

National Electric Power Regulatory Authority Islamic Republic of Pakistan

Registrar

NEPRA Tower, Attaturk 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

June 24, 2016

No. NEPRA/R/LAG-262/90/5-22

Mr. Saleem uz Zaman Company Secretary Jhimpir Power (Private) Limited 2nd Floor, Building No 36-C, Bukhari Commercial Lane No. 7, Phase 6, DHA, Karachi.

Subject: Modification-I in Generation Licence No: WPGL/25/2014 Licence Application No. LAG-262 Jhimpir Power (Private) Limited (JPPL)

Reference: Your application vide letter No. Nil, dated Nil (received on March 18, 2016).

It is intimidated that the Authority has approved "Licensee Proposed Modification" in Generation Licence No. WPGL/25/2014 (issued on September 16, 2014) in respect of Jhimpir Power (Private) Limited (JPPL), pursuant to Regulation 10(11)(a) of the NEPRA Licensing (Application and Modification Procedure) Regulations 1999.

2. Enclosed please find herewith determination of the Authority in the matter of Licensee Proposed Modification in the Generation Licence of JPPL along with Modification-I in the Generation Licence No. WPGL/25/2014, as approved by the Authority.

Encl:/As above





Copy to:

- 1. Secretary Ministry of Water & Power, 'A' Block, Pak Secretariat, Islamabad.
- 2. Chief Executive Officer, Alternative Energy Development Board (AEDB), 2nd Floor, OPF Building, G-5/2, Islamabad.
- 3. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore.
- 4. Chief Executive Officer, CPPA-G, 6th Floor, Shaheed-e-Millat Sectariat, Jinnah Avenue, Blue Area, Islamabad.
- 5. Chief Executive Officer, Hyderabad Electric Supply Company Limited (HESCO), WAPDA Offices Complex, Hussainabad, Hyderabad.
- 6. Director General, Environment Protection Agency, Government of Sindh, Complex Plot No. ST-2/1, Korangi Industrial Area, Karachi.
- 7. Secretary, Energy Department, Govt. of Sindh, 3rd Floor, State Life Building, Opposite C.M. House, Dr. Zia ud din Ahmad Road, Karachi.

National Electric Power Regulatory Authority (NEPRA) Determination of the Authority in the Matter of Licensee Proposed Modification of Jhimpir Power (Pvt.) Limited

<u>June 14, 2016</u> <u>Case No. LAG-262</u>

(A). Background

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(i). The Authority granted a Generation Licence (No. WPGL/25/2014 dated September 16, 2014) to Jhimpir Power (Pvt.) Limited (JPPL), in terms of Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 ("the NEPRA Act").

(ii). The generation facility/wind power plant of JPPL is to be located at Jhimpir, near Nooriabad, District Thatta in the Province of Sindh and is based on thirty one (31) wind turbine generators of General Electric (G.E.) 1.6 82.5m-50Hz.

(B). <u>Communication of Modification</u>

(i). In accordance with Regulation-10(2) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999, JPPL communicated a Licensee Proposed Modification (LPM) in its existing Generation Licence on March 18, 2016.

(ii). In "the text of the proposed modification", JPPL submitted that it intends to change wind turbine generator technology of its generation facility/wind power plant from G.E. 1.6 82.5m-50Hz to G.E. 1.7-103m-50Hz, which will result in an overall increase in the installed capacity of the generation facility/wind power plant from 49.60 MW to 49.735 MW. Regarding the "statement of the reasons in support of the modification", JPPL has, *inter alia*, stated that while evaluating different models of wind turbine generators it has now selected the latest and more advance wind turbine generators, which are more efficient and reliable than the previous one.

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(iii). About the "statement of the impact on the tariff, quality of service and the performance by the Licensee of its obligations under the Licence", JPPL submitted that the proposed change of wind turbine generator will not have any adverse impact on the tariff, quality of service 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 NEPRA Licensing (Application & Modification Procedure) Regulations, 1999 by JPPL, the Registrar published the communicated LPM on April 02 & 03, 2016 in one (01) Urdu and one (01) English newspaper, informing the general public about the communicated LPM and inviting their comments within a period of fourteen (14) days from the date of the said publication.

(ii). Apart from the above, separate letters were also sent to other stakeholders including different ministries, their attached departments and various representative organization etc. Through the said letters, the stakeholders were informed about the communicated LPM and publication of its notice in the press. Further, the said entities were invited for submitting their views and comments in the matter for assisting the Authority.

(D). <u>Comments of Stakeholders</u>

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(i). In reply to the above, the Authority received comments of from five (05) stakeholders including Pakistan Council of Renewable Energy Technologies of Ministry of Science and Technology Government of Pakistan, Anwar Kamal Law Associates, Energy Department Govt. of Sindh, AEDB and Ministry of Water & Power. The salient points of the comments offered by the said stakeholders are summarized in the following paragraphs: -

(a). Pakistan Council of Renewable Energy Technologies commented that contents of the LPM have been examined and it



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has no objection on LPM. However, Pakistan Council of Renewable Energy Technologies cannot comment on the financial or other TOR's of the project;

- (b). Anwar Kamal Law Associates raised different issues such as surplus capacity, under utilization of power plants and induction of new power plants on take or pay basis. Further, Anwar Kamal Law Associates highlighted issues regarding failure of JPPL to achieve financial close within the given time, extension in the date of financial close by the Authority, expiry of earlier upfront tariff of JPPL, approval of new upfront tariff of JPPL by the Authority, extension in COD of the project, must run condition of RE projects, suitability of upfront tariff regime for Pakistan, induction of RE projects in the current scenario (i.e. reduction in oil prices, RLNG contract with Qatar, upcoming coal power projects and introduction of competitive market etc.), affordability vs. availability of electric power and long term PPAs on take or pay basis etc. Anwar Kamal Law Associates requested the Authority not only to reject the LPM but also to cancel the Generation Licence already granted to JPPL;
- (c). Energy Department Govt. of Sindh submitted that keeping in view the current energy crises it is actively supporting the project sponsors for early development of environmental friendly and fuel free power projects. Energy Department Govt. of Sindh supported the change of wind turbine generator technology stating that the same may be considered as per rules and regulations;
- (d). AEDB in its comments required certain documents/certificates from JPPL including: (a). type certification of the proposed wind turbine generator from international institute, (b). certificate from the original equipment manufacturer regarding model and quality of the wind turbine generator, (c). undertaking by JPPL and



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certificate from EPC contractor that the wind turbine generators will be new and comply with the latest IEC and NTDC specifications; and

(e). Ministry of Water & Power submitted that NEPRA may obtain the confirmation that JPPL has acquired the approval of the change in technical specification of wind turbines from the competent authority. Thereafter, NEPRA may process the application as per provisions of the NEPRA Act, GoP Policy guidelines keeping in view the power supply and demand projections.

(ii). The above comments of the stakeholders were examined. Comments of Pakistan Council of Renewable Energy Technologies and Energy Department Govt. of Sindh were found in favor of the communicated LPM, whereas Anwar Kamal Law Associates had raised certain observations to the LPM of JPPL. Comments/observations of Anwar Kamal Law Associates are related to regulatory and policy decisions and reiteration of its earlier comments which had already been deliberated in the upfront tariffs in detail. However, it was considered appropriate seeking perspective of JPPL on the comments/observations of Anwar Kamal Law Associates, AEDB and Ministry of Water & Power.

(iii). JPPL submitted a detailed reply to the comments of Anwar Kamal Law Associates stating that the same are generic in nature and not specifically related to the LPM of JPPL. However, regarding the points/issues related to the LPM, JPPL has clarified that it has assumed the wind risk and signed energy purchase agreement with NTDC on March 13, 2015. Under the energy purchase agreement, the off-taker does not take the wind risk, which means that the off-taker will not pay monthly energy payments to JPPL during the period in which the plant does not generate or generated less than the benchmark electricity due to insufficient wind speed. JPPL applied for 2015 up-front tariff under relevant provisions of NEPRA Up-front Tariff (Approval & Procedure) Regulations, 2011 and its amendments and complied all the rules and procedures of NEPRA. Further, the LPM is in accordance with NEPRA Act, relevant Rules, Regulations





and other applicable documents. The Authority granted upfront tariff to JPPL on August 11, 2015 and JPPL is required to achieve financial close within one year from the date of the said decision of the Honorable Authority. JPPL has made significant progress so far in achieving the financial close of the Project within the stipulated timeframe. In view of the said, JPPL requested the Authority to reject the comments of Anwar Kamal Law Associates, and to issue the LPM in its Generation Licence.

(iv). In response to the observations of AEDB, JPPL informed that it has submitted the required certificates/documents to AEDB. AEDB after going through the desired information, vide its letter dated June 08, 2016 has recommended the installation of G.E.1.7-103m-50Hz wind turbine generators.

(V). In response to the observations of Ministry of Water & Power with respect to change of wind turbine generator technology, JPPL clarified that AEDB being the relevant authority has already recommended the installation of the new wind turbine generators.

(vi). The Authority considered the above comments of the stakeholders on the communicated LPM of JPPL and found the same supportive. In view of the said, the Authority decided to proceed further in the matter as stipulated in the Regulations and the NEPRA Licensing (Generation) Rules 2000 (the Rules).

(E). Approval of LPM

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(i). In terms of Regulation-10(5) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999, the Authority is empowered to modify a licence in accordance with Licensee Proposed Modification, 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 it;
- (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/25/2014 dated September 16, 2014) with an installed capacity of 49.60 MW of JPPL is based on G.E. 1.60 MW (31x 1.60 MW) wind turbine generators. Whereas, now JPPL intends to implement the Project with 29x1.715 MW=49.735 MW wind turbine generators of G.E. 1.7-103m-50Hz.

(iii). In this regard the Authority has examined the specifications of the proposed wind turbine generators and other technical data provided by JPPL and has observed that the G.E. 1.7-103m-50Hz wind turbine generator is an optimized Version/Model of G.E. 1.6-100, with improved efficiency and reliability. The output power of a single turbine has increased from 1600 kW to 1715 kW. The G.E. 1.7-103m-50Hz wind turbine generator offers a 55% increase in swept area when compared to the G.E 1.6-82.5-50Hz turbine, resulting in about 30% increase in annual energy production. The Incremental changes to the G.E. 1.7-103-50Hz wind turbine generator resulted in a significant performance increase. These enhancements include greater blade length and controls improvements, resulting in an increase in annual energy production, capacity factor and controlled sound performance. Designed with high reliability to provide continued operation in the field, G.E. 1.7-103-50Hz delivers excellent availability as compared to the General Electric's other units operating in the field today.

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Further, AEDB after going through the technical details of the new wind turbine generators has recommended the installation of G.E. 1.7-103m-50Hz.

(iv). In view of the above, the Authority is satisfied that the communicated LPM is reasonably necessary for JPPL to effectively and efficiently perform its obligations under its Generation Licence. The communicated LPM will not adversely affect the performance of JPPL 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.

(V). Regarding interconnection of the generation facility of JPPL, it is clarified that at the time of grant of Generation Licence to JPPL, NTDC has approved the interconnection study for 50 MW confirming that power from the said generation facility can be evacuated without any problem. Therefore, the Authority is of the opinion that nominal increase (i.e. 0.135 MW) in the installed capacity is within the permissible limits (i.e. 50 MW), which will not have any adverse impact on the already approved interconnection arrangements.

(vi). The Authority has also examined the impact of the communicated LPM on the tariff and observed that the up-front tariff granted to JPPL (through determination dated August 11, 2015) is applicable to the projects with installed capacity upto 250.00 MW and does not specify the technology of wind turbines to be installed by the project developers. Therefore, the Authority is satisfied that the communicated LPM of JPPL shall not have any impact on the already approved tariff. The Authority is convinced that JPPL has complied with all the requirements of the Regulations pertaining to the modification. In view of the said, the Authority in terms of Regulation 10(11)(a) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999 approves the communicated LPM of JPPL.

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(vii). Accordingly, the already granted Generation Licence (No. WPGL/25/2014, dated September 16, 2014) in the name of JPPL 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 and conditions of the Generation Licence and other applicable documents.

Authority

Maj. (R) Haroon Rashid (Member)

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Syed Masood-ul-Hassan Naqvi (Member)

Himayat Ullah Khan (Member)/Vice Chairman

Brig. (R) Tariq Saddozai Chairman

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National Electric Power Regulatory Authority (NEPRA) Islamabad – Pakistan

GENERATION LICENCE No. WPGL/25/2014

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 <u>JHIMPIR POWER (PRIVATE) LIMITED</u> (issued on September 16, 2014 and expiring on December 30, 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 is changed from 49.60 MW to 49.735MW;
 (ii) The validity date of the Generation Licence is changed from December 30, 2035 to December 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;

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(v). Changes in Schedule-II attached as Revised/Modified Schedule-II.

This Modification-I is given under my hand on day, of June Two Thousand & Sixteen.

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Article-1 Definitions

1.1 In this Licence

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- (a). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 ";
- (b). "Applicable Documents" have the same meaning as defined in the Rules
- (c). "Authority" means "the National Electric Power Regulatory Authority constituted under Section-3 of the Act";
- (d). "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;
- (e). "Carbon Credits" mean the amount of Carbon Dioxide (CO₂) 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;
- (f). "Commercial Operations Date (COD)" means the day immediately following the date on which the generation facility of the Licensee is Commissioned;
- (g). "CPPA-G" means "Central Power Purchasing Agency (Guarantee) Limited" or any other entity created for the like purpose;



- (h). "Distribution Code" means the distribution code prepared by XW-DISCO(s) and approved by the Authority, as it may be revised from time to time with the any necessary approval by the Authority;
- (i). "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
- (j). "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 the approval by the Authority;
- (k). "HESCO" means Hyderabad Electric Supply Company Limited and its successors or permitted assigns;
- (I). "IEC" means "the International Electro-technical Commission and its successors or permitted assigns;
- (m). "IEEE" means the Institute of Electrical and Electronics Engineers and its successors or permitted assigns;
- (n). "Law" means the Act, relevant rules and regulations made there under and all the Applicable Documents;

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- (o). "Licensee" means <u>JHIMPIR POWER (PRIVATE) LIMITED</u> and its successors or permitted assigns;
- (p). "NTDC" means National Transmission and Despatch Company Limited and its successors or permitted assigns;



- (q). "Policy" means "the Policy for Development of Renewable Energy for Power Generation, 2006" of Government of Pakistan as amended from time to time;
- (r). "Power Purchaser" means the CPPA-G purchasing electric power on behalf of XW-DISCO(s) from the Licensee, pursuant to an Energy Purchase Agreement for procurement of electricity;
- (s). "Regulations" mean "the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time";
- (t). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000";
- (u). "Wind Farm" means "a cluster of Wind Turbines in the same location used for production of electric power";
- (v). "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;
- (w). "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 Rules and regulations issued under the Act.

<u>Article-2</u> Applicability of Law

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



<u>Article-3</u> <u>Generation Facilities</u>

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.

<u>Article-4</u> <u>Term of Licence</u>

4.1 The Licence is granted for a term of twenty (20) years from the COD of the generation facility/Wind Farm.

4.2 Unless suspended or revoked earlier, the Licensee may apply for renewal of this licence ninety (90) days prior to the expiry of the above term, as stipulated in the Regulations.

<u>Article-5</u> Licence fee

After the grant of this 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.

<u>Article-6</u> <u>Tariff</u>

The Licensee shall charge only such tariff which has been determined, approved or specified by the Authority.





<u>Article-7</u> <u>Competitive Trading Arrangement</u>

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.

<u>Article-8</u> <u>Maintenance of Records</u>

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.

<u>Article-9</u> <u>Compliance with Performance Standards</u>

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.

<u>Article-10</u> <u>Compliance with Environmental Standards</u>

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





<u>Article-11</u> <u>Power off take Point and Voltage</u>

The Licensee shall deliver power to the Power Purchaser at the outgoing bus bar of its grid station. The up-gradation (step up) of generation voltage up to the required dispersal voltage level will be the responsibility of the Licensee.

<u>Article-12</u> 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.

<u>Article-14</u> Emissions Trading /Carbon Credits

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





Page 7 of 8 of Revised/Modified Articles Modification-I

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.



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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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<u>Site Location of the</u> <u>Generation Facility/Wind Farm /Wind Power Plant of</u> <u>Jhimpir Power (Private) Limited (JPPL)</u>



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Generation Licence Jhimpir Power (Private) Limited Jhimpir, near Nooriabad, District Thatta in the Province of Sindh

Site Access of the Generation Facility/Wind Farm /Wind Power Plant of JPPL



Generation Licence Jhimpir Power (Private) Limited Jhimpir, near Nooriabad, District Thatta in the Province of Sindh









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Land Coordinates of the Generation Facility/Wind Farm /Wind Power Plant of JPPL

Turbine ID	GE turbine model	Ground elevation (m)	Hub Height (m)	Easting (m)	Northing (m)	UTM zone
WTG-1	1.7-103	52	80.0	408890	2777255	42
_WTG-2	1.7-103	56	80.0	408557	2777469	42
WTG-3	1.7-103	66	80.0	408229	2777691	42
WTG-4	1.7-103	65	80.0	407901	2777909	42
WTG-5	1.7-103	57	80.0	407565	2778125	42
WTG-6	1.7-103	53	80.0	407241	2778346	42
WTG-7	1.7-103	49	80.0	406907	2778561	42
WTG-8	1.7-103	47	80.0	406577	2778778	42
WTG-9	1.7-103	45	80.0	406244	2778997	42
WTG-10	1.7-103	41	80.0	405914	2779214	42
WTG-11	1.7-103	41	80.0	405579	2779431	42
WTG-12	1.7-103	42	80.0	405252 🦄	2779651	42
WTG-13	1.7-103	41	80.0	404919	2779868	42
WTG-14	1.7-103	45	80.0	404589	2780088	42
WTG-15	1.7-103	45	80.0	404258	* 2780305	42
WTG-16	1.7-103	45	80.0/	403927	2780525	42
WTG-17	1.7-103	45	80.0	403597	2780743	42
WTG-18	1.7-103	46	80.0	403261	2780957	42
WTG-19	1.7-103	48	80.0 🗇	402933	2781173	42
WTG-20	1.7-103	<i>ि</i> 49 🔬	× 80.0 🗇	402606	2781391	42
WTG-21	1.7-103	° 50 🔌	[*] 80.0	402270	2781607	42
WTG-22	1.7-103	51	80.0	401944	2781828	42
WTG-23	1.7-103	S5 😚	80.0	401609	2782043	42
WTG-24	1.7-103	55	80.0	401108	2782373	42
WTG-25	1.7-103	60	80.0	400732	2782537	42
WTG-26	1.7-103 🗞	57	80.0	400613	2782853	42
WTG-27	1.7-103	59	80.0	400481	2783164	42
WTG-28	 1.7-103 % 	60	80.0	400323	2783462	42
WTG-29	🖘 1.7-103 🖉	59	80.0	400352	2783834	42

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Generation Licence Jhimpir Power (Private) Limited Jhimpir, near Nooriabad, District Thatta in the Province of Sindh





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Interconnection Arrangement for Dispersal of Power from the Generation Facility/Wind Farm/Wind Power Plant of JPPL

The power generated from the Generation Facility/Wind Power Plant/Wind Farm of JPPL shall be dispersed to the National Grid through the load center of HESCO.

(2). The proposed Interconnection arrangement/transmission facilities for dispersal of power will consist of the following:-

(a). The Generation Facility/Wind Farm/Wind Power Plant of Jhimpir Power (Private) Limited will be connected by constructing a 132 KV Double Circuit (D/C) Transmission Line (measuring about 10.00 KM in length) from the substation of Jhimpir Power (Private) Limited to New 220/132KV Jhimpir substation.

(3). The scheme of interconnection of Jhimpir Power (Private) Limited also proposes the following reinforcement already in place in Jhimpir cluster:-

(a). 220/132 KV Jhimpir-New Substation at suitable location in Jhimpir cluster;

(b). 220/132 KV Gharo-New substation at suitable location in Gharo cluster;

(c).

65 km long 220 KV double circuit from Gharo-New 220 KV Substation to Jhimpir-New 220 KV Substation;

- (d). Extend/retrofit 132 KV double circuit in a ring form starting and ending at Jhimpir-New 220/132 KV grid station connecting 12 Wind Farms;
- (e). Loop in-out Gharo–Thatta 132 KV D/C at Gharo-New 220/132 KV Substation connecting 7 wind Farms:



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- (f). 75 km long double circuit from T.M. Khan 132 KV Substation to Jhimpir-New 220/132 KV substation;
- (g). Re-conductoring Jhimpir-Kotri, Jamshoro-Jamshoro Old and Jamshoro-Qasimabad-I line using Greeley conductor. Also a direct circuit from Jamshoro to Hala Road using Greeley conductor is to be used.

(4). Any change in the above mentioned arrangement /transmission facilities duly agreed by Jhimpir Power (Private) Limited, NTDC and HESCO, shall be communicated to the Authority in due course of time.



Schematic Diagram of Interconnection Arrangement/Transmission Facilities for Dispersal of Power from the Generation Facility/Wind Farm/Wind Power of JPPL



<u>Detail of</u> <u>Generation Facility/Wind Power Plant/</u> <u>Wind Farm of JPPL</u>

(A). <u>General Information</u>

(i).	Name of the Company/Licensee	Jhimpir Power Private Limited
(ii).	Registered/Business Office	2nd Floor, 36-C Bukhari Commercial Lane No. 7 Phase-6 DHA, Karachi, Pakistan
(iii).	Plant Location	Jhimpir, near Nooriabad, District Thatta, in the Province of Sindh
(iv).	Type of Generation Facility	Wind Farm/Wind Power Plant

(B). Wind Farm Capacity & Configuration

(i).	Wind Turbine Type, Make & Model	General Electric (G.E.) 1.7 – 103m-50Hz
(ii).	Installed Capacity of Wind Farm (MW)	49.735 MW
(iii).	Number of Wind Turbine Units/Size of each Unit (KW)	29 x 1.715 MW

(C). <u>Wind Turbine Details</u>

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a. Rotor				
(i).	Number of Blades	3		
(ii).	Rotor Speed	10 – 17.14 rpm		
(iii).	Rotor Diameter	103m		
(iv).	Swept Area	8332 m ²		
(v).	Power Regulation	Combination of blade pitch angle adjustment, and generator/converter torque control.		
(vi).	Rated power at	9.45 m/s (air density = 1.225 kg/m³)		



		in the Province of Sindh		
(vii).	Cut-in Wind Speed	3.0 m/s 10 minute average		
(viii).	Cut-out Wind Speed	20 m/s 10 minute, 23 m/s 30 Sec, 25 m/s 3 Sec interval		
(ix).	Survival Wind Speed	37.5m/s 10 minute average & 56 m/s 3-Second average		
(x).	Pitch Regulation	Electric motor drives a ring gear mounted to the inner race of the blade pitch bearing		
b. B	lades			
(i).	Blade Length	50.2 m		
(ii).	Material	Glass fiber enforced epoxy resin		
(iii).	Weight	9580 Kg		
c. G	ear Box			
(i).	Туре	Multi-stage planetary		
(ii).	Gear Ratio	111.54		
(iii).	Weight	16500 Kg		
(iv).	Oil Quantity	300450 Liters		
(v).	Main Shaft Bearing	Roller bearing mounted in a pillow-block housing arrangement		
d. G	enerator			
(i).	Power	1737 KW		
(ii).	Voltage	690 V		
(iii).	Туре	Doubly-fed induction type		
(iv).	Speed	Range: 1000-2090 rpm; Synchronous Speed: 1500 rpm; Speed at rated power: 1735 rpm		
(v).	Enclosure Class	IP 54		
(vi).	Coupling	Flexible coupling		
(vii).	Efficiency	≥97%		
(viii).	Weight	8450		
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(ix).	Power Factor	±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		
(iv).	Speed	0.5 degrees/sec		
f. Control System				
(i).	Туре	Automatic or manually controlled		
(ii).	Grid Connection	Via back-to-back AC-DC-AC power electronics converter connected to rotor winding		
(iii).	Scope of Monitoring	Remote monitoring of more than 300 different parameters, e.g. temperature sensors, pitch parameters, speed, generator torque, wind speed & direction, etc.		
(iv).	Recording	Production data, event list, long & short term trends		
g. Brake				
(i).	Design	Three independent systems, fail safe (individual pitch)		
(ii).	Operational Brake	Aerodynamic brake achieved by feathering blades		
(iii).	(iii). Secondary Brake Mechanical brake located at the output (h speed) shaft of the gearbox			
h. Tower				
(i).	Туре	Cylindrical tubular steel tower		
(ii).	Hub Heights	80m		

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Power Curve of Wind Turbine Generator of General Electric-G.E. 1.715 MW (103 xls) (Tabular)

	Electrical Power [kW]				
Wind Speed at Hub Height (m/s)	Normal Turbulence Intensities 10% < TI < 15%	Low Turbulence Intensities TI < 10%	High Turbulence Intensities 15% < TI < 20%	Cp,e Normal Turbulence Intensities	
3.0	3	3	3	-	
3.5	55	54	57	0.25	
4.0	112	109	119	0.34	
4.5	1 83	179	194	0.39	
5.0	275	271	288	0.43	
5.5	388	381	406	0.46	
6.0	515	507	539	0.47	
6.5	664	653	692	0.47	
7.0 -	829	816	861 -	0.47	
7.5	1023	1010	1056	0.48	
8.0	1240	1229	1258	0.47	
8.5	1445	1451	1427	0.46	
9.0	1579	1601	1536	0.42	
9.5	1675	1690	1640	0.38	
10.0	1704	1712	1682	0.33	
10.5	1713	1715	1700	0.29	
11.0	1715	1715	1714	0.25	
11.5 to cut out	1715	1715	1715	-	





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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



SCHEDULE-II

(1).	Total Installed Gross ISO Capacity of the Generation Facility /Wind Farm (MW/GWh)	49.735 MVV
(2).	Total Annual Full Load Hours	'3391 Hrs
(3).	Average Wind Turbine Generator (WTG) Availability	97.0 %
(4).	Total Gross Generation of the Generation Facility/Wind Farm (in GWh)	241.654 GWh
(5).	Array & Miscellaneous Losses GWh) 12.0827 GWh (5%)
(6).	Availability Losses GWh	7.249 GWh (3%)
(7).	Balance of Plant Losses GWh	7.249 GWh (3%)
(8).	Annual Energy Generation (20 year equivalent Net AEP) GWh	168.682 GWh
(9).	Net Capacity Factor	38.71 %

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

Note

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Sec. 9

