# National Electric Power Regulatory Authority
## Islamic Republic of Pakistan

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**Registrar**

No. NEPRA/DL/LAT-05/2671-79 February 19, 2018

Mr. Wang Bo,
Chief Executive Officer,
Pak Matiari – Lahore Transmission Company (Private) Limited,
177-A, Street-6,
DHA, Lahore.

Subject: **Grant of Special Purpose Transmission Licence No: SPTL/03/2018**
**Licence Application No. LAT-05**
**Pak Matiari – Lahore Transmission Company (Private) Limited**

*Reference: PMLTCPL's application vide letter dated March 31, 2017 (April 13, 2017)*

Enclosed please find herewith Determination of the Authority in the matter of application of Pak Matiari – Lahore Transmission Company (Private) Limited (PMLTCPL) for grant of Special Purpose Transmission Licence along with Special Purpose Transmission Licence No. SPTL/03/2018 granted by the Authority to PMLTCPL for its Special Purpose Transmission Line from Converter Station Matiari to Converter Station Lahore, pursuant to Section 19 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).

2. Please quote above mentioned Transmission Licence No. for future correspondence.

**Enclosure: Special Purpose Transmission Licence (SPTL/03/2018)**

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

**(Syed Safeer Hussain)**

Copy to:

1. Secretary, Ministry of Energy (Power Division), A-Block, Pak Secretariat, Islamabad.
2. Managing Director, NTDC, 414-WAPDA House, Lahore
3. Chief Executive Officer, CPPA-G, ENERCON Building, Sector G-5/2, Islamabad.
4. Managing Director, Private Power Infrastructure Board (PPIB), Ground & 2nd Floor, Emigration Tower, Plot No. 10, Mauve Area, Sector G-*/1, Islamabad.
5. Chief Executive Officer, Hyderabad Electric Supply Company Limited (HESCO), WAPDA Offices Complex, Hussainabad, Hyderabad.
6. Chief Executive Officer, Lahore Electric Supply Company Limited (LESCO), 22-A, Queen Road, Lahore
7. Director General, Environment Protection Agency, Government of Sindh, Complex Plot No. ST-2/1, Korangi Industrial Area, Karachi.
8. Director General, Environment Protection Department, Government of Punjab, National Hockey Stadium, Ferozepur Road, Lahore.

# National Electric Power Regulatory Authority (NEPRA)

## Determination of the Authority in the Matter of Application of Pak Matiari-Lahore Transmission Company (Private) Limited for the Grant of Special Purpose Transmission Licence

**February 19, 2018**
**Case No. LAT-05**

## (A). Background

**(i).** The Govt. of Pakistan (GoP) has devised an ambitious plan not only to increase the generation capacity but also to rationalize the energy mix of the country. In this regard, a large number of imported, indigenous coal, nuclear and other Renewable Energy (RE) based generation facilities are being set up in the southern part of the country. In order to transport and disperse the electric power generated from the said generation facilities to the upcountry, GoP has planned laying a High Voltage Direct Current (HVDC) transmission line. In this regard, for the facilitation of the participation of the private in the transmission business, GoP has also formulated Policy Framework for Private Sector Transmission Line Project 2015 (the "Policy").

**(ii).** In consideration of the above, National Transmission and Despatch Company Limited (NTDC) signed a cooperation agreement with State Grid Cooperation of China (SGCC) for the construction of a HVDC transmission line from Matiari to Lahore. Under the agreement, SGCC nominated China Electric Power Equipment and Technical Company Limited (CET) for the development of the above mentioned proposed facility on Build, Own, Operate and Transfer (BOOT) basis. In order to develop the project/facility, CET through its different subsidiary companies incorporated a Special Purpose Vehicle (SPV) as stipulated under Section 32 of the Companies Ordinance 1984 (the Companies Ordinance) in the name of Pak Matiari-Lahore Transmission Company (Private) Limited (PMLTCPL).

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## (B). Filing of Application

**(i).** PMLTCPL submitted an application on April 13, 2017 for the grant of Special Purpose Transmission Licence (SPTL) in terms of Section-19 of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the "NEPRA Act") read with the relevant provisions of the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 (the "Licensing Regulations").

**(ii).** The Registrar examined the submitted application to confirm its compliance with the Licensing Regulations and observed that the application lacked some of the required information/documentation. Accordingly, PMLTCPL was directed to submit the missing information/documentation and the same was received on May 04, 2017. The Authority considered the matter and found the form and content of the application in substantial compliance with Regulation-3 of the Licensing Regulations. Accordingly, the Authority admitted the application on May 16, 2017 for consideration of the grant of SPTL as stipulated in Regulation-7 of the Licensing Regulations. The Authority approved an advertisement to invite comments of general public, interested and affected persons in the matter as stipulated in Regulation-8 of the Licensing Regulations. Accordingly, notices were published in one (01) Urdu and one (01) English newspapers on May 19, 2017.

**(iii).** In addition to the above, the Authority also approved a list of stakeholders for seeking their comments for the assistance of the Authority in the matter in terms of Regulation-9(2) of the Licensing Regulations. Accordingly, letters were sent to different stakeholders as per the approved list on May 23, 2017, soliciting their comments for assistance of the Authority.

## (C). Comments of Stakeholders

**(i).** In reply to the above, the Authority received comments from five (05) stakeholders. These included Punjab Power Development Board-PPDB, Private Power & Infrastructure Board-PPIB, NTDC, Ministry of Petroleum & Natural Resources-MoP&NR and Water & Power Development Authority-WAPDA. The

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salient points of the comments offered by the above stakeholders are summarized in the following paragraphs: -

**(a).** PPDB in its comments stated that the province of Punjab uses almost sixty-seven percent (67%) of the electric power generated in the country. It has three main load centers at Lahore, Gujranwala and Faisalabad. With the latest development of coal power projects in south, development of new high voltage transmission lines is a requirement to meet the demand of load centers. Therefore, the grant of SPTL in accordance with NEPRA Act for the proposed ±660 KV HVDC Project from Matiari (in the province of Sindh) to Lahore (in the province of Punjab) is supported;

**(b).** PPIB confirmed issuance of Letter of Intent (LoI) to the company on March 27, 2017 for the proposed ±660 KV HVDC transmission line project from Matiari to Lahore. In this regard, PPIB supported the grant of SPTL to the company.

**(c).** NTDC stated that for the proposed HVDC transmission line, the company has proposed towers with heights ranging from 27 to 75 meters, having wind span in the range of 480 to 580 meters. In view of the harsh weather conditions of the country particularly in desert areas of the province of Sindh, special attention must be paid to the design of towers or the height of towers and wind span be reduced as per site conditions. Special care must be exercised in selection of insulators and those chosen must be suitable for harsh weather conditions including dense fog, high temperature and heavy dust/sand storms otherwise a lot of problems will be faced in smooth operation. The communication system, i.e. Power Line Carrier-PLC, fiber optic and microwave should be compatible with the existing system of NTDC. The short circuit level of equipment should be selected keeping in view the future

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expansion plan of NTDC and size/capacity of network. Further, it was emphasized that only type tested equipment for HVDC transmission line and converter stations be allowed to be used for reliable operation in future. Trainings and foreign educational tours for engineers should be arranged in order to update their knowledge/skills, as HVDC is a new subject in the country therefore, there must be a provision for the live line maintenance. It was suggested that the route of the transmission line should be selected in such a way that maintenance crews have easy access to the towers of the transmission line.

**(d).** MoP&NR remarked that the project envisages transporting 4000 MW of electric power which will augment the existing transmission capacity therefore this ministry has no objection to the grant of SPTL to the company; and

**(e).** WAPDA in its comments expressed no reservations to the grant of SPTL to PMLTCPL.

**(ii).** The Authority considered the above comments of the stakeholders and considered it appropriate seeking the perspective of PMLTCPL on the observations of NTDC. On the said, PMLTCPL submitted that the technical specification and weather condition (3 second wind speed of 160 KM/h, temperature 52.5°C) stipulated in the Transmission Service Agreement (TSA) were followed during the course of designing. PMLTCPL submitted that the proposed towers would be able to withstand the harsh weather conditions along the route of the line with the proposed current design. The average span in desert area is ranging between 440 meter to 460 meter, less than the required maximum span. PMLTCPL submitted that the height of tower and wind span are interrelated parameters therefore, in case the height becomes higher than the correlated reference design height of maximum wind span, the actual wind span will accordingly be shortened.

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**(iii).** It was submitted that the contamination investigation was conducted by China Electric Power Research Institute (CPRI) at site. Further, the specifications of the insulators of the transmission lines built adjacent to the proposed route of the HVDC transmission line were also investigated. After analyzing the weather condition, environment and pollution level along the line route, CPRI issued "Research Report on Contamination Investigation and Exterior Insulation Configuration of ±660 KV Matiari-Lahore HVDC Transmission Line". During the design, a higher standard for the insulation configuration has been selected including the creepage distances of the DC composite insulators to be installed in heavy and medium polluted areas. The selected insulation level has been designed to withstand saturated salt density, with consideration of increasing contamination level. The tri-umbrella type disc insulator and composite insulator to be used for the project can fulfill the requirement of smooth operation in heavily polluted and high temperature environment. In this regard, PMLTCPL stated the proposed composite insulators have more than twenty (20) years of successful operation in China.

**(iv).** Further to the above, it was stated that the company has also been considered renewing the insulators installed in certain desert area after fifteen (15) to twenty (20) years of operation. The technical specifications as stipulated in the TSA had been followed for the confirmation of the contamination level and insulation design. PMLTCPL stated that the proposed HVDC transmission line will not have any microwave system but will be equipped with PLC and fiber optic (namely SDH equipment). In this regard, the equipment would be supplied and installed as per designated short list of NTDC and the same would be compatible with existing system of NTDC.

**(v).** PMLTCPL submitted that based on the future expansion plans provided by NTDC, the design of short circuit level of equipment had taken into account of future needs of grid development in Pakistan. PMLTCPL stated that it had discussed these issues with planning department of NTDC during the negotiation of the technical agreement(s). All the equipment for the converter station, transmission line conductor, insulators etc. would be compatible with requirements of the technical specifications of the TSA regarding type test etc. It

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was submitted that the sponsors of the project had already considered the training for Engineers and staff of NTDC. In consideration of importance of the Matiari-Lahore HVDC transmission line, the provision for live line maintenance would be considered and necessary training and special tools to NTDC would also be provided. PMLTCPL confirmed that the selected route of the HVDC transmission line is as close as possible to the roads while complying with environmental requirements, for convenience of construction and maintenance of the line.

**(vi).** The Authority considered the above submissions of PMLTCPL on the comments/observations of NTDC and decided to proceed further in the matter for the consideration of grant of SPTL as stipulated in the NEPRA Act, the Licensing Regulations and other applicable documents.

## (D). Findings/Evaluation

**(i).** The Authority considered the entire case of PMLTCPL in detail including the submissions made in the application, the comments of the stakeholders and the rejoinder in the matter. The observations of the Authority in the matter are explained/elaborated as follows: -

**(a).** The applicant company (i.e. PMLTCPL) is a private limited company (having Universal Incorporation No. 0095286 dated September 16, 2015), incorporated under Section-32 of the Companies Ordinance. The registered/business office of the company is located at House No.177-A, Street No.6, Phase-I, DHA Lahore in the province of Punjab.

**(b).** The proposed structure of the SPV company (i.e. PMLTCPL) is that two Hong Kong based companies in the name Zhong Cheng Xin International Limited and Zhong Zhuo Ye International Limited hold 69.98% and 30% shares of PMLTCPL. It is pertinent to mention that the said companies are 100% owned by State Grid International Engineering Limited, a 100% subsidiary of CET which is a 100% owned subsidiary of SGCC;

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**(c).** The Memorandum of Association of the company i.e. PMLTCPL, *interalia* includes establishing, construction, erecting, laying, operation and maintenance electrical transmission lines of extra high voltage/high voltage/medium voltage and low voltage and associated substations including distribution cable/wires etc. in Pakistan and abroad;

**(d).** As explained in the preceding paragraphs NTDC and SGCC signed a cooperation agreement on April 20, 2015 for development of ± 660 KV HVDC transmission line from Matiari to Lahore (hereafter called the Project) which is included in the priority projects under China Pakistan Economic Corridor (CPEC). Under the said cooperation agreement, both parties agreed that nominated subsidiary of SGCC i.e. CET will develop the Project on BOOT basis and for the said purpose it will also be the EPC contractor;

**(e).** CET has carried out projects in Ethiopia (Gerd-Dedesa-Holeta 500 KV Power Transmission Project, Ethiopian Railways Corporation AA-LRT GIS Substation Project, China (Xiamen Flexible 320 KV HVDC Transmission Demonstration Project, Zhoushan Multi Terminal Flexible 200 KV HVDC transmission project, 500 KV Shandong Yellow River power transmission and transformation project), Pakistan (design, manufacture, supply, installation, testing and commissioning of In & Out Arrangement of 500 KV Guddu-Multan 1st Circuit at Dera Ghazi Khan 500 KV Substation), Myanmar (Myanmar Supply and Technical Service of 230 KV Twin Bundle, Double Circuit Transmission Line and Substation Equipment for Belin-Monywa Project, Design, Material Supply & Technical Service of Baluchaung (3) - Baluchaung (2) – Shwemyo Transmission Line, Baluchaung (2) Substation Extension and Shwemyo Substation Extension). In view of the said, the

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Authority considers that CET has very rich experience as EPC contractor in construction of similar projects as that of the project.

**(f).** Regarding the financial health of the company, the Authority has considered the submissions of PMLTCPL and has observed that the SPV has been incorporated in September 2015 and does not have any substantial assets as there is no significant activity of the project. The Authority has noted that CET which will be working as EPC contractor has a total assets of U.S. $ 1.97 billion. Further, based on financial health of the sponsors, various Chinese banks (HSBC, UOB and CMBCL) have expressed their interest to finance the debt of the project. Further to the said, the Authority has observed that the project is included in the priority project of CPEC. In view of the said, the Authority considers that the sponsors of the project including SGCC and CET have strong financial health and possess the required resources to carry out the project.

**(g).** The proposed HVDC transmission facilities (±660KV transmission line) for which SPTL is being sought will be connecting Matiari converter station (about 38 KM northeast to Hyderabad) and Lahore converter station (about 40 KM southwest of Lahore City). The estimated length of the proposed transmission line/Project as determined in the feasibility study is (which is the recommended route) 878 KM.

**(h).** According to the submitted information, the proposed Project will be consisting of a total of 1998 No. Lattice Steel Towers. Out of the said total towers, there will be ZP1 (Quantity = 1362 No.), ZP2 (Quantity = 229 No.), ZPT (Quantity = 131 No.), JP1 (Quantity = 201 No.), JP2 (Quantity = 63 No.) and JP3 (Quantity = 12 No.). The total quantity of grounding sets

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for the said towers will be 1998. Further to the above, the conductor used for the proposed transmission line/Project will be ACSR and ACAR. According to the submitted details the quantity of ACSR conductor will be 664 x 2 KM whereas for ACAR the conductor length will be 214 x 2 KM. In order to protect the Lattice Steel Towers and other allied equipment from the effect of lightning, Optical Ground Wire (OPGW) measuring about 878 x 2 KM will be used. Further to the above, various types of other hardware for the HVDC transmission line including suspension/tension fittings, vibration dampers and joints etc. will be installed.

**(i).** The proposed project will be passing through the provinces of Sindh and Punjab. In this regard, NTDC as per the cooperation agreement has carried out the Environmental Social Impact Assessment (ESIA) for the project and obtained necessary No Objection Certificate (NOC) from the concerned environmental protection agencies of the provinces of Sindh and Punjab;

**(j).** According to the submitted information, the project is being built on BOOT basis and will be transferred to NTDC after a period of twenty-five (25) years. In this regard, PMLTCPL has informed that it plans signing a TSA for the said period therefore, the term of the SPTL may be set accordingly.

**(ii).** The Authority has observed that PMLTCPL has submitted and fulfilled all the required information/documents mentioned in the Licensing Regulations including (a). purpose; (b). line route and territory maps; (c). line lengths, starting point, termination point, year of completion; (d). system studies; (e). environmental and social soundness Assessment (f). structures: type, number/km; (g). line characteristics; (h). conductor, type, current carrying capacity, circuit power transfer; (i). insulators; (j). shield-wire: number, size; (k). compensation employed: series,

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shunt, SVC; (l). Communication system: PLC, fiber optics, microwave; and (m). grid station(s) involved etc.

**(iii).** Further to the above, the Authority has observed that according to signed cooperation agreement between the parties (i.e. PMLTCPL and NTDC) the main responsibilities of NTDC include (a). providing exact route; (b). providing data on metrological, geological, hydrological and other surface/sub surface conditions; (c). carrying out interconnection studies etc.; (d). power system stability, security and voltage control etc.; (e). land acquisition/Right of Way etc.; (f). O&M of the proposed transmission facility and (g). obtaining environmental approvals. The responsibilities of SGCC/CET/PMLTCPL include (a). collection of necessary/required data and conducting feasibility study; (b). design, construct and complete the proposed facility; and (c). operation and maintenance of substations/convertor stations. Further to the said, the Authority has also observed that PMLTCPL has submitted a detailed feasibility study of the project including the system studies based on which the HVDC line has been proposed.

**(iv).** The Authority in its determination for the tariff of the project dated May 04, 2017 had given various directions. These included (a). ensuring placement of proper structure for the execution of the project; (b). minimum possible length of the HVDC transmission line/the Project is ensured to reduce construction and other related cost etc.; (c). timely completion of 4,000 MW of electric power projects must be ensured so that the full capacity of the HVDC is utilized; (d). the TSA and the Implementation Agreement (IA) etc. should consider and incorporate technology transfer and indigenous capacity development (e). all the required system studies should be timely completed by the EPC contractor and NTDCL; (f). the necessary contingency planning should be carried out for the proposed HVDC transmission line; (g). compliance with Grid Code and NEPRA Performance Standard (Transmission) Rules, 2005 i.e. the Performance Rules; (h). the proposed TSA should specify on bi-directional transmission based on future requirements; and (i). PPIB must ensure that the sponsors adhere to the lock-in period for the Project.

**(v).** In consideration of the above, the Authority decided to seek the perspective of PMLTCPL and NTDC to confirm the status of the compliance of the

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above mentioned directions. In this regard, both PMLTCPL and NTDC confirmed that a suitable structure for the execution of the Project has already been placed. According to the said, the construction of the Project will be the responsibility of PMLTCPL including the Operation and Maintenance (O&M) of the converter stations at Matiari and Lahore. Whereas, NTDC will be responsible for the O&M of the transmission line part of the Project for which it will incorporate a separate legal entity.

**(vi).** About the selection of the proper route of the Project, both PMLTCPL and NTDC confirmed that maximum efforts are being made to select the shortest possible route duly considering the future transmission plans, social and environment aspect and to reduce the construction cost, land cost and associated maintenance and security costs.

**(vii).** Regarding the timely completion of 4,000 MW of electric power projects so that the full capacity of the HVDC is utilized, both NTDC and PMLTCPL confirmed that there will be proper coordination with various developers of the generation projects to ensure that the designated capacity of 4000 MW for the HVDC transmission line is optimally utilized by having these projects commissioned/online.

**(viii).** As regards the option of transfer of technology, it was submitted by PMLTCPL and NTDC that the said option for the current and future HVDC projects has been duly agreed and covered in the already initialed TSA and IA. Both, PMLTCPL and NTDC confirmed that the directions of the Authority in this regard will be adhered to in letter and spirit.

**(ix).** Regarding the timely completion of all the required system studies, PMLTCPL submitted that it had already carried out the said studies and submitted the same to NTDC for its concurrence and approval in July 2017. In this regard, NTDC duly confirmed the receipt of the said studies from PMLTCPL for vetting/approval. Further, NTDC stated that earlier it could not vet the required submitted studies due to non-availability of the required consultant. However, now the service of a Canadian firm in the name of HATCH has been hired as Owner's



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Engineer to validate and confirm the aforementioned system studies. After the confirmation of completion of all technical studies to the satisfaction of the Owner's Engineer, NTDC will implement the Project so that the safety and stability of the system is ensured.

**(x).** As regards the contingency planning for the proposed HVDC transmission line, PMLTCPL submitted that required studies in this regard has already been carried out and has been submitted to NTDC for review/vetting. It was submitted that as the system is changing from time to time therefore, a more detailed study shall be required to be carried out in consultation with NTDC. Accordingly, it is proposed that a stability control system is installed at NTDC to keep the system stable under the N-1 and N-2 conditions. In this regard, CET/PMLTCPL had already started the preliminary study in consultation with NTDC. It was confirmed that all the required studies and the required actions to be taken to implement the findings of the studies shall be completed before the Commercial Operation Date (COD) of the HVDC transmission line/the Project.

**(xi).** About the compliance with Grid Code and the Performance Rules, PMLTCPL confirmed that relevant provisions of the said code and rules will be followed in letter and spirit. Regarding the provision of bi-directional transmission arrangement based on future requirements, PMLTCPL confirmed that in the initialed TSA it has been mentioned that 80% of the contracted capacity will be available for reverse transmission. Further, PMLTCPL confirmed that it guarantees that HVDC system would realize such kind of function after the COD. As regard adhering to provisions of the lock-in period, PMLTCPL submitted that it has agreed in this regard and a suitable provision is being made in the IA confirming that the shareholdings of CET in the project company will not be diluted during lock-in period i.e. upto six (06) years from the COD of the Project. Further, PMLTCPL confirmed that necessary amendment is being made in the Articles of Association of the company to incorporate this provision of the IA.

**(xii).** The Authority considered the above submissions of PMLTCPL & NTDC and observed that the company has submitted all the required information/documents and has fulfilled the requirements of the Licensing

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Regulations including (a). purpose; (b). line route and territory maps; (c). line lengths, starting point, termination point, year of completion; (d). system studies; (e). environmental and social soundness Assessment (f). structures: type, number/km; (g). line characteristics; (h). conductor, type, current carrying capacity, circuit power transfer; (i). insulators; (j). shield-wire: number, size; (k). compensation employed: series, shunt, SVC; (l). Communication system: PLC, fiber optics, microwave; and (m). grid station(s) involved etc. In view of the above, the Authority considers that PMLTCPL qualifies for the grant of SPTL for its proposed HVDC transmission line/the Project.

## (E). Grant of SPTL

**(i).** Electricity is a fundamental element for the economic growth. The electricity consumption per capita has a strong correlation to the Social Development Indices (Human Development Index-HDI, life expectancy at birth, infant mortality rate, and maternal mortality) and Economic Indices (such as GDP per capita).

**(ii).** Increasing electricity consumption per capita can directly stimulate faster economic growth and indirectly achieve enhanced social development. In short, the economic growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. In view of the said, the Authority is of the considered opinion that for sustainable development, all types of electric power generation resources including Coal (Imported/Indigenous), Hydel, Wind, Solar and other RE resources must be tapped and developed on priority basis both in public and private sectors.

**(iii).** The existing energy mix of the country is heavily skewed towards the costlier thermal generation facilities/thermal power plants, operating on imported furnace oil. The import of furnace oil not only creates a pressure on the precious foreign exchange reserves of the country but also causes an increase in the consumer end tariff. The increase in the consumer end tariff not only results in higher inflation but it also affects the competitiveness of the local Industry with its foreign peers. In order to address the said issues, the Authority considers it imperative that efforts must be made to change the energy mix towards cheaper

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fuels. With the depleting natural gas reserves in the country and relatively longer lead time for the construction of hydroelectric power projects, the coal power plants are considered the best option in the short and medium term planning. Therefore, to reduce the Demand-Supply gap and to achieve sustainable development, it is vital that indigenous as well as imported coal projects are given priority for power generation and their development is encouraged. In view of the said, the GoP is setting a number of generation facilities/thermal power based on imported and indigenous fuels in the public and private sector. In order to transmit economically the generated power to the load center located in the north, the GoP has planned the first ever HVDC transmission line of the country.

**(iv).** In consideration of the above, NTDC signed a cooperation agreement with SGCC for the construction, operation and O&M of the proposed HVDC transmission line. In this regard, the sponsors of the project incorporated SPV for the project in the name of PMLPTCPL and approached the Authority for the grant of SPTL which was processed in terms of the relevant rules and regulations. In view of the explanation given, the Authority considers that PMLTCPL qualifies for the grant of the SPTL. In consideration of the above, the Authority considers that the transmission of electric power from the proposed generation facilities in the south of the country, using the proposed transmission facilities of PMLTCPL to the load center in the north of the country will be very vital therefore, according/approving the SPTL to it will serve the public interest as envisaged in Section-19 of the NEPRA Act.

**(v).** About the term of the proposed SPTL, the Authority clarifies that transmission facilities (including electrical circuits, transformers and sub-stations) normally have a useful life of more than thirty years. As explained above, the proposed SPTL of PMLTCPL is being built on BOOT basis with a term of twenty-five (25) years from its COD. In view of the said, the Authority fixes the term of the proposed SPTL to twenty-five (25) years from the COD of the Project.

**(vi).** Regarding the Tariff, it is hereby clarified that under Section-7(3)(a) of the NEPRA Act, the determining of tariff, rate and charges etc. is the sole prerogative of the Authority. In this regard, the Authority through its determination

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dated May 04, 2017 has determined the tariff of the Project. The Authority directs PMLTCPL to comply with the directions contained in the determination for tariff and charge only such tariff which has been determined, approved or specified by it.

**(vii).** The proposed transmission facilities for which PMLTCPL has sought the SPTL consists of overhead lines on lattice steel towers. In this regard, PMLTCPL has confirmed that proposed transmission facilities will be compliant with the requirements of the applicable environmental laws and policy. Further, PMLTCPL has also provided a copy of the NOC issued from the concerned environmental agencies of the provinces of Sindh and Punjab. Notwithstanding the said, the Authority makes it mandatory for PMLTCPL to comply with the environmental rules and regulations all the time without any exception. Further, the Authority directs PMLTCPL to submit a report on biannual basis confirming that its transmission facilities are operating in compliance with required environmental standards prescribed the relevant agencies.

**(viii).** In consideration of the above, the Authority hereby approves the grant of SPTL to PMLTCPL on the terms and conditions as set out in the licence annexed to this determination. The grant of SPTL will be subject to the provisions contained in the NEPRA Act, relevant rules, regulations framed there under and the Applicable Documents.

## Authority

Syed Masood-ul-Hassan Naqvi
(Member)

Himayat Ullah Khan
(Member)

Saif Ullah Chattha
(Member/Vice Chairman)

Tariq Saddozai
(Chairman)

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

## SPECIAL PURPOSE TRANSMISSION LICENCE

## No. SPTL/03/2018

In exercise of the powers conferred under Section-19 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby grants a Special Purpose Transmission Licence to the company having particulars as follows:-

**PAK MATIARI-LAHORE TRANSMISSION COMPANY (PRIVATE) LIMITED**

Incorporated under Section-32 of
the Companies Ordinance, 1984 (XLVII of 1984) Having Corporate Universal
Identification No. 0095286, Dated September 16, 2015

for its Special Purpose Transmission Line from Convertor Station Matiari (located at Village Siakhart, Taluka and District Matiari in the province of Sindh) to Convertor Station Lahore (located at Village Waizir, Phool Nagar Tehsil Pattoki, District of Kasur in the province of Punjab)

to engage in Transmission Business subject to and in accordance with the Articles of this Licence.

Given under my hand on 19th day of February Two Thousand & Eighteen and expires on 28th day of February Two Thousand & Forty-Six.

19 02 18

Registrar

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## Article-1
## Definitions

**1.1** In this Licence unless there is anything repugnant in the subject or context:

**(a).** "**Act**" means the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (XL of 1997) as amended from time to time;

**(b).** "**Affiliate**" in relation to any person, means any person who owns or controls, or is owned or controlled by, or is under common ownership or control with, that person, and for the purpose of this definition: -

**(i).** "**control**" means the right, power or ability to influence or determine any decision in respect of the conduct of affairs of the person under control; and

**(ii).** "**ownership**" means the ownership or the right to own the shares or voting securities of the person owned;

**(c).** "**Ancillary Services**" means the services ancillary or incidental to the safe, reliable, stable and efficient availability and utilization of electrical energy and net capacity and include without limitation, the following, namely: -

**(i).** energy imbalance service;

**(ii).** spinning reserve service;

**(iii).** supplemental reserve service;

**(iv).** reactive supply and voltage control service; and

**(v).** regulation and frequency response service;

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**(d).** "**Applicable Documents**" means the NEPRA rules and regulations, the grid code and any document issued or instrument or determination made by the Authority under any of the foregoing or pursuant to the exercise of the powers of the Authority under the Act, in each case of a binding nature applicable to the Licensee or where applicable, to its Affiliates and to which the Licensee or any of its Affiliates may be subject.

**(e).** "**Authority**" means the National Electric Power Regulatory Authority constituted under Section-3 of the Act;

**(f).** "**Commercial Operations Date (COD)**" means the day immediately following the date on which the transmission facility of the Licensee is commissioned;

**(g).** "**CPPA-G**" means the Central Power Purchasing Agency Company (Guarantee) Limited;

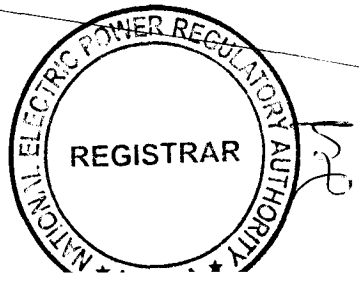
**(h).** "**Laws**" include all statutes, rules and regulations made pursuant thereto, judicial decisions, in each case as may be notified to the Licensee or its Affiliates;

**(i).** "**Licence**" means this Special Purpose Transmission Licence;

**(j).** "**Licensee**" means **Pak Matiari-Lahore Transmission Company (Private) Limited** and its successors or assigns;

**(k).** "**NTDC**" means National Transmission and Despatch Company Limited and its successors or permitted assigns which has granted a Transmission Licence (No. TL/01/2002, dated December 31, 2002 as amended from time to time) under Section-17 and Section-7(4) of the Act;

**(l).** "**Public Sector Entity**" means any authority, agency, division or instrumentality of the Federal or Provincial Government or a



local authority but does not include the Authority;

**(m).** "**Rules**" means the National Electric Power Regulatory Authority rules made under Section-46 of the Act;

**(n).** "**Transmission Business**" means the business of transmission of electric power carried on or to be carried on by the Licensee pursuant to and in accordance with the terms of this Licence in planning, development, construction and maintenance of the transmission facilities of the Licensee and operation of such facilities for the transmission of electric power including the inter-connection services;

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

## Article-2
## Grant of Licence

**2.1** This Licence is granted to the Licensee in terms of Section-19 of the Act and the Applicable Documents to construct, own, maintain and operate specified transmission facilities connecting the convertor station of Matiari in the province of Sindh and the convertor station of Lahore in the province of Punjab, as set out in Schedule-I to this Licence.

**2.2** The details specific to the transmission facilities of the Licensee, including length of line, transmission line type (underground/overhead), connecting grids, technical limits, technical functional specifications and other information are set out in Schedule-II of this Licence.

## Article-3
## Licence fee

The Licensee shall pay to the Authority the Licence fee, in the amount, manner and time specified in the National Electric Power Regulatory Authority (Fees) Rules, 2002 as amended from time to time.

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## Article-4
## Term and Renewal of Licence

**4.1** This Licence shall become effective from the date of its issuance and will have a term of twenty-five (25) years from the COD of the transmission facilities of the Licensee.

**4.2** Subject to the provisions of the National Electric Power Regulatory Authority (Application & Modification) Procedure Regulations, 1999, the Authority may renew this Licence for such further term as deemed appropriate.

**4.3** While considering renewal of Licence the Authority may keep in view the performance of the Licensee during the then expiring term and the interests of consumers and the electric power industry as a whole.

## Article-5
## Revocation and Suspension

**5.1** The Authority may suspend or revoke this Licence upon the persistent failure of the Licensee to comply with the terms and conditions of the Licence as stipulated in Section-28 of the Act.

**5.2** The Authority shall determine, on a case to case basis, the degree of recurrence of a specific breach of any term or condition of this Licence, provided that a breach shall be deemed to be recurring on a daily basis where the effects of breach are continuing beyond the time of breach and no measures for rectification thereof are undertaken by the Licensee to the satisfaction of the Authority.

**5.3** Subject to the provisions of sub articles-5.2 and 5.4, the occurrence of the following events shall constitute failure of the Licensee to comply with the terms and conditions of this Licence:-

**(a).** failure of the Licensee to pay the Licence fee when due;

**(b).** a breach by the Licensee of any of the provisions of the Applicable Documents which materially and adversely affects the

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standards, price and quality of service, the reliability and integrity of the transmission facilities, distribution systems or any generation facility, or the safe and efficient operation of the electric power industry, save where such breach occurs without the willful or negligent default of the Licensee;

**(c).** failure of the Licensee to prepare or adhere to any codes, programmes or manuals required to be prepared by the Licensee and, where applicable, obtain approval of the Authority, where such failure has a material adverse effect on the performance by the Licensee of its obligations under the Applicable Documents;

**(d).** except for the purposes of an amalgamation, reconstruction or re-organisation of the Licensee approved by the Authority, the occurrence of any of the following events:-

**(i).** the passing of a resolution by the shareholders for the winding-up of the Licensee, with the majority required under the Companies Ordinance, 1984 (XLVII) of 1984, to give effect to such resolution;

**(ii).** the appointment of a receiver, official assignee or administrator of the affairs of the Licensee which appointment has not been set aside or stayed within ninety (90) days of the date of such appointment; or

**(iii).** the making by a court of competent jurisdiction of an order for the winding-up of the Licensee that has not been stayed or set aside within thirty (30) days of the date of the order;

**(e).** abandonment by the Licensee of the operation of the Transmission Business or any part thereof;

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**(f).** the incurring by the Licensee of cumulative operating losses in an amount which materially and adversely affects, or is likely to affect, the financial viability of the Licensee and which disables or is likely to disable the Licensee from carrying out its Transmission Business and the failure of the Licensee to implement measures for improvement of its financial position within the time limit and with the results specified in this behalf by the Authority;

**(g).** the assignment or transfer of this Licence or the transfer, conveyance, loss or relinquishment by the Licensee of the ownership or control or the right to own, control or operate the Transmission Business or any material part thereof without an authorization in accordance with the provisions of the Act or this Licence, except where such transfer, conveyance, loss or relinquishment is effected pursuant to a contract approved by the Authority for the management or operation of the transmission facilities by a person other than the Licensee;

**(h).** any statement or representation made or information provided by the Licensee in the application for this Licence or subsequently on the directions of the Authority or pursuant to any Applicable Documents proving to have been incorrect, inaccurate or misleading in any material aspect and having a material adverse effect on the ability of the Licensee to perform its obligations under this Licence or causing the Authority to issue or renew this Licence in the belief of the accuracy and correctness of such statement, representation or information irrespective of whether or not the Authority would have issued this Licence if it had knowledge of the inaccuracy of such statement, representation or information;

**(i).** the exercise by the lenders, if any, of the Licensee of their

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remedies under the documentation relating to loans by such lenders in respect of the Transmission Business, where the exercise of the remedies renders the Licensee incapable of performing its obligations in its own right under this Licence or the Applicable Documents including, without limitation, the removal of the management of the Licensee from the control of the Transmission Business and the failure of the Licensee to obtain approval of the Authority for the appointment of the successor management within one hundred and twenty (120) days after such removal;

**(j).** any default by the Licensee in the making of any payment, other than the Licence fee, required to be made by it under the Applicable Documents within ninety (90) days of the due date thereof; or

**(k).** failure of the Licensee to comply with the objects, terms and articles of this Licence due to supervening impossibility notwithstanding the best efforts of the Licensee to comply, where such non-compliance continues for a period of ninety (90) days consecutively or for a cumulative period of one hundred and twenty (120) days in a calendar year.

**5.4** Notwithstanding the provisions of this Article, the Authority shall not revoke or suspend this Licence where the Licensee demonstrates to the satisfaction of the Authority that the breach of the terms of the Licence is a direct result of the failure of the Licensee to obtain consent or its renewal except where such consent is not granted or renewed because of the failure or inability of the Licensee to comply with the laws in relation to such consent or renewal and without providing an opportunity of hearing.

**5.5** Any decision to suspend or revoke this Licence shall be taken in accordance with the Act and the Applicable Documents.

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## Article-6
## Procurement of Electric Power

**6.1** The Licensee shall ensure that neither it nor any of its Affiliates or related undertakings on its own or in concert with others purchases electric power for the purpose of sale to a third party.

**6.2** The Licensee shall not take any measure to prevent or unduly delay changes to Applicable Documents to which it is a party and are required for the development of competitive electricity market and complete and timely enforcement and operation of competitive electricity market.

## Article-7
## Accounting Practices and Audit

**7.1** Subject to and in accordance with the terms of this Licence, the Licensee shall prepare the accounts of its business and other businesses, if any, in accordance with the Act and the Applicable Rules.

**7.2** The Licensee shall ensure that the Licensee and each of its Affiliates maintains accounting and financial reporting arrangements which enable separate accounts to be prepared for each separate business and showing the financial affairs of each such separate business as if it was a separate company so that the revenues, costs, assets, liabilities, capital, reserves and provisions of or reasonably attributed to, each separate business are separately identifiable in the books of the Licensee and its Affiliates from those of any other business, in sufficient detail.

**7.3** The Licensee and any of its Affiliates shall:-

**(a).** maintain and preserve the books of account and accounting records in respect of each financial year for a period of five(5) years; and

**(b).** prepare on a consistent basis for such financial records in respect of each financial year, accounting statement comprising of a profit



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and loss account, balance sheet and a statement of source and application of funds, together with notes thereto, and showing separately in respect of each separate business and in appropriate detail the amounts of any revenue, costs, assets, liability, reserve or provision which has been either:-

**(i).** charged from or to any other business, whether or not a separate business, together with a description of the basis of that charge; or

**(ii).** determined by apportionment or allocation between any separate business together with a description of the basis of the apportionment or allocation.

**7.4** Without prejudice to the provisions of the Applicable Documents regarding the audit of the accounts of the Licensee, the Authority may, after giving the Licensee an opportunity to be heard in this regard, appoint independent auditors of national repute from amongst a panel of auditors specified in this behalf by the Authority through a notification in the official Gazette, for the audit of the accounts of the Licensee, where the Authority has reason to believe that the accounts provided to the Authority by the Licensee do not provide a complete, true and fair view of the Transmission Business or any separate business of the Licensee, provided that such audit shall be restricted to accounting matters under question and shall not be carried out more than once in a financial year.

**7.5** The costs of audit as referred to in sub article-7.4 shall be borne by the Licensee.

**7.6** The Licensee shall ensure that the accounting statements in respect of each financial year prepared under sub article-7.3 (b) and report of the Auditor in respect of each financial year are made available to any person requesting them at a price not exceeding fair copying charges.

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## Article-8
## Open Access

**8.1** Subject to Section-19 of the Act, the Licensee shall offer its transmission and inter-connection services to NTDC and others on such terms and conditions as may be determined by the Authority.

**8.2** The Licensee in consultation with NTDC shall administer its transmission access (offer to connect) in a fair, transparent and open manner setting out rules, policies, procedures and charges as described in this Licence or Applicable Documents to be developed by the Licensee and approved by the Authority.

## Article-9
## Tariff

**9.1** The Authority through its order No. NEPRA/TRF-384/PMTC-2017/6223-6225, dated May 4, 2017 has determined the transmission service charges for the Licensee which must be complied with in letter and spirit.

**9.2** The Licensee shall make available to general public the tariff specifying the rates, charges and other terms and conditions for transmission and inter-connection services determined by the Authority.

## Article-10
## Grid Code

The Licensee shall comply with the provisions and terms & conditions of the Grid Code prepared by the NTDC and approved by the Authority as amended from time to time.

## Article-11
## Compliance with Distribution Codes

**11.1** The Licensee shall comply with the relevant provisions of the Distribution Code of the concerned distribution licensee to the extent applicable to the Licensee in the discharge of its obligations under this Licence.

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**11.2** The Licensee shall comply with any request of a distribution company with respect to its obligations to comply with the Distribution Code as long as such compliance by the Licensee is not in violation of the Grid Code.

## Article-12
## Commercial Code

The Licensee will comply with all relevant provisions in the Commercial Code approved by the Authority relevant to transmission, reliable operation, balancing and Ancillary Services and provision of information to CPPA-G.

## Article-13
## Acquisition and Disposal of Assets

The Licensee shall not, except under prior authorisation of the Authority, sell or dispose in any manner any tangible assets comprised in the transmission facilities or any intangible assets accruing or likely to accrue to the Licensee from the Transmission Business.

## Article-14
## Compliance with Performance Standards

The Licensee shall comply with the relevant provisions of the National Electric Power Regulatory Authority Performance Standards (Transmission) Rules 2005 as amended from time to time.

## Article-15
## Security Standard and Quality of Service

**15.1** The Licensee shall plan, construct, own, operate and maintain its transmission facilities in accordance with the Grid Code and subject to the approval of the Authority.

**15.2** Within three (03) months after the end of each financial year the Licensee shall submit to the Authority a report providing details of the performance of the Licensee during the previous financial year in maintaining the security, availability and quality of service of its transmission facilities.

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**15.3** The criteria referred to in Article-15.2, against which the performance of the Licensee will be measured will be set out in a statement drawn up consistent with NEPRA Performance Standards (Transmission) Rules, 2005 and approved by the Authority in consultation with the Licensee.

**15.4** The Authority may following consultation with the Licensee and, where appropriate with other licensees, issue directions relieving the Licensee of its obligations under Article-15.1 in respect of certain parts of the transmission facilities of the Licensee.

## Article-16
## Compliance with Environmental Standards

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

## Article-17
## Availability of Resources

**17.1** The Licensee shall at all times act in a manner to ensure that it has sufficient management and financial resources to enable it to:

**(a).** carry out the Transmission Businesses; and

**(b).** comply with its obligations under this Licence, the Act and the Applicable Documents.

**17.2** No later than two (02) calendar months following the beginning of each financial year, the Licensee shall submit a statement in writing to the Authority informing the Authority of its ability (or inability as the case may be) to fulfill its obligations under Article-17.1.

**17.3** The Licensee shall, as soon as it becomes aware, notify the Authority of any circumstances that may prevent it from fulfilling its obligations under Article-17.1

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## Article-18
## Industry Standards and Codes of Conduct

**18.1** The Licensee shall participate in such measures and activities as may be initiated by the Authority for the development of industry standards and uniform codes of conduct.

**18.2** The Licensee shall be obliged to comply with such industry standards and uniform codes of conduct which may be specified by the Authority as having a bearing on the safety, reliability, stability, integrated operability and efficiency of the whole or a material part of the electric power system.

## Article-19
## Insurance

The Licensee may obtain and maintain such policies of insurance as deemed fit and appropriate in accordance with the prudent utility practices.

## Article-20
## Maintenance of Records

**20.1** The Licensee shall keep complete and accurate records and data in respect of all aspects of each of its separate businesses. All such records and data shall, unless provided otherwise under the Laws or the Applicable Documents, be maintained for a period of five (05) years after the creation of such record or data.

**20.2** The Authority may authorize its any officer/professional staff to inspect documents, record and data as may be necessary to carry out the purposes of the Act and the Applicable Documents, at any time without prior notice to the Licensee.

**20.3** For the purposes of sub article-20.2, the authorized officer/professional staff shall have full and free access to any premises, place, documents or work station and may make copy of relevant record, information and data as may be necessary for the purposes of the Act and the Applicable Documents. The Licensee shall

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provide all reasonable facilities and assistance to ensure the effective exercise of the right of inspection.

## Article-21
## Safety to Public

The Licensee shall plan, design, operate and maintain its transmission facilities in such a manner so as not to endanger public life or property.

## Article-22
## Health and Safety of Employees

The Licensee shall arrange and maintain appropriate machinery in respect of the health and safety of the employees of Licensee at work.

## Article-23
## Provision of Information to the Authority and General Public

Pursuant to Section-44 of the Act, the Licensee shall furnish to the Authority, in such manner and at such times as the Authority may require, such information and shall procure and furnish such reports, as the Authority may require and deem necessary.

## Article-24
## Interpretation of the Licence Provisions

The Authority shall, in accordance with the provisions of the Act make the interpretation of any or all of the provisions of this Licence. The decision of the Authority in this regard shall be final.

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# SCHEDULE-I

The Specified Transmission Facilities the Licensee (is allowed to construct, own, maintain and operate for connecting Matiari Convertor Station in the province of Sindh to Lahore Convertor Station Lahore in the province of Punjab) are set out in this Schedule

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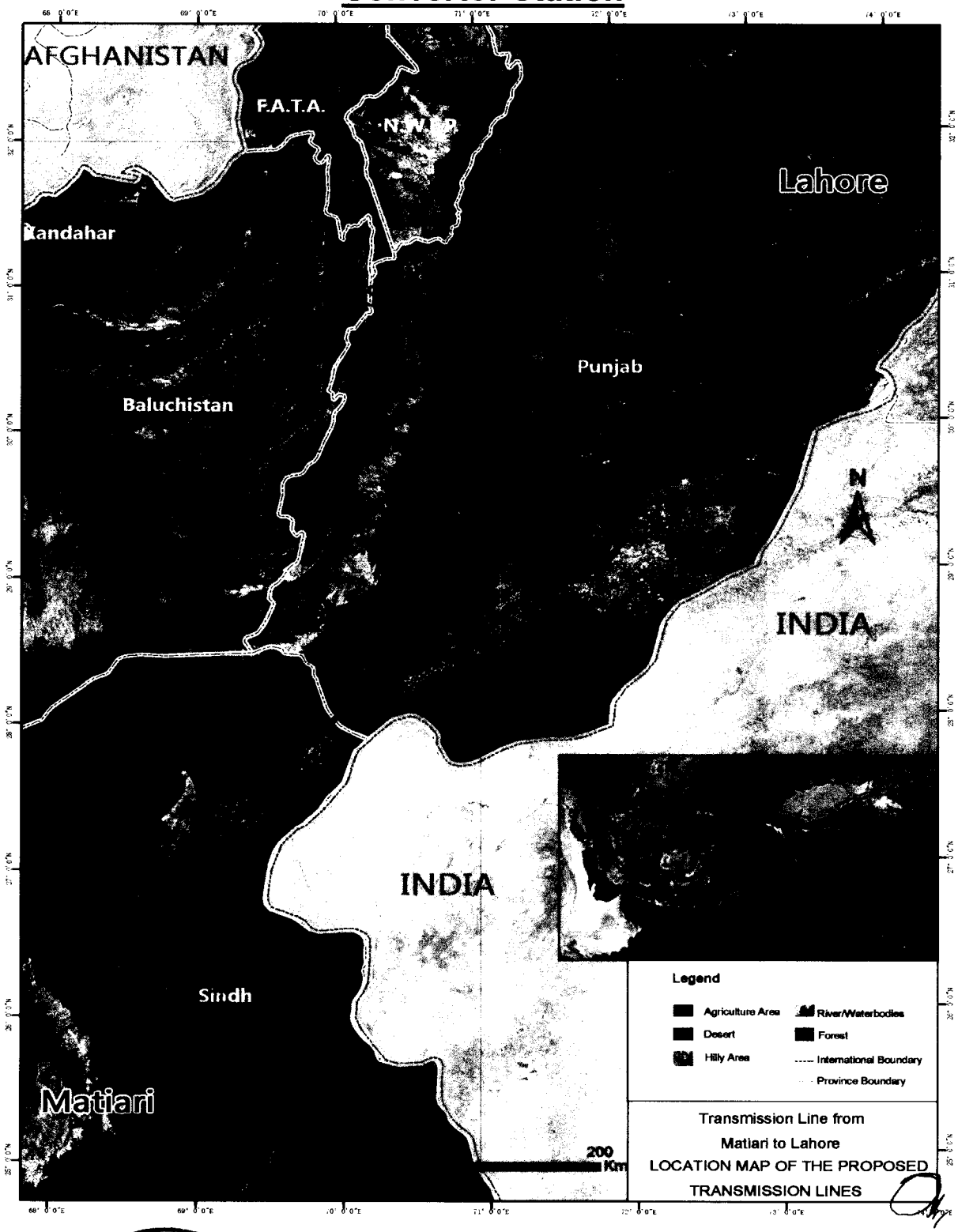
# Route of the Transmission Facilities of the Licensee from Matiari Convertor Station to Lahore Convertor Station

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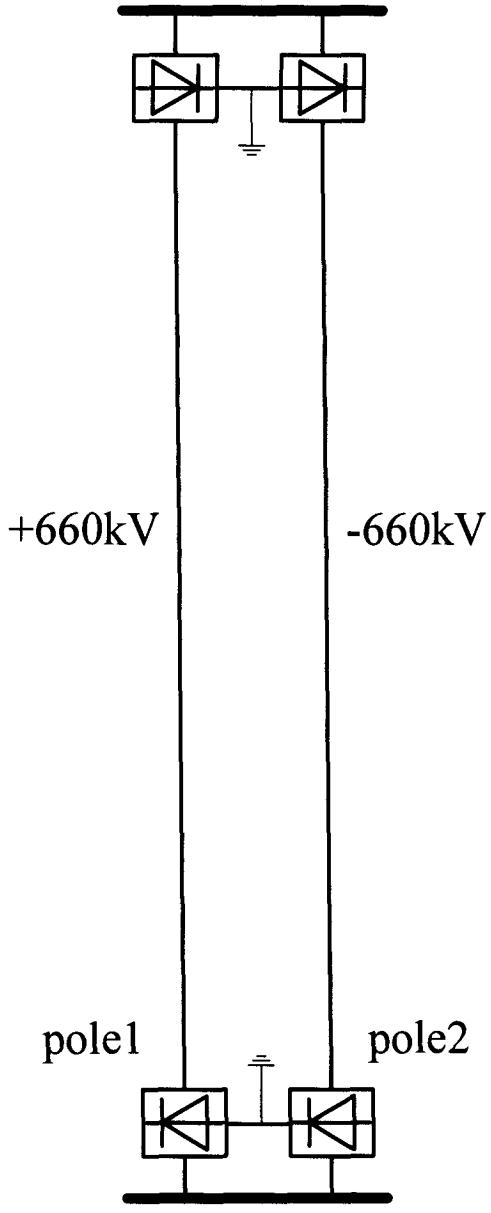
# Schematic Diagram of The ±660kV HVDC Transmission Project From Matiari Convertor Station to Lahore Convertor Station

## LAHORE CONVERTER STATION




## MATIARI CONVERTER STATION

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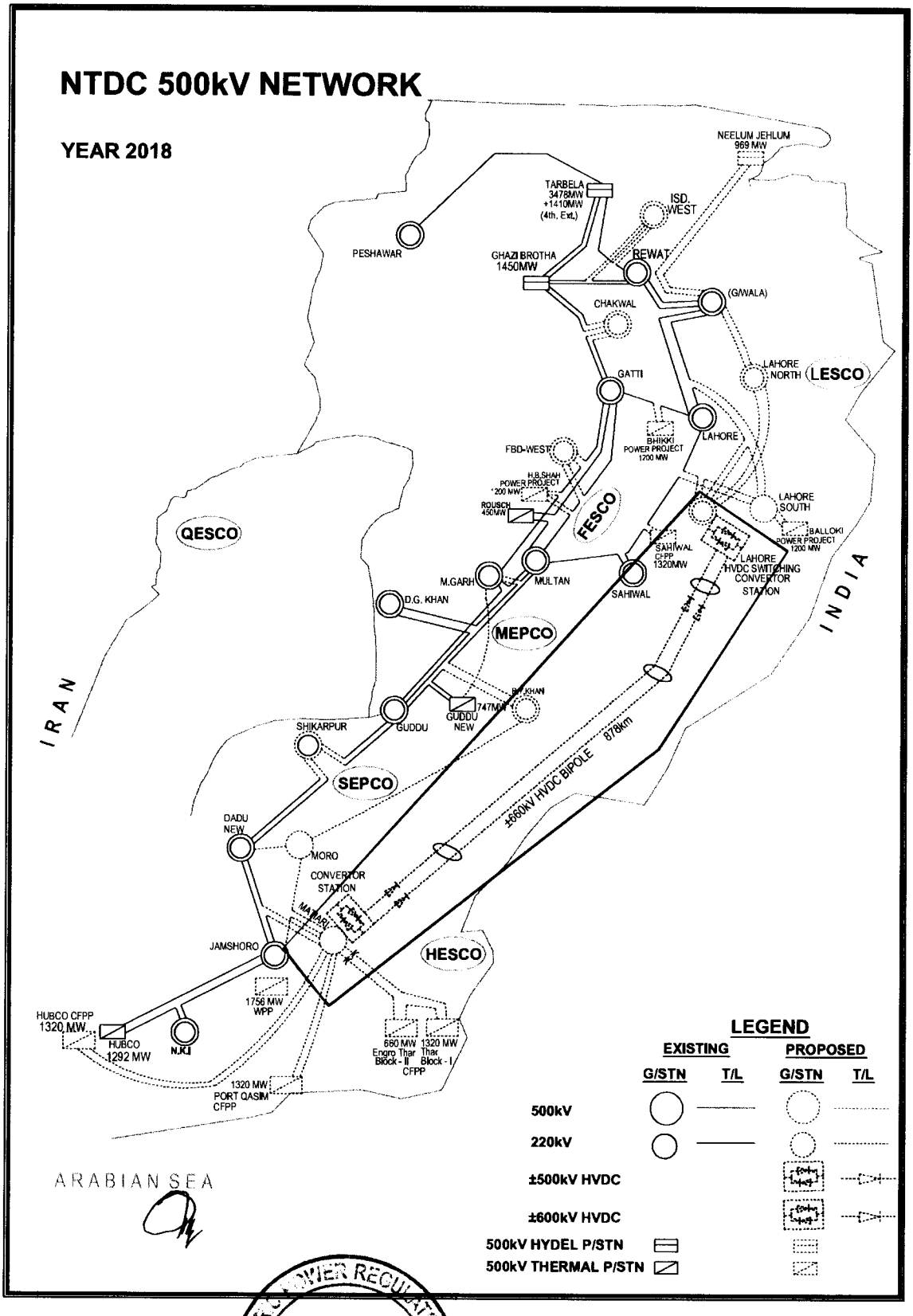
# Interconnection Diagram of The ±660kV HVDC Transmission Project From Matiari Convertor Station to Lahore Convertor Station

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# SCHEDULE-II

The details specific to the Transmission Facilities of the Licensee, including length of line, transmission line type (underground/overhead), connecting grids, technical limits, technical functional specifications and other information are described in this Schedule.

# Detail of Transmission Facilities of the Licensee

## (A). General Information

| | | | |
|---|---|---|---|
| (i). | Name of Company/ Licensee | Pak Matiari-Lahore Transmission Company (Private) Limited | |
| (ii). | Registered/Business Office of the Company/Licensee | House No.177-A, Street No.6, Phase-I, D.H.A., Lahore. | |
| (iii). | Location of the Transmission Facilities | Starting point | Ending Point |
| | | Matiari, Sindh Province | Lahore, Punjab Province |
| (iv). | Type of Transmission Facilities | Overhead Transmission Line (T/L) | |

## (B). Transmission Facilities

| | | |
|---|---|---|
| (i). | Type of Transmission Facilities | Overhead Transmission Line on Lattice Steel Towers. |
| (ii). | Transmission Line | Bi-Pole Single Circuit (S/C) |
| (iii). | Connecting Grid | From Matiari Converter Station to Lahore Converter Station |
| (iv). | Voltage Level | ±660 KV |
| (v). | Length of Transmission Line | 878-KM, the final length is subject to the final designs. |
| (vi). | Type of Conductor | 4×JL1/G3A-1250/70-76/7 ACSR Conductor and 4×JL1/LHA1-800/550-54/37 ACAR Conductor |
| (vii). | Type of Earth Wire | 2×OPGW-15-120-2 (24 core) |

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## (C). Bill of Quantity (BOQ) for the T/L

| | | |
|---|---|---|
| (i). | Type of Tower | ZP Series (i.e. ZP1, ZP2 & ZPT) & JP Series (i.e. JP1, JP2 & JP3) |
| (ii). | Tower Type ZP1 | 1362 No. |
| (iii). | Tower Type ZP2 | 229 No. |
| (iv). | Tower Type ZPT | 131 No. |
| (v). | Tower Type JP1 | 201 No. |
| (vi). | Tower Type JP2 | 63 No. |
| (vii). | Tower Type JP3 | 12 No. |
| (viii). | Grounding Set | 1998 No. |

## (D). Conductor & Earth Wire* (Length of Transmission Line)

| | | |
|---|---|---|
| (i). | Length of 4×ACSR Conductor | 664×2 KM |
| (ii). | Length of 4×ACAR Conductor | 214×2 KM |
| (iii). | Earth Wire (OPGW-120) | 878×2 KM |

## (E). Hardware for Conductor

| | | |
|---|---|---|
| (i). | Single 300KN Suspension Insulator | 184 Sets |
| (ii). | Single 420KN Suspension Insulator | 2982 Sets |
| (iii). | Double 300KN Suspension Insulator | 290 Sets |
| (iv). | Triple 420 KN Tension Insulator | 1174 Sets |

* Not including the transmission line for ground electrode

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| | | |
|---|---|---|
| (v). | Double 210KN Jumper Insulator | 582 Sets |
| (vi). | Spacer | 43578 No. |
| (vii). | Vibration Damper On Conducting Wires | 3651 No. |
| (viii). | Splicing Sleeves | 3938 No. |
| (ix). | Repair Sleeves | 1914 No. |

## (F). Hardware for Earth Wire

| | | |
|---|---|---|
| (i). | Single Suspension Fitting for OPGW | 3420 Sets |
| (ii). | Single Tension Fitting for OPGW | 904 Sets |
| (iii). | Joint Box for OPGW | 444 No. |
| (iv). | Cable tray for OPGW | 444 No. |
| (v). | Downlead clamp for OPGW | 25936 No. |
| (vi). | Vibration Damper On OPGW | 18550 No. |

## (G). Insulators

| | | |
|---|---|---|
| (i). | Disc Insulators (420 KN) | 276767 No. |
| (ii). | Disc Insulators (210 KN) | 1320 No. |
| (iii). | Synthetic insulator (300 KN) | 1268 No. |

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| | | |
|---|---|---|
| (iv). | Synthetic insulator (420 KN) | 6138 No. |
| (v). | Jumper insulator (160 KN) | 2156 No. |

## (H). Lahore Converter Station Facilities

| (a). | DC Equipment | |
|---|---|---|
| (i). | Converter Transformer | YD: 400MVA, (510/ √ 3)/280.3kV, +22/-8x1.25%<br>YY : 400MVA,(510/√3)/(280.3/√3)kV,+22/-8x1.25% |
| (ii). | Converter Valve | Double-valve, 5 inch thyristor, 3030A,660kV |
| (iii). | Smoothing reactor for pole line | 680kV, 3030A, 75mH, dry-type |
| (iv). | Smoothing reactor for neutral line | 150kV, 3030A, 75mH, dry-type |
| (v). | DC disconnector | 680kV, 3030A |
| (vi). | DC high-speed switch NBGS | 3030A, including circuit breaker, capacitor bank, and arrester etc. |
| (vii). | DC high-speed switch NBS | 3030A, including circuit breaker, capacitor bank, and arrester etc. |
| (viii). | DC current measuring devices | 680kV ,Optical current transformer, with optical connectors and photoelectron equipment |
| (ix). | DC voltage measuring devices | 680kV |
| (x). | DC pole bus arrester | 680kV |
| (xi). | $12^{th}/24^{th}$ DC filter | Including C1-high-voltage capacitor, high-voltage capacitor imbalance CT, L1-high-voltage reactor, L2-neutral point reactor, T3-reactor L2 branch CT, T4-F1 branch CT,T5-R1 branch CT,T6-CT on the neutral point side, F3-arresters on both ends of L1, F1-arrester on the high-voltage end of L1, C2 low-voltage capacitor, F2-arresters on both ends of L2, etc. |

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| | | |
|---|---|---|
| (xii). | 6th/42nd DC filter | Including C1-high-voltage capacitor, high-voltage capacitor imbalance CT, L1-high-voltage reactor, L2-neutral point reactor, T3-reactor L2 branch CT, T4-F1 branch CT,T5-R1 branch CT,T6-CT on the neutral point side, F3-arresters on both ends of L1, F1-arrester on the high-voltage end of L1, C2 low-voltage capacitor, F2-arresters on both ends of L2, etc. |
| (xiii). | Other DC equipment | Including high-voltage/low-voltage post insulators, low-voltage disconnector/earthing switch, low-voltage current/voltage measure device, DC neutral bus impulse capacitor, RI reactor, capacitor etc. |
| **(b).** | **AC Equipment** | |
| (i). | 500 kV AC switchgear | |
| (ii). | Circuit breaker | 550kV 4000A 63kA(3s) 160kA, with closing resistor |
| (iii). | Current transformer | 500kV 2x2000/1A |
| (iv). | Vertical disconnector with single earthing switch | 550kV 4000A 63kA(3s) 160kA |
| (v). | Disconnector, with single earthing switch | 550kV 4000A 63kA(3s) 160kA, dual-column, horizontal type |
| (vi). | Disconnector, with triple earthing switches | 550kV 4000A 63kA(3s) 160kA three-column, horizontal type |
| (vii). | Earthing switch | 550kV 63kA(3s) 160kA |
| (viii). | CVT | 500kV |
| (ix). | Metal-oxide surge arrester | 420kV/396kV |
| **(c).** | **500kV AC filter switchgear** | |
| (i). | AC filter/ shunt capacitor bank | 500kV, Rated capacity: 150Mvar/160Mvar |
| (ii). | Circuit breaker of ACF sub-bank | 550kV 3150A 63kA/3s 160kA |
| (iii). | CT of ACF sub-bank | 500kV |
| (iv). | Vertical disconnector of ACF sub-bank | 550kV 3150A 63kA/3s 160kA, with single earthing switch |
| (v). | Earthing switch of ACF sub-bank | 550kV 63kA/3s 160kA |
| (vi). | Metal oxide surge arrester | 396kV |

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| (vii). | CVT | 500/√3/0.1/√3/0.1/√3/0.1/√3/0.1kV |
| (viii). | Earthing switch of ACF bus | 550kV 63kA/3s 160kA |
| **(d).** | **Station auxiliary system** | |
| (i). | 500kV three-phase oil-immersed transformer | 130MVA 510±4×2.5%/35kV, non-exciting regulation |
| (ii). | 132kV three-phase oil-immersed transformer | 8MVA 132±2×2.5%/11.5kV, non-exciting regulation |
| (iii). | 500kV circuit breaker | 550kV 4000A 63kA/3s 160kA |
| (iv). | 132kV $SF_6$ circuit breaker | 145kV 3150A 40kA 100kA |
| (v). | 500kV disconnector | 550kV 3150A 63kA/3s 160kA, single earthing switch |
| (vi). | 132kV disconnector | 145kV 1600A 40kA 100kA, dual-column, horizontally opening, single earthing switch |
| (vii). | 132kV disconnector | 145kV 1600A 40kA 100kA, dual-column, horizontally opening, double earthing switches |
| (viii). | 500kV earthing switch | 500kV, 63kA/3s, 160kA |
| (ix). | 500kV CT | 500kV 2x2000/1A |
| (x). | 132kV CT | 132kV 800/1A |
| (xi). | 500kV metal oxide surge arrester | 420kV |
| (xii). | 132kV metal oxide surge arrester | 120kV |
| (xiii). | 500kV CVT | 500kV |
| (xiv). | 132kV CVT | 132kV |
| (xv). | 35kV three-phase two-winding transformer | 8MVA 35±2×2.5%/11.5kV, non-exciting regulation |
| (xvi). | 40.5kV circuit breaker | 40.5kV 2000A 40kA 100kA |
| (xvii). | 35kV CT | 35kV, outdoor type |
| (xviii). | 35kV voltage transformer | 35kV |
| (xix). | Dual-column horizontally-rotation disconnector | (a.) 40.5kV, 2000A; 40kA; 100kA; with double earthing switches<br>(b.) 40.5kV, 2000A; 40kA; 100kA; with single earthing switch |

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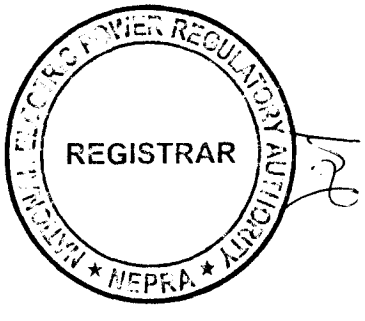
## (I). Matiari Converter Station Facilities

| (a). | DC Equipment | |
|---|---|---|
| (i). | Converter transformer | YD:400MVA, (510/√3)/280.3kV,+22/-8×1.25%<br>YY:400MVA,(510/√3)/(280.3/√3)kV,+22/-8×1.25% |
| (ii). | Converter Valve | Double-valve ,5 inch , 3030A,660kV |
| (iii). | smoothing reactor for pole line | 680kV, 3030A, 75mH, Dry-type |
| (iv). | smoothing reactor for neutral line | 150 kV,3030A, 75mH, Dry-type |
| (v). | DC disconnector | 680kV, 3030A |
| (vi). | DC high-speed switch NBGS | 3030A, including circuit breaker, capacitor bank, and arrester etc. |
| (vii). | DC high-speed switch NBS | 3030A, including circuit breaker, capacitor bank, and arrester etc. |
| (viii). | Metallic return transfer breaker | 3030A, including circuit breaker, capacitor bank, reactor, arrester etc. |
| (ix). | Ground return transfer switch | 3030A, including circuit breaker, capacitor bank, reactor, arrester etc. |
| (x). | DC current measuring devices | 680kV ,Optical current transformer, with optical connectors and photoelectron equipment |
| (xi). | DC voltage measuring devices | 680kV |
| (xii). | DC pole bus arrester | 680kV |
| (xiii). | $12^{th}/24^{th}$ DC filter | Including C1-high-voltage capacitor, high-voltage capacitor imbalance CT, L1-high-voltage reactor, L2-neutral point reactor, T3-reactor L2 branch CT, T4-F1 branch CT, T5-R1 branch CT,T6-CT on the neutral point side, F3-arresters on both ends of L1, F1-arrester on the high-voltage end of L1, C2 low-voltage capacitor, F2-arresters on both ends of L2, etc. |
| (xiv). | $6^{th}/42^{nd}$ DC filter | Including C1-high-voltage capacitor, high-voltage capacitor imbalance CT, L1-high-voltage reactor, L2-neutral point reactor, T3-reactor L2 branch CT, T4-F1 branch CT, T5-R1 branch CT,T6-CT on the neutral point side, F3-arresters on both ends of L1, F1-arrester on the high-voltage end of L1, C2 low-voltage capacitor, F2-arresters on both ends of L2, etc. |



| | | |
|---|---|---|
| (xv). | Other DC equipment | Including high-voltage/ low-voltage post insulators, low-voltage disconnector/earthing switch, low-voltage current/voltage measure device, DC neutral bus impulse capacitor, RI reactor, capacitor etc. |
| **(b).** | **AC Equipments** | |
| (i). | 500 kV AC switchgear | |
| (ii). | Circuit breaker | 550kV 4000A 63kA(3s) 160kA, with closing resistor |
| (iii). | Current transformer | 500kV 2 x 2000/1A |
| (iv). | vertical disconnector with single earthing switch | 550kV 4000A 63kA(3s) 160kA |
| (v). | Disconnector, with single earthing switch | 550kV 4000A 63kA(3s) 160kA, dual-column, horizontal type |
| (vi). | Disconnector, with triple earthing switches | 550kV 4000A 63kA(3s) 160kA , three-column, horizontal type |
| (vii). | Earthing switch | 550kV 63kA(3s) 160kA |
| (viii). | CVT | 500kV |
| (ix). | metal-oxide surge arrester | 420 kV/396kV |
| (x). | Shunt reactor | 550/√3kV, 60Mvar、<br>550/√3kV, 30Mvar |
| (xi). | Neutral-point reactor of 500kV shunt reactor | 66kV, 800 Ω - 1000 Ω |
| **(c).** | **500kV AC filter switchgear** | |
| (i). | AC filter/shunt capacitor bank | 500kV Rated capacity: 150Mvar /180Mvar |
| (ii). | Circuit breaker of ACF sub-bank | 550kV 3150A 63kA/3s 160kA |
| (iii). | CT of ACF sub-bank | 500kV |
| (iv). | Vertical disconnector of ACF sub-bank | 550kV 3150A 63kA/3s 160kA, with single earthing switch |
| (v). | Earthing switch of ACF sub-bank | 550kV 63kA/3s 160kA |
| (vi). | Metal oxide surge arrester | 420 kV / 396kV |
| (vii). | CVT | 500kV |
| (viii). | Earthing switch of ACF bank bus | 550kV 63kA/3s 160kA |

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| (d). | **Station Auxiliary system** | |
|---|---|---|
| (i). | 500kV three-phase oil-immersed transformer | 130MVA, 510±4×2.5%/35kV, non-exciting regulation |
| (ii). | 132kV three-phase oil-immersed transformer | 8MVA 132±2×2.5%/11kV , non-exciting regulation |
| (iii). | 500kV circuit breaker | 550kV 4000A 63kA/3s 160kA |
| (iv). | 132kV SF6 circuit breaker | 145kV 3150A 40kA 100kA |
| (v). | 500kV disconnector | 550kV 3150A 63kA/3s 160kA, single earth switch |
| (vi). | 132kV disconnector | 145kV 1600A 40kA 100kA, dual-column, horizontally opening, single earthing switch |
| (vii). | 132kV disconnector | 145kV,1600A,40kA,100kA,dual-column, horizontally opening, double earthing switches |
| (viii). | 500kV earthing switch | 500kV, 63kA/3s, 160kA |
| (ix). | 500kV CT | 500kV 2x2000/1A |
| (x). | 132kV CT | 132kV 800/1A |
| (xi). | 500kV metal oxide surge arrester | 420kV |
| (xii). | 132kV metal oxide surge arrester | 120kV |
| (xiii). | 500kV CVT | 500kV |
| (xiv). | 132kV CVT | 132kV |
| (xv). | 35kV three-phase two-winding transformer | 8MVA 35/11kV, non-exiting regulation |
| (xvi). | 40.5kV circuit breaker | 40.5kV 2000A 40kA 100kA |
| (xvii). | 35kV CT | 35kV, outdoor type |
| (xviii). | 35kV voltage transformer | 35kV |

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|---|---|---|
| (ix). | Dual-column horizontally-rotation disconnector | (a.) 40.5kV, 2000A; 40kA; 100kA; with double earthing switches<br>(b). 40.5kV, 2000A; 40kA; 100kA; with single earthing switch |

## (J). COD of the Transmission Facilities

| | | |
|---|---|---|
| (i). | Expected/ Anticipated COD of the Transmission Facility | March 01, 2021 |
| (ii). | Expected Useful Life of the Transmission Facility from COD | 25 Years (Minimum) |

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