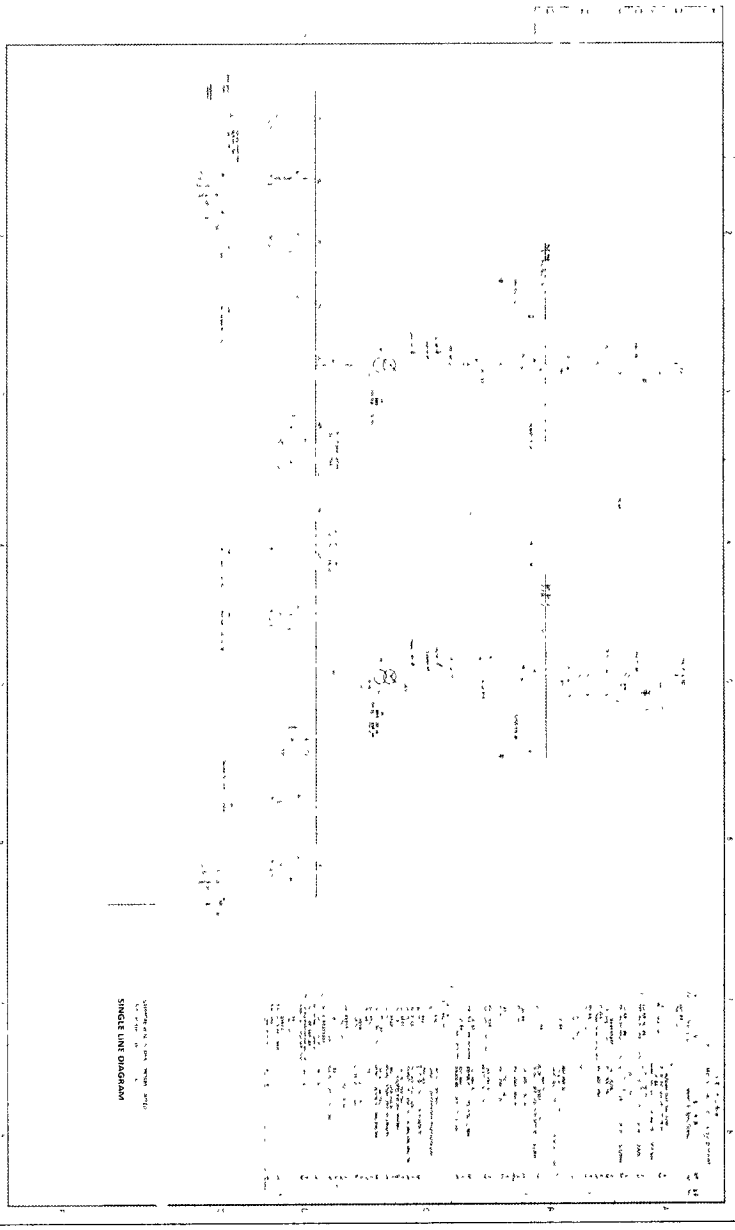
Single Line Diagram of Electrical System of the Generation Facility/ Wind Farm



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Interconnection Arrangement/Transmission Facilities for Dispersal of Power from the Generation Facility/Wind Power Plant/Wind Farm of the Licensee

The power generated from the Generation Facility/Wind Power Plant/Wind Farm of the Licensee shall be dispersed to the National Grid. The proposed Interconnection Arrangement/Transmission Facilities for dispersal of will consist of the following:-

(a). The initial connection between the substation of the Generation Facility/Wind Power Plant/Wind Farm of the Licensee and Grid Station of NTDC shall be through a Double Circuit In/Out arrangement of 132kV Transmission line from the substation of Three Gorges First Wind Farm Pakistan (Pvt.) Limited to the existing Jhimpir (Old);

(b). However, the ultimate arrangement will be through In/Out arrangement of 132kV a Double Circuit Transmission line from the Generation Facility/Wind Power Plant/Wind Farm of the Licensee to the Jhimpir-New (220kV collector substation) of NTDC.

(2). Any change in the above mentioned Interconnection Arrangement/Transmission Facilities duly agreed by Licensee, 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

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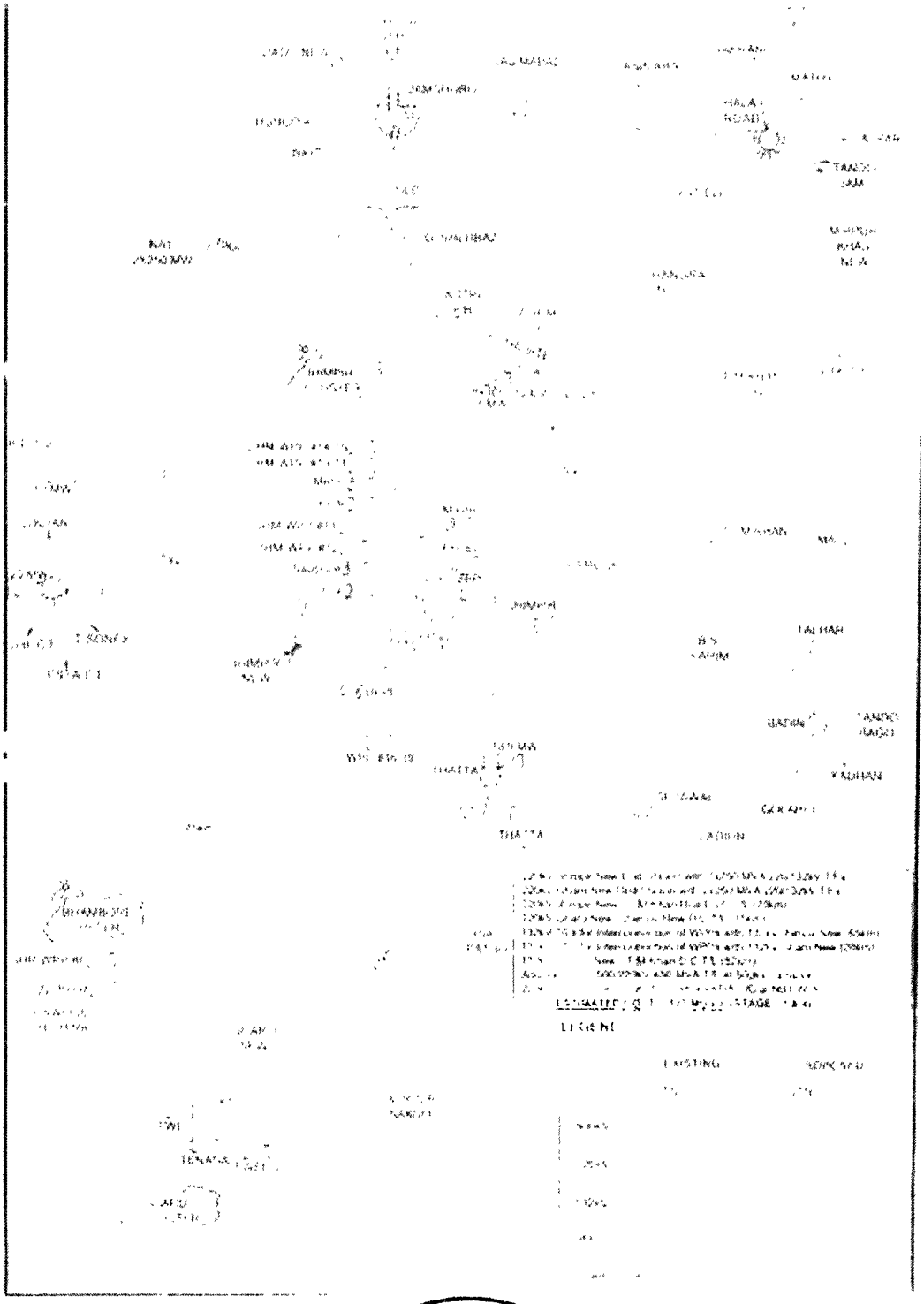

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Detail of Generation Facility/Wind Power Plant/ Wind Farm

(A). General Information

(i).	Name of the Company/Licensee	Sapphire Wind Power Company Limited
(ii).	Registered/Business Office	149, Cotton Exchange Building, I.I. Chundrigar Road, Karachi
(iii).	Location of the Generation Facility/Wind Farm	Jhampir, District Thatta, in the Province of Sindh
(iv).	Type of Generation Facility	Wind Power

(B). Wind Farm Capacity & Configuration

(i).	Wind Turbine Type, Make & Model	General Electric (G.E.) 1.6 – 82.5m
(ii).	Installed Capacity of the Generation Facility/Wind Farm (MW)	52.80 MW
(iii).	Number of Wind Turbine Units/Size of each Unit (KW)	33 x 1.60 MW

(C). Wind Turbine Details

(a).	Rotor	
(i).	Number of blades	3
(ii).	Rotor speed	9.8 – 18.7 rpm
(iii).	Rotor diameter	82.5 m
(iv).	Swept area	5346 m^2
(v).	Power regulation	Combination of blade pitch angle adjustment, and generator / converter torque control.
(vi).	Rated Power	At 12 m/s (air density = 1.225 kg/m3)
(vii).	Cut-in wind speed	3 m/s

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(viii).	Cut-out wind speed	25 m/s
(ix).	Survival wind speed	40 m/s, 3s average (40 m/s, 10min average; 56 m/s, 3s average)
(x).	Pitch regulation	Electric motor drives a ring gear mounted to the inner race of the blade pitch bearing.
(b).	**Blades**	
(i).	Blade length	40.3 m
(ii).	Material	Fiberglass polyester resin
(iii).	Weight	6,200 kg
(c).	**Gearbox**	
(i).	Type	Multi-stage planetary/helical gear design
(ii).	Gear ratio	1 : 104.5
(iii).	Oil quantity	300 – 450 liters
(iv).	Main shaft bearing	Roller bearing mounted in a pillow-block housing arrangement.
(d).	**Generator**	
(i).	Power	1,600 kW
(ii).	Voltage	690 V
(iii).	Type	Doubly-fed induction type
(iv).	Speed	Range: 1000 – 2000 rpm (synchronous speed 1500 rpm)
(v).	Enclosure class	IP 54
(vi).	Coupling	Flexible coupling
(vii).	Efficiency	≥ 97%
(viii).	Weight	8,450 kg
(ix).	Power factor	+0.95 to -0.95
(e).	**Yaw System**	
(i).	Yaw bearing	Roller bearing
(ii).	Brake	Planetary yaw drives (with brakes that engage when the drive is disabled)
(iii).	Yaw drive	4 planetary yaw drives.

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(iv).	Speed	0.5 degree/s
(f).	**Control System**	
(i).	Type	Automatic or manually controlled.
(ii).	Grid connection	Via IGBT converter
(iii).	Scope of monitoring	Remote monitoring of different parameters, e.g. temperature sensors, pitch parameters, speed, generator torque, wind speed and direction, etc.
(iv).	Recording	Production data, event list, long and short-term trends
(g).	**Brake**	
(i).	Design	Three independent systems, fail safe (individual pitch)
(ii).	Operational brake	Aerodynamic brake achieved by feathering blades.
(iii).	Secondary brake	Mechanical brake on (high speed) shaft of gearbox.
(h).	**Tower**	
(i).	Type	Cylindrical tubular steel tower
(ii).	Hub heights	Tubular tower 80 m

(D). Other Details

(i).	Expected COD of the Generation Facility/Wind Farm (Anticipated)	November 30, 2015
(ii).	Expected Life of the Generation Facility/Wind Farm from its COD	20 Years

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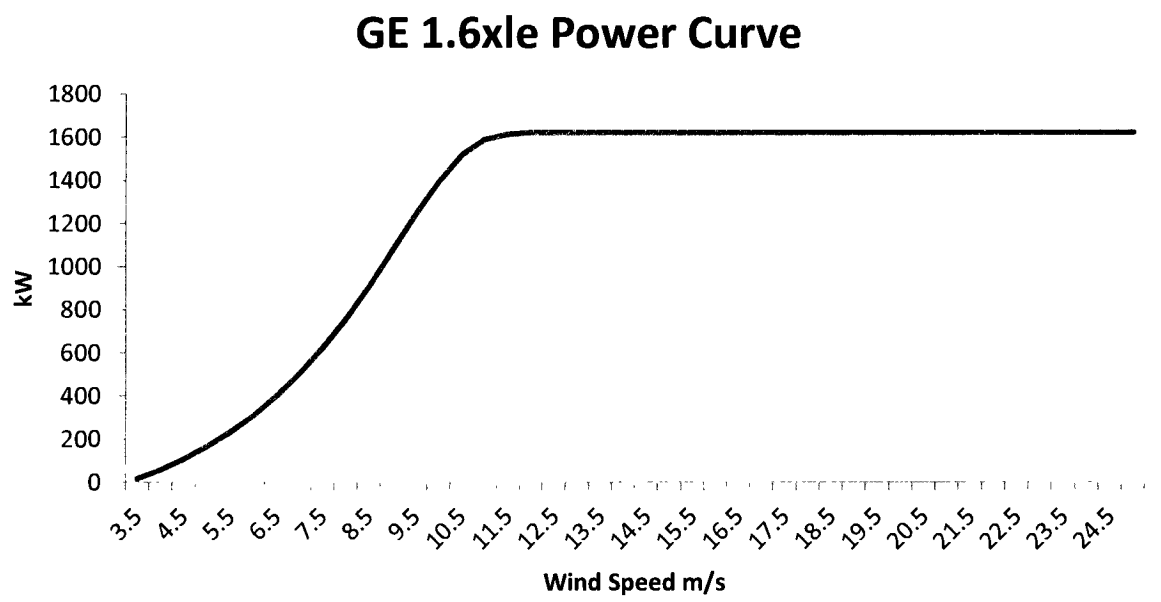
Power Curve of Wind Turbine Generator (GE 1.6xle-82.5) Graphic



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Power Curve of Wind Turbine Generator
(GE 1.6xle-82.5)
Tabular

[illegible] Curve [illegible] 5

Wind Speed at Hub Height m/s	Normal [illegible]	Low Turbulence Intensities	High Turbulence Intensities	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REGISTRAR

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)	52.8 MW
(2).	Total Annual Full Load Hours	2715Hrs
(3).	Average Wind Turbine Generator (WTG) Availability	96.0 %
(4).	Total Gross Generation of the Generation Facility/Wind Farm (in GWh)	218.4GWh
(5).	Array & Miscellaneous Losses GWh	60.82GWh
(6).	Availability Losses GWh	8.74GWh
(7).	Balance of Plant Losses GWh	5.46GWh
(8).	Annual Energy Generation (20 year equivalent Net AEP) GWh	143.38GWh
(9).	Net Capacity Factor	31.0%

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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