National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
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No. NEPRA/R/DL/LAG-486/7931-36 February 16, 2021

Mr. Nusrat Ullah Khan Afridi,
Plant Manager,
Karachi Nuclear Power Plant,
Pakistan Atomic Energy Commission,
P.O Box No. 3094,
Islamabad.

Subject: **Grant of Generation Licence No. GL/27/2021**
Licence Application No. LAG-486
Pakistan Atomic Energy Commission (PAEC)

Reference: *PAEC's application vide letter No. KOK8-PC-960-006/2020 dated October 23, 2020,*

Enclosed please find herewith Generation Licence No. GL/27/2021 granted by National Electric Power Regulatory Authority (NEPRA) to Pakistan Atomic Energy Commission (PAEC) for its 1145.00 MW Nuclear Power Plant located at West of the City of Karachi, Tehsil & District Karachi, in the province of Sindh, pursuant to Section 14B of the Regulation of Generation, Transmission and Distribution of Electric Power Act 1997/Amendment Act, 2018. Further, the determination of the Authority in the subject matter is also attached.

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

Enclosure: Generation Licence (GL/27/2021)

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(Syed Safeer Hussain)

Copy to:

1. Secretary, Ministry of Water and Power, A-Block, Pak Secretariat, Islamabad.
2. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore.
3. Chief Executive Officer, CPPA-G, ENERCON Building, Sector G-5/2, Islamabad.
4. Chief Executive Officer, K-Electric Limited, KE House, 39 B, Main Sunset Boulevard, DHA Phase-II, Karachi.
5. Director General, Environment Protection Department, Government of Sindh, Complex Plot No. ST-2/1, Korangi Industrial Area, Karachi.

National Electric Power Regulatory Authority (NEPRA)

Determination of the Authority in the Matter of Application of Pakistan Atomic Energy Commission (PAEC) for the Grant of Generation Licence

February 16, 2021
Case No. LAG-486

(A). Background

(i). The Government of Pakistan (GoP) has entrusted Pakistan Atomic Energy Commission (PAEC) for the promotion of nuclear energy in the country. In this regard, a number of initiatives have been undertaken in the electric power sector for addition of generation through nuclear energy.

(ii). In consideration of the above, five (05) generation facilities on nuclear technology with a cumulative installed capacity of approximately 1482.00 MW are operational across the country. PAEC has embarked on an aggressive plan to enhance this capacity substantially.

(B). Filing of Application

(i). PAEC submitted an application on October 23, 2020 for the grant of generation licence for its Karachi Nuclear Power Plant Unit No. 3 (KANUPP-3/K-3) in terms of Section-14B 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 and found the same compliant with the Licensing Regulations. Accordingly, the Registrar submitted the application for the consideration of the Authority to decide the

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admission of the same or otherwise. 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 November 09, 2020 for consideration of the grant of generation licence as stipulated in Regulation-7 of the Licensing Regulations. The Authority also approved a notice of admission to be published in the press for inviting comments of general public, interested and affected persons in the matter as stipulated in Regulation-8 of the Licensing Regulations. Accordingly, the said notices were published in one (01) Urdu and one (01) English newspapers on November 11, 2020.

(iii). In addition to the above, the Authority also approved a list of stakeholders for seeking their comments for 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 November 12, 2020, soliciting their comments for assistance of the Authority.

(C). Comments of Stakeholders

(i). In reply to the above, the Authority received comments from one (01) stakeholder only which included Pakistan Nuclear Regulatory Authority (PNRA). The salient points of the comments offered by PNRA are summarized below:-

(a). PNRA submitted that the preliminary design and safety features of K-3 have been reviewed against the regulatory framework and found generally acceptable. Furthermore, construction and commissioning activities are in progress under the regulatory oversight.

(ii). The Authority considered the above comments and in view of the positive response, considered it appropriate to proceed further in the matter of

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the application of PAEC for the consideration of the grant of generation licence as stipulated in the Licensing Regulations and NEPRA Licensing (Generation) Rules, 2000 (the "Generation Rules").

(D). Evaluations/Findings

(i). The Authority reviewed the submissions of PAEC including the information provided in its application for the grant of generation licence and the comments of the stakeholders. Further to the said, the Authority has also considered PC-I of the project, interconnection & dispersal arrangement studies, etc., and the relevant rules & regulations.

(ii). The Authority observed that PAEC is a statutory body established under the Pakistan Atomic Energy Commission Ordinance, 1965 entrusted with the objectives of setting up of Nuclear Power Plants and other related infrastructure in the country. As explained above, in its current application under consideration PAEC has approached the Authority for the consideration of grant of generation licence for its K-3 project/power plant. It is pertinent to mention that under Section-24 of the NEPRA Act, the licensees are required to be companies registered under the Companies Ordinance, 1984 (XLVII of 1984) specially exempted by the Authority. In this regard, PAEC specially requested the Authority for the envisaged exemption and the same was allowed at the time of admission.

(iii). The Authority is satisfied that PAEC has sufficient experience in the operation and management of such generation facilities. It is pertinent to mention that PAEC is operating and maintaining five (05) Nuclear Power Plants including one (01) at Karachi (i.e. Karachi Nucelar Power Plant Unit-1-KANUPP-1) and four (04) at Chashma (i.e. (CHASNUPP-1/C-1,CHASNUPP-2/C-2, CHASNUPP-3/C-3 & CHASNUPP-4/C-4) whereas another plant of Karachi Nuclear Power Plant-Unit No. 2 (KANUPP/K-2) is near completion. The Authority had granted separate generation licences to all the mentioned nuclear

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power plants. It is pertinent to mention that all the said nuclear power plants are operating trouble free for the last many decades without any operational or radiological hazards.

(iv). According to information provided, the proposed K-3 plant is located on the coastline of the Arabian Sea near the city of Karachi in the Province of Sindh about 1.50 km in the North West of KANUPP. As explained above, Executive Committee of the National Economic Council (ECNEC) approved the projects K-2 and K-3 as single package at a total cost of Rs. 959.00 billion (approximately) including a foreign aid of equivalent of Rs. 635.00 billion approximately arranged from Exim Bank of China. In view of the said, the total cost of K-3 is considered as 50% of the said approved cost. PAEC signed an EPC contract with China Zhongyuan Engineering Corporation (CZEC).

(v). The Authority has observed that CZEC is a subsidiary of China National Nuclear Corporation (CNNC) working under the umbrella of China Atomic Energy Agency (CAEA). The EPC contractor i.e. CZEC is an overseas nuclear project platform of CNNC and has grown into the first and largest Chinese overseas nuclear project contractor. The company has more than thirty (30) years of overseas nuclear project construction experience and has exported numbers of nuclear power plants. It has gained abundant technical strength and accumulated rich management experience. It has carried out a number of collaborative activities with renowned domestic and overseas enterprises and institutions, and generated an integrated global supply chain of resources, offering clients worldwide with a unified solution to nuclear energy with access to flexible financing services. CZEC has been ranked among the top 250 largest international contractors for many years by Engineering News Records (ENR), the most globally authoritative academic magazine in construction field of America.

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(vi). In this regard, the Authority has observed that the proposed plant i.e. K-3 will be deploying ACP-1000 nuclear reactor design, also known as "Hualong One" is China's Generation-III nuclear reactor design which has also passed an International Atomic Energy Agency (IAEA) generic reactor safety review (GRSR). The ACP-1000 is an approximately 1145.00 MW, three-loop Pressurized Water Reactor (PWR) having a combination of active and passive safety systems, a single stack layout, 177 nuclear fuel assemblies, a double containment structure, and a comprehensive implementation of "defence-in-depth" design principles. According to the IAEA the reactor design, the safety features of the ACP-1000 use advanced nuclear power technology which meet safety requirements. IAEA has validated the design through detailed experiments and is safe and reliable. K-3 will be operated on slightly enriched uranium fuel (UO_2-1.8%-3.1%). Light water will act as moderator and coolant. According to the submitted information the plant will consist of one (01) Steam Turbine Unit with rated maximum gross capacity of 1145.00 MWe. The maximum net rated capacity of the plant will be 1059.00 MWe.

(vii). The Authority has considered the submissions of PAEC and has observed Grid Interconnection Study (GIS) for the project was carried out by the National Transmission and Despatch Company Limited (NTDC). According to the said study, the electric power from K-2 and K-3 will be dispersed at the voltage level of 500 kV. The interconnection and transmission arrangement will be consisting of (a). a 500 kV D/C Transmission Line (on AASC Greely Conductor on quad bundle Measuring about 102 km in length) from K-2 and K-3 power plants for making In-Out one circuit of 500 kV D/C Transmission Line connecting imported coal power plant of Port Qasim to Matiari Switching/Convertor Station; (b). a 500 kV D/C Transmission Line (on AASC Greely Conductor on quad bundled measuring about 10.00 km) from K-2 and K-3 power plants for making an In-Out of existing 500 kV S/C Transmission Line connecting HUBCO (old oil fired) power plant and NKI; and (c). a 500 kV D/C

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Transmission Line (on AASC Greely Conductor on quad bundled Measuring about 2.00 km in length) for making an In-Out of 500 kV Transmission line connecting the project/power plant of China Power Hub Generation Company (Private) Limited (new coal fired) and Jamshoro grid station to connect K-2 and K-3 power plants.

(viii). The Authority considers that being a Nuclear Power Plant, K-3 will be requiring a significant amount of water for generating steam to run its Steam Turbine. According to the submitted information, K-3 will be requiring approximately 75 cusecs of water. The said quantity of water will be obtained from the Arabian Sea. After cooling the reactor the water will flow back to sea. In this regard, necessary approval from the concerned agencies has already been granted for utilizing water for K-3 from the Arabian sea.

(ix). The Authority is really appreciative of the fact that PAEC has confirmed that appropriate radioactive waste management system will be designed for K-3. Further, PAEC has confirmed radioactive releases and other nuclear waste during normal operation will be well below the permissible limits prescribed by the IAEA and will not cause any harm to public and environment. Environmental Protection Agency Government of the Sindh (EPAGoS) has already issued a No Objection Certificate (NOC) for the construction of K-3.

(x). In terms of Rule-3 of the Generation Rules, the Authority may grant a generation licence to any person to engage in the generation business. The said rule stipulates various conditions pertaining to the grant of generation licence as explained in Rule-3(2), Rule-3(3), Rule-3(4) and Rule-3(5) of the Generation Rules. In the particular case under consideration, the Authority considers that conditions of Rule-3(2) and Rule-3(3) stand satisfied as PAEC has provided details of location, technology, size, net capacity, interconnection arrangements, technical limits, technical functional specifications and other details specific to the generation facility/Nuclear Power Plant. The provision of

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Rule-3(4) of the Generation Rules regarding holding a public hearing is not applicable as there was no issue requiring this exercise.

(xi). The Rule-3(5) of the Generation Rules stipulates that the Authority may refuse to issue a generation licence where the site, technology, design, fuel, tariff or other relevant matters pertaining to the generation facility proposed in an application for a generation licence are either not suitable on environmental grounds or do not satisfy the least cost option criteria. In this regard, the Rule-3(5) of the Generation Rules also stipulates the conditions pertaining to least cost option criteria which include (a). sustainable development or optimum utilization of the renewable or non-renewable energy resources proposed for generation of electric power; (b). the availability of indigenous fuel and other resources; (c). the comparative costs of the construction, operation and maintenance of the proposed generation facility against the preferences indicated by the Authority; (d). the cost and right-of-way considerations related to the provision of transmission and interconnection facilities; (e). the constraints on the transmission system likely to result from the proposed generation facility and the costs of the transmission system expansion required to remove such constraints; (f). the short-term and the long-term forecasts for additional capacity requirements; (g). the tariff resulting or likely to result from the construction or operation of the proposed generation facility; and (h) the optimum utilization of various sites in the context of both the short-term and the long-term requirements of the electric power industry as a whole. The Authority considers that the proposed project will result in optimum utilization of the indigenous uranium resources of the country which are relatively unutilized, resulting in pollution free electric power. It is pertinent to mention that uranium is an indigenous resource and such resources should have a preference for the energy security.

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(xii). As explained in the preceding paragraphs, the sponsor of the project carried out the GIS which concludes that the project will not face any constraints in transmission system. Further, being located at reasonable distance from the thick population of the area, the project will not result in cost and right-of-way issues for the provision of transmission and interconnection facilities. In view of the said, it is considered that the project of PAEC fulfills the eligibility criteria for grant of generation licence as stipulated in the NEPRA Act, rules, regulations and other applicable documents.

(E). Grant of Licence

(i). The Authority considers that electric power/electricity is a fundamental element for the economic growth of any country. 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 etc.).

(ii). The Authority is of the considered opinion that increasing the per capita consumption of electricity 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 considers that for sustainable development, all types of electric power generation resources including coal (Imported/Indigenous), Nuclear, Hydel, Wind, Solar and other Renewable Energy (RE) resources must be tapped and developed on priority basis both in Public and Private Sectors.

(iii). The initiative of installation of new Nuclear Power Plants in the electrical power system is considered important as their induction in the system always results in better overall energy mix. The Nuclear Power Plants are

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always used as base load power plant and displace thermal generation particularly those based on imported furnace oil, resulting in precious foreign exchange reserves saving. Further, for a Nuclear Power Plant, the fuel cost is very small as compared to that of a conventional thermal power plant. In view of the low fuel cost, the induction of Nuclear Power Plant always results in stabilizing the generation cost of electricity. The operations of the Nuclear Power Plant are independent of any seasonal effects as in the case of Hydro Power Plants and any daily variations in the case of solar and wind power plants. Thus Nuclear Power Plants can provide much needed firm generating capacity in low hydro generation periods. K-3 is being set up in the vicinity of the existing KANUPP where most of the basic infrastructures for the setting up of a Nuclear Power Plant already exist. Therefore, the installation of K-3 at its proposed location of district Karachi will result in economies of scale thus reducing further the overall cost of electricity from it. Therefore, the project of K-3 will be extremely beneficial as its tariff is expected to be lower than other upcoming projects. The project will help in enhancing energy security of the country not only by diversifying the energy mix of the country but will also reduce dependence on imported fuels. In consideration of the above, the Authority considers that the efforts of PAEC for setting up another Nuclear Power Plant in the country will help in meeting with the growing energy needs of the country at very reasonable, affordable and reliable manner.

(iv). The term of a generation licence under Rule-5(1) of the Generation Rules is required to match with the maximum expected useful life of the units comprised in a generating facility. According to the information provided, K-3 will be achieving the Commercial Operation by March 31, 2022 and will have a useful life of about forty (40) years from its commissioning/Commercial Operation Date (COD). PAEC has claimed that the plant may also be used further, for period of another twenty (20) years after the completion of the forty (40) years of initial life however, major rehabilitation will be required for this. PAEC has proposed that the term of the Generation Licence

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may be fixed to forty (40) years. The Authority considers that apart from the reactor part of the Nuclear Power Plant, the balance of the plant resembles with a conventional Steam Turbine Thermal Power Plant which has a normal useful life of at least thirty (30) years. In consideration of the said, the Authority sets the term of the Generation Licence to thirty (30) years. However, PAEC will have the option to get the term of the Generation Licence extended subsequently, if required as stipulated in the relevant rules and regulations.

(v). Regarding the tariff of generation facility (of K-3) that it will charge from the Power Purchaser, PAEC has confirmed that it will be filing a Tariff Petition with the Authority in terms of NEPRA (Tariff Standards and Procedure) Rules, 1998 for the determination of the same. The Authority directs PAEC to charge the Power Purchaser only such Tariff which has been determined, approved or specified by it. The Authority is satisfied that the NTDC has endorsed the site and parameters of the project. Further, NTDC has also confirmed that the Interconnection and Transmission facilities for dispersal of power from K-3 are in advance stage of construction and will be available for transportation of electric power to National Grid, once it starts production.

(vi). The safety and environmental aspects for the Nuclear Power Plant are of real concerns for all the stakeholders. PAEC has confirmed the Authority that K-3 is being installed in accordance with the National and International Regulations/Standards/Criteria for Nuclear Power Plants including site selection, design, construction and commissioning. As explained above, PNRA has given its nod for K-3 confirming that the preliminary design and safety features are acceptable. About the environmental aspects, PAEC has clarified that several technical and administrative procedure have been prepared as per National/International standards that ensure that all the radioactive effluents in the form of gases, liquids and solids will be kept well within the permissible limits as prescribed by the National/International regulatory bodies. The Authority considers that in view of the stringent regulations of the PNRA and the

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requirements of the EPAGoS which has also issued NOC for the construction of K-3, the said agencies provide adequate guidelines for the maintenance of nuclear safety and environmental standards. The Authority directs PAEC to follow the instructions, guidelines, relevant rules and regulations of the said agencies in letter and spirit. Further, the Authority also directs PAEC to submit a report on a bi-annual basis, confirming that operation of K-3 is compliant with required environmental standards as prescribed by the relevant authority.

(vii). In view of the above, the Authority hereby approves the grant of generation licence to PAEC for K-3 on the terms and conditions set out in the generation licence annexed to this determination. The grant of generation licence will be subject to the provisions contained in the NEPRA Act, relevant rules, regulations framed thereunder and other applicable documents.

Authority:

Rafique Ahmed Shaikh
(Member)

29/04/21

Rehmatullah Baloch
(Member)

Engr. Bahadur Shah
(Member)

Saif Ullah Chattha
(Member)/Vice Chairman

4.2.2021

Tauseef H. Farooqi
(Chairman)

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National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE
No. GL/27/2021

In exercise of the powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section 14B of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997/Amendment Act, 2018, the Authority hereby grants a Generation Licence to:

PAKISTAN ATOMIC ENERGY COMMISSION-PAEC

for its Karachi Nuclear Power Plant Unit-3 (KANUPP-3/K-3), located at West of the City of Karachi, Tehsil & District Karachi, in the Province of Sindh

(Total Installed Capacity: 1145.00 MW_e Gross)

to engage in generation business subject to and in accordance with the Articles of this Licence.

Given under my hand this on 16th day of ~~January~~ February Two Thousand & Twenty One and expires on 30th day of March Two Thousand & Fifty Two.

16.02.21

Registrar

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Article-1
Definitions

1.1 In this licence

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

(b). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997";

(c). "Applicable Documents" mean the Act, the rules and regulations framed by the Authority under the Act, any documents or instruments issued or determinations made by the Authority under any of the foregoing or pursuant to the exercise of its powers under the Act, the Grid Code, the applicable Distribution Code, the Commercial Code if any, or the documents or instruments made by the Licensee pursuant to its generation licence, 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;

(d). "Applicable Law" means all the Applicable Documents;

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

(f). "Bus Bar" means a system of conductors in the generation facility of the Licensee on which the electric power of all the generators is collected for supplying to the Power Purchaser;

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(g). "Commercial Code" means the commercial code prepared under the National Electric Power Regulatory Authority (Market Operator, Registration, Standards and Procedure) Rules, 2015 as amended or replaced from time to time;

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

(i). "CPPA-G" means "Central Power Purchasing Agency (Guarantee) Limited" or any other entity created for the like purpose;

(j). "Distribution Code" means the distribution code prepared by distribution company and approved by the Authority, as it may be revised from time to time with necessary approval of the Authority;

(k). "Generation Rules" mean the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000 as amended or replaced from time to time;

(l). "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 necessary approval of the Authority;

(m). "IEC" means International Electrotechnical Commission or any other entity created for the like purpose and its successors or permitted assigns;

(n). "IEEE" means the Institute of Electrical and Electronics Engineers and its successors or permitted assigns;

(o). "Licensee" means "Pakistan Atomic Energy Commission-PAEC" and its successors or permitted assigns;

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

(q). "NTDC" means National Transmission and Despatch Company Limited or its successors or permitted assigns;

(r). "Power Purchase Agreement" means the power 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, as may be amended by the parties thereto from time to time;

(s). "Power Purchaser" means the CPPA-G which will be purchasing electric power on behalf of XW-DISCOs from the Licensee, pursuant to Power Purchase Agreement for procurement of electricity;

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

(u). "SCADA System" means the supervisory control and data acquisition system for gathering of data in real time from remote locations to control equipment and conditions;

(v). "XW DISCO" means "an Ex-WAPDA distribution company engaged in the distribution of electric power".

1.2 The words and expressions used but not defined herein bear the meaning given thereto in the Act or Generation Rules and Licensing Regulations issued under the Act.

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Article-2
Applicability of Law

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

Article-3
Generation Facilities

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

3.2 The net capacity of the generation facility of the Licensee is set out in Schedule-II hereto. The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility before its COD.

Article-4
Term of Licence

4.1 This licence shall become effective from the date of its issuance and will have a term of thirty (30) years from the COD of the generation facility/Solar Power Plant/Solar Farm of the Licensee subject to Section 14-B of the Act.

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

Article-5
Licence fee

The Licensee shall pay to the Authority the licence fee as stipulated in the National Electric Power Regulatory Authority (Fees) Rules, 2002 as amended or replaced from time to time.

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Article-6
Tariff

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

Article-7
Competitive Trading Arrangement

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement.

7.2 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.

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

Article-8
Maintenance of Records

For the purpose of sub-rule(1) of Rule-19 of the Generation 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.

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Article-9
Compliance with Performance Standards

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

Article-10
Compliance with Environmental & Safety Standards

10.1 The Licensee at all times shall comply with the environmental and safety standards as may be prescribed by the relevant competent authority as amended from time to time.

10.2 The Licensee shall provide a certificate on a bi-annual basis, confirming that the operation of its generation facility is in line with environmental and safety standards as prescribed by the relevant competent authority.

Article-11
Compliance with Radioactive Standards

11.1 The Licensee at all times shall comply with the radioactive standards as may be prescribed by the relevant competent authority as amended from time to time.

11.2 The Licensee shall provide a certificate on a bi-annual basis, confirming that the operation of its generation facility is in line with radioactive standards as prescribed by the relevant competent authority.

Article-12
Power off take Point and Voltage

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 interconnection voltage level will be the responsibility of the Licensee.

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Article-13
Provision of Information

13.1 In accordance with provisions of Section-44 of the Act, the Licensee shall be obligated to provide the required information in any form as desired by the Authority without any exception.

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

Article-14
Installing the System of SCADA

The Licensee shall install SCADA System or compatible communication system at its generation facility for proper communication with the Power Purchaser.

Article-15
Design & Manufacturing Standards

All the components of the generation facility shall be designed, manufactured and tested according to the latest IEC, IEEE or any other equivalent standards. All plant and equipment shall be unused and brand new.

Article-16
Compliance with Applicable Law

The Licensee shall comply with the provisions of the Applicable Law, guidelines, directions and prohibitory orders of the Authority as issued from time to time.

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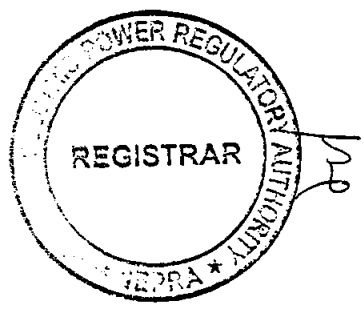
Article-14
Corporate Social Responsibility

The Licensee shall provide the descriptive as well as monetary disclosure of its activities pertaining to corporate social responsibility (CSR) on an annual basis.



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 Facilities of the Licensee are described in this Schedule.

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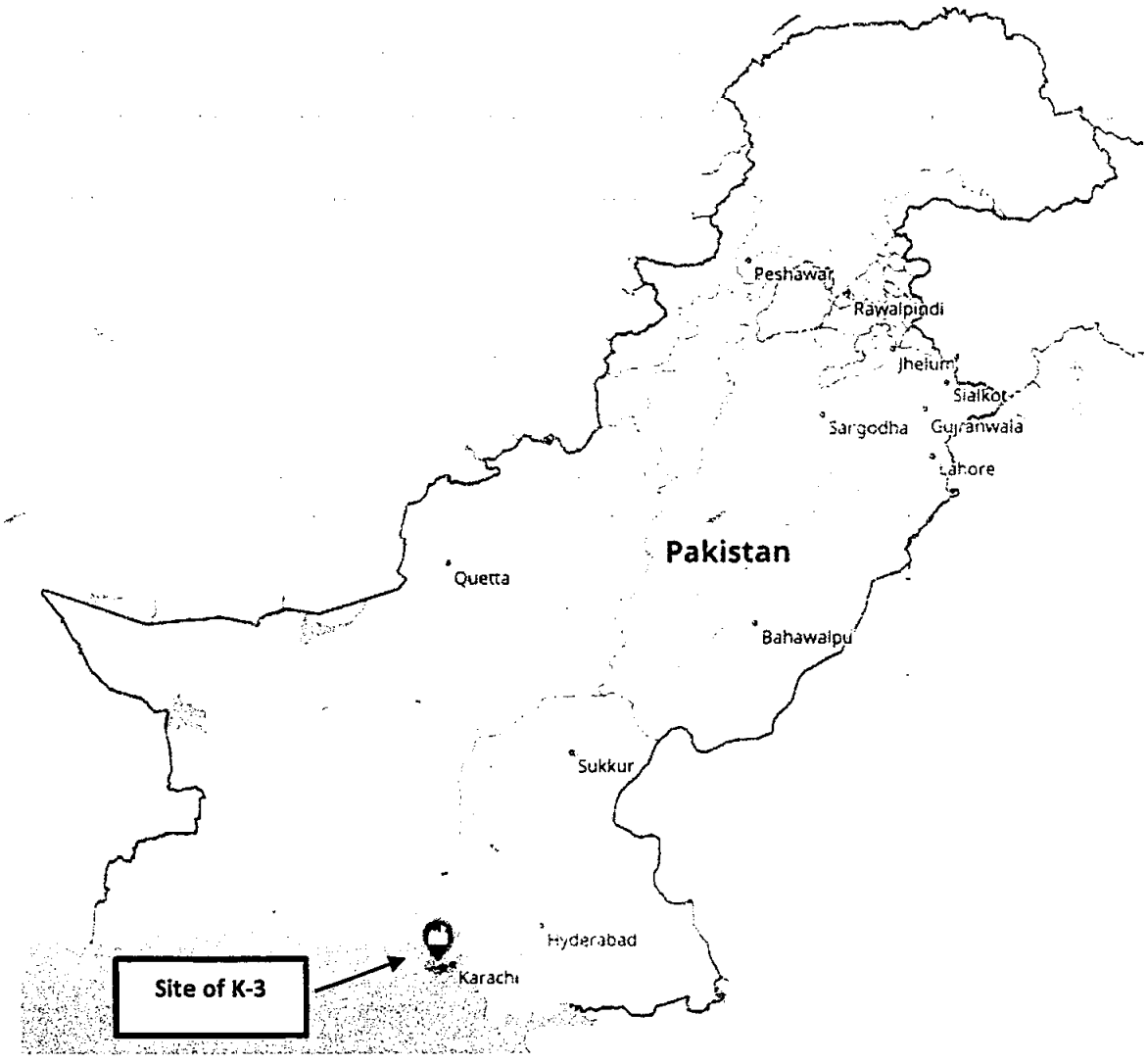
Location of the Generation Facility/Thermal Power Plant/Nuclear Power Plant of the Licensee on Map of Pakistan



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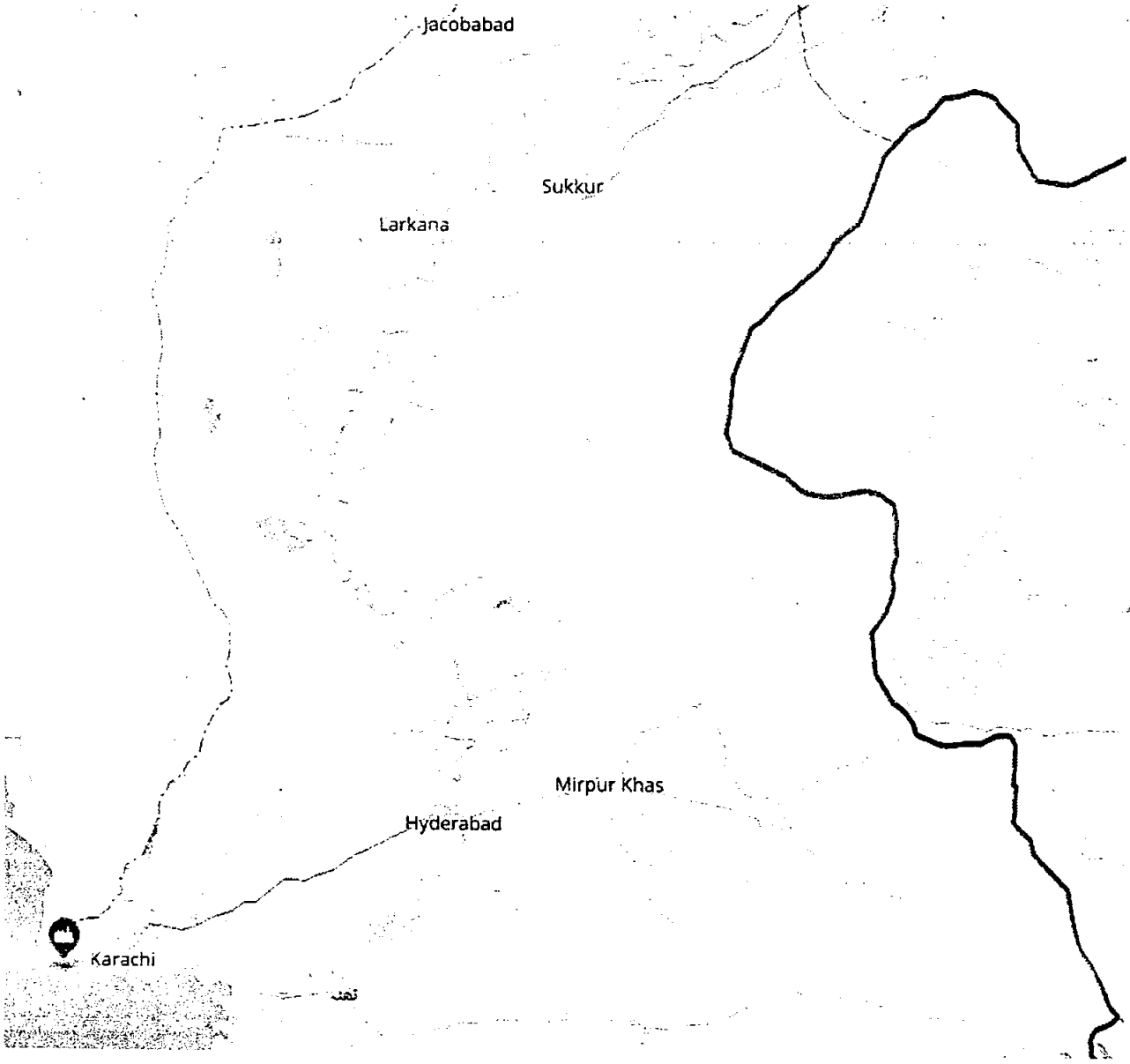
Location of the Generation Facility/Thermal Power Plant/Nuclear Power Plant of the Licensee on Map of Province of Sindh



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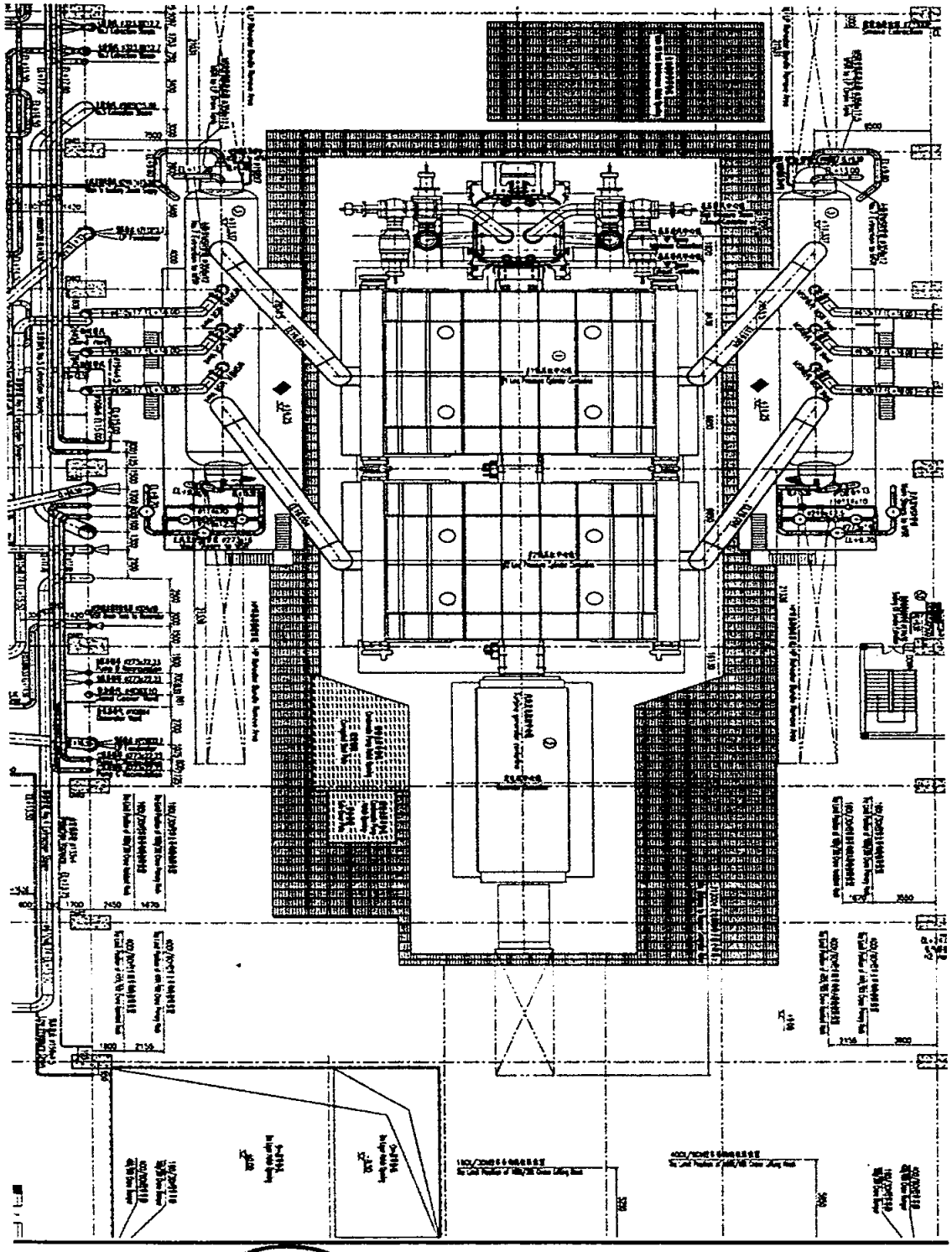
Layout of the Generation Facility/Thermal Power Plant/Nuclear Power Plant of the Licensee



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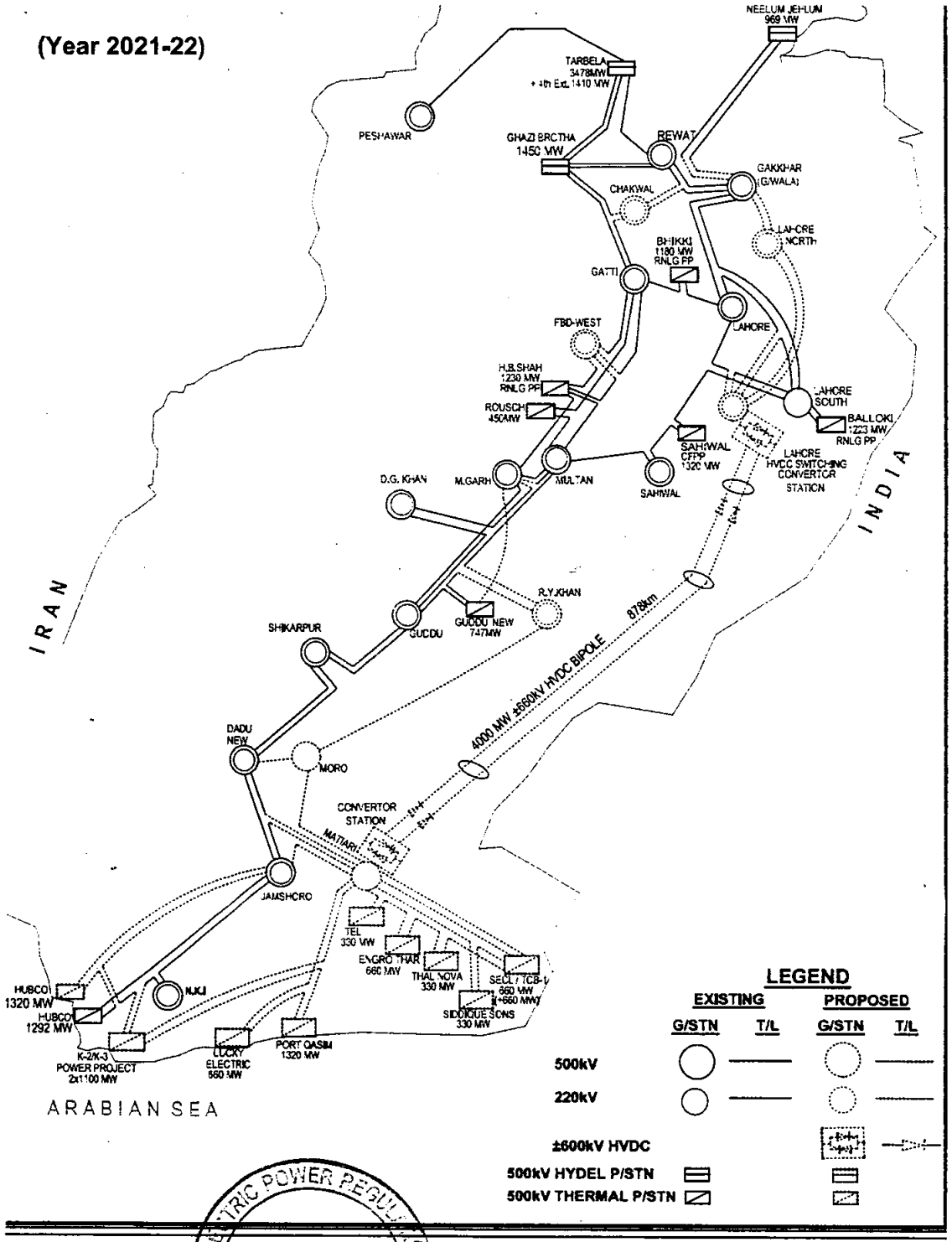
Schematic Diagram of Interconnection Arrangement/Transmission Arrangements for Dispersal of Electric Power from the Generation Facility of the Licensee

(Year 2021-22)



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Interconnection Arrangement/ Transmission Arrangements for Dispersal of Electric Power from the Generation Facility of the Licensee

The electric power from the nuclear based generation facility/power plant (i.e. Karachi Nuclear Power Plant Unit-3/KANUPP-3/K-3) of the Licensee/Pakistan Atomic Enemy Commission will be dispersed to the National Grid.

(2). The Interconnection Facilities (IF)/Transmission Arrangements (TA) for supplying to National Grid from the above mentioned generation facility shall be at 500 kV level. The IF/TA for supplying to National Grid will be consisting of the following: -

(a). A 500 kV Double Circuit (D/C) transmission line, approx. 102 km long on quad-bundled Greeley conductor, from K-2/K-3 power plants for looping In/Out on the proposed Port Qasim CFPP – Matiari (switching/convertor station) 500kV single circuit;

(b). A 500 kV Double Circuit (D/C) transmission line, approx. 10 km long on quad-bundled Greeley conductor, from K-2/K-3 power plant for looping in/out on the Existing Hubco (existing power plant) – NKI 500 kV single circuit;

(c). A 500 kV Double Circuit (D/C) transmission line, approx. 2 km, on quad-bundled Greeley conductor for looping in/out of Hubco CFPP - Jamshoro 500 kV single circuit with K-2/K-3 power plants – Hubco (existing power plant) 500 kV single circuit.

(3). Any change in the above mentioned IF/TA for dispersal of electric power as agreed by the Licensee, NTDC and the Power Purchaser shall be communicated to the Authority in due course of time.

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Detail of Generation Facility/ Power Plant

(A). General Information

(i).	Name of Company/ Licensee	Pakistan Atomic Energy Commission (PAEC) for Karachi Nuclear Power Plant Unit-3 (K-3)
(ii).	Registered/Business Office	P.O. Box 3094, Islamabad
(iii).	Location of the Generation Facility/ Power Plant	Karachi, Pakistan
(iv).	Type of Generation Facility/ Power Plant	Thermal Generation Facility/Nuclear Power Plant

(B). Configuration of Generation Facility

(i).	Installed Capacity/Size of the Generation Facility/Power Plant	1145 MWe
(ii).	Type of Technology	Pressurized Light Water Nuclear Power Plant
(iii).	Number of Units/Size (MW)	1 x 1145 MWe (Steam Turbine)
(iv).	Unit Make & Model	People's Republic of China (P.R China)
(v).	Moderator	Light Water
(vi).	No. of Loops	3
(vii).	COD of the Generation Facility/Power Plant (Anticipated)	March 31, 2022
(viii).	Expected Useful Life of the Generation Facility/Power Plant from COD	Minimum 40 years

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(C). Fuel/Raw Material Details

(i).	Primary Fuel	Slightly Enriched Uranium (UO_2 1.8% ~ 3.1%)
(ii).	Start-Up Fuel	Not Applicable (N/A)
(iii).	Fuel Source (Imported/Indigenous)	Imported
(iv).	Fuel Supplier for each of the above	China Nuclear Energy Industry Corporation, P.R. China
(v).	Supply Arrangement	China Nuclear Energy Industry Corporation, P.R. China
(vi).	Fuel Assemblies	177
(vii).	Fuel Storage	Racks are used for dry storage of fresh fuel assemblies
(viii).	Storage Capacity	18 fresh fuel assemblies can be stored in Storage Racks

(D). Cooling System

(i).	Cooling Water Source/Cycle	Karachi Arabian Sea/Open Cycle

(E). Plant Characteristics

(i).	Generation Voltage	24 kV ±5%
(ii).	Frequency	49.5 Hz ~ 50.5 Hz
(iii).	Power Factor	0.85 (lagging)
(iv).	Automatic Generation Control (AGC)	No (K-3 is a Base Load Plant)

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(v).	Ramping Rate	Turbine Generator Load Range	Cold Start MWe per minute	Hot Start MWe per minute
		5% ~ 50%	0.5 ~ 10	-
		50% ~ 100%	-	10 ~ 25
(vi).	Time required to Synchronize to Grid and loading the complex to full load.	6 hrs. (Approx.)		

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SCHEDULE-II

The Installed/ISO Capacity (MW), De-Rated Capacity At Mean Site Conditions (MW), Auxiliary Consumption (MW) and the Net Capacity At Mean Site Conditions (MW) of the Generation Facilities of Licensee is given in this Schedule

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SCHEDULE-II

(1).	Total Gross Installed Capacity of the Generation Facility/Power Plant	1145.00 MW
(2).	De-rated Capacity of Generation Facility/Power Plant at Reference Site Conditions	1145.00 MW
(3).	Auxiliary Consumption of the Generation Facility/Power Plant	≈ 86.00 MW
(4).	Total Installed Net Capacity of Generation Facility/Power Plant at Reference Site Conditions	1059.00 MW

Note

All the above figures are indicative as provided by the Licensee. The Net Capacity available to Power Purchaser for dispatch will be determined through procedure(s) contained in the Power Purchase Agreement (PPA) or any other Applicable Document(s).

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