Lincoln's Law Chamber™

Corporate Office: 22nd F-Floor, Beverley Center, Blue Area, Islamabad
Business Center : 22nd M-Floor, Beverley Center, Blue Area, Islamabad

The Registrar
National Electric Power Regulatory Authority
NEPRA Tower Attaturk Avenue (East),
Sector G-5/1, Islamabad

Subject: **APPLICATION OF PROVINCIAL GRID COMPANY FOR GRANT OF TRANSMISSION LICENCE TO THE PUNJAB GRID COMPANY PURSUANT TO SECTION 18A OF THE NEPRA ACT**

Dear Sir,

I, Barrister Asghar Khan, being the duly authorized representative of Punjab Grid Company by virtue of Resolution dated 20th January, 2023 hereby apply to the National Electric Power Regulatory Authority for the grant of a license as a Provincial Grid Company to the Punjab Grid Company pursuant to section 18A of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (as amended from time to time) (**NEPRA Act**).

I hereby certify that the documents-in-support attached with this application are prepared and submitted in conformity with the provisions of the National Electric Power Regulatory Authority Licensing (Application, Modification, Extension and Cancellation) Procedure Regulations, 2021, and PGC undertakes to abide by the terms and provisions of the above-said regulations. Affidavit of CEO, PGC is also attached along with Petition..

A Treasury Cheque of Government of Punjab bearing No. 371013 dated 17th January, 2023 in favor of National Electric Power Regulatory Authority amounting to Rupees 1,355,412/- being the license application fee calculated in accordance with Schedule II to the National Electric Power Regulatory Authority Licensing (Application, Modification, Extension and Cancellation) Procedure Regulations, 2021, is also attached herewith.

Date: 23rd January, 2023

LINCOLN'S LAW CHAMBER ★ ISLAMABAD ★

For and on Behalf of
Punjab Grid Company

Barrister Asghar Khan
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BEFORE THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
ISLAMABAD

Petition No. _____ / 2023

PUNJAB GRID COMPANY LIMITED

APPLICANT / PETITIONER.....

PETITION FOR TRANSMISSION LICENCE FOR PROVINCIAL GRID COMPANY PURSUANT TO SECTION 18A OF THE NEPRA ACT

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Applicant / Petitioner

Through Counsel

Barrister Asghar Khan

Advocate

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PETITION FOR TRANSMISSION LICENCE FOR PROVINCIAL GRID COMPANY PURSUANT TO SECTION 18A OF THE NEPRA ACT

A. PUNJAB GRID COMPANY LIMITED (THE "APPLICANT / PETITIONER")

I. INTRODUCTION

1. Punjab Grid Company Limited (the "**Applicant / Petitioner**") is registered with Securities & Exchange Commission of Pakistan ("**SECP**") under Companies Act, 2017 ("**Companies Act**") as a public limited company which is a wholly owned by Government of Punjab ("**GoPb**").

2. The object and specific purpose of the establishment of the Applicant / Petitioner is to engage in the business of transmission, grid systems, transmission infrastructure & dispatch of electric power and to cater for the need of extra high voltage electric power infrastructure within the Province of Punjab ("**Province of Punjab**").

3. The Applicant / Petitioner is duly certified under the Certificate of Incorporation and its Memorandum and Articles of Association are registered. The Applicant / Petitioner's in pursuance of Section 16 of the Companies Act is issued a Certificate of Incorporation on 3rd Day of January, 2023.

4. The Applicant / Petitioner has been constituted, approved and incorporated with objects and purposes pertaining to Provincial Grid as are specified in the Memorandum of Association whereas the affairs of the Applicant / Petitioner shall be regulated in accordance with the Articles of Association.

(Copy of Incorporation Certificate is annexed at Annex – A)
(Copy of Memorandum of Association is annexed at Annex - B)
(Copy of Articles of Association is annexed at Annex – C

II. OBJECTS & PURPOSES:

1. The principal objects, purposes and businesses of the Applicant / Petitioner is to inter alia:

(i). carry out business of electric transmission lines, laying of transmission lines, construction, operation and maintenance of the grid systems, system operator, scheduling of generation and despatch of the generation plants, wheeling of electricity, transmission of electric power, all within the territorial limits of Province of Punjab;

(ii). act as a Provincial Grid Company under Section 18A of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (as amended from time to time) ("**NEPRA Act**");

(iii). operate and provide safe and reliable transmission services on a non-discriminatory basis including to bulk power consumers;

(iv). provide transmission and interconnection services to the National Grid Company;

(v). purchase interconnection services from the National Grid Company for connection of its facilities to the National Grid; and

(vi). develop and maintain investment program in support of its service obligations and sale purchase of assets.

B. LEGAL COMPETENCE OF THE APPLICANT / PETITIONER TO SETUP PROVINCIAL GRID COMPANY

I. CONSTITUTION OF ISLAMIC REPUBLIC OF PAKISTAN 1973 (THE CONSTITUTION)

1. In pursuance of Article 157 (2) (c) of the Constitution, the Government of a Province may construct power houses and grid stations and lay transmission lines for use within the territorial limits of Province of Punjab.

2. Further in pursuance of Article 157 (2) (c) of the Constitution, the Parliament has enacted Section 18A in the NEPRA Act for establishment and grant of license to Provincial Grid Company for transmission of electricity within a Province of Punjab.

II. NEPRA Act

1. That Section 18A of the NEPRA Act provides that the Authority may grant a license authorizing a company owned by a Provincial Government to engage in the transmission of electric power within the territorial limits of Province of Punjab.

(Copy of NEPRA Act (as amended from time to time) is annexed at Annex – D)

2. Further, Section 7 (4) of the NEPRA Act provides that notwithstanding anything contained in this Act, the Government of a Province may construct power houses and grid stations and lay transmission lines for use within the Province and determine the tariff for distribution of electricity within the Province and such tariff shall not be called into question by the Authority.

3. Furthermore, Section 16 of the NEPRA Act requires that no person shall engage in the transmission of electric power without obtaining a license issued by the Authority. The Applicant / Petitioner should meet at least the minimum requirements of solvency, technical and human resource, but also comply with the criteria as may be prescribed by the Federal Government.

C. COMPLIANCES

1. The eligibility criteria for setting up a Provincial Grid Company under Section 18B of the NEPRA Act is as follows:

"The eligibility criteria for grant of license as a Provincial Grid Company shall be prescribed and shall include, without limitation:

(a) Minimum solvency requirements; and

(b) Minimum technical and human resource requirements."

2. The Applicant / Petitioner is wholly owned by the GoPb. The GoPb has committed and guaranteed to meet the eligibility criteria as prescribed under NEPRA Act with respect to minimum solvency, required for successful implementation of the project, as detailed in this Application / Petition.

3. The Applicant / Petitioner has carried out a Feasibility Study Report (**FSR**) dated September, 2022 setting out transmission ecosystem, NTDC network, role of NTDC with respect to distribution companies, power sector analysis, demand projections, identification of potential projects for the Applicant / Petitioner, mini / micro grids, role of Applicant / Petitioner, framework for coordination between Applicant / Petitioner and NTDC / Distribution Companies (**DISCOs**), scope of functions, business plan, corporate and organizational structure, human resources, role of Applicant / Petitioner in Competitive Trading and Bilateral Contracting Market (**CTBCM**), development models for transmission projects, financing plan, financial model and tariff regime.

(Copy of the Feasibility Study Report is annexed at Annex - E)

4. This FSR has been approved by the Panel of Experts (POE) in meeting dated 16th September, 2022 as follows:

"The Panel of Experts unanimously approved the Feasibility Study conducted for Establishment of Punjab Grid Company and appreciated the efforts of PPDB in the better interest of the province of Punjab."

The POE comprised of Managing Director, PPDB, Advisor KPTGCL, Chief Engineer (NESPAK), Section Officer (Energy Department, GoPb), Chief Engineer (NTDC, Planning), Chief Energy (P&D, GoPb) and Senior Manager (CERAD, UET, Lahore)

(Copy of Minutes of Meeting / POE is annexed at Annex - F)

5. The Applicant / Petitioner complies with the minimum technical and human resource requirements as set out in the Feasibility Study Report and this Application / Petition.

6. The Applicant / Petitioner shall follow the performance standards laid down by the Authority for transmission of electric power, including safety, health and environmental protection instructions issued by the Authority or any Governmental agency.

7. The Applicant / Petitioner shall make available to the general public the tariff specifying the Authority's approved rates, charges and other terms and conditions for transmission services.

8. The Applicant / Petitioner shall not levy any rate or charge or impose any condition

for the transmission of electric power, except in cases where integration of PGC transmission line to the national grid is not involved, which has not been approved by the Authority as a tariff.

9. The Applicant / Petitioner shall develop, maintain and publicly make available, with the prior approval of the Authority, its grid integration investment program for satisfying its service obligations and acquiring and selling its assets.

10. The Applicant / Petitioner shall periodically and from time to time as per the requirements apprise NEPRA of the technical details of its Transmission and Grid (**T&G**) System including information as to the type, technology, model, technical details and design of the facilities proposed to be constructed, developed or installed; the expected life of the facility or the system; the location of the facility or the system, or the territory with outer boundaries within which the facilities or the system is proposed to be installed and operated by the licensee, along with maps and plans; the type and details of the services proposed to be provided; and information regarding route, grid stations, metering, control and protection system, SCADA and communication, etc.

11. The Applicant / Petitioner is fully able to, and further undertakes that it shall, comply with prudent utility practices, the grid code, or the uniform industry standards and codes of conduct and hence will follow the following for all its national grid connected initiatives / projects:

(i) Connection Code
(ii) Operating Code
(iii) Planning Code
(iv) Scheduling and Dispatch Code
(v) Metering Code
(vi) Protection Code
(vii) Commercial Code

For intra-province transmission projects without integration with the national grid PGC may formulate its own codes or adopt the national codes.

12. The Applicant / Petitioner is fully able, and further undertakes, that its transmission facilities or the system shall operate in co-ordination with other licensees, where needed.

13. The standards and the specifications of the equipment and material for all national grid connected initiatives / projects shall be as per the requirements that meet the Grid Code and in accordance with the standards enumerated by the NTDC/System Operator.

14. The scope of functions for Provincial Grid Company as contained in NEPRA Act clearly establishes that the Applicant / Petitioner will not be expected to carry out dispatch of generation facilities in relation to the national grid projects; a function presently under the domain of National Grid Company /NTDC (as long as it is responsible for system operation) and later on system operator.

15. The Applicant / Petitioner shall ensure that there is in force at all times a Grid Code, which meets the requirements under NEPRA Act, Rules and Regulations. The Applicant / Petitioner shall implement and comply with the provisions of such Grid Code for all national grid connected initiatives / projects

16. The Grid Code may be drawn-up / adopted after consultation with the licensees and other interested parties to the extent possible with a view:

(i) to achieve the performance standards (transmission) prescribed under the NEPRA Act; and

(ii) to facilitate the development, maintenance and operation of an efficient, coordinated, safe, reliable and economical system for transmission of electric power.

D. APPLICANT / PETITIONER AS A PROVINCIAL GRID COMPANY

I. BACKGROUND

1. The Province of Punjab is the most populous province having high commercial, agricultural and industrial activities and thus the major load centers of the country are located in Punjab. It has the population of about 110 million which is increasing day by day and the demand of electricity in the Province of Punjab is around 18,000

MW, during summer, which is anticipated to grow substantially in future due to rapid industrialization, urbanization and lifestyle improvement and population growth.

2. The Province of Punjab is major transmission corridor where the assets of NTDC are installed. As per Feasibility Study Report (Section 2.2), out of total (16) sixteen 500kV Grid Stations, ten (10) are installed in Punjab which are listed below:

(i) 500 kV Rawat G/S
(ii) 500 kV Lahore (Sheikhupura) G/S
(iii) 500 kV Gatti (Faisalabad) G/S
(iv) 500 kV Nokhar G/S
(v) 500 kV Sahiwal (Yousafwala) G/S
(vi) 500 kV Lahore South G/S
(vii) 500 kV New Multan G/S
(viii) 500 kV Muzafargarh G/S
(ix) 500 kV Rahim Yar Khan G/S
(x) 500 kV Dera Ghazi Khan G/S

(10 installed 500 kV Grid Stations is annexed at Annex –G)

3. The demand of Punjab is forecasted to rise further in years to come. There are a number of existing Industrial Estates/ Export Processing Zones (EPZs)/ Special Economic Zones (SEZs) /Bulk Power Consumers (**BPCs**) in Punjab. In addition, new industrial zones are being planned in the Province of Punjab. Some of these are under development thereby power demand is increasing day by day. The load demand of the Industrial Estates/Zones/BPCs within DISCOs of Punjab is estimated around 2000 MW.

4. The consumers in various localities are scattered and so far the National Grid has not been able to penetrate into the far flung areas which on one hand has deprived the Province from realizing its full generation potential and on the other hand deprived the population from access to electricity. In order to meet demand growth there is a need to exploit indigenous resources of the Province for power generation and improve transmission and distribution network and to get reliable and affordable electricity which is vital for socioeconomic development. The GoPb intends to aggressively tap its potential of hydroelectric power, solar, waste to energy and wind power renewables as well as indigenously produced gas-based power generation.

5. The Province of Punjab comprises of rural and urban economics which provides a unique blend for generation, transmission and distribution activities in the power sector. The Province of Punjab resource mix can harness renewables like solar, wind, municipal waste and biomass/biogas on one hand and exploit indigenous fossils fuel in shape of coal for power generation. Furthermore, out of ten (10) DISCOs, five (5) DISCOs are located in Punjab i.e. LESCO, FESCO, IESCO, GEPCO and MEPCO which are providing electricity to end consumers of the province.

6. The Province of Punjab is major transmission corridor where most of the 500 kV and 220 kV infrastructures are installed. The Applicant / Petitioner through exploitation of indigenous resources within the Province of Punjab and making sufficient transmission capacity shall ensure safe and reliable operations of the transmission and grid system through adherence to the performance standards prescribed by the NEPRA Authority. The Applicant / Petitioner shall operate and maintain the transmission and grid system consistent with the requirements of the grid code or as the case may be the distribution code.

E. ROLE / COMPETENCE OF APPLICANT / PETITIONER

(A). Limitations & Constraints of NTDC & DISCOs Network

1. The transmission constraints has seriously affected GoPb plans and time lines to evacuate power from its cheap and abundant potential renewable and conventional projects and transmit it to the nearby and remote load centers in a reliable manner. Further, non-availability of a proper and adequate transmission network has hit planned schedules of existing and future renewable and non-renewable projects which are under execution/to be executed by PPDB under various contractual modes such as private sector, public sector, G2G, B2B, B2G, PPP and through competitive bidding.

2. In the current scenario, the total generation capacity of public and private entities of country is surplus as declared by the Government. But still load shedding is being carried out because of inadequate transmission network and transformation capacity to evacuate power from generation companies to load centres in some areas. The DISCOs are mostly able to cater the demand but still there are many areas where demand is not being met due to some system constraints i.e., over loaded transmission, distribution lines and transformers. Moreover, in some areas the capacity of transmission network is not

enhanced but due to political interference the low tension (L.T) network is extended unprofessionally. These unprofessional extensions in L.T network by violating normal practices caused increased load demand and network losses. In normal practice every DISCO has its own 5-year plans to cater the future load requirement and to remove the system constraints.

3. In particular, non-availability of a comprehensive transmission network and absence of reliable network to evacuate power from its renewable and non-renewable projects has affected the Province of Punjab in a multilateral manner as follows:

(i) a complete loss of direction as how to evacuate power from current and future renewable and non-renewable projects and in the absence of a readily available network to link renewable and non-renewable projects source to the load centers as and when required. It has resulted heavy financial loss to the national and provincial exchequer;

(ii) commercial operation dates and timelines of completed and pipeline renewable and non-renewable projects consequently and consistently delayed;

(iii) contractual & financial damages to ancillary projects;

(iv). large segment of population is off-grid;

(v). industrial, special economic zones, cottage industry, bulk power consumers are deprived of reliable, cost effective and uninterrupted supply of power;

(vi) difficult to plan, showcase and market future renewable and non-renewable projects and to seek and attract potential investors within the country and from abroad; and

(vii) projects of strategic and urgent natures which are demanded to be run on fast track have been affected. The commencement schedule is needed to be available in the line of sight, which cannot be figured out in the absence of a rightly available HV & Extra High Voltage (EHV) transmission network.

4. The Applicant / Petitioner, in capacity of the Provincial Grid Company, shall serve as the cornerstone of the GoPb's existing and upcoming energy policies those aim to utilize at optimum level, the massive potential of water / canals and other renewable resources

including solar, bagasse, waste to energy to produce clean & cheap electricity.

5. The transmission system available mainly of NTDC/ DISCOs in Punjab has been reviewed with key focus on congestions/constraints which results in power load shedding in some areas. This is another area where Applicant / Petitioner may tap the potential projects from the constraints in 5 DISCOs. The Applicant / Petitioner may pick most feasible project and may check technical and economic viability before implementation. The Applicant / Petitioner can pick up economically and technically viable projects. Such projects after its implementation can be good source of income by charging wheeling cost.

(DISCO wise Constraints/Problems and Potential Projects are given in Table-11 is annexed at Annex - H).

6. While reviewing the energy consumption of 5 DISCOs of Punjab; it reveals that energy purchased by 5 DISCOs is about 85,192 GWh whereas energy sold is 76,184 GWh as recorded in FY 2020-21. The gap between the purchase and sale shows the loss of energy about 9000 GWh which translates the loss of 11.64% of DISCOs in Punjab. When the energy losses of 5 DISCOs of Punjab are compared with the all 10 DISCOS of the country, it is found that the losses occurred in Punjab's DISCOs are less than the losses of all 10 DISCOs which are around 17.32%. Nevertheless, such losses are beyond regulatory prescribed and allowable / permissible limits and the consumers of Punjab including industrial, commercial, bulk power, agricultural and domestic cannot be subjected to inequities arising out of non-performance and inefficiencies of the transmission and distribution companies.

7. The difference between supply and demand due to generation and transmission constraints of NTDC has inflicted other worst eventualities. Voltage profile of the system goes out of ranges of the established figures guaranteed by the utility DISCOs / NTDC, which result in huge asset damages and financial loses to the domestic and industrial consumer beside operational damages to the network itself. The problem is resolved with forced outages which give rise to consumer resentments.

8. The NTDC network is believed to be aged and require sizable refurbishment and investment. It is run on a compromised transmission capacity. Its various transmission lines need re-conductoring for enhanced transmission capacities with replacement of grid stations terminal equipment to match increased levels of system parameters.

9. As the energy sector at the national level is under financial crises for reasons known to all and is presently touching the lowest ebb, including but not limited to circular debt, unmet revenue requirements, high transmission and distribution losses, low recoveries, high administrative costs, dilapidated infrastructure, interruptible supplies chances are remote that the above constraints and limitations could be settled out by NTDC in the near future in order to guarantee an efficient, reliable and economic power supply to its domestic, industrial and agricultural consumers.

10. Under such scenario, there seems to be little or no chances that GoPb could be able to get adequate share of NTDC Transmission corridors in order to tap and evacuate its potential of renewable and conventional projects in the near future in an efficient and reliable manner. This is also established by the Integrated Generation Capacity Expansion Plan (**IGCEP**) prepared by the NTDC which either delays, omits or ignores the provincial power projects.

11. The NTDC transmission limitations will deprive the GoPb and Federal Government beside all other stakeholders to yield benefit from the cheap renewable and non-renewable potential resources of the Province of Punjab, which is badly required under the current energy crisis with strategic objectives to enhance renewable generation to the desired level and to reduce and keep thermal generation's component at bay. Further, the high input cost of electricity is detrimental to industrial growth in Punjab. The existing industry in urban centres and industrial estates / clusters is struggling to compete in the regional and global trade markets. Affordable electricity solutions using sub-optimally utilized generation resources with PGC transmission service would provide boost to compromised industrial units and promote industrial / economic growth in the province.

(B). Applicant's / Petitioner's Potential of Transmission Projects:

1. The Province of Punjab is gifted by nature with renewable and conventional / fossil fuels. There is lot of generation potential in the area. However, there is non-availability and insufficient transmission capacity of the national grid in many parts of the Province that is severely hampering transmission of electric power besides development and exploitation of the natural resources available within the Province which intends to harness power resources for its industrial, commercial, agricultural and domestic use.

2. The GoPb has inaugurated various polices, plans and guidelines with the intent to encourage the private sector for generation, transmission and distribution of electric

power services within the Province of Punjab in accordance with its constitutional mandate. These polices, plans and guidelines pertain to renewables, hydro, waste to energy, solarization etc.

(Extracts of GoPb Polices, Plans and Guidelines are annexed at Annex - I)

3. Upon analysis of congestions/constraints in 500 kV, 220 kV and 132 kV Transmission Line system of NTDC & DISCOs, many transmission lines have been identified which require removal of their constraints which can be accomplished through either of the following options:

(i). increasing size of conductors
(ii). converting single circuit into double circuit
(iii). placing extra circuit on existing towers
(iv). new transmission lines

4. In case of Provincial Grid Company, in areas where existing circuits are overloaded and need new transmission line, the Applicant / Petitioner can pick up economically and technically viable new transmission line projects in collaboration with relevant DISCOs and NTDC. The Applicant / Petitioner can also undertake intra-province transmission line projects without integration to the national grid. The Applicant / Petitioner hence shortlisted few such potential projects from constrained transmission lines in parallel to NTDC through a collaborative mode instead of a competitor.

(Potential Projects of 500 kV and 220 kV Transmission Line are given in the Table-12 of FSR annexed at - J)

(i). Criteria for Selection of Projects

5. Based upon detailed review of Secondary Transmission & Grids (**STGs**) and future transmission line expansion plans of NTDC/DISCOs, the Applicant / Petitioner may undertake newly upcoming transmission line projects of 500/220/132 kV with NTDC and 5 DISCOs of Punjab.

(ii). Potential Projects of 132 kV Transmission Line

6. The Applicant / Petitioner has reviewed the 7th/8th STG plans of DISCOs of Punjab to extract the potential transmission line projects for Applicant / Petitioner. Based on broader criteria for shortlisting the potential projects, the total potential projects of 132 kV transmission line in all 5 DISCOs are identified around 19 nos. having total length of 729 Km.

7. The Applicant / Petitioner has examined scope of 132 kV intra-province dedicated transmission line projects for sale of electricity to public sector bulk consumers. Number of such projects have been identified through conduct of a comprehensive feasibility study. Later, scope of such 132kV projects may be expanded for providing transmission service to B2B and G2B electricity sale / purchase projects.

8. The potential short-, medium- and long-term projects of 132 kV Transmission Line under the PGC include without limitation, the following:

PHASE – I: SHORT-TERM (1-3 YEARS)

Sr. No.	Project Name	Voltage Level	Length (km)	Source MW
1	Reshma Power Plant to Sundar Industrial Estate	132 kV	4.5	96.96
2	Reshma Power Plant to Orange Line Authority Lahore	132 kV	40	96.96
3	Chishtian Solar Plant to Bahawalpur Industrial Estate	132 kV	149	250
4	Chishtian Solar Plant to Multan Industrial Estate	132 kV	165	250
5	Chishtian Solar Plant to Muzaffargarh Industrial Estate	132 kV	187	250

6	Chishtian Solar Plant to Vehari Industrial Estate	132 kV	83	250
7	Chishtian Solar Plant to Okara Industrial Estate	132 kV	129	250
8	Chishtian Solar Plant to Chunnian Aqua Business Park	132 kV	166	250
9.	Lakhodair Landfill Power Plant to Orange Line Metro UET G.T Road Substation	132	8	60
10.	Lakhodair Landfill Power Plant to Lahore Knowledge Park	132	20	60
11.	Mehmood Booti Landfill Power Plant to Sundar Industrial Estate	132	48	60

PHASE – II: MEDIUM TERM (3-5 YEARS)

Sr. No.	Project Name	Voltage Level	Voltage Level	Source MW
1	Taunsa to Multan Industrial State	132 kV	80	135
2	Multan Industrial State to Vehari Industrial State	132 kV	80	135

3	Taunsa to DGK Industrial State	132 kV	65	135
4	Rojhan to RYK Industrial State	132 kV	40	300
5	Rojhan to No Grid Areas	132 kV	10	300

(Total Potential Projects of 132 kV Transmission Line in all 5 DISCOs are provided in Table-13 of FSR annexed at Annex - K)

(iii). Potential Projects of 220 kV & 500kV Transmission Line

9. The Applicant / Petitioner has reviewed NTDC plans up to 2026 and extracted the potential 500 kV & 220 kV transmission line projects for Applicant / Petitioner. Based on broader criteria for shortlisting the potential projects, 4 potential projects of 500 kV transmission line having total length of 940 Km and 8 potential projects of 220 kV transmission line having total length of 563 Km are identified.

In the long run, Applicant / Petitioner may consider other intra-province 500kV and 200 kV transmission line projects without integration to the national grid. The potential projects of 220 kV & 500kV Transmission Line under the PGC include without limitation, the following:

PHASE – III: LONG TERM (5 YEARS PLUS)

Sr. No.	Project Name	Voltage Level	Length (km)
1	H.Faqirian – Ludewala	220 kV	88

2	500 kV Nokhar – Gujranwala-II	220 kV	80
3	Chishtian – Vehari S/C at Lal Sohanra	220 kV	80
4	Sialkot New – Sialkot (Sahuwala)	220 kV	12
5	Sialkot New – Gujranwala-II	220 kV	36
6	Qasimpur – Multan	220 kV	12
7	Maira – Islamabad West	500 kV	130
8	Sialkot New – Lahore North	500 kV	55
9	Ludewala – Faisalabad West	500 kV	100

(Potential projects of 500 kV Transmission Line & 220 kV Transmission Line are identified in Table-14 of FSR annexed at Annex - I)

(iv). Industrial Estates/EPZs/SEZs/BPCs

10. It is expected that after the implementation of CTBCM in near future, Bulk Power Consumers (BPCs) will be at liberty to procure power directly from generators under bilateral contract. Accordingly, transmission infrastructure would be needed to offtake power from generators to BPCs and this will provide the transmission business opportunity for Applicant / Petitioner.

11. There are a number of existing Industrial Estates/ Export Processing Zones (EPZs)/ Special Economic Zones (SEZs) /BPCs in Punjab. In addition, new industrial zones are being planned in the Province. Some of these are under development thereby power demand is increasing day by day. It is pertinent to mention here that industries in general and export-oriented industries need reliable, uninterrupted, and affordable electricity to be competitive in national and international market. These Zones/Estates as a Bulk Power Consumers may need to be connected with nearby IPPs/generators through dedicated transmission lines on wheeling principle. The ultimate load demand of the Industrial Estates/Zones/BPCs within DISCOs of Punjab is estimated around 2000 MW. Furthermore, the load requirement of housing schemes is huge, so the existing and upcoming large housing schemes as BPCs in DISCOs will also be potential projects for Applicant / Petitioner due to requirement of transmission lines for feeding these schemes. This load demand depicts a great potential for Applicant / Petitioner for wheeling transmission projects under CTBCM. The existing & future Industrial Estates/Zones/SEZs/BPCs within DISCOs in Punjab that are given in detail in Feasibility Study.

(Existing & Future Industrial Estates/Zones/SEZs/BPCs within DISCOs in Punjab are given in Table-15 annexed at Annex - M)

(v). Identification of Generation Plans Including Renewable Energy Plants

12. The data provided by each DISCO containing existing generation and future generation projects in the Province of Punjab has been carefully reviewed. The generation power plant operated by IPPs which have their contract expiration in near future are identified and already given in Feasibility Study Report. Whereas the future generation power projects including renewables have also been identified which could be potential projects for Applicant / Petitioner to supply electricity to the BPCs in Punjab.

(Existing & Future Generation Power Plants in Punjab annexed at Annex – N)

(vi). Hydropower Projects Plan in Punjab

13. The PPDB has already initiated development of hydropower projects (HPPs). The upcoming hydropower generation projects in Punjab along with name of the project, location, capacity and name of sponsor are listed in detail in Feasibility Study Report.

(Upcoming Hydropower Projects in Punjab in IPP Mode are listed in Table 17 of FSR annexed at Annex – O)

(vii). Small Hydropower Projects in Punjab

14. The Small Hydropower Projects to whom Letter of Intents (LoIs) have been issued by PPBD to be developed in near future along with their status are listed in detail in Feasibility Study Report.

(Captive Hydropower Projects /Punjab are listed in Table 18 of FSR annexed at Annex - P)

(viii). Electrification of Weak / No Grid Areas

15. Most of the areas of Punjab are electrified but yet there are some areas which are not electrified and there is no grid. On the other hand, there are some weak grid areas. These weak grids are not able to supply power to meet the load requirement of those areas due to many reasons. The one of the major reasons is transmission line constraints which is due to over loading or incapable old transmission lines to cater loads of expansion of existing and new loads in the surrounding areas. These areas can be electrified by solar and wind hybrid projects as indicated in the short-term generation plan in Rojhan, D.G. Khan and Muzaffargarh.

16. Identification of weak grid areas and no grid areas in Punjab is done in general by analysing the historical record and projected plans for next 5 years of DISCOs. The assumption is made that in these areas electrification is not expected in near future. The non-electrified areas identified in district Muzaffargarh, Rajanpur and D.G. Khan along with Indus River with some of villages named as Baitwala, Gujabahar Sial, Patti Rid,

Bhindi Hakeem, Moza Mondas etc. up to Rojhan which are yellow marked on map provided in Section 6 of Feasibility Study Report.

(Non-Electrified Areas as figured in Figure 12 of the FSR annexed at Annex - Q)

(ix). Solar/Wind Potential in Punjab

17. To assess the solar and wind potential in Pakistan, World Bank has recently conducted a study i.e., "Variable Renewable Energy Locational Study". The study has also identified the sites in Punjab suitable for solar power potential which are detailed in the Feasibility Study Report.

(Identified sites in Punjab suitable for Solar Power Potential as identified in Figure–13 of FSR annexed at Annex - R)

Short Term Scenario: The sites for solar and wind power plants which are found technically feasible for grid integration in Punjab province for the short-term scenario of 2023 are 10 sites of around 1530 MW.

Medium Term Scenario: The sites identified for solar and wind power plants which are found technically feasible for grid integration in Punjab province for the medium-term scenario of 2025, are 16 sites of around 1390 MW. More grid infrastructure is needed in order to evacuate the power from large-scale solar parks.

(x). Projects Phasing

18. Based on the anticipated potential projects and information provided by PPDB, the phasing of projects for Applicant / Petitioner is given in the Feasibility Study Report.

(Project Phasing as per Table -21 of FSR annexed at Annex - S)

19. The single line diagrams/maps of the proposed short-term and medium-term transmission line projects are given in the Feasibility Study Report.

(Single line diagrams/maps of proposed short- and medium-term transmission line projects are as per Figures 14-19 of FSR annexed at Annex - T).

(xi) Identified Particular Transmission Line Projects

20. The proposed 250 MW Chishtian solar project is also a potential project which needs power evacuation/transmission. Thus, from the Applicant's / Petitioner's perspective the transmission infrastructure development from Chishtian solar project to nearby grid station could be a short run potential project.

21. Furthermore, it is expected that the evacuated power from Chishtian solar project can be supplied to WASA facilities located at Multan, Bahawalpur, Faisalabad, Lahore as well as Lahore Orange Line Metro Train (OLMT). As most of these facilities are spread throughout the Province thus at the outset, the viable option can be to transmit power through NTDC/DISCO(s) system under a wheeling arrangement, as MEPCO 132 kV grid station is located at around 28 km and NTDC 220 kV grid station is located at around 12 km from proposed Chishtian solar plant is given in the Feasibility Study Report.

(Diagram / Map of Chishtian 250 MW Solar Plant to 132 kV MEPCO Grid Station as shown in Figure-16 of FSR annexed at Annex - U)

22. In addition, the power can also be evacuated and supplied to the WASA installations, industrial estates as well as OLMT etc. by developing dedicated transmission lines of various length by Applicant / Petitioner subject to its detailed feasibility study as shown in Figure-17.

(Diagram / Map of Chishtian Solar Plant to Bahawalpur, Multan, Muzaffargarh, Vehari & Okara Industrial Estates and Chunnian Aqua Business Park is shown in Figure-17 of FSR annexed at Annex - V)

23. Moreover, the Taunsa Hydropower Project of 135MW can also be a potential project which needs power evacuation/transmission and further it can evacuate power to Multan,

Vehari, and DGK Industrial Estates areas.

(Diagram / Map of Taunsa Hydropower Project of 135MW to Multan, Vehari, DGK Industrial Estates is shown in Figure-18 of FSR annexed at Annex - W)

24. The Rojhan Solar Plant of 250 MW is another potential project requiring power evacuation/transmission and has the potential to evacuate power to Rahim-Yar-Khan Industrial Estate.

(Diagram / Map of Rojhan Solar Plant of 250 MW to Rahim-Yar-Khan Industrial Estate is shown in Figure-19 of FSR annexed at Annex - X)

(xii). Mini/Micro Grid

25. The GoPb shall consider implementation of Mini/Micro grid in the Province of Punjab as it has large irrigation system on canals which has potential of small/mini hydropower and this potential could be exploited for providing cheap electricity to population and small industry located in nearby areas. Moreover, solar and wind potential are also available both near to grid and in no grid areas as well. These potentials shall be exploited and utilized economically by creating a Mini/Micro grid.

26. Most of areas in Province of Punjab are electrified but still there are some areas of population which are yet to be electrified due to various reasons. Punjab has natural energy resource like small/mini hydropower, solar, wind, etc. which can be utilized to electrify those weak or no grid areas of Province of Punjab. Expansion of centralized grid is not economically viable in most of the remote un-electrified locations in Province of Punjab. In this regard, Mini/Micro grids development offer an excellent opportunity to address this problem and to improve the life quality of people living in those areas, facilitating irrigation, local cottage industry, etc. and complement the economy thereof.

(C). Plan to meet Future Demand

1. The historical demand/supply of 5 DISCOs of Punjab has already been given in the Feasibility Study Report. In fact, historical demand is a suppressed demand. Because there are many pending applications due to ban imposed on new large industrial, commercial, agricultural and residential schemes from time to time. Moreover, cities are expanding on fast pace by converting agricultural land into residential societies and

industrial activities on the periphery of urban areas. Therefore, the actual demand of DISCOs is more than current historical demand.

(Short- and Medium-Term Future Load Demand is provided in Table-9 of the FSR annexed at Annex - Y)

2. In the current scenario, the total generation capacity of public and private entities of country is surplus as declared by the Government. But still load shedding is being carried out because of inadequate transmission network and transformation capacity to evacuate power from generation companies to load centres in some areas. The DISCOs are mostly able to cater the demand but still there are many areas where demand is not being met due to some system constraints i.e., over loaded transmission, distribution lines and transformers. Moreover, in some areas the capacity of transmission network is not enhanced but due to political interference the low tension (L.T) network is extended unprofessionally. These unprofessional extensions in L.T network by violating normal practices caused increased load demand and network losses. In normal practice every DISCO has its own 5 year plan to cater the future load requirement and to remove the system constraints.

3. It is a normal practice for DISCOs to prepare five (5) years, 132 kV STG Plan and get approved for the implementation on PC-I from the government. Some of DISCOs are implementing 7th STG program and some or implementing 8th STG program e.g. IESCO is implementing 7th STG whereas LESCO implementing 8th STG program. These programs mainly contain addition of new grid stations, extension/augmentation of existing grid stations.

4. Furthermore, it also includes new transmission lines, transmission bays, etc. as envisaged in their five (5) year plans. These plans are normally to remove system constraints like overloaded transmission lines and transformers. The development of total projects envisaged in the 5 years plans rarely achieve 100% implementation. Some of the projects left over at approval stage mainly due to funds constraints. Some of projects achieve 100% completion, however, others get delayed because of various reasons, e.g. late approvals, lack of funds, delays in fund release, late procurement of material, etc. After reviewing the 5 years plans of DISCOs in Punjab, the Applicant / Petitioner keeping in

view of potential, extracted the new grid stations and new transmission lines projects to cater future load growth as detailed in the Feasibility Study Report.

(132 kV STG Plans for DISCOs to Meet the Future Demand is given in Table-10 of FSR annexed at Annex - Z)

(D). Modes of Development:

1. As the Applicant / Petitioner is well aware of the fact that financing needs in the power sector are enormous, particularly in developing countries like Pakistan. Government faces huge and competing demands on its scarce available capital. This has long been recognized in respect of power generation and Pakistan is among those countries that have used private sector financing for the development of IPPs. But for various reasons, reliance on private sector participation (PSP) has not been a feature of transmission networks in developing countries like Pakistan. The national transmission grid is often seen as having national strategic importance, with an incumbent monopoly operator, hence the default/historic position is often to view the grid (and transmission projects generally) as not being a suitable arena for private participation.

2. In the FSR, an overview of the four business models used in the transmission sector around the world is provided and most relevant model(s) for Applicant / Petitioner is suggested. Further in the FSR, a business plan for Applicant / Petitioner is formulated while a financial plan for the Applicant / Petitioner is also provided.

3. There are four basic business models that can be used for developing transformation assets using PSP. These are:

   (i). EPC+ – Engineering, Procurement, Construction plus
   (ii). BOO(T) – Build-Own-Operate and or Transfer
   (iii). Transco – Private transmission company or special purpose transmission licensee
   (iv). Merchant – Market Participant

4. The EPC approach is well known and needs no explanation other than to note that EPC is a basic form of PSP and will be a component of each of the other three

models. The EPC plus model involves add-ons to the EPC, including financing and operation and maintenance of a specific transmission asset.

5. The key difference between the EPC+ and BOOT models is ownership. The EPC+ ownership of the assets remains with the developer / Applicant / Petitioner, but with the BOOT model, the developer retains ownership, in some form, for a period after commissioning. The term "operate" in BOOT is used loosely. Planning and day-to-day operation/dispatch of the network will be the responsibility of the utility/transmission system operator (TSO) but the developer will be responsible for maintenance of its transmission assets and will operate the substations, if any.

6. The Transco model is perhaps the most distinct model. Here the private sector is invited to take over a complete utility. However, even here the boundary between this and BOOT could be blurred where the grid that is taken over by the private sector is relatively small. Because the Transco is a natural monopoly, the price is charged or regulated by an independent regulator, normally with at least some discretionary powers. A BOOT arrangement is typically regulated through a legally binding contract.

7. The Merchant model involves significant risk in developing transmission assets without the involvement of a TSO/utility. The developers identify an opportunity, often based on a significant differential in market prices in two different parts of competitive markets or in order to bring large volumes of cheap electricity to a market where it is needed. The volumes and prices are determined either:

   (i). By the market where the developer must take the full volume and price risk, or;

   (ii). Bilateral negotiation between two parties

8. The model is only suited to define transmission lines. This can work in complex competitive markets, but examples are limited to a few geographies.

(Characteristics / Key Features, Bankability, Risk Allocation & Drivers for Selection of a Development Mode as per Feasibility Study Report annexed at Annex – AA)

9. The Applicant / Petitioner may collaborate with other international reputed transmission companies for construction, operation, and maintenance of the transmission and grid systems under the applicable laws and policies.

10. The Applicant / Petitioner shall offer a non-discriminatory open access transmission inter-connection service to any party or parties who are either connected to or intend to be connected to its transmission system. The inter- connection service shall be offered in terms of non-preferential point-by-point and network service on comparable terms and conditions. The following parties shall be qualified to obtain inter-connection service from the Applicant / Petitioner:

(i) a licensed generator of electricity or a person who is intending to become one;

(ii) a person who is or intends to become a Bulk Power Consumer taking power supply directly from the Applicant / Petitioner transmission system;

(iii) any power plant that is constructed and owned by the GoPb and or PPDB;

(iv). any power plant that is constructed and owned by the WAPDA and or Federal Government;

(v). any power plant that is constructed and owned by any other Province;

(vi). an electricity trader or supplier of electric power services;

(vii). private power generation companies;

(viii). transfer of electric power services from and to the National Grid on mutually agreed terms and conditions;

11. The Applicant / Petitioner shall administer its transmission access (offer to connect) in a fair, transparent and open manner setting out rules, policies, procedures and approved charges.

12. The Applicant / Petitioner shall ensure a fair, non-discriminatory and effective management, operation and planning of the transmission services, in order to optimize

the transportation costs attributable to transmission services within the Applicant's / Petitioner's transmission system. The Applicant / Petitioner shall also ensure that the resultant financial impact of transmission services is equitably distributed among the parties connected to or intending to be connected to its transmission system.

(E). Project Development Plan

1. In order to make provincial grid company a success story, it is imperative to have a target-oriented project development plan with the Applicant / Petitioner. At the outset, it is expected that transmission projects will be developed as per the development modes elaborated above. The key steps require under project development plan are:

(i). First, to identify projects list for development.

(ii). Then projects would further be categorized in to Type-A and Type-B projects. Type-A projects should be those projects for which Applicant / Petitioner could arrange funds by its own resources. Whereas all others projects will fall under the category of Type-B projects.

(iii). Type-A projects should be developed by Applicant / Petitioner under its 100% ownership. The equity party will be provided by Applicant / Petitioner own equity. The loan part will be arranged through various international and national funding agencies/banks.

(iv). Type-B projects should be offered to private sector to develop on BOOT mode for a specified concession period and after the expiry of concession period the ownership would be transferred to Applicant / Petitioner under a transmission line investment policy with the approval of GoPb.

(v). For development of Type-A projects, Applicant / Petitioner may hire the services of EPC contractors under competitive bidding mechanism.

(vi). In the case of Type-B projects, competitive bidding mechanism may be adopted under a transmission line investment policy with the approval of GoPb.

(vii). Detailed feasibility study would be required to conduct for each project. For any Type-A project, feasibility study could be conducted by Applicant / Petitioner through its own resources/project allocated fund while for Type-B

project any such feasibility may be conducted by the investor/concessionaire. Applicant / Petitioner could facilitate the private investor regarding any such feasibility study and regulatory processing.

(F). Operation & Maintenance (O&M) Plan

1. Along with projects development, it is equally imperative to have a proper plan for O&M of projects particularly Type-A projects (funded by own resources). At the outset, it is suggested to outsource the O&M of projects to competent O&M contractors till such time Applicant / Petitioner adequately equip itself technically and financially by preparing pool of in-house professionals who may undertake O&M of its projects in longer term.

(G). Human Resource Management

1. According to industry best practices, for efficient and effective working, the Applicant / Petitioner may outsource some of its functions. For instance, O&M of transmission system may be carried out in relatively cost effective and efficient manner if it is done through specialist groups than if done by the Applicant / Petitioner. Main job requirements are included here for technical, administration and human resource and commercial as provided in the proposed Organogram as depicted below. The current professional team of Applicant / Petitioner has the competency to operate the Applicant / Petitioner as Provincial Grid Company, as the expert professionals of the Applicant / Petitioner have relevant experience and have served with various national and multi-nation state and private owned companies. The curriculum vitae of the Applicant / Petitioner senior management, key technical and professional staff demonstrate the ability to undertake the functions as are prescribed for the grid company under the NEPRA Act, rules and regulations. It shall own, operate and maintain a Provincial Grid System by further enhancing its technical competence by hiring necessary professionals from open market if needed through transparent and competitive process. The recruitment for the professional positions shall be in accordance with the proposed Organogram.

2. The detailed departmentalization of the Applicant / Petitioner upon its full functionality shall comprise of the following departments:

(i). Transmission Planning Department: Interaction with NGC/NTDC, distribution companies and other entities at federal and provincial level for preparation and exchange of plans, Interaction with captive and other generation facilities, BPCs.

(ii). Procurement, Construction and O&M Department: Procurement of equipment, design requirement for new equipment; Asset management, Operation and Maintenance of transmission system.

(iii). Connections and User Services Department: Standard connection agreements, standard connection process, receive and administer request for new connections or changes to existing connections to the transmission system, registration and monitoring of signed connection agreements, administration of operational and connection complaints.

(iv). Information Technology Department: Administration of computer resources and communications systems. Organization and maintenance of Data Bases. Implementation and maintenance of server and net, software development and maintenance.

(v). Commercial Department: Billing and collection of connection charges when applicable; metering data of transmission users, invoicing and collection of transmission use of system charges from relevant transmission users.

(vi). Regulatory and Legal Department: Prepare petitions for transmission charges; review and feedback to regulator on proposed new regulations or amendment of existing regulations and Codes applicable to transmission.

(vii). Administration and Human Resources Department: Responsible for management of internal human resources, including promotions, selections, and training programs.

(viii). Finance Department: Responsible for financial management, including finance associated a proposed business plan, accounting, and budget.

(ix). Organization Structure: The Applicant / Petitioner is proposed in an

organizational structure with envisaged posts / staff positions in the aforesaid departments. It may be noted that this is an indicative organization structure and in the first phase only planning and engineering / technical, legal, commercial / finance and administration departments will oversee other functions also.

(*Proposed Organogram is annexed at Annex – BB*)

3. The roles and responsibilities of the key functionaries and staffing plan is provided in the Feasibility Study Report.

(*Roles and Responsibilities of key functionaries and staffing plan annexed at Annex - CC*)

4. After incorporation, the Applicant / Petitioner need to be staffed by specialized and experience people hired on market-based salaries. Fortunately, a good number of energy and power professionals are working in NTDC and a pool of retired advisors is also available.

5. Grid and transmission company is a highly technical organization as it requires experts in electrical engineering, power systems, simulation, instrumentation and control, competitive market and power trading besides administration, management, accounts, audit, business development, environment, infrastructure/civil engineering, mechanical engineering, and land acquisition etc. Accordingly, the Applicant / Petitioner will have following main formations:

(i). Head office,
(ii). Project Management,
(iii). Operations, and
(iv). Billing and metering team.

6. The head office work will be supervised by the CEO, who will work under the directive and guidance of the Board (**BoD**).

7. The project management department will be headed by General Manager (GM) /CE procurement & construction, who will be stationed at head office and report to BoD through CEO. The Operations department will be led by GM/Chief Engineer planning & operations and will be responsible to ensure the smooth operations of the system as per the applicable grid code and safety standards. The billing and metering

team will be responsible to note down the meter readings regarding power dispatch of different clients though the Applicant's / Petitioner's transmission system and bill them as per the agreed terms and conditions under Transmission Services Agreement (**TSA**). This collection of the billed amount will also be the duty of the billing and metering team.

8. As already mentioned, the power transmission business is highly technical and its success is a function of experience. The Applicant / Petitioner need to have the requisite experienced professionals who could undertake the operations and business in a best possible way. Best possible Human Resource (**HR**) policy need to be devised for hiring and then retaining the pool of competent professionals from the market to undertake these activities.

9. The BoD will be the highest decision-making body within the Applicant / Petitioner. Day-to-day management of the Applicant / Petitioner may be entrusted on the Chief Executive Officer, Chief Financial Officer (CFO), General Managers and other Officers. The BoD will delegate powers as it deems necessary to the Chief Executive Officer, who in turn will delegate appropriate powers to other senior officials through a notification of delegation of powers. The CEO, CFO, General Managers/Chief Engineers and other officers will exercise their powers delegated to them. The performance of employees and management need vigilant monitoring through proper SOPs.

10. The performance of the employees should be aligned with strategies and objectives, so as to assess the progress against laid down strategies and objectives which may consist, but not limited to, the following:

    (i). Company/business specific;
    (ii). Quantifiable;
    (iii). Achievable; and
    (iv). Time-based.

(H). Financials & Bankability

1. No company whether public or private can be termed as stable and sustainable and well placed to maintain a growth projectile until its corporate financial system is based on a sound structure. the unique factor and advantage that Applicant / Petitioner possess will

be its ability to link Province of Punjab huge renewable and non-renewable projects to remote load centers at an affordable and attractive tariff rates including various categories of domestic, commercial, agricultural and industrial consumer.

2. The GoPb as a 100% shareholder is committed to meet the Applicant's / Petitioner's financial and operational requirements. Furthermore, the Finance Department of the Applicant / Petitioner shall be responsible for financial management, including finance associated proposed business plan, accounting, and budget.

3. Furthermore, the Applicant / Petitioner is backed by the GoPb, which has guaranteed and assured to comply with the minimum solvency requirements and provide the necessary funds whenever required.

4. Upon grant of license, the GoPb shall sanction the amount required to carry out the Feasibility and Interconnection / Grid Studies on project specific basis.

5. The Applicant / Petitioner shall meet its revenue requirements by the Tariff approved by the NEPRA, mutually agreed, or grant (if any) by the GoPb.

6. The Applicant / Petitioner has developed three (3) independent models using the cost-plus approach to establish a tariff for all three voltage types assumed. For this purpose, the largest transmission lines available in the technical and financial plan for all three voltage types is chosen. This approach was adopted in order to provide an estimated tariff and the financial results that can be expected for projects of each voltage type.

7. The total capital cost of the Project as detailed in the Feasibility Study Report incorporates the cost of the main project packages:

   (i). EPC Cost;

   (ii). Non-EPC Cost;

   (iii). Development Costs (Including Project Management, Engineering, Site Supervision, Topographical survey, Soil Investigation, Fees, Permits Insurance cost and Overhead Cost;

   (iv). Debt Service Reserve;

(v). Insurance During Construction;

(vi). Financing Fees and Charges;

(vii). Contingencies; and

(viii). Interest During Construction.

8. The cost parameters are based on the following:

(i). Cost estimation is based on (i) the latest PC-I available for the projects planned by NTDC and DISCOs and (ii) in-house data. Cost estimation classification system recommended by American Association of Cost Engineers (IR-97) has been adopted in which Class 5 is chosen as the benchmark for costing estimations. Class 5 indicates that the project is at a concept screening stage with an accuracy level of +/-20%-100%.

(ii). The total length of the lines chosen for calculations were as follows:

(a). 132 kV: 127 KM
(b). 220 kV: 150 KM
(c). 500 kV: 330 KM

(iii). The total timeframe for implementation/ construction of the Project is estimated at 1 year for voltage type 132 kV, 2 years for 220 kV and 3 years for 500 kV projects during which the complete transmission line will be laid and energized.

(iv). Interest arising on loans during the construction period is projected to be accrued and rolled over into the debt principal and carried forward up to the completion of the Project. Accordingly, it is capitalized as part of Project Cost. Interest during construction is calculated on the basis of the total debt outstanding at each month end during the development period. The financing rate used for computation of this cost is as per the secured terms of financing, taken at 3-month KIBOR interest rate of 14.54% + 3.50% Spread.

9. The assumptions of the financing plan for the purposes of the financing model and financial analysis, financing structure based on debt and equity, financing framework with participation of private sector and other development models, returns including weighted average cost of capital, return on equity and other tariff components are provided in the Feasibility Study Report.

(Details of the Financial Plan is provided in the FSR annexed at Annex - DD)

(I). Tariff

1. The Applicant / Petitioner shall charge tariff in respect of its transmission business, for its project / initiatives integrated with the national grid, pursuant to NEPRA Tariff (Standards and Procedure) Rules, 1998. The Applicant / Petitioner shall make available to general public the tariff specifying the NEPRA Authority's approved rates, charges and other terms and conditions for transmission and inter-connection services. For the intra-province transmission line projects / initiatives, which do not require interconnection to the national grid, PGC and the power supplier / purchaser may mutually agree on a transmission service tariff / use of system charges, connection charges or charge a tariff approved by a competent forum of GoPb.

2. The use of system, wheeling and connection charges shall be calculated on a basis which reflects the costs prudently incurred or to be incurred, less any gains achievable through efficiencies, in the provisions, procurement, installation, operation or maintenance of the facilities for use of system or the connection including, without limitation, in respect of any work, replacement or reinforcement of the transmission system or any part thereof, as the case may be, together with a reasonable return on the capital represented by such costs.

3. Amongst all, cost-plus regime was selected to be the most preferred option. The typical cost-plus tariff consists of actual cost and an agreed return to be paid to the investor in Pakistan, this type of tariff is generally used in the power sector where Independent Power Producers (IPPs) operate under this tariff regime.

4. In the Cost-plus tariff regime, the project revenues are primarily derived from the capacity charge and the energy cost which are the two main components of "Cost-Plus"

regime. Such tariff is usually the multiple of fixed and variable cost factors combining the Capacity requirement aligning with fixed cost and the variable cost related to the injection and withdrawal aligning with the variable factor. Added to this is the allowed rate of return ("IRR") on investment which will be calculated to reflect the weighted cost of capital ("WACC"), i.e. the expected cost of capital relates to equity investors and cost of capital related to debt such as interest rate from the debt investors.

5. The cost-plus method requires that the cost is allocated to the specific user according to their related activity and the cost associated therewith. Therefore, a tariff is appropriately calculated for each type of user and hence the cost allocation depends on the user type of storage.

6. The levelized tariff for the transmission lines at 132kV, 220kV and 500kV voltages based on the financial parameters and financial plan as shown above over a period of 25 years has been demonstrated in the Feasibility Study Report. During the early years of operation, tariff will generally tend to be on the higher side based on factors such as debt repayments which will typically end in year 10.

(Relevant Extract of Tariff Calculation annexed at Annex – EE)

7. The tariff calculation will be impacted by the loading of the transmission lines as there is interrelation between load factor (**LF**) and levelized tariff. The financial models for all three-voltage level transmission line projects (132 kV, 220 kV and 500 kV) of Applicant / Petitioner reflect that any decrease in LF is inversely related to per unit levelized transmission tariff. At 100% LF, the transmission tariff is Rs. 0.74, per kW per hour in case of 132 kV transmission line, Rs. 0.63 in case of 220 kV transmission line and Rs. 0.43 in case of 500 kV circuit. To avoid any overloading of transmission line, the base case has been considered at 80% LF for each voltage line and thus corresponding tariff, under base case scenario, stands at Rs. 0.93 in case of 132 kV circuit, Rs. 0.79 in case of 220 kV transmission line and Rs. 0.54 for 500 kV circuit.

8. Under the circumstances of any underutilization of the line by the party availing the wheeling service of Applicant / Petitioner would have to pay relatively higher tariff. The decrease in LF of each line is associated with corresponding increase in levelized tariff. A decrease of 50% in the LF almost doubles the applicable tariff for each voltage level transmission line, as compare to applicable tariff at 100% LF of the line, and thus stands Rs. 1.49 in case of 132 kV transmission line, Rs. 1.26 in case of 220 kV

transmission line and Rs. 0.86 in case of 500 kV transmission line. By further decreasing LF of the line, the applicable tariff continues to rise a LF of 10% results in a tariff of Rs. 7.43 for 132 kV transmission line, Rs. 6.30 for 220 kV transmission line and Rs. 4.31 for 500 kV transmission line is reflected which is almost 10 times higher of the tariff applicable at 100% LF of the respective line. Regarding thermal power projects like gas, oil and coal fired power plants, the LF of the transmission line would be high i.e. 60-80% due to firm supply all the time while in case of Renewable Projects like wind and solar power plants the LF of the lines will comparatively low i.e., 20-30% due to less availability factors and intermittency issues of RE plants. Subsequently, the estimated levelized transmission tariff for thermal based power plants would be low in comparison of applicable tariff for RE plants.

(Loading Factor Impact on Levelized Tariff provided in Figure 21 of FSR annexed at Annex - FF)

9. According to Feasibility Study Report, the impact on tariff as a base case, Equity of 25%, Local Debt of 7.5% and Foreign Debt of 67.5% has been assumed. Any change in the ratio of local and foreign debt will have a direct impact on the tariff, IRR, NPV and Payback Period.

(Impact on Tariff provided in Table 33 of FSR annexed at Annex –GG)

10. The project net earnings are generated as a difference between income from its core operations and expenditures incurred to meet its operations and the other non-operating expenditures principally the project financing cost. The results indicate a substantially viable project as is demonstrated through the summary results of the income and expenditure flows in the periodical average results.

(Projected Income Statement (25years average) provided in Table 34 of FSR annexed at Annex - HH)

11. The financial analysis for the quantitative assessment of the project based on base case parameters including key financial indicators, NPV, IRR, Payback Period have been calculated in the Feasibility Study Report.

(Key Financial Indicators are provided in Table 35 of FSR annexed as Annex - II)

12. The financial model manual for each of the three voltages (132kV, 220kV & 500kV)

have been developed based on market studies and best estimates keeping in view international best practices. The financial model encapsulates sensitivity analysis for interest rate, currency depreciation and other variable parameters. The snapshot / pictorial view of financial dashboard, tariff module, project cost and IDC, financial statements is provided in the Feasibility Study Report.

(Excel Sheets of the Financial Model annexed at Annex - JJ)

F. PROPOSED LICENSE

1. The Applicant / Petitioner has proposed to obtain the Transmission and Provincial Grid License so as to become a Provincial Grid Company of the Province of Punjab for carrying the roles and responsibilities as provided for in the NEPRA Act within the Province of Punjab.

2. That the Applicant / Petitioner shall be authorized to engage in the business of transmission of electric power including engineering, procurement, construction, operation and maintenance of transmission lines and grid stations at all voltage levels within the territorial limits of Province of Punjab, subject to such conditions as the NEPRA Authority may impose.

G. TERM AND RENEWAL OF LICENCE

1. It is proposed that the License shall come into force from the date of issue and shall remain in force for a period of 30 years.

2. Furthermore, subject to the provisions of the NEPRA Licensing (Application, Modification, Extension and Cancellation) Procedure Regulations, 2021, the NEPRA Authority may renew this license for such further term as deemed appropriate.

H. EXCLUSIVITY

1. Proviso to Section 18A of the NEPRA Act states that only one transmission license in respect of the provincial grid company shall be granted for each Province at any one time.

2. The Licensee shall during the term of this Licence have the exclusive right in respect of the Service Territory specified in **Schedule-I** of this Petition to:

(i). construct, operate and maintain grid systems;

(ii). construct, operate and maintain mini and micro grids;

(iii). carry out transmission of electric power;

(iv). provide transmission and interconnection services;

(v). allow open access to and through its transmission network;

(vi). conduct system operations of the provincial grid;

(vii). permit wheeling of electricity;

(viii). charge tariff, use of system charges in consideration of transmission services;

(ix) formulate performance standards for the transmission business;

(x). authorization to participate in the CTBCM;

(xi) engage in other activities incidental to the transmission business.

I. REPRESENTATIONS AND WARRANTIES

1. That this is the first Application / Petition being submitted to NEPRA Authority.

2. The Applicant / Petitioner is solvent and owned by the GoPb hence solely entitled to make this Application / Petition since the law prescribes that there shall be only one licensee to be licensed as the Provincial Grid Company.

3. There is a demand, as detailed herein this Application / Petition, hence the investment is prudent and justified.

4. The Applicant / Petitioner warrants compliance of standards set out by NEPRA as well as the Prudent Utility Practices and Prudent Electrical Practices.

5. The Applicant / Petitioner shall also comply with all other laws of Pakistan and the Province of Punjab including environmental and taxation.

6. The Applicant / Petitioner shall make all efforts to render safe and reliable transmission services.

7. The Applicant / Petitioner shall offer its services in areas where the national grid is not serving or lacks capacity to serve within the Province of Punjab and even otherwise the complement, augment and reinforce transmission facilities of the National Grid.

8. The Applicant / Petitioner shall make all efforts to render suitable services in accordance with the applicable law including the NEPRA Performance Standards (Transmission) Rules 2005.

9. The Applicant / Petitioner shall comply with such other criteria, rules, regulations, codes, guidelines as are prescribed from time to time under the NEPRA Act.

J. PRAYER

1. In view of above facts, reasons and grounds, it is most humbly prayed to the NEPRA Authority as follows:

   A. The NEPRA Authority may admit the Applicant's / Petitioner's request for the

grant of License to the Punjab Grid Company as Provincial Grid Company to engage in the business of transmission of electric power within the territorial limits of the Province of Punjab in pursuance of the Constitution and NEPRA Act;

B. The NEPRA Authority may grant the License to the Punjab Grid Company as Provincial Grid Company to engage in the business of transmission of electric power within the territorial limits of the Province of Punjab in pursuance of the Constitution and NEPRA Act;

C. The NEPRA Authority may grant the License to the Punjab Grid Company as Provincial Grid Company to carry its roles and responsibilities as Provincial Grid Company in pursuance of the Constitution and NEPRA Act;

D. The NEPRA Authority may grant the License to the Punjab Grid Company as Provincial Grid Company to carry its functions as delineated in Section H of this Application / Petition in pursuance of the Constitution and NEPRA Act;

E. The NEPRA Authority may grant the License to the Punjab Grid Company as Provincial Grid Company for the Term as provided in Section G (1) of this Application / Petition; and

F. Any other and better relief that the NEPRA Authority may deem appropriate in the circumstances may kindly be granted to the Applicant / Petitioner.

PUNJAB GRID COMPANY ★ Government of the Punjab ★

Applicant / Petitioner

Through

LINCOLN'S LAW CHAMBER ★ ISLAMABAD ★

Barrister Asghar Khan
Advocate

Ali Roshan Gillani
Advocate

Atif Waheed
Advocate

ANNEX-"A" -45-

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

Company Registration Office

CERTIFICATE OF INCORPORATION

[Under section 16 of the Companies Act, 2017 (XIX of 2017)]

Corporate Unique Identification No. 0219574

I hereby certify that **PUNJAB GRID COMPANY LIMITED** is this day incorporated under the Companies Act, 2017 (XIX of 2017) and that the company is **limited by shares.**

Given at **Lahore** this **Third** day of **January,** Two **Thousand** and **Twenty Three**

Saila Jamshaid
Joint Registrar

https://eservices.secp.gov.pk/eServices/ControllerServlet?request_id=VERIFY_ONLINE_INCORP_CERT&id=0219574

Disclaimer: This certificate of incorporation is not a permission to accept deposits from the general public by offering fake jobs/investment packages and return thereon, indulge in leasing/ financing of vehicles and household products etc., MLM, Pyramid and Ponzi Schemes, Lottery Business, trading in forex and virtual currencies or any other unlawful business activities.

ANNEX "B"

-46-

THE COMPANIES ACT, 2017 (XIX of 2017)

(COMPANY LIMITED BY SHARES)

MEMORANDUM

OF

ASSOCIATION

OF

PUNJAB GRID COMPANY LIMITED

THE COMPANIES ACT, 2017 (XIX of 2017)

(COMPANY LIMITED BY SHARES)

MEMORANDUM OF ASSOCIATION OF
"PUNJAB GRID COMPANY LIMITED

1. The name of the company is PUNJAB GRID COMPANY LIMITED.

2. The registered office of the Company will be situated in Province of Punjab.

3. (i) The principal line of business of the company shall be to carry out business of electric transmission lines, laying of transmission lines, construction, operation and maintenance of the grid systems, system operator, scheduling of generation and despatch of the generation plants, wheeling of electricity, transmission of electric power, all within the territorial limits of the Province of Punjab. The company will act as a Provincial Grid Company as provided in the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997. The Company will operate and provide safe and reliable transmission services on a non-discriminatory basis including to bulk power consumers. It shall provide transmission and interconnection services to the National Transmission & Despatch Company (**NTDC**) and may purchase interconnection services from the NTDC for connection of its facilities to the National Grid. It shall file tariff applications / petitions, to apply for upfront tariff or any application for the tariff and its terms and conditions if any and to do anything ancillary to the matter. Furthermore, it shall execute agreements for sale of power to distribution companies, bulk power consumers, buyers of electricity and other persons and to coordinate, aid and advise on the activities of other companies and concerns, including subsidiaries, associates and affiliates engaged in generation, transmission, distribution and wheeling of electric power and schedule and dispatch generation of all units connected to the provincial power system. It may enter into any arrangements with the Government of Pakistan or Government of Punjab or any other Government, or any local or provincial authorities, national, local, municipal or otherwise or with any person for the purpose of directly or indirectly carrying out the objects or furthering the interest of the company or its members and to obtain from any such

Government, Provincial Authority or person any charters, subsidies, loans, indemnities, grants, contracts, funds, decrees, rights, sanctions, privileges or concessions which the company may think desirable to obtain and carry out, excise and comply with the same. It may carry on the business of purchasing, selling, importing, exporting, wheeling, system operation, trading of power, including finalization of tariff, billing and collection thereof. It can execute power purchase agreements with generating companies, federal and provincial generating stations, utilities, companies and persons. It can directly or indirectly carry on the business of works and full set of services required within the electricity supply industry including but not limited to environment and properly services, institutional reform and development, strategic planning, power systems analysis, power quality, project feasibility development, detailed design and construction supervision for networks of provincial / national scale and for all system voltages (kV) to interact with power utilities provision of environmental and engineering services for power transmission and distribution (T&D) infrastructure and to do all such acts, deeds or things as would be required for effect fulfilment of the said objective. It may take over, acquire, purchase, take on lease exchange or otherwise hold any transmission, generation and distribution concessions of whatever nature or extent and to use, exercise deal with sublease or otherwise turn to account any such rights, licenses, grants, claims options, privileges so acquired in any way or manner the company deems fit. Additionally, it may establish or have and maintain offices, branches and other setups all over Pakistan or Punjab for conduct of its business and can enter into contracts and agreements for the transmission and wheeling of electric power services. Also, it can undertake, for and on behalf of others, or itself the erection, operation, maintenance, management of, AC and or DC transmission systems, extra high voltage, high voltage, medium voltage, low voltage lines and associated substations equipment apparatus, cables and wires. It can study, investigate, collect information and data, review operations, plan, research, design, prepare project reports, diagnose operational difficulties and weakness, advise on the remedial measures to improve and modernize existing EHV, HV, MV, LV lines and sub station subject to any permission required by any law and its approval from the competent authorities, if so required.

(ii). Except for the businesses mentioned in sub-clause (iii) hereunder, the company may engage in all the lawful businesses and shall be authorized to take all necessary steps and actions in connection therewith and ancillary thereto;

(iii). Notwithstanding anything contained in the foregoing sub-clauses of this clause nothing contained herein shall be construed as empowering the Company to undertake or indulge, directly or indirectly in the business of a Banking Company, Non-banking Finance Company (Mutual Fund, Leasing, Investment Company, Investment Advisor, Real Estate Investment Trust management company, Housing Finance Company, Venture Capital Company, Discounting Services, Microfinance or Microcredit business), Insurance Business, *Modaraba* management company, Stock Brokerage business, forex, real estate business, business of providing the services of security guards or any other business restricted under any law for the time being in force or as may be specified by the Commission.

(iv). It is hereby undertaken that the company shall not:

(a) engage in any of the business mentioned in sub-clause (iii) above or any unlawful operation;

(b) launch multi-level marketing (MLM), Pyramid and Ponzi Schemes, or other related activities/businesses or any lottery business;

(c) engage in any of the permissible business unless the requisite approval, permission, consent or license is obtained from competent authority as may be required under any law for the time being in force.

4. The liability of the members is limited.

5. The authorized capital of the company is Rs. 20,000,000 /- (Rupees Twenty Million only) divided into 200,000 (Two Hundred Thousand) ordinary shares of Rs.100 /- (Rupees One Hundred only) each with powers to the company from time to time to increase and reduce its capital subject to any permission required under the law.

We, the several persons whose names and addresses are subscribed below, are desirous of being formed into a company, in pursuance of this memorandum of association, and we respectively agree to take the number of shares in the capital of the company as set opposite our respective names:

Name and surname (present & former) in full (in Block Letters)	NIC No. (in case of foreigner, Passport No)	Father's/ Husband's Name in full	Nationality (ies) with any former Nationality	Occupation	Usual residential address in full or the registered/ principal office address for a subscriber other than natural person	Number of shares taken by each subscriber (in figures and words)	Signatures
Mohammad Ajmal Bhatti Secretary Energy and Power / Ex-Officio Member On Behalf of Government of Punjab	31202-7120014-7	Muhammad Akram Bhatti	Pakistani	Ex-Officio Member Energy & Power Government of Punjab	House # 35-B, Mohalla GOR-3, Shadmaan, Lahore	998 (Nine Hundred Ninety-Eight Shares)	

Mohammad Sohail Anwar Choudhry Secretary Planning and Development / Ex-Officio Member On Behalf of Government of Punjab	35202-4006459-7	Ch Anwar Ali	Pakistani	Ex-Officio Member Planning & Development Government of Punjab	House # 199, Block Ahmed, Mohalla New Garden Town, Lahore	1 (One Share)	
Wasif Khurshid Secretary Finance / Ex-Officio Member On Behalf of Government of Punjab	36302-9171740-9	Khurshid Ahmad Anwar	Pakistani	Ex-Officio Member Finance) Government of (Punjab	Khurshid Ahmad Anwar	1 (One Share)	
		Total number of shares taken (in figures and words)				One Thousand (1000) Ordinary Shares	

Dated the 28th day of December, 2022

ANNEX-"C"

THE COMPANIES ACT, 2017 (XIX of 2017)

(Company Limited by Shares)

ARTICLES OF ASSOCIATION

OF

PUNJAB GRID COMPANY LIMITED

PRELIMINARY

1. (1) In these regulations-

(a) "section" means section of the Act;

(b) "the Act" means the Companies Act, 2017;

(c) "the seal" means the common seal or official seal of the company as the case may be;

(2) Unless the context otherwise requires, words or expressions contained in these regulations shall have the same meaning as in this Act; and words importing the singular shall include the plural, and *vice versa*, and words importing the masculine gender shall include feminine, and words importing persons shall include bodies corporate. If the provisions of these Articles are in any way inconsistent with the provisions of the Companies Act, 2017 or any other law for the time being in force, the provisions of Companies Act, 2017 shall prevail.

OPERATIONALIZATION & BUSINESS

2. For the purposes of operationalization and achievement of objectives, the company may borrow or raise money by means of local and foreign currency loans from scheduled banks, industrial banks and financial institutions, governments, foreign institutions, donors, development institutions including other specialized institutions or non-banking finance companies for the purpose of purchase, manufacture, market, supply, export and import of machinery, construction activities and improvements, repair and renovations. It may arrange money by issue of debentures, debenture stock, perpetual or otherwise convertible into shares and to mortgage, or charge the whole or any part of the property or assets of the Company, present or future, by special assignment or to transfer or convey the same absolutely or in trust as may seem expedient and to, purchase, redeem or payoff any such securities. May purchase / import raw materials, machinery, equipment and allied items required in connection thereto in any manner the company may think fit. Furthermore, it may purchase, take on lease or in exchange, hire, apply for or otherwise acquire and hold for any interest, any rights, privileges, lands, building, easements, trademarks, patents, patent rights, copyrights, licenses, machinery, plants, stock-in-trade and any movable and immovable property of any kind necessary or convenient for the purposes of or in connection with the Company's business or any branch or department thereof and to use, exercise, develop, grant licenses in respect of or otherwise return to account any property, rights and information so acquired, subject to any permission required under the law. Moreover, it may acquire by concession, grant, purchase, barter,

use either absolutely or conditionally and either solely or jointly with others any lands, buildings, machinery, plants, equipment, privileges, rights, licenses, trademarks, patents, and other movable and immovable property of any description which the Company may deem necessary or which may seem to the Company capable of being turned to account, subject to any permission as required under the law. Additionally, it may invest surplus money of the Company in shares, stocks or securities of any company, debentures, debenture stocks or in any investments, short term and long term participation, term finance certificates or any other government securities in such manner as may from time to time be decided by the directors, without indulging non-banking finance business, banking business or an investment company or any other any lawful business and can charge, levy, collect system of use charges, wheeling charges, tariff and other terms and conditions. The said decisions shall be taken with prior approval of Board & shareholders whatever applicable but the same shall be subject to the provisions of Companies Act 2017.

3. The directors shall have regard to the restrictions on the commencement of business imposed by section 19 if, and so far as, those restrictions are binding upon the company.

SHARES

4. In case of shares in the physical form, every person whose name is entered as a member in the register of members shall, without payment, be entitled to receive, within thirty days after allotment or within fifteen days of the application for registration of transfer, a certificate under the seal specifying the share or shares held by him and the amount paid up thereon:

Provided that if the shares are in book entry form or in case of conversion of physical shares and other transferable securities into book-entry form, the company shall, within ten days after an application is made for the registration of the transfer of any shares or other securities to a central depository, register such transfer in the name of the central depository.

5. The company shall not be bound to issue more than one certificate in respect of a share or shares in the physical form, held jointly by several persons and delivery of a certificate for a share to one of several joint holders shall be sufficient delivery to all.

6. If a share certificate in physical form is defaced, lost or destroyed, it may be renewed on payment of such fee, if any, not exceeding one hundred rupees, and on such terms, if any, as to evidence and indemnity and payment of expenses incurred by the company in investigating title as the directors think fit.

7. Except to the extent and in the manner allowed by section 86, no part of the funds of the company shall be employed in the purchase of, or in loans upon the security of, the company's shares.

8. The company may alter its share capital in accordance with section 85 of the Act.

TRANSFER AND TRANSMISSION OF SHARES

The instrument of transfer of any share in physical form in the company shall be executed by the transferor and transferee, and the transferor shall be deemed to remain holder of the share until the name of the transferee is entered in the register of members in respect thereof.

10. Shares in physical form in the company shall be transferred in the following form, or in any usual or common form which the members and non-member directors shall approve: -

Form for Transfer of Shares

(First Schedule to the Companies Act, 2017)

I..... s/o ..... r/o..... (hereinafter called "the transferor") in consideration of the sum of rupees ..... paid to me by..... s/o ..... r/o..... (hereinafter called "the transferee"), do hereby transfer to the said transferee.....theshare(orshares)withdistinctivenumbersfrom .....to.....inclusive, in the..... Limited, to hold unto the said transferee, his executors, administrators and assigns, subject to the several conditions on which I held the same at the time of the execution hereof, and I, the said transferee, do hereby agree to take the said share (or shares) subject to the conditions aforesaid. As witness our hands this..... day of..... . 20.....

Signature .....

Transferor

Full Name, Father's / Husband's Name
CNIC Number (in case of foreigner,
Passport Number)
Nationality
Occupation and usual Residential Address

Witness 1:

Signature.....date .....
Name, CNIC Number and Full Address

Signature .....

Transferee

Full Name, Father's / Husband's Name
CNIC Number (in case of foreigner,
Passport Number)
Nationality
Occupation and usual Residential Address
Cell number
Landline number, if any
Email address

Witness 2:

Signature.....date .....
Name, CNIC Number and Full Address

Bank Account Details of Transferee for Payment of Cash Dividend
(Mandatory in case of a listed company or optional for any other company)

It is requested that all my cash dividend amounts declared by the company, may be credited into the following bank account:

Tile of Bank Account	
Bank Account Number	
Bank's Name	
Branch Name and Address	

It is stated that the above mentioned information is correct and that I will intimate the changes in the above-mentioned information to the company and the concerned Share Registrar as soon as these occur.

.....
Signature of the Transferee(s)

11. (1) Subject to the restrictions contained in regulation 12 and 13, the directors shall not refuse to transfer any share unless the transfer deed is defective or invalid. The directors may also suspend the registration of transfers during the ten days immediately preceding a general meeting or prior to the determination of entitlement or rights of the shareholders by giving seven days' previous notice in the manner provided in the Act. The directors may, in case of shares in physical form, decline to recognise any instrument of transfer unless—

a) a fee not exceeding fifty rupees as may be determined by the directors is paid to the company in respect thereof; and

b) the duly stamped instrument of transfer is accompanied by the certificate of the shares to which it relates, and such other evidence as the directors may reasonably require to show the right of the transferor to make the transfer.

(2) If the directors refuse to register a transfer of shares, they shall within fifteen days after the date on which the transfer deed was lodged with the company send to the transferee and the transferor notice of the refusal indicating the defect or invalidity to the transferee, who shall,

r removal of such defect or invalidity be entitled to re-lodge the transfer deed with the mpany.

Provided that the company shall, where the transferee is a central depository the refusal shall be conveyed within five days from the date on which the instrument of transfer was lodged with it notify the defect or invalidity to the transferee who shall, after the removal of such defect or invalidity, be entitled to re-lodge the transfer deed with the company.

TRANSMISSION OF SHARES

12. The executors, administrators, heirs, or nominees, as the case may be, of a deceased sole holder of a share shall be the only persons recognised by the company to deal with the share in accordance with the law. In the case of a share registered in the names of two or more holders, the survivors or survivor, or the executors or administrators of the deceased survivor, shall be the only persons recognised by the company to deal with the share in accordance with the law.

13. The shares or other securities of a deceased member shall be transferred on application duly supported by succession certificate or by lawful award, as the case may be, in favour of the successors to the extent of their interests and their names shall be entered to the register of members.

14. A person may on acquiring interest in a company as member, represented by shares, at any time after acquisition of such interest deposit with the company a nomination conferring on a person, being the relatives of the member, namely, a spouse, father, mother, brother, sister and son or daughter, the right to protect the interest of the legal heirs in the shares of the deceased in the event of his death, as a trustee and to facilitate the transfer of shares to the legal heirs of the deceased subject to succession to be determined under the Islamic law of inheritance and in case of non-*Muslim* members, as per their respective law.

15. The person nominated under regulation 14 shall, after the death of the member, be deemed as a member of company till the shares are transferred to the legal heirs and if the deceased was a director of the company, not being a listed company, the nominee shall also act as director of the company to protect the interest of the legal heirs.

16. A person to be deemed as a member under regulation 13, 14 and 15 to a share by reason of the death or insolvency of the holder shall be entitled to the same dividends and other advantages to which he would be entitled if he were the registered holder of the share and exercise any right conferred by membership in relation to meetings of the company.

ALTERATION OF CAPITAL

17. The company may, by special resolution-

(a) increase its authorised capital by such amount as it thinks expedient;

(b) consolidate and divide the whole or any part of its share capital into shares of larger amount than its existing shares;

(c) sub-divide its shares, or any of them, into shares of smaller amount than is fixed by the memorandum;

(d) cancel shares which, at the date of the passing of the resolution in that behalf, have not been taken or agreed to be taken by any person, and diminish the amount of its share capital by the amount of the share so cancelled.

18. Subject to the provisions of the Act, all new shares shall at the first instance be offered to such persons as at the date of the offer are entitled to such issue in proportion, as nearly as the circumstances admit, to the amount of the existing shares to which they are entitled. The offer shall be made by letter of offer specifying the number of shares offered, and limiting a time within which the offer, if not accepted, will deem to be declined, and after the expiration of that time, or on the receipt of an intimation from the person to whom the offer is made that he declines to accept the shares offered, the directors may dispose of the same in such manner as they think most beneficial to the company. The directors may likewise so dispose of any new shares which (by reason of the ratio which the new shares bear to shares held by persons entitled to an offer of new shares) cannot, in the opinion of the directors, be conveniently offered under this regulation.

19. The new shares shall be subject to the same provisions with reference to transfer, transmission and otherwise as the shares in the original share capital.

20. The company may, by special resolution-

(a) consolidate and divide its share capital into shares of larger amount than its existing shares;

(b) sub-divide its existing shares or any of them into shares of smaller amount than is fixed by the memorandum of association, subject, nevertheless, to the provisions of section 85;

(c) cancel any shares which, at the date of the passing of the resolution, have not been taken or agreed to be taken by any person.

21. The company may, by special resolution, reduce its share capital in any manner and with, and subject to confirmation by the Court and any incident authorised and consent required, by law.

GENERAL MEETINGS

22. The statutory general meeting of the company shall be held within the period required by section 131.

23. A general meeting, to be called annual general meeting, shall be held, in accordance with the provisions of section 132, within sixteen months from the date of incorporation of the

pany and thereafter once at least in every year within a period of one hundred and twenty s following the close of its financial year.

24. All general meetings of a company other than the statutory meeting or an annual general meeting mentioned in sections 131 and 132 respectively shall be called extraordinary general meetings.

25. The directors may, whenever they think fit, call an extraordinary general meeting, and extraordinary general meetings shall also be called on such requisition, or in default, may be called by such requisitionists, as provided by section 133. If at any time there are not within Pakistan sufficient directors capable of acting to form a quorum, any director of the company may call an extraordinary general meeting in the same manner as nearly as possible as that in which meetings may be called by the directors.

26. The company may provide video-link facility to its members for attending general meeting at places other than the town in which general meeting is taking place after considering the geographical dispersal of its members:

Provided that in case of listed companies if the members holding ten percent of the total paid up capital or such other percentage of the paid up capital as may be specified, are resident in any other city, the company shall provide the facility of video-link to such members for attending annual general meeting of the company, if so required by such members in writing to the company at least seven days before the date of the meeting.

NOTICE AND PROCEEDINGS OF GENERAL MEETINGS

27. Twenty-one days' notice at the least (exclusive of the day on which the notice is served or deemed to be served, but inclusive of the day for which notice is given) specifying the place, the day and the hour of meeting and, in case of special business, the general nature of that business, shall be given in manner provided by the Act for the general meeting, to such persons as are, under the Act or the regulations of the company, entitled to receive such notice from the company; but the accidental omission to give notice to, or the non-receipt of notice by, any member shall not invalidate the proceedings at any general meeting.

28. All the business transacted at a general meeting shall be deemed special other than the business stated in sub-section (2) of section 134 namely; the consideration of financial

statements and the reports of the board and auditors, the declaration of any dividend, the election and appointment of directors in place of those retiring, and the appointment of the auditors and fixing of their remuneration.

29. No business shall be transacted at any general meeting unless a quorum of members is present at that time when the meeting proceeds to business. The quorum of the general meeting shall be-

(a) in the case of a public listed company, not less than ten members present personally, or through video-link who represent not less than twenty-five percent of the total voting power, either of their own account or as proxies;

(b) in the case of any other company having share capital, two members present personally, or through video-link who represent not less than twenty-five percent of the total voting power, either of their own account or as proxies.

30. If within half an hour from the time appointed for the meeting a quorum is not present, the meeting, if called upon the requisition of members, shall be dissolved; in any other case, it shall stand adjourned to the same day in the next week at the same time and place, and, if at the adjourned meeting a quorum is not present within half an hour from the time appointed for the meeting, the members present, being not less than two, shall be a quorum.

31. The chairman of the board of directors, if any, shall preside as chairman at every general meeting of the company, but if there is no such chairman, or if at any meeting he is not present within fifteen minutes after the time appointed for the meeting, or is unwilling to act as chairman, any one of the directors present may be elected to be chairman, and if none of the directors is present, or willing to act as chairman, the members present shall choose one of their number to be chairman.

32. The chairman may, with the consent of any meeting at which a quorum is present (and shall if so directed by the meeting), adjourn the meeting from time to time but no business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting from which the adjournment took place. When a meeting is adjourned for fifteen days or more, notice of the adjourned meeting shall be given as in the case of an original meeting. Save as aforesaid, it shall not be necessary to give any notice of an adjournment or of the business to be transacted at an adjourned meeting.

33. (1) At any general meeting a resolution put to the vote of the meeting shall be decided on a show of hands unless a poll is (before or on the declaration of the result of the show of hands) demanded. Unless a poll is so demanded, a declaration by the chairman that a resolution has, on a show of hands, been carried, or carried unanimously, or by a particular majority, or lost, and an entry to that effect in the book of the proceedings of the company shall be conclusive evidence of the fact, without proof of the number or proportion of the votes recorded in favour of, or against, that resolution.

(2) At any general meeting, the company shall transact such businesses as may be notified by the Commission, only through postal ballot.

34. A poll may be demanded only in accordance with the provisions of section 143.

If a poll is duly demanded, it shall be taken in accordance with the manner laid down in sections 144 and 145 and the result of the poll shall be deemed to be the resolution of the meeting at which the poll was demanded.

36. A poll demanded on the election of chairman or on a question of adjournment shall be taken at once.

37. In the case of an equality of votes, whether on a show of hands or on a poll, the chairman of the meeting at which the show of hands takes place, or at which the poll is demanded, shall have and exercise a second or casting vote.

38. Except for the businesses specified under sub-section (2) of section 134 to be conducted in the annual general meeting, the members of a private company or a public unlisted company (having not more than fifty members), may pass a resolution (ordinary or special) by circulation signed by all the members for the time being entitled to receive notice of a meeting. The resolution by circulation shall be deemed to be passed on the date of signing by the last of the signatory member to such resolution.

VOTES OF MEMBERS

39. Subject to any rights or restrictions for the time being attached to any class or classes of shares, on a show of hands every member present in person shall have one vote except for election of directors in which case the provisions of section 159 shall apply. On a poll every member shall have voting rights as laid down in section 134.

40. In case of joint-holders, the vote of the senior who tenders a vote, whether in person or by proxy or through video-link shall be accepted to the exclusion of the votes of the other joint-holders; and for this purpose seniority shall be determined by the order in which the names stand in the register of members.

41. A member of unsound mind, or in respect of whom an order has been made by any court having jurisdiction in lunacy, may vote, whether on show of hands or on a poll or through video link, by his committee or other legal guardian, and any such committee or guardian may, on a poll, vote by proxy.

42. On a poll votes may be given either personally or through video-link, by proxy or through postal ballot:

Provided that nobody corporate shall vote by proxy as long as a resolution of its directors in accordance with the provisions of section 138 is in force.

43. (1) The instrument appointing a proxy shall be in writing under the hand of the appointer or of his attorney duly authorised in writing.

(2) The instrument appointing a proxy and the power-of-attorney or other authority (if any) under which it is signed, or a notarially certified copy of that power or authority, shall be deposited at the registered office of the company not less than forty-eight hours before the time for holding the meeting at which the person named in the instrument proposes to vote and in default the instrument of proxy shall not be treated as valid.

44. An instrument appointing a proxy may be in the following form, or a form as near thereto as may be:

INSTRUMENT OF PROXY

..... Limited

"I ..... s/o ..... r/o ..... being a member of the ..... Limited, hereby appoint ..... s/o ..... r/o ..... as my proxy to attend and vote on my behalf at the (statutory, annual, extraordinary, as the case may be) general meeting of the company to be held on the ..... day of ..... 20..... and at any adjournment thereof."

45. A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the previous death or insanity of the principal or revocation of the proxy or of the authority under which the proxy was executed, or the transfer of the share in respect of which the proxy is given, provided that no intimation in writing of such death, insanity, revocation or transfer as aforesaid shall have been received by the company at the office before the commencement of the meeting or adjourned meeting at which the proxy is used.

DIRECTORS

The following subscribers of the memorandum of association shall be the first directors of the company, so, however, that the number of directors shall not in any case be less than that specified in section 154 and they shall hold office until the election of directors in the first annual general meeting:

1. Mouhammad Ajmal Bhatti, Secretary Energy and Power, Government of Punjab (in Ex Officio capacity)

2. Mohammad Sohail Anwar Choudhry, Secretary Planning and Development, Government of Punjab (in Ex Officio capacity)

3. Mr. Wasif Khurshid, Secretary Finance, Government of Punjab (in Ex Officio capacity)

47. The remuneration of the directors shall from time to time be determined by the company in general meeting subject to the provisions of the Act.

48. Save as provided in section 153, no person shall be appointed as a director unless he is a member of the company.

POWERS AND DUTIES OF DIRECTORS

49. The business of the company shall be managed by the directors, who may pay all expenses incurred in promoting and registering the company, and may exercise all such powers of the company as are not by the Act or any statutory modification thereof for the time being in force, or by these regulations, required to be exercised by the company in general meeting, subject nevertheless to the provisions of the Act or to any of these regulations, and such regulations being not inconsistent with the aforesaid provisions, as may be prescribed by the company in general meeting but no regulation made by the company in general meeting shall invalidate any prior act of the directors which would have been valid if that regulation had not been made.

50. The directors shall appoint a chief executive in accordance with the provisions of sections 186 and 187.

51. The amount for the time being remaining undischarged of moneys borrowed or raised by the directors for the purposes of the company (otherwise than by the issue of share capital) shall not at any time, without the sanction of the company in general meeting, exceed the issued share capital of the company.

52. The directors shall duly comply with the provisions of the Act, or any statutory modification thereof for the time being in force, and in particular with the provisions in regard to

registration of the particulars of mortgages, charges and pledge affecting the property of the pany or created by it, to the keeping of a register of the directors, and to the sending to the strar of an annual list of members, and a summary of particulars relating thereto and notice of any consolidation or increase of share capital, or sub-division of shares, and copies of special resolutions and a copy of the register of directors and notifications of any changes therein.

53. Without prejudice to the general powers conferred by the last preceding article and the other power conferred by these presents it is expressly declared that the Directors shall have the following powers provided below;

a) To take on lease, purchase, erect or otherwise acquire for the Company any land building, property rights or privileges which the Company is authorized to acquire at such price and generally on such terms and conditions, as they think fit.

b) To sell, let, exchange or otherwise dispose of absolutely or conditionally all or any part of the property, privileges and undertaking of the Company upon such terms and conditions and for such consideration as they may think fit.

c) To buy, sell, import, export or procure the supply of all plants and machinery, material, stocks in trade and other movable and immovable property and things required for the purpose of the Company.

d) To engage, fix and pay the remuneration of and dismiss or discharge any manager, engineer, agent, secretary, clerk, accountant, workman, expert, technical adviser, or other persons employed or to be employed in or in connection with business of the Company.

e) To appoint any person to be attorney of the Company for such purposes and with such powers, authority and discretions and for such period and subject to such conditions as they may from time to time think fit and to revoke such powers at pleasure.

f) To enter into, carry, rescind or vary all financial arrangements or agreement with any banks, persons or corporations for, or in connection with the Company's business and affairs and in connection with such arrangements to deposit, hypothecate any property of the Company or documents representing or relating to the same.

g) To take give receipts and other discharges for money payable to the Company and to the claims and demands of the Company and to draw, accept, endorse, negotiable promissory notes, bills of exchange or other negotiable and transferable instruments concerning/ relating to business of the company.

h) To deal with surplus money of the Company not immediately required for the purpose thereof upon such terms and conditions as may be thought expedients.

i) To determine who shall be entitled to sign on Company's behalf, bills, cheques, notes, receipts, acceptances, endorsements, releases, contracts and documents.

j) To enter into such negotiations and contracts and rescind or vary all such contracts and execute and do all such acts, deeds and things in the name of the Company as they may consider expedient.

k) To open accounts with any bank or bankers and to pay into and withdraw money from such accounts from time to time.

l) To get insured the movable and immovable property of the Company.

m) To pay to any person employed by the Company a commission on the profits of the Company.

n) To institute, combat, prosecute, defend, compound, settle compromise adjust refer to arbitration withdraw, abandon any legal proceedings by or against the Company or its officers or otherwise concerning the affairs of the Company.

o) To make advances for the business of the Company to such persons upon such security or without security as they may think fit, and generally to direct, manage, control the receipts, custody, employment, investment and expenditure of the moneys and funds of the Company and the keeping of accounts thereof.

p) To appear for and on behalf of the Company in any Court of Justice, Criminal, Civil or Revenue, Police, Postal, Excise, Transport, Income Tax, Regulator, NEPRA or other office in any action or proceedings or matters in which the Company may be interested and to promote, safeguard or defend its interest. The directors can delegate such powers aforementioned to any person through a duly authorized instrument.

q) To sign and verify any plan, written statement, petition, compromise, mukharnama, vakalatnama, authorizing the legal practitioner to act on behalf of the Company in all Court, Civil, Criminal, and Revenue. The directors can delegate such powers aforementioned to any person through a duly authorized instrument.

MINUTE BOOKS

54. The directors shall cause records to be kept and minutes to be made in book or books with regard to:

(a) all resolutions and proceedings of general meeting(s) and the meeting(s) of directors and Committee(s) of directors, and every member present at any general meeting and every director present at any meeting of directors or Committee of directors shall put his signature in a book to be kept for that purpose;

(b) recording the names of the persons present at each meeting of the directors and of any committee of the directors, and the general meeting; and

(c) all orders made by the directors and Committee(s) of directors:

Provided that all records related to proceedings through video-link shall be maintained in accordance with the relevant regulations specified by the Commission which shall be appropriately rendered into writing as part of the minute books according to the said regulations.

THE SEAL

55. The directors shall provide for the safe custody of the seal and the seal shall not be affixed to any instrument except by the authority of a resolution of the board of directors or by a committee of directors authorized in that behalf by the directors and in the presence of at least two directors and of the secretary or such other person as the directors may appoint for the purpose; and those two directors and secretary or other person as aforesaid shall sign every instrument to which the seal of the company is so affixed in their presence.

DISQUALIFICATION OF DIRECTORS

56. No person shall become the director of a company if he suffers from any of the disabilities or disqualifications mentioned in section 153 or disqualified or debarred from holding such office under any of the provisions of the Act as the case may be and, if already a director, shall cease to hold such office from the date he so becomes disqualified or disabled:

Provided, however, that no director shall vacate his office by reason only of his being a member of any company which has entered into contracts with, or done any work for, the company of which he is director, but such director shall not vote in respect of any such contract or work, and if he does so vote, his vote shall not be counted.

PROCEEDINGS OF DIRECTORS

57. The directors may meet together for the dispatch of business, adjourn and otherwise regulate their meetings, as they think fit. A director may, and the secretary on the requisition of a director shall, at any time, summon a meeting of directors. Notice sent to a director through email whether such director is in Pakistan or outside Pakistan shall be a valid notice.

58. The directors may elect a chairman of their meetings and determine the period for which he is to hold office; but, if no such chairman is elected, or if at any meeting the chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to act as chairman, the directors present may choose one of their number to be chairman of the meeting.

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At least one-third (1/3) of the total number of directors or two (2) directors whichever is higher, for the time being of the company, present personally or through video-link, shall constitute a quorum.

60. Save as otherwise expressly provided in the Act, every question at meetings of the board shall be determined by a majority of votes of the directors present in person or through video-link, each director having one vote. In case of an equality of votes or tie, the chairman shall have a casting vote in addition to his original vote as a director.

61. The directors may delegate any of their powers not required to be exercised in their meeting to committees consisting of such member or members of their body as they think fit; any committee so formed shall, in the exercise of the powers so delegated, conform to any restrictions that may be imposed on them by the directors.

62. (1) A committee may elect a chairman of its meetings; but, if no such chairman is elected, or if at any meeting the chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to act as chairman, the members present may choose one of their number to be chairman of the meeting.

(2) A committee may meet and adjourn as it thinks proper. Questions arising at any meeting shall be determined by a majority of votes of the members present. In case of an equality of votes, the chairman shall have and exercise a second or casting vote.

63. All acts done by any meeting of the directors or of a committee of directors, or by any person acting as a director, shall, notwithstanding that it be afterwards discovered that there was some defect in the appointment of any such directors or persons acting as aforesaid, or that they or any of them were disqualified, be as valid as if every such person had been duly appointed and was qualified to be a director.

64. A copy of the draft minutes of meeting of the board of directors shall be furnished to every director within seven working days of the date of meeting.

65. A resolution in writing signed by all the directors for the time being entitled to receive notice of a meeting of the directors shall be as valid and effectual as if it had been passed at a meeting of the directors duly convened and held.

FILLING OF VACANCIES

66. At the first annual general meeting of the company, all the directors shall stand retired from office, and directors shall be elected in their place in accordance with section 159 for a term of three years.

67. A retiring director shall be eligible for re-election.

The directors shall comply with the provisions of sections 154 to 159 and sections 161, 162 and 167 relating to the election of directors and matters ancillary thereto.

Any casual vacancy occurring on the board of directors may be filled up by the directors, but the person so chosen shall be subject to retirement at the same time as if he had become a director on the day on which the director in whose place he is chosen was last elected as director.

70. The company may remove a director but only in accordance with the provisions of the Act.

DIVIDENDS AND RESERVE

71. The company in general meeting may declare dividends but no dividend shall exceed the amount recommended by the directors.

72. The directors may from time to time pay to the members such interim dividends as appear to the directors to be justified by the profits of the company.

73. Any dividend may be paid by a company either in cash or in kind only out of its profits. The payment of dividend in kind shall only be in the shape of shares of listed company held by the distributing company.

74. Dividend shall not be paid out of unrealized gain on investment property credited to profit and loss account.

75. Subject to the rights of persons (if any) entitled to shares with special rights as to dividends, all dividends shall be declared and paid according to the amounts paid on the shares.

76. (1) The directors may, before recommending any dividend, set aside out of the profits of the company such sums as they think proper as a reserve or reserves which shall, at the discretion of the directors, be applicable for meeting contingencies, or for equalizing dividends, or for any other purpose to which the profits of the company may be properly applied, and pending such application may, at the like discretion, either be employed in the business of company or be invested in such investments (other than shares of the company) as the directors may, subject to the provisions of the Act, from time to time think fit.

(2) The directors may carry forward any profits which they may think prudent not to distribute, without setting them aside as a reserve.

77. If several persons are registered as joint-holders of any share, any one of them may give effectual receipt for any dividend payable on the share.

78. (1) Notice of any dividend that may have been declared shall be given in manner hereinafter mentioned to the persons entitled to share therein but, in the case of a public company, the company may give such notice by advertisement in a newspaper circulating in the Province in which the registered office of the company is situate.

(2) Any dividend declared by the company shall be paid to its registered shareholders or to their order. The dividend payable in cash may be paid by cheque or warrant or in any electronic mode to the shareholders entitled to the payment of the dividend, as per their direction.

(3) In case of a listed company, any dividend payable in cash shall only be paid through electronic mode directly into the bank account designated by the entitled shareholders.

79. The dividend shall be paid within the period laid down under the Act.

ACCOUNTS

80. The directors shall cause to be kept proper books of account as required under section 220.

81. The books of account shall be kept at the registered office of the company or at such other place as the directors shall think fit and shall be open to inspection by the directors during business hours.

82. The directors shall from time to time determine whether and to what extent and at what time and places and under what conditions or regulations the accounts and books or papers of the company or any of them shall be open to the inspection of members not being directors, and no member (not being a director) shall have any right of inspecting any account and book or papers of the company except as conferred by law or authorised by the directors or by the company in general meeting.

83. The directors shall as required by sections 223 and 226 cause to be prepared and to be laid before the company in general meeting the financial statements duly audited and reports as are referred to in those sections.

84. The financial statements and other reports referred to in regulation 80 shall be made out in every year and laid before the company in the annual general meeting in accordance with sections 132 and 223.

85. A copy of the financial statements and reports of directors and auditors shall, at least twenty-one days preceding the meeting, be sent to the persons entitled to receive notices of general meetings in the manner in which notices are to be given hereunder.

86. The directors shall in all respect comply with the provisions of sections 220 to 227.

87. Auditors shall be appointed and their duties regulated in accordance with sections 246 to 249.

NOTICES

88. (1) A notice may be given by the company to any member to his registered address or if he has no registered address in Pakistan to the address, if any, supplied by him to the company

for the giving of notices to him against an acknowledgement or by post or courier service or through electronic means or in any other manner as may be specified by the Commission.

(2) Where a notice is sent by post, service of the notice shall be deemed to be effected by properly addressing, prepaying and posting a letter containing the notice and, unless the contrary is proved, to have been effected at the time at which the letter will be delivered in the ordinary course of post.

89. A notice may be given by the company to the joint-holders of a share by giving the notice to the joint-holder named first in the register in respect of the share.

90. A notice may be given by the company to the person entitled to a share in consequence of the death or insolvency of a member in the manner provided under regulation 85 addressed to them by name, or by the title or representatives of the deceased, or assignees of the insolvent, or by any like description, at the address, supplied for the purpose by the person claiming to be so entitled.

91. Notice of every general meeting shall be given in the manner hereinbefore authorised to (a) every member of the company and also to (b) every person entitled to a share in consequence of the death or insolvency of a member, who but for his death or insolvency would be entitled to receive notice of the meeting, and (c) to the auditors of the company for the time being and every person who is entitled to receive notice of general meetings.

WINDING UP

92. The company shall follow, in case of its winding up, the relevant provisions of the Act.

INDEMNITY

93. Every officer or agent for the time being of the company may be indemnified out of the assets of the company against any liability incurred by him in defending any proceedings, whether civil or criminal, arising out of his dealings in relation to the affairs of the company, except those brought by the company against him, in which judgment is given in his favour or in which he is acquitted, or in connection with any application under section 492 in which relief is granted to him by the Court.

the several persons whose names and addresses are subscribed below, are desirous of being formed into a company, in pursuance of these articles of association, and we respectively agree to take the number of shares in the capital of the company as set opposite our respective names:

Name and surname (present & former) in full (in Block Letters)	NIC No. (in case of foreigner, Passport No)	Father's/ Husband's Name in full	Nationality (ies) with any former Nationality	Occupation	Usual residential address in full or the registered/ principal office address for a subscriber other than natural person	Number of shares taken by each subscriber (in figures and words)	Signatures
Mohammad Ajmal Bhatti Secretary Energy and Power / ExOfficio Member On Behalf of Government of Punjab	31202-7120014-7	Muhammad Akram Bhatti	Pakistani	Ex-Officio Member Energy & Power Government of Punjab	House # 35-B, Mohalla GOR-3, Shadmaan, Lahore	998 (Nine Hundred Ninety-Eight Shares)	

[illegible]mad [illegible]Anwar [illegible]dhry Secretary Planning and Development / Ex-Officio Member On Behalf of Government of Punjab	35202-4006459-7	Ch Anwar Ali	Pakistani	Ex-Officio Member Planning & Development Government of Punjab	House # 199, Block Ahmed, Mohalla New Garden Town, Lahore	1 (One Share)	
Wasif Khurshid Secretary Finance / ExOfficio Member On Behalf of Government of Punjab	36302-9171740-9	Khurshid Ahmad Anwar	Pakistani	Ex-Officio Member Finance) Government of Punjab (	House # 17-A, Mohalla Golf Road, GOR 1, Lahore	1 (One Share)	
		Total number of shares taken (in figures and words)				One Thousand (1000) Ordinary Shares	

Dated the 30th day of December, 2022

ANNEX-"D" -72-

THE REGULATION OF GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER ACT, 1997

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THE REGULATION OF GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER ACT, 1997

ACT No. XL OF 1997

An Act to provide for the regulation of generation, transmission and distribution of electric power

WHEREAS it is expedient to provide for the regulation of generation, transmission and distribution of electric power and matters connected therewith and incidental thereto;

[1][AND WHEREAS it is expedient to ensure the elimination of energy poverty in the country to ensure the highest standards of transparent, certain and effective regulation of the electric power markets of the Islamic Republic of Pakistan, to provide the legal framework within which a competitive electric power market can develop and sustain, to make special provisions for development of renewable electricity markets in accordance with the international commitments of the Islamic Republic of Pakistan as well as the responsibility of the Islamic Republic of Pakistan to support and encourage measures to effectively mitigate adverse climate change and to effectively manage conflict of interest of the State in relation to development of the electric power markets of the Islamic Republic of Pakistan;]

It is hereby enacted as follows:—

CHAPTER I
GENERAL

1. Short title, extent and commencement.— (1) This Act may be called the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

(2) It extends to the whole of Pakistan.

[2][shall apply to the Federally Administered Tribal Areas.]

[3][shall apply to the Provincially Administered Tribal Areas of the North-West Frontier Province, except the tribal area adjoining Manshera district and the former state of Amb.]

[1][(3) It shall come into force at once, except sections 23A, 23B, 23G and 23H which shall come into force within a period of five years of coming into force of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 or on such earlier date as the Federal Government may, by notification in the official Gazette, appoint.]

2. Definitions.— In this Act, unless there is anything repugnant in the subject or context,

(i) **"Authority"** means the National Electric Power Regulatory Authority established under section 3;

(ii) **"bulk-power consumer"** means a consumer who purchases or receives electric power, at one premises, in an amount of one megawatt or more or in such other amount and voltage level and with such other characteristics as the Authority may [1][specify] and the Authority may [1][specify] different amounts and voltage levels and with such other characteristics for different areas;

[1][(iia) **"captive generating plant"** means a power plant setup by any person to generate electricity primarily for his own use and includes a power plant setup

[1]Added, Subs. and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss. 2-4

[2] This Act shall apply to F.A.T.A. vide SRO. 119(I)/2007, Dated. 7-2-2007

[3]Ins. vide Government of KPK Notification No. SO (FATA)/HD/1-105/06 dated 17.05.2006

by any co-operative society or association of persons for generating electricity primarily for use of members of such co-operative society or association;]

(iii) **"Chairman"** means the Chairman of the Authority;

[1][(iiia) **"consolidated accounts"** means the consolidated revenue requirement of public sector licensees, engaged in supply of electric power to consumers, complied by the uniform tariff applicant, on the basis of individual tariff determined by the Authority of such licensees;]

(iv) **"consumer"** means a person or his successor-in-interest who purchases or receives electric power for consumption and not for delivery or re-sale to others, including a person who owns or occupies a premises where electric power is supplied;

[2][(iva) "**consumer category**" means such category of consumers as may be prescribed;]

(v) **"distribution"** means the ownership, operation, management or control of distribution facilities for the movement or delivery [2][**] to consumers of electric power but shall not include the ownership, operation, management and control of distribution facilities located on private property and used solely to move or deliver electric power to the person owning, operating, managing and controlling those facilities or to tenants thereof shall not constitute distribution;

(vi) **"distribution company"** means a person engaged in the distribution of electric power;

(vii) **"distribution facilities"** means electrical facilities operating at distribution voltage and used for the movement or delivery of electric power;

(viii) **"distribution voltage"** means any voltage below minimum transmission voltage;

(ix) **"electric power"** means electrical energy or the capacity for the production of electrical power;

[2][(x) **"electric power service"** includes the generation, transmission, distribution, supply, sale or trading of electric power and all other services incidental thereto;]

[2][(xa) **"electric power supplier"** means a person who has been granted a licence under this Act to undertake supply of electricity;

(xb) **"electric power trader"** means a person who has been granted a licence under this Act to undertake trading in electricity;]

(xi) **"generation"** means the ownership, operation, management or control of generation facilities for delivery or sale of electric power and not solely for

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[1]Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021 (XIV of 2021), s.2

[2]Ins. Omitted and subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018),s.4

consumption by the person owning, operating, managing, and controlling those facilities;

(xii) **"generation company"** means a person engaged in the generation of electric power;

(xiii) **"generation facility"** means the electrical facility used for the production of electric power;

(xiv) **"inter-connection service"** means the connection of one company's electrical facilities to another company's electrical facilities;

(xv) **"KESC"** means the Karachi Electric Supply Corporation, a public limited company, incorporated under the Companies Act, 1913;

(xvi) **"licence"** means a licence issued [1][* * * * *] under this Act;

(xvii) **"licensee"** means a holder of a licence;

[1][(xviia) **"market operator"** means a person responsible for organization and administration of trade in electricity and payment settlements among generators, licensees and consumers;]

(xviii) **"member"** means a member of the Authority including the Chairman [1][or a member of the Appellate Tribunal where the context so requires];

(xix) **"minimum transmission voltage"** means sixty-six kilovolts or such other voltage that the Authority may determine to be the minimum voltage at which electrical facilities are operated when used to deliver electric power in bulk;

[1][(xixa) **"national electricity policy"** means a policy approved by the Council of Common Interests and made under section 14A;

(xixb) **"national electricity plan"** means the plan made under section 14A;]

(xx) **"national grid company"** means the person engaged in the transmission of electric power and granted a licence under section 17;

[1][(xxa) **"Pakhtunkhwa Energy Development Organization"** or **"PEDO"** means the Pakhtunkhwa Energy Development Organization established under the Pakhtunkhwa Energy Development Organization Act, 1993 (Khyber Pakhtunkhwa Act No. I of 1993);]

(xxi) **"person"** shall include an association of persons, concern, company, firm or undertaking [2][,authority, or body corporate set up or controlled by the Federal Government or, as the case may be, the Provincial Government];

(xxii) **"prescribed"** means prescribed by rules made under this Act;

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[1]Omitted, Ins. and Added by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s.4

[2]Added by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2011(XVIII of 2011), s.2

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[1][(xxiia) **"provincial grid company"** means the person engaged in transmission of electric power and licensed under section 18A;]

(xxiii) **"public sector project"** means generation, transmission or distribution facilities constructed, owned, managed or controlled by the Federal Government, a Provincial Government, a local authority or any body owned or controlled by any such Government or authority;

(xxiv) **"regulations"** means regulations made under this Act;

[1][(xxiva) **"renewable electricity"** means electricity derived from—

(a) a wind, solar, renewable, biomass, ocean (including tidal, wave, current and thermal), geothermal or hydroelectric source; or

(b) hydrogen derived from renewable biomass or water using an energy source described in clause (a);

(xxivb) **"service territory"** means the area specified in a licence within which the licensee is authorized to conduct business;]

[1][(xxv) * * * * * * *]

[1][(xxva) **"specified"** means specified by regulations made under this Act;

(xxvb) **"system operator"** means a person licensed under this Act to administer system operation and dispatch;]

(xxvi) **"transmission"** means the ownership, operation, management or control of transmission facilities;

(xxvii) **"transmission facilities"** means electrical transmission facilities including electrical circuits, transformers and sub-stations operating at or above the minimum transmission voltage but shall not include—

(a) electrical circuits forming the immediate connection between generation facilities and the transmission grid to the extent that those circuits are owned by a generation company and are directly associated with that company's generation facilities;

(b) specified facilities operating at or above the minimum transmission voltage which the Authority, upon an application by a licensee under section 20, determines that such facilities shall be owned and operated by a distribution licensee;

[2][(xxviia) **"uniform tariff applicant"** means any entity designated by the concerned Minister in Charge for the purposes of filling uniform tariff application based on consolidated accounts; and

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[1] Ins. and Omitted by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s.4

[2]Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act,2021 (XIV of 2021), s.2

(xxviib) **"uniform tariff application"** means an application filed by the uniform tariff applicant for the purposes of determination, modification and revision of the uniform tariff;]

(xxviii) **"WAPDA"** means the Pakistan Water and Power Development Authority established under the Pakistan Water and Power Development Authority Act, 1958 (W.P. Act XXXI of 1958).

CHAPTER II

ESTABLISHMENT OF AUTHORITY

3. Establishment of the Authority.— [1][(1)As soon as may be, after the commencement of this Act, the Federal Government shall, by notification in the official Gazette, establish an Authority to be known as the National Electric Power Regulatory Authority which shall be a body corporate, having perpetual succession and a common seal with powers, subject to the provisions of this Act, to acquire and hold property, both moveable and immovable, and to sue and be sued by its name.]

[1][(2) The Authority shall consist of a Chairman and four specialized members, to be appointed by the Federal Government and shall comprise of,—

(a) the member tariff and finance who shall be a person holding a degree in the field of economics, corporate finance or chartered accountancy and is a professional of known integrity and eminence with a minimum of twelve years of related experience in the field of corporate finance or chartered accountancy and shall be nominated by the Provinces or Federal Government, as the case may be, by rotation in the following order, namely:—

(i) the member representing the province of Balochistan;

(ii) the member representing the province of Punjab;

(iii) the member representing the province of Khyber Pakhtunkhwa; and

(iv) the member representing the province of Sindh;

(b) the member technical shall be a person holding an engineering degree in the fields of electricity, energy or power and is a professional of known integrity and eminence with a minimum of twelve years of related experience in the field of electrical and power services business and shall be nominated by the Provinces or Federal Government, as the case may be, by rotation in the following order, namely:—

(i) the member representing the province of Sindh;

(ii) the member representing the province of Khyber Pakhtunkhwa;

(iii) the member representing the provinces of Punjab; and

(iv) the member representing the province of Balochistan;

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[1] Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021 (LIV of 2021), s.2

(c) the member law who shall be a person holding a degree in the field of corporate and economics law and is a professional of known integrity and eminence with a minimum of twelve years of related experience in the field of corporate law and economics law and shall be nominated by the Provinces or Federal Government, as the case may be, by rotation in the following order, namely,—

(i) the member representing the province of Punjab;

(ii) the member representing the province of Sindh;

(iii) the member representing the province of Balochistan; and

(iv) the member representing the province of Khyber Pakhtunkhwa; and

(d) the member development who shall be a person holding a degree in the field of economics, chartered accountancy or an engineering in electricity, energy or power and is a professional of known integrity and eminence with a minimum of twelve years of related experience in the field of public policy, renewable energy or electric power services business and shall be nominated by the Provinces or Federal Government, as the case may be, by rotation in the following order, namely:—

(i) the member representing the provmce of Khyber Pakhtunkhwa;

(ii) the member representing the province of Balochistan;

(iii) the member representing the province of Sindh; and

(iv) the member representing the province of Punjab.]

[1][(3) The Chairman shall be a person known for his integrity and eminence having experience of not less than twelve years in any relevant field including law, business, engineering, finance, [2][chartered accountancy] or economics preferably in the electric power services business.]

[2][(4) Every member of the Authority shall be appointed for a period of three years on such terms and conditions as may be prescribed.]

[1][(4A) The Authority as a whole shall comprise the requisite range of skills, competence, knowledge and experience relevant to its functions.]

(5) The Chairman [2][***] shall, unless he resigns or is removed from office earlier as hereinafter provided, hold office for a term of four years and shall be eligible for re-appointment for similar term:

[2][Provided that the Chairman or a member shall not be appointed under sub-section (2) if he has attained the age of sixty years;]

[2][Provided further that the process of appointment of new Chairman or member under sub-section (2) shall be finalized ninety days prior to the retirement of incumbent Chairman or member as the case may be.]

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[1] Subs.and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s.5

[2] Subs. and Omitted by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021(LIV of 2021), s.2

[1][Provided also that the process of appointment shall be finalized within ninety days in case of vacancy created due to the death, resignation or removal of the Chairman or member. The Federal Government shall appoint a member to work as an acting Chainman till the appointment of new Chairman within the prescribed time period.]

(6) No act or proceeding of the Authority shall be invalid by reason only of the existence of a vacancy in, or defect in, the constitution of the Authority.

(7) The principal office of the Authority shall be in Islamabad and it may set-up offices at such place or places as it may deem appropriate.

4. Resignation and removal of Chairman, etc.—(1) The Chairman, or a member may, by writing under his hand, resign from his office.

(2) The Chairman or a member may be removed by the Federal Government from his office if, on an inquiry by the Federal Public Service Commission, he is found incapable of performing the functions of his office by reason of mental or physical incapacity or has been found guilty of misconduct [2][or fails to disclose a conflict of interest as provided for under this Act].

5. Meetings of the Authority, etc.—[2][(1) Subject to the provisions of this Act, the Authority shall, in performance of its functions and exercise of its powers, conduct its proceedings in accordance with regulations made under this Act.]

[1][(2) The Chairman and two other members shall constitute a quorum for a meeting of the Authority requiring a decision by the Authority:

Provided that the members of the Authority shall nominate a member amongst themselves to work as an acting Chairman in case of absence of the Chairman, as the case may be, for meeting of the Authority.]

(3) The member shall have reasonable notice of the time and place of the meeting and the matters on which a decision by the Authority shall be taken in such meeting.

(4) The decision of the Authority shall be taken by the majority of its members present, and in case of a tie, the person presiding the meeting shall have a casting vote.

6. Decisions of the Authority.— All orders, determinations and decisions of the Authority shall be taken in writing and shall identify the determination of the Chairman and each member.

7. Powers and functions of the Authority.—(1) The Authority shall be exclusively responsible for regulating the provision of electric power services.

(2) In particular and without prejudice to the generality of the foregoing power, only the Authority, but subject to the provisions of sub-section (4), shall—

[2][(a) grant licences under this Act;]

[2][(aa) specify procedures and standards for registration of persons providing electric power services;

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[1]Ins. and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021(LIV of 2021). ss.2-3

[2]Added, Subs. and Ins.by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018),ss.6-8

(ab) aid and advise the Federal Government, in formulation of national electricity plan;

(ac) ensure efficient tariff structures and market design for sufficient liquidity in power markets;]

[1][(b) specify procedures and standards for investment programmes by generation companies and persons licensed or registered under this Act;

(c) specify and enforce performance standards for generation companies and persons licensed or registered under this Act;

(d) specify accounting standards and establish a uniform system of account by generation companies and persons licensed or registered under this Act;]

(e) [1][specify] fees including fees for grant of licences and renewal thereof;

[1][(f) * * * * * * * *]

[2][(g) review its orders, decisions or determinations;

[1][(h) settle disputes between licensees in accordance with the specified procedure;]

2[(i) issue guidelines and standards operating procedures;] [1][*]

[1][(ia) promote development of a market, including trading, in accordance with the national electricity policy and the national electricity plan; and]

2[(j) perform any other function which is incidental consequential to any of the aforesaid functions.]

(3) Notwithstanding the provisions of sub-section (2) and without prejudice to the generality of the power conferred by sub-section (1) the Authority shall—

(a) determine tariff, rates, charges and other terms and conditions for supply of electric power services by the generation, transmission and distribution companies and recommend to the Federal Government for notification;

(b) review organizational affairs of generation [1][* * *] companies [1][and persons licensed or registered under this Act] to avoid any adverse effect on the operation of electric power services and for continuous and efficient supply of such services;

(c) encourage uniform industry standards and code of conduct for generation [1][* * *] companies [1][and persons licensed or registered under this Act];

(d) tender advice to public sector projects;

(e) submit reports to the Federal Government in respect of activities of generation [1][* * *] companies [and persons licensed or registered under this Act]; and

(f) perform any other function which is incidental or consequential to any of the aforesaid functions.

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[1]Subs., Omitted and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018(XII of 2018),s.8

[2]Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2011 (XVIII of 2011), s.4

(4) Notwithstanding anything contained in this Act, the Government of a Province may construct power houses and grid stations and lay transmission lines for use within the Province and determine the tariff for distribution of electricity within the Province [1][and such tariff shall not be called into question by the Authority].

(5) Before approving the tariff for the supply of electric power by generation companies using hydro-electric plants, the Authority shall consider the recommendations of the Government of the Province in which such generation facility is located.

[1][(6) In performing its functions under this Act, the Authority shall protect interests of consumers and companies providing electric power services in accordance with the principles of transparency and impartiality.]

[1][**8. Remuneration of Chairman and members**.—(1) The Chairman and members of the Authority shall be eligible for such remuneration and allowances as the Authority may, with approval of the Federal Government, determine.

(2) The remuneration and allowances of the Chairman and members shall account for—

(a) the specialised nature of work to be performed by the Authority;

(b) the need to ensure the financial self-sufficiency of the Chairman and members; and

(c) the salaries paid in the private sector to individuals with equivalent responsibilities, expertise and skills.]

[1][**8A. Disclosure of interest by members of the Authority.**—(1) For the purpose of this and the following section, a person shall be deemed to have an interest in a matter if he has any direct or indirect financial interest, or has any connection with any company connected with the provision of electric power services in such manner which could reasonably be regarded as giving rise to a conflict between his duty to honestly perform his functions under this Act and such interest, so that his ability to consider and decide any question impartially or to give any advice without bias, may reasonably be regarded as impaired.

(2) A member of the Authority having any interest in any matter to be discussed or decided by the Authority or any of its committees shall, prior to any discussion of the matter, disclose in writing to the Authority, the fact of his interest and the nature thereof.

(3) A disclosure of interest under sub-section (2) shall be recorded in minutes of the Authority prior to any discussion of or decision on the matter and after disclosure the member of the Authority who has made the disclosure—

(a) shall not, except as provided in sub-sections (7) to (10), take part or be present in any deliberation or decision of the Authority; and

(b) shall be disregarded for the purpose of constitution of a quorum of the Authority.

[1]Ins. and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.8-10

(4) The member of the Authority who fails to disclose his interest as required by this section shall be guilty of an offence and shall on conviction be liable to imprisonment for a term which may extend to one year, or a fine not exceeding ten million rupees, or with both.

(5) It shall be a valid defence for a person charged with an offence under sub-section (4), if he proves that he was not aware of the facts constituting the offence and that he exercised due care and diligence in discovering those facts which he ought reasonably to have known in the circumstances.

(6) Upon being appointed, a member of the Authority shall give written notice to the Federal Government of all direct or indirect pecuniary interests that he has acquired or acquires in a body corporate carrying on a business in the Islamic Republic of Pakistan. The nature of such interests and the particulars and any changes thereof shall be disclosed in the report of the Authority made under clause (a) of sub-section (1) of section 42.

(7) If the Chairman becomes aware that a member of the Authority has the interest, he shall—

(a) if he considers that the member of the Authority should not take part or continue to take part, as the case may require, in determining the matter, direct the member of the Authority accordingly, or

(b) in any other case, cause the member of the Authority's interest to be disclosed to the persons concerned in the matter, including any person whose application is pending decision or adjudication by the Authority.

(8) The member in respect of whom a direction has been given under clause (a) of sub-section (7) shall comply with the direction.

(9) The Chairman of the Authority shall disclose his interest to the persons concerned in the matter including any person whose application is pending decision or adjudication by the Authority.

(10) Subject to sub-section (7), the Chairman or the member who has any interest in any matter referred to in this section shall not take part or continue to take part, as the case may require, in determining the matter unless everyone concerned in it consents to the Chairman or, as the case may be, the member so taking part.

8B. Notification of interest by others.— (1) Where a person who, in the course of—

(a) performing a function or exercising a power, as a delegate of the Authority;

(b) performing functions or service as an employee; or

(c) performing a function or services in any capacity by way of assisting or advising the Authority or any of its committees or any delegate of the Authority,

is required to consider a matter in which he has an interest, such person shall forthwith give to the Authority a written notice stating that he is required to consider the matter and has an interest in it and setting out particulars of the interest.

(2) The person referred to in sub-section (1) shall also declare his interest in accordance with the said sub-section whenever it is necessary to avoid a conflict of interest.

(3) Any person referred to in sub-section (1) who fails to disclose his interest as required by this section shall be guilty of an offence and shall on conviction be liable to imprisonment for a term which may extend to one year, or a fine not exceeding ten million rupees, or with both.

(4) It shall be a valid defence for a person charged with an offence under sub-section (3), if he proves that he was not aware of the facts constituting the offence and that he exercised due care and diligence in discovering those facts which he ought reasonably to have known in the circumstances.]

9. Chairman, etc. to be public servant.— The Chairman, members, staff, experts, consultants, advisors and other employees of the Authority, when acting or purporting to act in pursuance of any of the provisions of this Act or the rules and regulations, shall be deemed to be public servants within the meaning of section 21 of the Pakistan Penal Code, 1860 (Act XLV of 1860).

10. Staff and advisers, etc.—(1) To carry out the purposes of this Act, the Authority may, from time to time, employ officers, members of its staff, experts, consultants, advisers and other employees on such terms and conditions as it may deem fit.

(2) All officers, members of staff, experts, consultants, advisers and other employees employed by the Authority shall not be deemed to be civil servants within the meaning of the Civil Servants Act, 1973 (LXXI of 1973).

[1][**10A. Indemnity.**— No suit, prosecution or other legal proceedings shall lie against the Chairman, members, officers or any employee of the Authority for anything done in good faith or intended to be done in pursuance of this Act or any rules or regulations made thereunder.]

11. Tribunals.— The Authority may, from amongst its professional staff, establish [1][*] tribunals for resolving contractual disputes between licensees or such other matters as the Authority may assign.

12. Delegation.— The Authority may delegate to the Chairman, a member or any of its officers or a special tribunal constituted under section 11, all or any of its powers, functions or duties under this Act, except—

(a) the power to grant, reject, amend, vary or revoke licences or any condition thereof;

(b) the power to determine or modify tariffs;

(c) the power to approve, disapprove or modify an investment programme or a power acquisition programme; [1][and]

[1][(d) the power to recommend rules or make or repeal regulations made under this Act.]

[1][(e) * * * * * * *]

[1][CHAPTER IIA

APPELLATE TRIBUNAL]

[1][**12A. Establishment of Appellate Tribunal.**— (1) The Federal Government shall, by notification in the official Gazette, establish an Appellate Tribunal for the purposes of exercising jurisdiction under this Act.

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[1]Ins., Omitted, Added and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018),ss.11-13

(2) The members of the Appellate Tribunal shall be appointed by the Federal Government and shall comprise—

(a) a former judge of a High Court who shall be the Chairman, for a single term of four years on such terms and conditions as may be prescribed and shall be nominated by the Provinces or Federal Government, as the case may be, by rotation in the following order, namely:—

(i) the member representing the Federal Government;

(ii) the member representing the Province of the Punjab;

(iii) the member representing the Province of Khyber Pakhtunkhwa;

(iv) the member representing the Province of Sindh; and

(v) the member representing the Province of the Balochistan:

Provided that the Chairman of the Appellate Tribunal shall not be appointed if he has attained the age of sixty-five years.

(b) a member finance who shall be a qualified chartered accountant or a qualified cost and management accountant or a qualified chartered financial analyst and shall be nominated by the Provinces or Federal Government, as the case may be, by rotation in the following order, namely:—

(i) the member representing the Province of Sindh;

(ii) the member representing the Province of the Punjab;

(iii) the member representing the Federal Government;

(iv) the member representing the Province of Khyber Pakhtunkhwa; and

(v) the member representing the Province of Balochistan;

(c) a member electricity, who shall be a member of the Pakistan Engineering Council, with a specialization in electrical engineering and shall be nominated by the Provinces or the Federal Government, as the case may be, by rotation in the following order, namely:—

(i) the member representing the Province of Balochistan;

(ii) the member representing the Province of Khyber Pakhtunkhwa;

(iii) the member representing the Federal Government;

(iv) the member representing the Province of the Punjab; and

(v) the member representing the Province of Sindh.

[1]Ins. and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.13-14

(3) The member finance and member electricity of the Appellate Tribunal shall be appointed for a period of three years on such terms and conditions as may be prescribed:

Provided that no person who has attained the age of sixty years shall be appointed as member finance and member electricity:

Provided further that no person shall be eligible to be the member finance or member electricity, if in case of being a civil servant, they hold a position which is less than BPS-21 or equivalent.

(4) No person shall be appointed as member of the Appellate Tribunal unless he is a citizen of Pakistan and such member shall be employed on full-time basis.

12B. Qualifications and eligibility.— No person shall be appointed as member of the Appellate Tribunal unless he—

(a) has at least a masters or professional degree or qualification from an accredited university;

(b) has at least fifteen years of professional work experience;

(c) has no past record of criminal conviction, other than for minor offences; and

(d) has no past record of any specific activities or conduct that could reasonably call into question his ability to discharge his duties as a member of the Appellate Tribunal with honesty, integrity, reliability, competence and objectivity.

12C. Disqualifications.— No person shall be appointed or continue as member or an employee of the Appellate Tribunal, if such person—

(a) has been convicted of an offence involving moral turpitude;

(b) has been or is declared insolvent; or

(c) is incapable of discharging his duties by reasons of physical or mental unfitness and has been so declared by a duly constituted medical board appointed by the Federal Government.

12D. Automatic disqualification.— If a member of the Appellate Tribunal remains absent from his position or otherwise fails to undertake his duties for any reason whatsoever for a period of three months it shall be a ground for automatic disqualification of such member.

12E. Decisions, determinations and quorum.—(1) Decisions and determinations of the Appellate Tribunal shall be taken by majority.

(2) If there are less than three members of the Appellate Tribunal, the presence of two members serving shall constitute a quorum:

Provided that in the case of a quorum of two, the decision shall be taken by consensus.

(3) Any decision or determination taken at a meeting where a quorum is present shall constitute a valid and enforceable decision or determination of the Appellate Tribunal.

12F. Vacancy in the Appellate Tribunal.—(1) If position of a member becomes vacant, the Federal Government shall designate a new member and where the vacancy arises in the position of the Chairman, the Federal Government shall appoint one of the existing members to serve as Acting Chairman:

Provided that no person shall serve as Acting Chairman for more than a period of three months:

Provided further that the Federal Government shall fill a vacancy in the Appellate Tribunal within a period of three months from the date such vacancy occurs.

(2) The absence of the Chairman or the temporary incapacity of the Chairman shall not affect the other members' ability to act as the Appellate Tribunal and to exercise its powers and authority under this Act.

12G. Appellate procedures.—(1) Any person aggrieved by a decision or order of the Authority or a single member thereof or a Tribunal established under section 11 may, within thirty days of the decision or order, prefer an appeal to the Appellate Tribunal in the prescribed manner and the Appellate Tribunal shall decide such appeal within three months after filing of the appeal.

(2) In examining an appeal under sub-section (1), the Appellate Tribunal may make such further inquiry as it may consider necessary and after giving the Authority or the Tribunal and an appellant an opportunity of being heard, pass such order as it thinks fit, confirming, altering or annulling a decision or order appealed against:

Provided that if the decision under appeal is a determination of tariff by the Authority, then the Appellate Tribunal may in case of disagreement with the determination of the Authority, remand the matter back to the Authority with relevant guidelines, which shall be duly considered by the Authority which shall be bound to review its determination within one month of the receipt of such guidelines from the Appellate Tribunal.

(3) The decision of the Appellate Tribunal shall be in writing, detailing the issues raised in the appeal and the arguments adopted by the appellant and the Authority or Tribunal, as the case may be. The Appellate Tribunal shall also provide reasons for reaching its decision with reference to the provisions of this Act and the facts of the case.

(4) The Appellate Tribunal shall provide copies of its decision to all the appellants and the respondents including the Authority or Tribunal, as the case may be, not later than five days from the date of rendering its decision.

(5) A decision or order of the Authority or Tribunal, as the case may be, shall be given full force and effect during the pendency of any appeal of such determination.

(6) The decision of the Appellate Tribunal shall be appealable before the High Court having territorial jurisdiction.

12H. Disclosure of interest. —The following shall apply to members of the Appellate Tribunal including the Chairman, namely:—

(a) a member of the Appellate Tribunal shall be deemed to have an interest in a matter if he has any interest, pecuniary or otherwise, in such matter which could reasonably be regarded as giving rise to a conflict between his duty to honestly perform his functions, so that his ability to consider and decide any question

impartially or to give any advice without bias, may reasonably be regarded as impaired;

(b) a member of the Appellate Tribunal having any interest in any matter to be discussed or decided by the Appellate Tribunal shall disclose in writing to the Secretary to the Appellate Tribunal, the fact of his interest and the nature thereof;

(c) a member of the Appellate Tribunal shall give written notice to the Secretary to the Appellate Tribunal of all direct or indirect pecuniary or other material or personal interests that he has or acquires in a body corporate involved in a matter before the Appellate Tribunal; and

(d) a disclosure of interest under clause (a) shall be made a part of the record of the Appellate Tribunal in that particular matter.

12I. Powers of the Appellate Tribunal.—(1) The Appellate Tribunal shall, for the purpose of deciding an appeal, be deemed to be a civil court and shall have the same powers as are vested in such court under the Code of Civil Procedure, 1908 (Act V of 1908), including the powers of—

(a) enforcing attendance of any person and examining him on oath;

(b) compelling production of documents; and

(c) issuing commissions for examination of witnesses and documents.

(2) The Appellate Tribunal may call for and examine any record, information or documents from any person in relation to the matter under appeal before it for the purposes of enabling it to come to a decision.

12J. Panel of experts.— The Appellate Tribunal may maintain a panel of national and international experts in power sector to assist it in performance of its functions under this Act as and when deemed fit by the Appellate Tribunal.

12K. Budget.— The Appellate Tribunal shall have an independent budget which shall comprise—

(a) an initial grant from the Federal Government; and

(b) fees and costs associated with appellate procedures as may be prescribed.]

13. Funds.—(1) The operations of the Authority shall be funded from—

(a) grants from the Federal Government, including an initial grant of one hundred million rupees; and

(b) fees and fines collected [1][* * * * * * *].

[2][(2) Any surplus of receipts over the actual expenditure in a year, after payment of tax, shall be remitted to the Federal Consolidated Fund and any deficit from the actual expenditure shall be made up by the Federal Government.]

14. Accounts.—(1) The Authority shall maintain complete and accurate books of accounts of its actual expenses and receipts.

(2) The Accounts of the Authority shall be audited annually by the Auditor General of Pakistan.

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[1]Omitted by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s. 15

[2]Added vide Finance Act, 2012(XVII of 2012)

[1][CHAPTER IIB

NATIONAL ELECTRICITY POLICY AND PLAN

14A. National electricity policy and plan.—(1) The Federal Government shall, from time to time, with approval of the Council of Common Interests, prepare and prescribe a national electricity policy for development of power markets:

Provided that in development of policies under this section, the Federal Government may seek such input and assistance from the Authority as may be required.

(2) The policies referred to in sub-section (1) shall provide for, *inter alia*,—

(a) development of systems based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy;

(b) development of efficient and liquid power market design;

(c) integration of national and provincial transmission systems;

(d) special provisions for ensuring development of a sustainable renewable energy market with a dedicated and gradually increasing share in electricity power sector; and

(e) any other matter pertaining to development, reform, improvement and sustainability of power sector.

(3) The Federal Government may either on its own motion or on recommendation of a Provincial Government and subject to approval of the Council of Common Interests, review or revise the policies referred to in sub-section (1).

(4) The Federal Government, in consultation with the Provincial Governments, shall prepare a national electricity plan in accordance with the policies prepared and prescribed under sub-section (1) and notify such plan once in five years:

Provided that the Federal Government, while preparing or amending the national electricity plan, shall publish the draft national electricity plan and invite suggestions and objections thereon within thirty days of the notification:

Provided further that a Provincial Government may, if required, propose an amendment to the national electricity plan, which may be adopted with the concurrence of the Provincial Governments and the Federal Government.

(5) The Authority shall perform its functions in accordance with the national electricity policy and the national electricity plan.

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[1]Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s.16

CHAPTER IIC
GENERATION OF ELECTRICITY

14B. Generation.— (1) Subject to sub-section (5), no person shall, except under authority of a licence issued by the Authority under this Act and subject to the conditions specified in this Act and as may be imposed by the Authority, construct, own or operate a generation facility.

(2) An application for grant of a licence for generation facility shall specify—

(a) the type of facility for which the licence is applied;

(b) the location of the generation facility; and

(c) the expected life of the generation facility.

(3) The Authority may, after such enquiry as it may deem appropriate and subject to the conditions specified in this Act and as it may impose, grant a licence authorizing the licensee to construct, own or operate a connected generation facility.

(4) In the case of a generation facility connecting directly or indirectly to the transmission facilities of the national grid company, the licensee shall make the generation facility available to the national grid company for the safe, reliable, non-discriminatory, economic dispatch and operation of the national transmission grid and connected facilities, subject to the compensation fixed by the Authority for voltage support and uneconomic dispatch directed by the national grid company.

(5) The Federal Government may, after consultation with the Authority and by notification in the official Gazette, provide a mechanism for gradual cessation of the generation licences for various classes of generation licence holders, which shall not extend beyond a period of five years from the coming into effect of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 and thereafter, any generation company may establish, operate and maintain a generation facility without obtaining a licence under this Act if it complies with the technical standards relating to connectivity with the grid as may be specified:

Provided that a generation company intending to set up a generating facility shall prepare and submit a detailed scheme covering all financial, geological, hydrological, technical, safety and environmental aspects to the Authority for its concurrence:

Provided further that, while considering the scheme submitted by a generation company intending to set up a hydro-generating facility, the Authority shall consider whether or not in its opinion the proposed river work will prejudice the prospects for the best ultimate development of the river or its tributaries for power generation and are consistent with the requirements of drinking water, irrigation, flood control and other public purposes and shall satisfy itself that necessary approvals have been sought from the concerned authorities of the Federal Government and Provincial Governments.

14C. Captive generation.— (1) Notwithstanding anything contained in this Act, a person may construct, maintain or operate a captive generating plant and dedicated transmission lines:

Provided that the supply of electricity from the captive generating plant through the grid shall be regulated in the same manner as the generating facility of a generating company.

(2) Every person, who has constructed a captive generating plant and maintains and operates such plant, shall have the right to open access for the purposes of carrying electricity from his captive generating plant to the destination of his use:

Provided that such open access shall be subject to availability of adequate transmission facility and such availability of transmission facility shall be determined by the national grid company or the provincial grid company, as the case may be:

Provided further that any dispute regarding the availability of transmission facility shall be adjudicated upon by the Authority.

14D. Duties of generating companies.—(1) Subject to the provisions of this Act, the duties of a generating company shall be to establish, operate and maintain generating stations, tie-lines, sub-stations and dedicated transmission lines connected therewith and within the generation facility, in accordance with the provisions of this Act or the rules or regulations made thereunder.

(2) In the case of a generation facility connecting directly or indirectly to the transmission facilities of the national grid company or a provincial grid company, the generation company shall make the generation facility available for the safe, reliable, non-discriminatory, economic dispatch and operation of the national transmission grid and connected facilities, subject to the compensation fixed by the Authority for voltage support and uneconomic dispatch directed by the system operator.

(3) A generating company may supply electricity to any transmission, distribution, supply or market trader licensee in accordance with this Act and the rules and regulations made thereunder and may, subject to section 23E, supply electricity to any consumer.

(4) Every generating company shall—

(a) submit technical details regarding its generating stations to the Authority; and

(b) co-ordinate with the relevant transmission company, for transmission of the electricity generated by it.]

CHAPTER III
LICENCES [1][AND REGISTRATION]

[1][15* * * * * * *]

16. Transmission licence.— [1][(1) Subject to the conditions laid down in this Act, no person shall engage in the transmission of electric power without obtaining a licence issued by the Authority.

(1A) The eligibility criteria for grant of transmission licence shall be prescribed by the Federal Government and shall include, without limitation—

(a) minimum solvency requirements; and

(b) minimum technical and human resource requirements.]

(2) An application for licence for transmission of electric power shall specify—

(i) the type of service for which the licence is being sought; [1][*]

(ii) the territory with location maps and plans to which electric power shall be transmitted [1][;and]

[1][(iii) any other information as may be specified.]

17. National Grid Company.— [1][(1) The Authority may, subject to the provisions of this Act and after such enquiry as it may deem appropriate, grant a licence authorizing the licensee to engage in the transmission of electric power subject to such conditions as it may impose:

Provided that only one such licence shall be granted at any one time.]

(2) The licensee referred to in sub-section (1) shall have exclusive right to provide transmission service in the [1][service] territory specified in such licence [1][* * * * * *].

[1][(3) The eligibility criteria for grant of licence as a national grid company shall be prescribed and shall include, without limitation,—

(a) minimum solvency requirements; and

(b) minimum technical and human resource requirements.]

18. Responsibilities of National Grid Company.—(1) The national grid company shall be responsible to operate and provide safe, reliable transmission and inter-connection services on a non-discriminatory basis, including to a bulk-power consumer who proposes to become directly connected to its facilities.

(2) Without prejudice to the foregoing responsibilities, the national grid company shall—

(a) make available to the general public the tariffs specifying the Authority's approved rates, charges and other terms and conditions for transmission and inter-connection services;

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[1]Added, Omitted, Subs. and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018),ss.17-20

(b) not levy any rate or charge or impose any condition for the transmission of electric power which has not been approved by the Authority as a tariff;

(c) not cause a division or any associated undertaking to engage in generation and distribution :

Provided that this clause shall not apply to the KESC and WAPDA so long as their electric systems remain integrated; [1][*]

(d) develop, maintain and publicly make available, with the prior approval of the Authority, an investment programme for satisfying its service obligations and acquiring and selling its assets [1][;and]

[1][(e) perform functions of a system operator.]

[1][**18A. Provincial grid company.**—(1) The Authority may, subject to the provisions of this Act and after such enquiry as it may deem appropriate, grant a licence authorizing a company owned by a Provincial Government to engage in transmission of electric power within territorial limits of such Province, subject to such conditions as it may impose:

Provided that only one such licence shall be granted for each Province at any one time.

(2) The eligibility criteria for grant of license as a provincial grid company shall be prescribed and shall include, without limitation,—

(a) minimum solvency requirements; and

(b) minimum technical and human resource requirements.

18B. Responsibilities of provincial grid company.—(1) The provincial grid company shall be responsible to operate and provide safe and reliable transmission services on a non-discriminatory basis, including to a bulk-power consumer who proposes to become directly connected to its facilities.

(2) Without prejudice to the foregoing responsibilities, the provincial grid company shall—

(a) provide transmission and inter-connection services to the national grid company and to others, wherever necessary, at such rates, charges and terms and conditions as the Authority may determine;

(b) purchase inter-connection service from the national grid company as may be necessary and to connect its facilities to the national transmission grid at the rates, charges and terms and conditions determined by the Authority;

(c) follow the performance standards laid down by the Authority for transmission of electric power, including safety, health and environmental protection instructions issued by the Authority or any governmental agency;

(d) make available to general public the tariff specifying the Authority's approved rates, charges and other terms and conditions for transmission services;

(e) not levy any rate or charge or impose any condition for transmission of electric power which has not been approved by the Authority as a tariff;

[1]Omitted, Added and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.21-22

(f) not cause a division or any associated undertaking to engage in generation and distribution; and

(g) develop, maintain and publicly make available, with prior approval of the Authority, an investment program for satisfying its service obligations and acquiring and selling its assets.]

19. Special purpose transmission licence.— Notwithstanding anything contained in section 17, the Authority may, in the public interest, grant a licence authorising the licensee to engage in the construction, ownership maintenance and operation of specified transmission facilities on the conditions that the licensee shall—

(a) provide transmission and inter-connection services to the national grid company and to others, wherever necessary, at such rates, charges and terms and conditions as the Authority may determine ;

(b) purchase inter-connection service from the national grid company as may be necessary and to connect its facilities to the national transmission grid at the rates, charges and terms and conditions determined by the Authority ;

(c) make its transmission facilities available for operation by the national grid company consistent with applicable instructions established by such company;

(d) follow the performance standards laid down by the Authority for transmission of electric power, including safety, health and environmental protection instructions issued by the Authority or any Governmental agency;

(e) make public the tariff specifying the rates, charges and other terms and conditions of service for transmission and inter-connection services determined by the Authority; and

(f) maintain accounts in accordance with the manner and procedure [1][specified] by the Authority.

20. Distribution licences.— (1) No person shall, except under the authority of a licence issued by the Authority under this Act and subject to the conditions specified [1][* * * * * * *], engage in the distribution of electric power.

[1][(1A) The eligibility criteria for grant of distribution licence shall be prescribed and shall include, without limitation,—

(a) minimum solvency requirements; and

(b) minimum technical and human resource requirement.]

(2) An application for a licence for distribution of electric power shall specify—

(i) the type of service for which licence is being sought;

(ii) the territory in which the electric power shall be distributed ; and

(iii) the source and scope of electric power and rates paid by it.

[1]Subs., Omitted and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.23-24

21. Duties and responsibilities of distribution licensees.—(1) The Authority may, after such enquiry as it may deem appropriate and subject to the conditions specified [1][* * * * * * *], grant a licence for distribution of electric power.

(2) The licensee shall—

(a) possess the [1][*] right to provide, for such period as may be specified in the licence, distribution service [1][* * * * * * *] in the [1][service territory] specified in the licence; and to frame schemes in respect of that [1][service territory]:

Provided that a generation company may make sales of electric power to bulk-power consumers [1][* * * * * * *];

(b) be responsible to provide distribution service [1][* * * * * *] within its [1][service] territory on a non-discriminatory basis to all the consumers who meet the eligibility criteria laid down by the Authority:

[1][* * * * * * *]

(c) publicly make available tariff specifying the Authority's approved rates, charges and other terms and conditions for distribution services [1][* * * * *];

[1][(d) establish, within three months of the issue of its licence for distribution of electric power and make available to public, the manner and procedure for obtaining its service;]

[1][(e) make its transmission facilities available for operation by any other licensee, consistent with applicable instructions established by the system operator;]

(f) follow the performance standards laid down by the Authority for distribution and transmission of electric power, including safety, health and environmental protection instructions issued by the Authority or any Government agency [1][or Provincial Government];

(g) maintain accounts in accordance with the manner and procedure laid down by the Authority; and

(h) develop, maintain and publicly make available, with the prior approval of the Authority, an investment programme for satisfying its service obligations and acquiring and selling its assets.

22. Sale to bulk power consumers.— [1][(1) Notwithstanding anything contained in section 21, the Authority may permit sale of electric power to bulk power consumers located in service territory of the holder of a license under this Act.]

(2) Where a bulk power consumer intends to stop purchase of electric power from a distribution company, it shall convey its intention by notice in writing [1][one year] before such stoppage [1][.]

[1][* * * * * * *]

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[1]Omitted, Subs. & Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.25-26

23. Sale of electric power to other distribution companies.— A distribution company may sell electric power to other distribution companies and distribute electric power sold by generation companies to other distribution companies [1][* * * * * * *] in accordance with the rates, charges and other terms and conditions of service for such sales as approved by the Authority.

[1][**23A. Market operator licence.**—(1) No person shall, unless licensed by the Authority under this Act and subject to the prescribed conditions, act as a market operator:

Provided that any person acting as a market operator on commencement of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018, shall within a period of one year apply for a licence under this Act:

Provided further that only one market operator licence shall be granted at one time.

(2) The eligibility criteria for grant of licence as a market operator shall be prescribed by the Federal Government and shall include, without limitation,—

(a) minimum solvency requirements;

(b) minimum technical and human resource requirements; and

(c) public service obligations of the licensee including quality of service, transparency of transactions, timely collection and dissemination of payments, effective collection and dissemination of any and all taxes and surcharges as may be imposed by the Federal Government, etc.

(3) A person eligible for a licence to be licensed as a market operator may make an application to the Authority in such form and manner and on such conditions as may be specified.

(4) An application for licence under sub-section (3) shall be accompanied by a draft commercial code governing the form and manner in which the market operator shall undertake its licensed activities.

(5) The Authority may require an applicant under sub-section (3) to provide such further information as it considers necessary in relation to the application, in such form or verified in such manner as the Authority may direct.

23B. Duties and responsibilities of a market operator.— (1) A market operator may, from time to time and subject to approval by the Authority, make such commercial code as may be required to enable it to perform its functions as a market operator.

(2) A market operator shall regulate its operations, standards of practice and business conduct of market participants and their representatives in accordance with its commercial code, policies and procedures as approved by the Authority.

(3) The Authority may, if requited in the public interest, direct a market operator to make such commercial code or amend its existing regulations as it may specify in writing:

Provided that if the market operator does not comply with the direction of the Authority within a period of thirty days without providing just cause for such non-compliance to the Authority, the commercial code of the market operator shall be deemed to have been made or amended, as the case may be, and shall take effect accordingly.

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[1]Omitted and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.27-28

23C. Electric power trader licence.—(1) No person shall, unless licensed by the Authority under this Act, engage in trading of electric power.

(2) The eligibility criteria for grant of licence for trading of electric power shall be prescribed and include, amongst others,—

(a) minimum solvency requirements;

(b) minimum technical and human resource requirements; and

(c) public service obligations of the licensee including quality of service, transparency of transactions, timely collection and dissemination of payments, effective collection and dissemination of any and all taxes and surcharges as may be imposed by the Federal Government, etc.

(3) An application for a licence under sub-section (1) shall specify—

(a) the type of service for which the licence is being sought;

(b) the mode and manner in which the service is proposed to be provided; and

(c) any other information as may be specified.

23D. Duties and responsibilities of electric power trader.— (1) The Authority may, after such enquiry as it may deem appropriate and subject to the conditions specified, grant a licence for trading of electric power.

(2) The licensee shall—

(a) possess a right to trade in electric power subject to the conditions of licence;

(b) be responsible to carry out trade bilaterally between the parties by entering into appropriate contracts containing necessary safeguards with regard to supply of electricity through trading;

(c) ensure that appropriate meters are in place for the purpose of energy accounting and comply with the specifications as specified by the Authority;

(d) have requisite agreements with transmission licensees and distribution licensees for transmission or wheeling of electricity, as the case may be;

(e) declare to the Authority its maximum trading monthly volume and five-year trading plan;

(f) comply with any direction issued by the system operator;

(g) publicly make available the Authority's approved applicable rates, charges and other terms and conditions for power sales to consumers;

(h) maintain accounts in accordance with the manner and procedure laid down by the Authority; and

(i) any other obligations as may be imposed by the Authority.

23E. Electric power supply licence.—(1) No person shall, unless licensed by the Authority under this Act, engage in supply of electric power to a consumer:

Provided that the holder of a distribution licence on the date of coming into effect of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 shall be deemed to hold a licence for supply of electric power under this section for a period of five years from such date.

(2) The eligibility criteria for grant of licence to supply electric power shall be prescribed by the Federal Government and shall include, without limitation,—

(a) minimum solvency requirements;

(b) minimum human resource requirements;

(c) provisions with respect to a supplier of the last resort, as the case may be; and

(d) public service obligations of the licensee including quality of service, transparency of transactions, timely collection and dissemination of payments, effective collection and dissemination of any and all taxes and surcharges as may be imposed by the Federal Government, etc.

(3) An application for a licence for supply of electric power shall specify—

(a) the type of service for which the licence is being sought;

(b) the mode and manner in which the service is proposed to be provided; and

(c) any other information as may be specified.

23F. Duties and responsibilities of an electric power supplier.—The Authority may, after such enquiry as it may deem appropriate and subject to the conditions specified, grant a licence for supply of electric power.

(2) The licensee shall—

(a) possess a right to make sales of electric power to consumers in the territory specified in the licence and to frame schemes in respect of that territory;

(b) be responsible to make sales of electric power within its territory on a non-discriminatory basis to all the consumers who meet the eligibility criteria laid down by the Authority:

Provided that—

(i) the licensee may not be required to make sale of electric power to a bulk power consumer who has contracted for electric power supply from another supplier; and

(ii) the licensee may request the concerned distribution licensee to disconnect the provision of electric power to a consumer for default in payment of power charges or to a consumer who is involved in theft of electric power;

(c) publicly make available the Authority's applicable rates, charges and other terms and conditions for power sales to consumers;

(d) establish, within three months of the issue of its licence and make available to the public, instructions specifying—

(i) procedures for obtaining service; and

(ii) the manner and procedure for metering, billing and collection of the licensee's approved charges and disconnection in case of non-payment of charges, electric power theft and use of energy for purposes other than for which it was supplied and procedures for re-connection and recovery of arrears and other charges;

(e) maintain accounts in accordance with the manner and procedure laid down by the Authority; and

(f) develop, maintain and publicly make available, with prior approval of the Authority, an investment program for satisfying its service obligations and acquiring and selling its assets.

[1][(g) ensure timely submission of annual or multiyear petitions and quarterly petitions, as specified by the Authority and to the extent applicable to it, ensure timely submission of all information and data to the uniform tariff applicant so that the uniform tariff application duly supported by consolidated accounts is moved by it within a period of fifteen days of intimation of tariff by the Authority under sub-section 4 of section 31of this Act:

Provided that in the event timely submissions are not made, then the Authority may call for requisite information in terms of section 44 of this Act.]

23G. System operator licence.— (1) No person shall, unless licensed by the Authority under this Act, undertake functions as a system operator as may be specified by the Authority, including but not limited to—

(a) generation scheduling, commitment and dispatch;

(b) transmission scheduling and generation outage coordination;

(c) transmission congestion management;

(d) cross border transmission coordination;

(e) procurement and scheduling of ancillary services and system planning for long term capacity; and

(f) such other activities as may be required for reliable and efficient system operations:

Provided that only one such licence shall be granted at any one time:

Provided further that the national grid company shall be deemed to be a system operator for a period of two years from commencement of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018.

[1]Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021 (XIV of 2021), s.3

(2) The eligibility criteria for grant of licence as a system operator shall be prescribed by the Federal Government and shall include, without limitation,—

(a) minimum technical and human resource requirements; and

(b) public service obligations of the licensee including quality of service and transparency of transactions.

(3) A person eligible for a licence to be licensed as a system operator may make an application to the Authority in such form and manner and on such conditions as may be specified.

(4) An application for licence under sub-section (3) shall be accompanied by a draft grid code governing the form and manner in which the system operator shall undertake its licensed activities.

(5) The Authority may require an applicant under sub-section (3) to provide such further information as it considers necessary in relation to the application, in such form or verified in such manner as the Authority may direct.

23H. Duties and responsibilities of a system operator.— (1) A system operator shall, from time to time and subject to approval by the Authority, make such grid management code as may be required to enable it to carry out its functions as a system operator.

(2) A system operator shall regulate its operations, standards of practice and business conduct in accordance with policies and procedures as approved by the Authority.

(3) The Authority may, if required in the public interest, direct the system operator to make such grid code or amend its existing grid code as it may specify in writing:

Provided that if the system operator does not comply with the directions of the Authority within a period of thirty days without providing just cause for such non-compliance to the Authority, the grid code of the system operator shall be deemed to have been made or amended, as the case may be, and shall take effect accordingly.]

24. Licensees to be companies. Except the WAPDA the [1][PEDO] or any other person specially exempted by the Authority, a [1][* * * * *] licence shall not be granted to any person unless it is a company registered under the Companies Ordinance, 1984(XLVII of 1984).

25. Licences of Territory Served by KESC.—(1) Notwithstanding anything contained in this Act and subject to the provisions of this section, the Authority may grant licences [1][or registration under this Act] [1][* * * * * * *] to one or more licensees [1][or registered persons] for the territory served by the KESC at the time of commencement of this Act.

(2) For a period of six months from the commencement of this Act, the KESC shall be deemed to be a licensee under this Act and, shall during the said period apply for an appropriate licence in accordance with the provisions of this Act.

(3) Where a licence under this section is granted to the KESC, the conditions applicable to a licensee [1][or registered person] under this Act [1][* * * * * * *], shall equally be applicable to the KESC.

[1][**25A. Registration.**— (1) Any person providing electric power services, other than generation under Chapter IIA or an electric power service requiring a licence under this Act, shall be registered with the Authority in the manner and subject to such conditions as may be prescribed.

[1]Subs., Omitted and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.29-31

(2) Without prejudice to the generality of sub-section (1), a person registered under this section shall, at all times,—

(a) maintain the prescribed minimum capital requirement;

(b) maintain adequate facilities to ensure efficient provision of the service it is registered to provide; and

(c) comply with the provisions of this Act and the rules and regulations made hereunder.]

26. Modifications.— If the Authority is of the opinion that it is in the public interest it may, with the consent of the licensee, amend or vary the conditions of any licence issued [1][or registration granted] under this Act and in the absence of licensee's consent, the Authority shall conduct a public hearing on whether the proposed amendment or variance is in the public interest and shall make a determination consistent with the outcome of that hearing.

27. Assignment of licence prohibited.— A licensee [1][or a registered person, as the case may be] shall not, without the prior approval of the Authority, surrender, assign or transfer its licence [1][or registration] to any person.

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[1]Ins. and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss. 32-33

[1][CHAPTER IIIA
ENFORCEMENT

27A. Investigation and proceedings by the Authority.—(1) The Authority may appoint not less than two officers to conduct investigations in respect of any matter that is a violation of this Act, the rules, regulations and codes made thereunder or the conditions of a licence issued or registration granted under this Act, as the case may be.

(2) The Authority, in the notice of appointment of investigation officers under sub-section (1), shall specify—

(a) the reason for initiation of investigation;

(b) the possible violations which are to be investigated; and

(c) the time frame within which the investigation is to be completed:

Provided that a copy of the notice of investigation shall be provided to the persons under investigation, who shall be bound to facilitate the investigation officers in all aspects of the investigation.

(3) When an investigation has been ordered under sub-section (1), an investigating officer may, by notice in writing, require any person to produce before him such books, registers or documents as are in custody or under control of that person.

(4) A person who obstructs or hinders an investigating officer while exercising any of the powers under this section or deliberately fails to produce any such books, registers or documents as are required by the Authority or an investigating officer, shall be liable to—

(a) proceedings under sections 27B and 28, where the Authority is of the view that non-compliance with the investigation would adversely affect the interest of the consumers of the person under investigation and where the person under investigation is a licensee or a registered person; and

(b) imposition of penalty under section 27B, in all other cases.

(5) Any person aggrieved by the conduct of an investigating officer may lodge a complaint in respect thereof to the Authority.

(6) The Authority shall, within fifteen days of receipt of the complaint under sub-section (5), commence a hearing to determine the veracity of such complaint in accordance with the specified procedure.

27B. Penalty for default or contravention.— Any person who acts in contravention of this Act or the rules and regulations made thereunder or fails to comply with the conditions of a licence issued or registration granted to that person and such person is a party to such contravention shall be punishable in case of—

(a) a company, with a minimum fine of ten million Rupees which may extend to two hundred million Rupees and, in the case of a continuing default, with an

[1]Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s. 34

additional fine which may extend to one hundred thousand Rupees for every day during which the contravention continues; and

(b) an individual, with a minimum fine of one million Rupees which may extend to ten million Rupees and, in the case of a continuing default, with an additional fine which may extend to ten thousand Rupees for every day during which the contravention continues:

Provided that a fine shall only be imposed under this section after providing a reasonable opportunity of being heard to the person alleged to be in contravention:

Provided further that where the person is a generation company, a licensee or a person registered under this Act, a penalty imposed under this section shall not be treated as a cost for the purposes of tariff determination by the Authority.

27C. Prohibition order.—(1) The Authority may, after recording reasons in writing, for continuing violations of this Act or the rules or regulations made thereunder—

(a) prohibit a generation company, a licensee or a registered person, from providing electric power services; or

(b) in the case of a generation company, prohibit any or all persons from purchasing electricity from such generation company; or

(c) require a generation company, a licensee or a registered person, to improve the provision of electric power services so as to ensure compliance with this Act and the rules and regulations made thereunder.

(2) The Authority may, either on its own motion or on the application of a generation company, a licensee or a registered person, against whom a prohibition or requirement has been imposed under sub-section (1), rescind or vary such prohibition or requirement if the Authority is satisfied that no violation of this Act or rules or the regulations made thereunder exists to that extent.]

28. Suspension and revocation.—[1][(1) Notwithstanding anything contained in section 27B, the Authority may suspend or revoke any licence issued or registration granted under this Act for consistent failure of the licensee or registered person to comply with the conditions of the licence or registration:

Provided that before taking action under this section, the Authority shall issue a notice to show cause and may provide an opportunity to rectify the omission subject to such conditions as the Authority may specify.]

(2) Where the Authority revokes or suspends a licence [1][or registration], it may undertake all or any of the following actions for continuance of the facilities covered under the licence [1][or registration], namely—

(a) permit the licensee [1][or registered person] to continue operating such facilities under such terms and conditions as the Authority may specify;

[1]Subs. and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s.35

(b) contract with another person to immediately take over the operation of the facilities; or

(c) appoint an administrator to take over the operation of the facilities.

(3) The actions specified in sub-section (2) may continue till a successor licensee [1][or registered person] takes over the charge of the facilities on such terms and conditions as the Authority may determine including payment of compensation for the plant, machinery and other equipment installed at a facility of the licensee [1][or registered person] whose licence [1][or registration] was revoked.

[1][**29.** * * * * * * *]

30. WAPDA and [1][PEDO] to be licensees.—Notwithstanding anything contained in this Act for a period of six months from the commencement of this Act, the WAPDA and the [1][PEDO] shall be deemed to be licensees under this Act, and shall, during the said period, apply for appropriate licences in accordance with the provisions of this Act.

(2) Where a licence under this section is granted to the WAPDA or the [1][PEDO], the conditions applicable to a licensee under this Act for generation, transmission and distribution of electric power, as the case may be, shall equally be applicable to WAPDA or [PEDO].

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[1]Ins., Omitted and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.35-37

[1][CHAPTER IIIB

TARIFF]

[1][**31. Tariff.**—(1) The Authority shall, in the determination, modification or revision of rates, charges and terms and conditions for the provision of electric power services, be guided by the national electricity policy, the national electricity plan and such guidelines as may be issued by the Federal Government in order to give effect to the national electricity policy and national electricity plan.

(2) The Authority, in the determination, modification or revision of rates, charges and terms and conditions for the provision of electric power services shall keep in view—

(a) the protection of consumers against monopolistic and oligopolistic prices;

(b) the research, development and capital investment programme costs of licensees;

(c) the encouragement of efficiency in licensees, operations and quality of service;

(d) the encouragement of economic efficiency in the electric power industry;

(e) the economic and social policy objectives of the Federal Government; and

(f) the elimination of exploitation and minimization of economic distortions.

(3) Without prejudice to the generality of sub-section (2), the following general guidelines shall be applicable to the Authority in the determination, modification or revision of rates, charges and terms and conditions for provision of electric power services, namely:—

(a) tariffs should allow licensees the recovery of any and all cost prudently incurred to meet the demonstrated needs of their customers:

Provided that assessments of licensees' prudence may not be required where tariffs are set on other than cost of service basis, such as formula based tariffs that are designed to be in place for more than one year;

(b) tariffs should generally be calculated by including a depreciation charge and a rate of return on the capital investment of each licensee commensurate to that earned by other investments of comparable risk;

(c) tariffs should allow licensees a rate of return which promotes continued reasonable investment in equipment and facilities for improved and efficient service;

(d) tariffs should include a mechanism to allow licensees a benefit from and penalties for failure to achieve the efficiencies in the cost of providing the service and the quality of service;

(e) tariffs should reflect marginal cost principles to the extent feasible, keeping in view the financial stability of the sector;

(f) the Authority shall have a preference for competition rather than regulation and shall adopt policies and establish tariffs towards that end;

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[1]Ins. and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.38-39

(g) tariffs may be set below the level of cost of providing the service to consumers categories consuming electric power below such consumption levels as may be prescribed, as long as such tariffs are financially sustainable;

(h) tariffs should, to the extent feasible, reflect the full cost of service to consumer categories with similar service requirements;

(i) tariffs should seek to provide stability and predictability for customers; and

(j) tariffs should be comprehensible, free of misinterpretation and shall state explicitly each component thereof:

Provided that the Authority shall strike a balance to the extent possible, among the general guidelines in order to optimize the benefits to all persons likely to be affected by the determination, modification or revision of rates, charges and terms and conditions.

(4) Subject to sub-sections (2) and (3), the Authority shall, [1][on the basis of uniform tariff application, determine a uniform tariff for public sector licensees, engaged in supply of electric power to consumers, in the consumer's interest,] on the basis of their consolidated accounts.

(5) The Authority may specify procedures for determination, modification or revision of rates, charges and terms and conditions for the provision of electric power services, including without limitation—

(a) time frame for decisions by the Authority on tariff applications;

(b) opportunity for customers and other interested parties to participate meaningfully in the tariff approval process; and

(c) protection for refund, if any, to customers while tariff decisions are pending.

(6) The time frame for determination by the Authority on tariff petition shall not exceed four months after the date of admission of the tariff petition:

Provided that this time frame shall commenc after the applicant has complied with all requirements of rules and regulations and the Authority has admitted the tariff petition.

[1][(7) Notification of the Authority's approved tariff or uniform tariff, as the case may be; rates, charges, and other terms and conditions for the supply of electric power services shall be made, in the official Gazette, by the Federal Government within thirty days of intimation of the same by the Authority. In the event the Federal Government falls to notify the tariff so determined by the Authority, or refer the matter to the Authority for reconsideration, within the time period specified, then the Authority may direct immediate application of its recommended and approved tariff or uniform tariff as the case may be, by way of notification of the same, subject to adjustment which may arise on account of reconsideration, if any, subsequently filed by the Federal Government:

Provided that—

[1]Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021 (XIV of 2021), s.4

(i) the Federal Government may, as soon as may be, but not later than thirty days of receipt of the Authority's intimation of its approved tariff of public sector licensees involved in distribution and supply business, require the Authority to reconsider its determination of such tariff to the extent of issues common to these licensees. Whereupon the Authority shall, within thirty days, determine these after reconsideration and intimate the same to the Federal Government;

(ii) the Authority may, on a quarterly basis and not later than a period of fifteen days, make quarterly adjustments in the approved tariff on account of capacity and transmission charges, impact of transmission and distribution losses, variable operation and maintenance and, policy guidelines as the Federal Government may issue and, intimate the tariff so adjusted to the Federal Government prior to its notification in the official Gazette. The Federal Government may, as soon as may be, but not later than fifteen days of receipt of the Authority's intimation of its recommendation for adjustment, require the Authority to reconsider its determination of such quarterly adjustment. In the event the Federal Government does not refer the matter to the Authority for reconsideration, within the time period specified above, then the Authority shall notify the tariff so adjusted in the official Gazette. However, in case of filing of the reconsideration request by the Federal Government, within the time period specified above, the Authority shall, within fifteen days, determine such adjustments after reconsideration and intimate the same to the Federal Government prior to its notification in the official Gazette;

(iii) the Federal Government in lieu of reconsideration requests may opt to file an appeal, however, in the event the Federal Government moves reconsideration request then it shall not subsequently be entitled to avail the remedy of appeal against the decision of reconsideration request;

(iv) the Authority may, on a monthly basis and not later than a period of seven days, make adjustments in the approved tariff on account of any variations in the fuel charges and policy guidelines as the Federal Government may issue and, notify the tariff so adjusted in the official Gazette.]

[1][(8) Notwithstanding anything contained in this Act and in addition to the tariff, rates and charges notified under sub-section (7) and this sub-section, each electric power supplier shall collect such surcharges from any or all categories of consumers, as the Federal Government may charge and notify in the official Gazette from time to time, in respect of each unit of electric power sold to any or all categories of consumers and deposit the amount so collected in such manner as may be prescribed. The amount of such surcharges shall be deemed as a cost incurred by the electric power supplier and included in the tariff notified under sub-section (7):

Provided that such surcharges shall be levied for the following purposes, namely:—

[1]Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021 (XIV of 2021), s.4

(a) funding of any public sector project of public importance [to the extent decided by the Federal Government]; and

(b) fulfillment of any financial obligation of the Federal Government with respect to electric power services [to the extent decided by the Federal Government].

Explanation.— For the purposes of this proviso, the term "financial obligations" includes obligations of the Federal Government to make payments in respect of purchase of electric power as well as obligations related to electric power services secured through issuance of sovereign guarantee:

Provided further that the aggregate amount of such surcharges shall not exceed ten percent of the aggregate revenue requirement of all electric power suppliers, engaged in supply of electric power to end consumers, as determined by the Authority.]

32. Investment and power acquisition programmes.— (1) The Authority shall, within eighteen months from the commencement of this Act, [1][specify] procedures and standards for the Authority's prior approval of the transmission companies' and distribution companies' investment and power acquisition programmes.

(2) Any procedures [1][specified] by the Authority under this section shall advance the goal of minimizing regulatory oversight of contracts entered into by the national grid company [1][,the provincial grid companies] and distribution companies.

(3) Any investment programme or power acquisition programme, approved by the Authority under this section shall take into account the national energy plans issued by the Federal Government.

(4) Upon the Authority's approval of an investment programme or a power acquisition programme, the Authority shall, subject to such terms and conditions including rates and charges of electric power, permit the distribution company to enter into long term contracts for power purchases.

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[1]Subs. and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s.40

[1][CHAPTER IIIC
PERFORMANCE AND STANDARDS]

33. Organizational matters.— Subject to the procedures established by the Authority under this Act, the Authority may, in the public interest, with or without modifications, approve the following activities by a licensee for generation, transmission and distribution, namely :—

(a) the undertaking of a merger or a major acquisition or sale of facilities;

(b) the expansion of the licensee's business activities; and

(c) the undertaking of a re-organization of the licensee's business structure.

34. Performance standards.—The Authority shall [1][specify] performance standards for generation, transmission and distribution companies to encourage safe, efficient and reliable service, including standards for—

(i) service characteristics such as voltage and stability;

(ii) scheduled and unscheduled outages ;

(iii) reserve margins where applicable;

(iv) time required to connect new customers; and

(v) principles and priorities of load shedding.

35. Industry standards and codes of conduct.—The Authority shall [1][specify] industry standards and uniform codes of conduct so as to provide—

(a) planning criteria for safety, reliability and cost effectiveness of the generation, transmission and distribution facilities:

[1][(aa) technical standards for construction of electrical plants, electric lines and connectivity to the grid;

(ab) grid standards for operation and maintenance of transmission lines;]

(b) construction practices and standards of such facilities;

(c) operating standards and procedures;

(d) maintenance schedules;

(e) maintenance of adequate spinning reserves and plans to satisfy demand;

(f) equipment specification and standardization; and

(g) load-shedding and restoration procedures.

[1][**35A. Offices of complaints regarding over-billing etc.**— (1) Notwithstanding anything contained in section 38 or section 39, the Authority may establish district level complaint offices to hear and decide complaints regarding overbilling, non-compliance of instructions respecting metering

[1]Ins. and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.41-43

and collection of approved charges, disconnection in case of non-payment of charges, electric power theft and use of energy for purposes other than for which it was supplied.

(2) The manner and procedure whereby consumers and licensees may make complaints under this section shall be specified:

Provided that the office of complaints shall, on receipt of a complaint and before taking any action thereon, give notice to the licensee or any other person against whom such complaint has been made to show cause and provide such licensee or such other person an opportunity of being heard.

(3) If, on inspection by an office of complaints, a willful contravention against a licensee or any other person is established, a licensee person and any such anyother person that is party to the contravention shall be punishable in case of—

(a) a licensee, with a fine under section 27B;

(b) an employee of a licensee who is found to be party to the contravention complained of, to imprisonment for a term which may extend to three years or to a fine which may extend to ten million Rupees or to both;

(c) a consumer that is a company, with a fine under section 27B; and

(d) any other individual who is found to be party to the contravention complained of, to imprisonment for a term which may extend to three years or to a fine which may extend to ten million Rupees or to both.]

36. Uniform system of accounts.— The Authority shall [1][specify] a uniform system of accounts which shall be followed by the licensee of generation, transmission and distribution facilities within such period as may be [1][specified].

37. Review of public sector projects.—(1) For the purposes of coordination, in the case of any public sector project, the advice of the Authority shall be sought by the agency planning to undertake such projects.

(2) The provision of sub-section (1) shall not apply to public sector projects which do not supply electricity to the national grid.

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[1]Ins. and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.44-45

CHAPTER-IV
ADMINISTRATION

38. Provincial offices of inspection.— (1) Each Provincial Government shall—

(a) establish offices of inspection that shall be empowered to—

(i) enforce compliance with distribution companies' instructions respecting metering, billing, electricity consumption charges and decision of cases of theft of energy; and

(ii) make determination in respect of disputes over metering, billing and collection of tariff and such powers may be conferred on the Electric Inspectors appointed by the Provincial Government under section 36 of the Electricity Act, 1910 (Act IX of 1910), exerciseable, in addition to their duties under the said Act.

(b) establish procedures whereby distribution companies and consumers may bring violations of the instructions in respect of metering, billing and collection of tariff and other connected matters before the office of inspection; and

(c) enforce penalties determined by the Provincial Government for any such violation.

(2) The Provincial Governments may, upon request by the Authority, submit to the Authority—

(a) a copy of any document in the charge of the Provincial Government relating to Provincial offices of inspection; and

(b) other reports, statements and information as the Authority determines to be necessary or appropriate for the Authority's periodic assessment of the effectiveness of inspection made by Provincial Officers of inspection.

[1][(3) Any person aggrieved by any decision or order of the Provincial Office of Inspection may, within thirty days of the receipt of the order, prefer an appeal to the Authority in the [2][specified] manner and the Authority shall decide such appeal within sixty days.]

39. Complaints.— (1) Any interested person, including a Provincial Government, may file a written complaint with the Authority against a licensee for contravention of any provision of this Act or any order, rule, regulation, licence or instruction made or issued thereunder.

(2) The Authority shall, on receipt of a complaint, before taking any action thereon, give notice to the licensee or any other person against whom such complaint has been made to show cause and provide such licensee or such other person an opportunity of being heard.

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[1]Added by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2011 (XVIII of 2011), s. 8

[2]Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s. 46

[1][CHAPTER IVA
MISCELLANEOUS]

40. Enforcement of orders of the Authority.— The Authority's determinations on decisions by tribunals set-up under section 11 of this Act shall be deemed to be decrees of a civil court under the Code of Civil Procedure, 1908 (Act V of 1908).

41. Sum payable to the Authority to be recoverable as land revenue.— All sums payable to the Authority in accordance with the provisions of this Act and the rules shall be recoverable as arrears of land revenue.

42. Reports of the Authority.— (1) The Authority shall submit, to the Council of Common Interests and to the Federal Government, at the end of every financial year, but before the last day of September of that year—

(a) a report on the conduct of its affairs for that year including anticipated developments for the following year ; and

(b) report on the state of the electric power services in the country identifying the ownership, operation, management, efficiency and control of electric power facilities, amount of transmission and generation capacity, present and future demand of electricity, cost of electric power services and other matters relating to electric power services.

43. Inspection by public.— (1) The Authority shall maintain public files that shall be kept open in convenient form for public inspection and examination during reasonable business hours.

(2) Subject to procedures and standards for confidentiality, the Authority's public files shall include all relevant documents to be maintained and indexed as the Authority deems fit.

(3) The Provincial Governments shall keep open in convenient form for public inspection and examination during reasonable business hours all complaints, responses and decisions relating to the Provincial inspection offices.

44. Information.— The Authority may call for any information, required by it for carrying out the purposes of this Act from any person involved directly or indirectly, in the provision of electric power services or any matter incidental or consequential thereto. Any such person shall be liable to provide the [1][*] information called by the Authority, failing which he shall be liable to a [1][* * *] penalty [1][under this Act.]

45. Relationship to other laws.— The provisions of this Act, rules and regulations made and licences issued thereunder shall have effect notwithstanding anything to the contrary contained in any other law, rule or regulation, for the time being in force and any such law, rule or regulation shall, to the extent of any inconsistency, cease to have any effect from the date this Act comes into force and the Authority shall, subject to the provisions of this Act, be exclusively empowered to determine rates, charges and other terms and conditions for electric power services :

[1]Ins., Omitted and Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), ss.47-48

Provided that nothing in this Act shall affect the jurisdiction, powers or determinations of the Corporate Law Authority or the Monopoly Control Authority.

[1][**46. Rules.**—(1) The Federal Government may, either on its own motion or on recommendation of the Authority and by notification in the official Gazette, make rules for matters required to be prescribed under this Act:

Provided that the power to make rules conferred by this section shall be subject to consultation with the Authority and the Provincial Governments and be subject to previous publication for eliciting public opinion thereon within a period of not less than fourteen days from the date of publication:

Provided further that in case of a disagreement between the Federal Government and the Provincial Governments, such rules shall be referred to the Council of Common Interests for a decision thereon.

(2) Without prejudice to the generality of the foregoing powers, such rules may provide for—

(a) procedure for seeking nominations of members of the Authority and the Appellate Tribunal from the Provincial Governments;

(b) publication of rates and charges of electricity consumption;

(c) procedure for submission of various reports to the Council of Common Interests or to the Federal Government and the manner of preparation of such reports;

(d) procedure for inquiry and investigation into affairs of an applicant for a licence and for any contravention of any provision of this Act;

(e) seeking of information; and

(f) any other matter incidental or consequential.

47. Regulations.—(1) The Authority may, for performance of its functions under this Act and by notification in the official Gazette, make regulations not inconsistent with the provisions of this Act and the rules.

(2) Without prejudice to the foregoing powers, such regulations may provide for—

(a) appointment of officers, members of staff and such other persons and the terms and conditions of their service;

(b) the form and manner of applications to be made for a licence for generation, transmission or distribution facilities;

(c) the fees and documents to be accompanied with the applications for licences;

(d) procedure for metering, billing and collection of electric power charges by the licensees;

(e) procedure for resolving disputes amongst the licensees and consumers;

(f) manner and procedure of show cause notices; and

(g) any other matter incidental or consequential.

[1]Subs. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s.49

(3) The power to make regulations conferred by this section shall be subject to the condition of previous publication and before making any regulations the draft thereof shall be published in two newspapers of wide circulation for eliciting public opinion thereon within a period of not less than thirty days from the date of its publication.]

[1][**48. Power of the Authority to issue directives, circulars, guidelines, etc.**— The Authority shall have the power to issue such directives, codes, guidelines, circulars or notifications as are necessary to carry out the purposes of this Act and the rules and regulations made hereunder.

49. Cognizance of offences.— Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), no court other than the court of sessions shall take cognizance of an offence under this Act except on a complaint by an officer authorized in this behalf by the Authority.

50. Savings.— (1) Notwithstanding anything contained in the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 or any repeal effected thereby, nothing shall affect or be deemed to affect anything done or any action taken or purported to have been taken, including any rule, regulation, notification, determination, order or notice made or issued, any approval, appointment or declaration made, any operation undertaken or direction given, any proceedings taken or any penalty, punishment or fine imposed under this Act before the commencement of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018.

(2) Subject to sub-section (1), any order, rule, notification, regulation, appointment, conveyance, deed, document or direction made, fee directed, determination given, proceedings taken, instrument executed or issued or thing done under or in pursuance of any provision of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 shall, if in force before the commencement of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018, continue to be in force and shall have effect as if made, directed, passed, given, taken, executed, issued or done under or in pursuance of this Act:

Provided that, pursuant to the coming into effect of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018, the rules and regulations issued under this Act shall be brought into conformity with the amended provisions of this Act, wherever required, within a period of one year from the date of coming into effect of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018.

(3) Any person appointed to any office prior to the coming into force of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 shall be deemed to have been appointed to that office under and by virtue of this Act and any condition or term of service or employment modified through the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 shall not have retrospective application or effect.

[1]Added by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 (XII of 2018), s. 50

51. Validation.— [1][(1)] Anything done, actions taken, orders passed, instruments made, notifications issued, agreements made, proceedings initiated, processes or communications issued, powers conferred, assumed or exercised by the Federal Government in terms of sub-section (5) of section 31 on or after the first day of July, 2008 till the coming into force of the Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 shall be deemed to have been validly done, made, issued, taken, initiated, conferred, assumed and exercised and shall be deemed to have effect accordingly.

[1][(2) All acts done or taken and notifications issued by the Federal Government with respect to electric power services, from the enactment of the Regulation of the Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 till the coming into force of the Regulation of the Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021, shall be deemed to have been validly made and issued under this Act].

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[1]Renumbred and Ins. by The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2021 (XIV of 2021), s.5

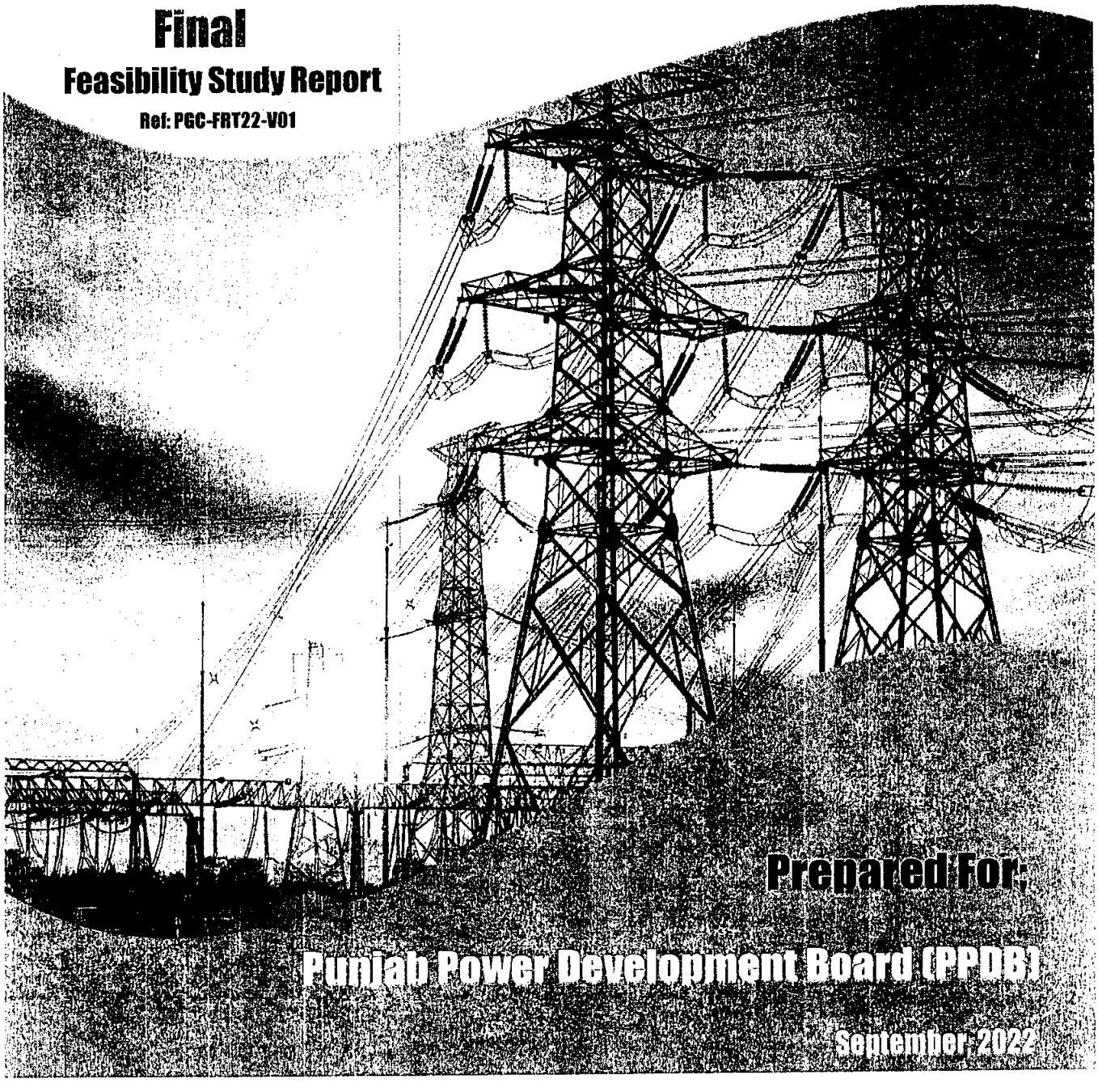
ANNEX-"E"

Establishment of Punjab Grid Company (PGC)

Final

Feasibility Study Report

Ref: PGC-FRT22-V01



Prepared For:

Punjab Power Development Board (PPDB)

September, 2022

Consultants

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Disclaimer: Élan Partners, INTEGRATION, A.H.W & Co. Charted Accountants and **A.H.W Management Consultants** have prepared this document in accordance with the standard report format desired by PPDB and shall not have any liability to any third party in respect of this report or any actions taken or decisions made as a consequence of the results, advice or recommendations set forth herein. Any other persons, companies, or institutions that use any information contained herein do so at their own risk

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ACRONYMS

Abbreviation	Full Wording
A/C	Alternating Current
ADB	Asian Development Bank
AEDB	Alternative Energy Development Board
AEGCL	Assam Electricity Grid Corporation Limited
BOO	Build Own Operate
BOOT	Build Own Operate and Transfer
BMC	Balancing Market for Capacity
BPCs	Bulk Power Consumers
CBDA	Central Business District Development Authority
CCI	Council of Common Interest
CDP	Common Delivery Point
CDXP	Compliance Data Exchange Portal
CPEC	China-Pakistan Economic Corridor
CPPA-G	Central Power Purchasing Agency Guaranteed
CPPs	Captive Power Producers
CSR	Corporate Social Responsibility
CTBCM	Competitive Trading Bilateral Contract Market
D/C	Direct Current
DISCOs	Distribution Companies
ED	Energy Department
EEE	Economics, Energy and Environment
EPZs	Export Processing Zones
ERP	Enterprise Resource Planning
FESCO	Faisalabad Electric Supply Company
FS	Feasibility Study
FY	Financial Year
GENCOs	Generation Companies

GEPCO	Gujranwala Electric Power Company
G/S	Grid Station
GM	General Manager
GoP	Government of Pakistan
GWh	Giga Watt Hour
HESCO	Hyderabad Electric Supply Company
HPPs	Hydropower Projects
HUBCO	Hub Power Company
HVDC	High Voltage Direct Current
IAA	Independent Auction Administrator
ICAEW	Institute of Chartered Accountants in England and Wales
ICA	Inter Connection Agreement
ICAP	Institute of Chartered Accountants of Pakistan
IESCO	Islamabad Electric Supply Company
IGCEP	Indicative Generation Capacity Expansion Plan
IIPs	Independent Power Producer
IRR	Internal Rate of Return
KANUPP	Karachi Nuclear Power Plant
KAPCO	Koat Addu Power Company
KE	K-Electric
KESC	Karachi Electric Supply Corporation
Km	Kilo meter
KPI	Key Performance Indicators
KPK	Khyber Pakhtunkhwa
KPK-T&GSCPL	Khyber Pakhtunkhwa Transmission and Grid System Company (Private) Limited
KV	Kilo Volt
LESCO	Lahore Electric Supply Company
LF	Load Factor
LoI	Letter of Intent

L.T	Low Tension
MDI	Maximum Demand Indicator
MEPCO	Multan Electric Power Company
MkWh	Million Kilo Watt Hour
MMS	Market Management Software
MO	Market Operator
MRC	Marketing Research Consulting
MSP	Metering Service Provider
MVA	Mega Volt Ampere
MW	Mega Watt
NEP	National Electricity Policy
NEPRA	National Electric Power Regulatory Authority
NGC	National Grid Company
NPCC	National Power Control Centre
NPV	Net Present Value
NTDC	National Transmission and Dispatch Company
OLMT	Orange Line Metro Train
O&M	Operation and Maintenance
PAEC	Pakistan Atomic Energy Commission
PEPCO	Pakistan Electric Power Company
PESCO	Peshawar Electric Power Company
PGC	Punjab Grid Company
PITC	Pakistan Innovation & Testing Centre
POE	Panel of Experts
PPDB	Punjab Power Development Board
PPIB	Private Power and Infrastructure Board
PPP	Public Private Partnership
QESCO	Quetta Electric Supply Company
RFP	Request for Proposal
ROI	Return on Investment

S/C	Single Circuit
SCADA	Supervisory Control and Data Acquisition
SDXP	System Operator Data Exchange Portal
SPV	Special Purpose Vehicle
SWOT	Strengths, Weaknesses, Opportunities, and Threats
SEPCO	Sukkar Electric Power Company
SEZs	Special Economic Zones
SO	System Operator
SOPs	Standard Operating Procedures
SPPs	Small Power Producers
SPTL	Special Purpose Transmission Licensees
STG	Secondary Transmission & Grid
T&D	Transmission & Distribution
TESCO	Tribal Electric Supply Company
T/L	Transmission Line
TSA	Transmission Service Agreement
TSEP	Transmission Expansion Plans
T.T Singh	Toba Tek Singh
USAID	United States Agency for International Development
USTDA	United States Trade and Development Agency
VRE	Variable Renewable Energy
WAPDA	Water and Power Development Authority
WASA	Water and Sanitation Agency
WB	World Bank

0. EXECUTIVE SUMMARY

Since transmission network is the heart of the power system and it should match with that of generation and distribution development, therefore across the globe, various countries are focusing to develop the transmission sector in parallel to power generation projects to cope with any evacuation constraints. Therefore, a number of provincial level and private sector transmission companies have been established in various countries in addition to nation grid companies.

Similarly, in Pakistan besides National Transmission & Dispatch Company (NTDC), 02 provincial transmission and grid companies have already been established i.e., Sindh Transmission and Dispatch Company (STDC) and Khyber Pakhtunkhwa Transmission and Grid System Company (Private) Limited (KPK T&GSCPL). Now, Punjab Power Development Board (PPDB) under Energy Department of the government of Punjab intends to establish a provincial grid company i.e., Punjab Grid Company (PGC) to cater the ever-increasing load demand and power transmission challenges in the province.

Power Market Analysis of Punjab

NTDC is the national grid company of Pakistan and generally owns transmission infrastructure of 220 kV and above. The province of Punjab is major transmission corridor where most of the 500 kV and 220 kV infrastructure is installed. The major load centres of the country are also located in Punjab and out of total 10 DISCOs, 05 are in Punjab province i.e., FESCO, GEPCO, IESCO, LESCO and MEPCO. The maximum load demand of 5 DISCOs of Punjab is around 18,290 MW in summer whereas maximum supply by these DISCOs is around 17,043 MW. The gap in summer is around 1250 MW while in winter it narrows down to 300 MW. The number of bulk power consumers (BPCs) in 5 DISCOs rose to 2300 by June 2021.

Demand Projections and NTDC/DISCOs Plans

The demand of Punjab is forecasted to rise further in years to come. There are a number of existing Industrial Estates/ Export Processing Zones (EPZs)/ Special Economic Zones (SEZs) /BPCs in Punjab. In addition, new industrial zones are being planned in the province. Some of these are under development thereby power demand will increase day by day. The load demand of the Industrial Estates/Zones/BPCs within DISCOs of Punjab is estimated around 2000 MW. This load demand depicts a great potential for PGC for wheeling transmission projects. Most of the areas of Punjab are electrified but yet there are some areas which still to be electrified. Similarly, there are some weak grid areas and generally face constraints to get uninterrupted power supply. On the other hand, Punjab has abundant natural energy resources like small/mini hydropower, solar, wind, etc. which can also be exploited by off taking power to load centres.

The existing T&D system of the country in general and Punjab in particular is facing constraints and resultantly load shedding is normally observed in various areas of the province. Consultant during technical analysis has observed various circuits which are overloaded since long and thus new T/L projects would be needed to address the constraints and futuristic load challenges in the Punjab. The consultant has reviewed the 7th/8th STG Plans of DISCOs as well as NTDC Plans up to 2026 and has identified the various T/L projects which could be the potential projects for PGC.

Provincial Grid Company

Under the Constitution of Pakistan, as well as also under the existing policy, rules, and regulations, provinces are allowed to establish provincial grid companies. In compliance to these provisions, PPDB under Energy Department of Punjab took initiative to establish Punjab Grid Company (PGC).

PGC as a licensee under NEPRA regulatory regime will be required to interact with a number of entities and licensees including NEPRA, NGC, generators, distribution companies and others depending on the regime (isolated or integrated mode) in which it is operating.

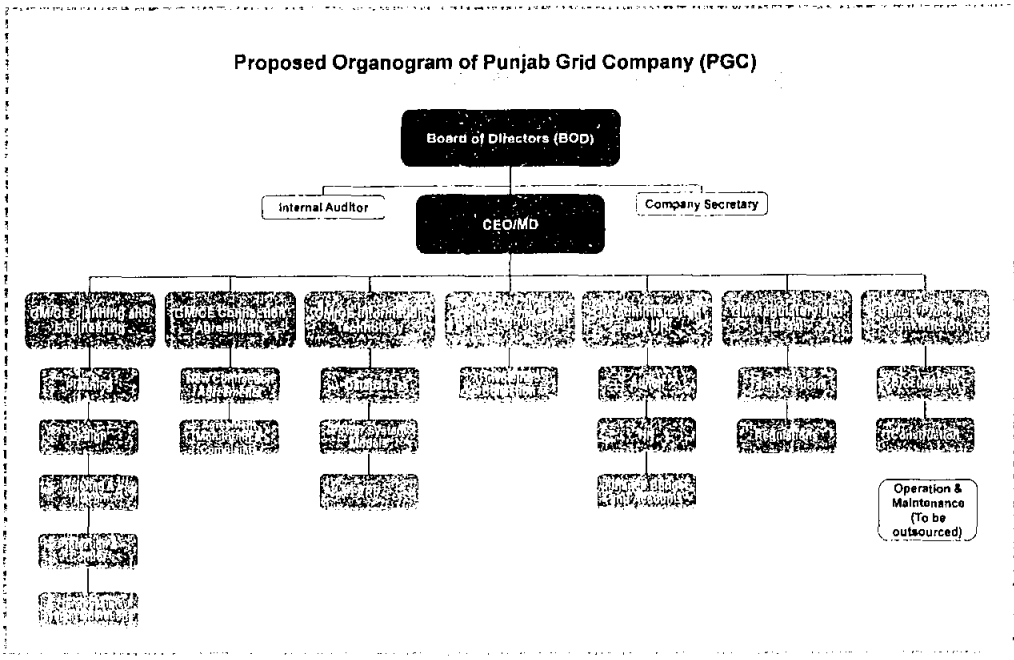
The modus operandi for PGC to function could be either in Isolated or Integrated regime. Under Isolated mode, PGC would develop and operate its transmission system independently without any connection with NTDC system while under integrated mode PGC would be connected with NTDC transmission system. Regarding integrated mode, according to the existing NEPRA approved Grid Code, NTDC will be responsible for preparing transmission expansion plans for different future scenarios. PGC will not only provide its own future expansion plans to NTDC but it would be able to identify those, which NTDC could not complete as scheduled.

Setting-up of PGC

The company will be governed through a Board of Directors from government and other independent professionals in the field. Essentially the function of a transmission company is to provide and facilitate power transmission services and charge use of system transmission fee/tariff.

Under all scenarios, the transmission companies like PGC must follow the basic principle of open access and non-discrimination to new connections and users of the grid.

PGC would need to have a proper organization structure through establishment of all relevant departments including engineering, commercial, financial, regulatory and administrative etc., as given in the organogram.



According to section 18A (2) of NEPRA Act, the eligibility criteria for grant of license as a provincial grid company shall be prescribed and shall include, – (a) minimum solvency requirements; and (b) minimum technical and human resource requirements.

Since PGC will not have funds through its own operations at the time of filing for application of PGC license before NEPRA, therefore PGC will be required to urgently seek firm commitments by the provincial government for an initial seed money and funding at later stages on 'as and when' need basis to satisfy solvency requirements for its license application under the NEPRA Act. Similarly, highly qualified and experienced professionals in the field of engineering planning, design, construction, Finance, accounting, legal and administration would be required to be included in the PGC setup. At the time of filing of application for license with NEPRA, a core team must be in place to take initiate the setting-up of PGC.

Role and Opportunities for PGC under CTBCM

The PGC is expected to play a major role not only under the present market structure, but under CTBCM also when its opportunities for providing transmission and interconnection services will increase manifold. The opportunities for PGC will expand with the increase in number of Competitive Suppliers and Traders in service territory of different distribution companies, as those will create demand for transmission corridors. When compared with the existing structure, it may be seen that PGC will be required to have close coordination, database and information about BPCs and their plans for power

procurement, whereas under CTBCM, the efforts by PGC would be more focused towards Competitive Suppliers and Traders which in a way will ease the burden on PGC for creating new opportunities for its business.

Business Plan of PGC

Like any other corporate entity, PGC will need to a have a prudent way of working in place. Since the objective of establishment of PGC is to undertake power transmission activities and supplying power in the province, therefore it is recommended that after registration of the company with Securities Exchange Commission of Pakistan (SECP), next step would be to file and obtain transmission license from the NEPRA as to become eligible for undertaking transmission business activities. Prior to applying to SECP and NEPRA, PGC would require to put in place its key positions i.e. chief executive officer (CEO), Board of Directors along with key management team. PGC will need to have appropriate plans/policies related to HR, Financial, Marketing, and IT etc.

It is imperative to have a target-oriented project development plan with PGC. At the outset, it is expected that transmission projects will be developed either in public sector or through Public-Private Participation (PPP) by PGC. PGC would then may proceed to construct, own and operate transmission infrastructure mainly of 132 kV, 220 kV and 500 kV etc. and charge a service fee to parties who avail its service. It is to highlight that PGC will not act as competitor of NTDC and DISCOs but as a facilitator to undertake its operations through a collaborative mode with these entities.

Along with projects development, it is equally important to have a proper plan for O&M of projects particularly projects funded by PGC own resources. At the outset, it is suggested to outsource the O&M of projects to competent O&M contractors till such time PGC adequately equip itself technically and financially by preparing pool of in-house professionals who may undertake O&M of its projects in longer term.

Tariff and Financial Modelling

Three (3) independent financial models, using the cost-plus approach, have been developed to establish a tariff for all three voltage types. For this purpose, the largest transmission lines available in the plan for all three voltage types was chosen:

- 132 kV: 127 km
- 220 kV: 150 km
- 500 kV: 330 km

Each project is proposed to be financed through a combination of debt and equity with the expectation of a debt-to-equity ratio of 75:25.

Table below provides a brief overview of the tariff heads where the costs have been levelized over a period of 25 years. During the early years of operation, tariff will generally tend to be on the higher side based on factors such as Debt repayments which will end in year 10.

Levelized Tariff	132 kV	220 kV	500 kV
Capacity Charge			
Debt Principal Repayment - Foreign	0.2124	0.1836	0.1388
Debt Interest Payment - Foreign	0.1359	0.1175	0.0693
Debt Principal Repayment - Local	0.0018	0.0015	0.0011
Debt Interest Payment – Local	0.0076	0.0066	0.0046
Fixed O&M	0.1828	0.1448	0.0916
Insurance tariff	0.0547	0.0484	0.0334
ROE	0.1479	0.1278	0.0924
Total Capacity Charge (PKRs.)	0.7431	0.6302	0.4311
Total Capacity Charge (80% LF)	0.9288	0.7878	0.5389
Energy Charge			
Variable O&M	0.0000	0.0000	0.0000
Total Energy Charge	0.0000	0.0000	0.0000
Total Base Tariff (PKRs.)	0.9288	0.7878	0.5389

Furthermore, a comprehensive analysis has been carried out of the Project to assess its economic and financial viability and to determine its feasibility with reference to various risks present and mitigation of such risks thereof. Using the free cash flow model, Table below shows the key financial indicators for the Project appraisal.

Key Financial Indicators (Project)	132kV	220kV	500kV
Net Present Value (NPV – PKR)	1,396,132,153	3,797,225,441	18,758,412,236
Internal Rate of Return (IRR – %)	5.52	4.63	4.36
Project Payback Period (Years)	11.50	12.83	13.92

Stakeholders and PoEs Meetings on Draft Feasibility Report

The draft feasibility report was duly reviewed and discussed in detail in stakeholders (private & public) consultation meetings held on 21st & 22nd June, 2022 and PoEs two meetings held on 27th July & 2nd September 2022 respectively. PoEs in its 2nd meeting unanimously approved the draft final feasibility report.

Conclusion and Way Forward

This feasibility study concludes that establishment of PGC is viable from technical, financial, commercial and regulatory perspectives. In light of the conclusion, some of the critical steps to be taken for the establishment and operationalization of PGC are summarized below, whereas detail of other steps is provided in **Section 8.2** of this feasibility report.

Step-1: Establishment of PGC and its registration with SECP along with appointment of key experts including BoDs, administrative & technical team etc.

Step-2: Obtaining NEPRA transmission license, tariff approval and fulfilling other applicable regulatory requirements.

Step-3: Formulation and approval of transmission policy for Punjab

Step-4: Obtaining approval from BoDs for each feasible project.

Step-5:
- Signing of TSA with power off-taker/dispatcher in case of public project
- Signing of concession agreement with investor/concessioner in case of BOOT project

Step-6: Arrangement of funds for approved public mode projects: government funding, donor agencies funding or blending of funds.

1. INTRODUCTION

1.1 Background

Energy is the driving force of an economy and key pillar for social development of any country. The role of energy has become more evident after rapid industrialization and with improvement in life style of human society. The energy needs of Pakistan are tremendous and increasing day by day due to population growth, urbanization and industrialization etc.

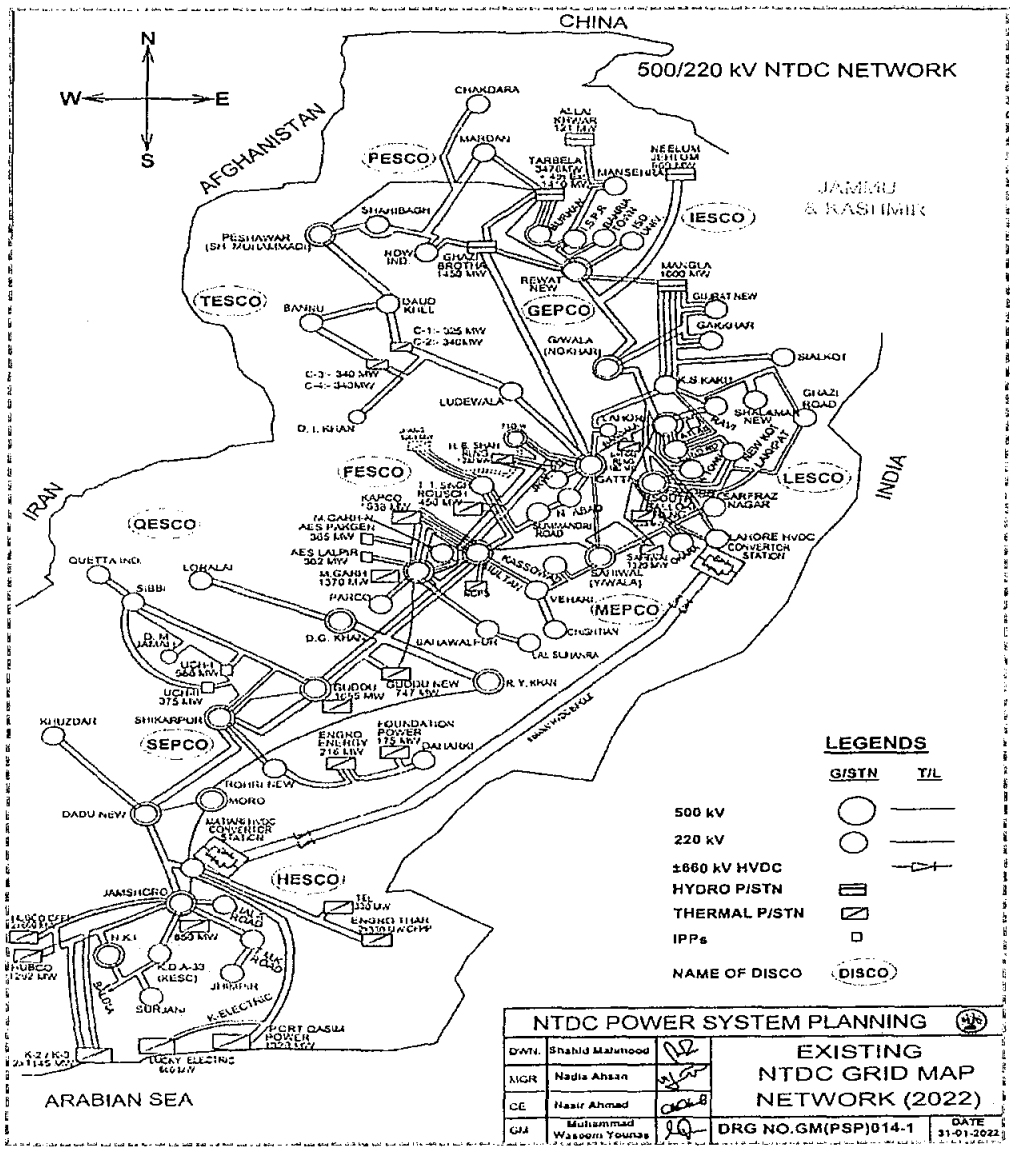
Research shows that electricity is an imperative form of energy. The usage of electricity motivates monetary efficiency and industrial evolution and is very significant for the operation of every contemporary economy. The availability of uninterrupted reliable and safe power supply at affordable price through an efficient way is the goal of almost every power system across the globe for social and economic uplifting of respective society. Across the whole supply chain of electric power industry, the role of each of the three segments, i.e. generation, transmission and distribution, is utmost important and critical.

In Pakistan, National Electric Power Regulatory Authority (NEPRA) has been established to regulate the electric power business in the country. For this purpose, besides the NEPRA Act, various rules and regulation have been framed and notified by the government and amended time to time. Under the NEPRA Act, it is mandatory to acquire license and other regulatory approvals from NEPRA for undertaking any of the generation, transmission and distribution business within the jurisdiction of Pakistan.

In the past there were two vertically integrated power companies operating in Pakistan, i.e., the Water and Power Development Authority (WAPDA) and Karachi Electric Supply Corporation (KESC). WAPDA was responsible for development, operation and maintenance of all the three segment of supplying electricity to consumers apart from the greater metropolis of Karachi, which was supplied by the KESC. Restructuring of Pakistan's power market started in mid 1990s with the unbundling of WAPDA's power wing into a number of independent corporate entities. Accordingly, the power wing of WAPDA was un-bundled into 04 Generation Companies (GENCOs), one Transmission and Dispatch Company (NTDC) and 10 distribution companies (DISCOs). On generation side the power is generated by 04 GENCOs, Pakistan Atomic Energy Commission (PAEC), WAPDA hydel plants and different independent power producers (IPPs), which sell their power to DISCOs through Central Power Purchasing Agency Guaranteed (CPPA-G) under the power purchase agreements. Thus power generation segment in Pakistan comprises of both public and private participation.

From the generation side, the power is dispatched through primary grid network having capacity of 220 kV and above. NTDC is the grid owner of this primary network of the country excluding the Karachi city and adjacent area which is served by Karachi Electric (KE). CPPA-G is the market operator while National Power Control Centre (NPCC) is the system operator of NTDC network. The existing NTDC transmission network 2022 of Pakistan in shown in **Figure-1** below.

Figure-1: NTDC Transmission Network 2022 of Pakistan



Onward, from the primary grid, the power is dispatched to distribution network of 10 DISCOs for further supply to end consumers. The 10 DISCOs are Lahore Electric Supply Company (LESCO), Gujranwala Electric Power Company (GEPCO), Faisalabad Electric Supply Company (FESCO), Islamabad Electric Supply Company (IESCO), Multan Electric

Power Company (MEPCO), Peshawar Electric Power Company (PESCO), Hyderabad Electric Supply Company (HESCO), Quetta Electric Supply Company (QESCO), Tribal Electric Supply Company (TESCO) and Sukkar Electric Power Company (SEPCO).

Out of 10 DISCOs, 05 DISCOs are located in Punjab i.e. LESCO, FESCO, IESCO, GEPCO and MECPCO. Punjab is the most populous province having high commercial, agricultural and industrial activities and thus the major load centres of the country are located in Punjab.

These DISCOs are providing electricity to end consumers of the province. Currently total load demand of Punjab is around 18,000 MW, during summer, which is anticipated to grow substantially in future due to rapid industrialization, urbanization and lifestyle improvement and population growth. In order to meet demand growth there is a need to exploit indigenous resources of the province for power generation and improve transmission and distribution network and to get reliable and affordable electricity which is vital for socioeconomic development.

Punjab has the potential to develop power generation through indigenous resources such as solar, hydro, biomass, municipal solid waste and local coal etc. which is abundantly available in the province. The provincial government through its Energy Department (ED) /Punjab Power Development Board (PPDB) is already working in this direction by encouraging private sector investment in power generation and doing its efforts to provide a conducive environment for private investors. It is anticipated that a number of power plants would be installed in the province for fully exploitation of these indigenous resources. In addition, Government of the Punjab is now planning to establish their own Power Grid Company, which could play a catalyst role in development and upgradation of the province's power system.

Electricity generated through these resources can be transmitted to Bulk Power Consumers (BPCs) and other consumers through primary and secondary transmission system. Accordingly, it would need to develop a reliable and secure transmission network in Punjab in parallel to NTDC and DISCOs network.

Furthermore, the power sector of the country is in transition phase towards a competitive and open electricity market and the induction of new players like provincial grid company would be the need of the hour to avoid any transmission and dispatch constraints. In future there will be frequent B2B and off-grid electricity sale / purchase transactions. Provision of transmission services to upcoming open market buyers / sellers by Government of Pakistan (GoP) entities i.e., NTDC, DISCOs alone could be difficult. In Punjab, number of IPPs will be retiring / maturing their PPA terms and may opt to sell their power to potential consumers. Similarly, due to development of new renewable

energy power projects there could also be need to dispatch the power from these plants to consumers mainly to BPCs and would definitely require transmission infrastructure.

Under NEPRA Act amendments 2018, provinces are empowered to develop transmission infrastructures for power dispersal within the jurisdiction of respective province. In this regard, two provinces i.e. Sindh and Khyber Pakhtunkhwa (KPK) have taken lead and already established their provincial grid companies. By looking in to all these facts and changing scenario, the Govt. of Punjab now intends to establish a provincial grid company i.e., Punjab Grid Company (PGC), to undertake the transmission business within its provincial territory.

1.2 Objective of the Project

The objective of the project is to assess the viability of establishing a provincial grid company in Punjab, from technical, financial, regulatory and commercial perspectives, to cater the transmission and grid services for power dispersal from generation plants to consumers, mainly bulk power consumers, industrial zones and unserved/no grid areas within the provincial territory.

1.3 Rationale

The province of Punjab has large quantum of load requirements. Though NTDC and concerned DISCOs are owning and operating large network of transmission and distribution within the Punjab but they are unable to fully transmit the power demand of Punjab resulting in load shedding because of constraints in transmission and distribution systems. In addition to overloading, the transmission and distribution systems also confront the issue of high losses. The overbilling is another serious issue of DISCOs systems which consumers face. Due to lack of any competition in transmission segment and non-presence of provincial grid company, most of these issues continue to persist. Under the current scenario, NTDC transmits power from various power plants of the country to distribution systems of DISCOs including those of Punjab. NTDC is a federal entity and its infrastructure is installed in all 04 provinces and it caters system requirements of whole country not of a particular province through its own system expansion plan. NTDC has its own priorities while the province of Punjab needs keen consideration related to expansion of transmission system throughout the province especially to those areas having no or low grid infrastructure. In addition, due to existing constraints and overloading of NTDC system as well as futuristic anticipated growth in load demand in Punjab, it is vital to have a reliable and secure transmission system in parallel to NTDC system which would take care the upcoming power requirements of Punjab. Thus, PGC will exploit the additional transmission capacity which is locked in the

generation system, due to existing system constraints, and will unlock it through development of transmission infrastructure. The PGC will act mainly as service provider for dispatching power from generation nodes to consumption points while charging a reasonable tariff to parties availing its services for power transmission and system usage.

1.4 Transmission Sector Liberalization and Provincial Grid Companies Establishment

Since transmission network is the heart of the power system and it should match with that of generation and distribution development, therefore across the globe, various countries are focusing to develop the transmission sector in parallel to power generation projects to cope with any evacuation constraints. However, there are examples where transmission sector development could not coincide with capacity addition by a single state-owned company due to one reason or the other, primarily resource availability and capacity of state-owned transmission companies. Therefore, a number of private transmission companies and state level transmission and grid companies have been established in various countries across the globe in order to resolve the transmission congestion issues. A brief overview about international, regional and national scenarios regarding private and provincial grid companies is provided in below subsections.

1.4.1 International Scenario

Argentina is pioneer in restructuring electricity sector which unbundled generation, transmission and distribution segments in to separate entities. In transmission segment it has 07 private transmission grid companies where as 01 company owns transmission network at country level while the rest of 06 companies own regional transmission systems. All of these transmission companies have been granted transmission licenses by the Argentinean regulator.

1.4.2 Regional Scenario

In India, the transmission system is owned primarily by central and state/provincial companies and power transmission largely remains a government-controlled activity. The transmission sector was separated from the power generation part way-back in 1989 and thus Power Grid Corporation of India (PowerGrid) was set up. Further, regional transmission grid companies have also been established.

PowerGrid is responsible for the planning, implementation, operation & maintenance of inter-state transmission system, and the operation of national and regional power grids. Besides PowerGrid, there are 05 regional grids i.e., East, West, South, North and North-

East (NE). Each of the 05 regional grids, comprises of further several state transmission grid companies' networks. The National Load Despatch Centre (NLDC) manages the scheduling and dispatch of electricity over inter-regional links in accordance with grid standards, and monitors the national transmission grid. While, Regional Load Despatch Centres (RLDCs) manage the operation of the power system in the respective regions. Under each RLDC, state level power transmission and grid companies are working. Assam Electricity Grid Corporation Limited (AEGCL) is one of the state level power transmission and grid company in NE region of India. A brief overview about AEGCL is described below.

Assam Electricity Grid Corporation Limited (AEGCL) is public sector state transmission company which was incorporated in 2003. It owns transmission network in Assam having voltage levels of 400kV, 220kV, 132kVand 66kV with cumulative length of 5367 km. It is the largest state transmission company in NE region and evacuating power from various Assam based power plants and national transmission network to the distribution company networks in the state of Assam and state transmission companies of neighbouring NE states. In Assam there is a state level regulator besides central regulator. The intra-state level affairs are regulated by state regulator while inter-state matters are regulated by Indian Central Regulator. The AEGCL has developed intra-state level grid code which has been approved by state regulator. The Assam Grid Code is in-line with Indian central grid code. Thus, state level power system operations are conducted under the Assam Grid Code while inter-state level operations are maintained as per central gird code and Electricity Act of India. A State Load Dispatch Centre (SLDC) is being operated by AEGCL. SLDC Monitors and operates the state grid of Assam on real time basis through optimum scheduling & despatch in secure and economic ways, and in accordance with the provisions of Indian Electricity Grid Code (IEGC) and State Grid Code. The intra-state transmission projects in Assam are generally developed by AEGCL through own funds, power sector development funds and donor agencies financial support. The state grid of Assam complements the national grid of India on cooperative basis to address transmission constraints and it charges state regulator approved tariff for services provided to generation and distribution companies operating in Assam.

Following are key benefits which resulted due to incorporation of AEGCL;

- Transmission system availability of AEGCL is more than 99 % as against minimum requirement of 98.5 %.
- The Transmission system energy losses in Assam region are brought down from 8.41 % from the year 2006-07 to about 3.55% during 2017-18.
- Due to establishment of AEGCL, the frequency of Black outs & Brown outs during the year in Assam has decreased comprehensively.

- AEGCL has made good compliance with regulatory requirements regarding voltage, frequency thresholds and third-party access etc. Resultantly, the power supply quality towards end consumers has improved considerably in the region.
- In addition, it has played key role to resolve the congestion issue in NE region and always remained a helping hand thorough transporting a fair share of power to the other sister states of the region.

It is pertinent to mention that AEGCL has reduced the burden on national/central grid company to transmit power to far-flanged areas of NE region. The power has been evacuated from regional power plants which otherwise would have been difficult due to congestion and system overloading issues. Similarly, due to reduction of losses, financial burden as well as Green House Gases (GHGs) emissions have also reduced. In a nut shell, AEGCL has thus played an important role in the socio-economic development of region.

1.4.3 National Scenario

In Pakistan besides NTDC, so far 02 provincial transmission and grid companies have been established e.g., Sindh Transmission and Dispatch Company (STDC) established and granted license by NEPRA in 2015 and Khyber Pakhtunkhwa Transmission and Grid System Company (Private) Limited (KPK-T&GSCPL) established and granted license by NEPRA in 2021. Despite being at a nascent stage, STDC has already made tangible progress by developing 95 km long, 132 kV transmission line to connect Nooriabad Power generation plant to KE system whereas KPK-T&GSCPL is also in planning stage to undertake appropriate transmission line project out of various transmission opportunities available in their province.

In addition, private sector has taken initiative in Pakistan by developing transmission line projects on Build Own Operate and Transfer (BOOT) basis and recently country's first 660 kV high voltage Direct Current (HVDC) 878 km line, from Matiari to Lahore, has been constructed in private sector through the special purpose Pak Matiari-Lahore Transmission Company which is in operation. Since the provincial grid companies in Sindh and Khyber Pakhtunkhwa are in the initial stage of its developing, therefore it would be too early to comment on their performance in technical and financial terms. However, it appears that absence of policies, regulations and necessary technical and legal guide lines for coordination with other entities including NTDC and DISCOs, present a major challenge for the viability of these provincial grid companies.

Notwithstanding above observations about Sindh and KPK transmission companies, regional and international experience of state/provincial grid companies and their role in opening up of transmission sector by promoting competition while providing uninterrupted power supply has been duly acknowledged internationally. It is in this context, the feasibility study of Punjab Grid Company is being carried out.

1.4.4 Inter-Provincial Scenario

Presently inter-DISCO 132 kV transmission lines exist between different DISCOs, which also cross adjoining provincial boundaries for electric power exchange, reliability and meeting consumer's demand. It is foreseen that after formation of provincial grid companies, inter-provincial power exchange would be essential. For meeting this objective, necessary guidelines and legal instruments have to be developed thorough consultative process between provincial grid companies and respective provincial authorities like PPDB etc.

1.5 Legal and Regulatory Grounds

Robust transmission network is the backbone of a sustainable power system which ensures the availability of reliable and affordable electricity supply to consumers. A secured transmission system complements generation plans to evacuate power from connected power plants to load centres via a smooth system operation mechanism. Thus, development of robust transmission network is required for smooth operation of power system to avoid congestions, disruptions, and load shedding etc. The robustness of the transmission network links with its efficiency and such efficiency would be possible due to induction of new players like provincial grid companies as well as private transmission companies to inject technical and commercial resources in to the sector via heathy competition. It is pertinent to mention that robust transmission network development needs supportive legal and regulatory ground along with proper planning, funding, technical know-how and conducive market environment. In this regard, the Constitution of Pakistan as well as NEPRA Act provides legal and regulatory provisions respectively for establishment of provincial grid company.

Article 157 (2)(c) of the Constitution of Pakistan provides that the Government of a Province may construct power houses and grid stations and lay transmission lines for use within the province. Also, Sections 18(A) & 18(B) of the amended NEPRA Act No. XL of 1997 provides that the provincial governments are allowed to establish the provincial grid companies subject to the approval and licensing by the federal regulator.

To avail this opportunity of developing provincial grid and transmission infrastructure, PPDB under the auspices of provincial energy department has planned to conduct the technical, financial and commercial feasibility study for establishment of Punjab Grid Company (PGC) in the better interest of province.

1.6 Sponsor / Punjab Power Development Board (PPDB)

The Energy Department (ED), Government of Punjab, is policy and regulation formulation entity regarding energy sector of the province. The optimal development of energy resources comes under the domain of ED. The Energy Department of Punjab have following vision.

- Attract Private Sector Investment
- Provide Enabling Environment
- Promote Energy Efficiency and Conservation
- Find Economic Growth

The ED has number of attached departments/bodies to undertake energy infrastructure development activities in the province. To undertake power sector related activities as per goals of ED, it has a dedicated wing i.e. Punjab Power Development Board (PPDB) which provides one window facility to promote private investors participation in power sector.

In this regard, PPDB has conducted wide-ranging work in generation segment by facilitating installation of private power plants mainly of renewable technologies. Now, PPDB is also looking to develop the transmission segment of power sector within the province and thus it intends to establish a Provincial Grid Company to deliver affordable / sustainable electricity to consumers in Punjab region.

1.7 Consultants Consortium

To conduct the subject feasibility study, PPDB has hired the services of consortium of consultants comprising of Élan Partners (Pvt.) Ltd., INTEGRATION Environment & Energy GmbH, A.H.W & Co. Charted Accountants and A.H.W Management Consultants with lead firm Élan Partners (Pvt.) Ltd.

1.7.1 Élan Partners (Pvt.) Ltd (Lead Consultant)

Élan Partners (Pvt) Ltd is an Islamabad base international consulting company offering services in Economics, Energy and Environment (EEE) and providing economic and technical solutions to Pakistan's rapidly expanding economy in general and energy sector in particular since 2004. Élan have demonstrated its abilities working on World Bank (WB), Asian Development Bank (ADB), United States Agency for International Development (USAID) and United States Trade and Development Agency (USTDA) funded projects and undertaken various renewable energy projects across Pakistan. Élan's team possesses extensive experience of handling business plans formulations, surveys, research / assessments studies, pre-feasibilities, feasibilities, project management, construction supervision, project scheduling, preparation of tender documents, contracts negotiation, implementation and operation of all types of energy projects.

1.7.2 INTEGRATION Environment & Energy GmbH.

INTEGRATION environment & energy GmbH is a German based consulting company with contact offices in Pakistan, Afghanistan, China, and project offices in Bosnia and Herzegovina, Brazil, India, Indonesia, and Mexico. The company was founded in 1998, being an equal member of the INTEGRATION Group covering two consultancy companies in Frankfurt/Main and Gräfenberg (near Nuremberg).

The company has maintained a permanent local presence in Pakistan since 2013. The local office in Islamabad works in close cooperation with the head office in Gräfenberg, Germany for transparent and effective execution of donor funded projects in Pakistan and the neighbouring regions. Over the years, the company has built up capacity in technical assistance as well as consultancy services related to implementation of energy and development projects in the region.

1.7.3 A.H.W & Co. Chartered Accountants.

A.H.W. & Co. Chartered Accountants was established 2015 registered with Institute of Chartered Accountants of Pakistan (ICAP) and Institute of Chartered Accountants in England and Wales (ICAEW). The AHW offices are located in Lahore and Islamabad. AHW

employs a diverse range of qualified and experienced professionals which includes Chartered Accountants, Cost and Management Accountants, Tax Specialists, Certified Internal Auditors, Corporate Affairs Consultants, Certified Information System Auditors, Masters in Business Administration, Law Graduates, and Information System Analysts & Programmers.

AHW have substantial individual and collective experience of serving clients in major areas encompassing Audit and Assurance, Income, Sales & Service Tax Advisory, Accounting & Business Process Automation, Corporate Advisory, Business Operations Outsourcing, Business Advisory, Offshore Services and Actuary Services.

1.7.4 A.H.W Management Consultants

A.H.W management consultants is a sister company of A.H.W & Co. Chartered Accountants and undertakes various assignments in the area of management consultancy. Its officers are located in Lahore and Karachi. AHW has substantial expertise in serving clients about strategic planning, operation management, human resource management and commercial considerations. The company employs a diverse range of qualified management graduates, financial professionals, accounting professionals, certified auditors and law graduates etc.

1.8 Scope of Work of the Consulting Assignment

Under the contract, the following services are to be carried out by the Consultant for the feasibility study of PGC:

i. Feasibility Study on technical, financial and commercial viability of PGC including power market analysis in Punjab; the need of PGC and to which areas it will serve.
ii. Brief NEPRA on technical aspects of PGC.
iii. Study and indicate scope of service of PGC in view of current regulatory environment and upcoming wholesale / competitive electricity market.
iv. Study and identify potential clients for PGC including bulk electricity consumers in Punjab, existing power generation facilities, future power market participants etc.
v. Preferential
vi. PGC Operation and Maintenance (O&M) modelling inter-alia considering;
    a) O&M in public mode
    b) O&M in private contractual mode
    c) O&M through federal entities (NTDC / DISCOs)
vii. Prepare business plan for sustainable operation of PGC.
viii. Propose ways where PGC can facilitate the National Grid Company in removal of transmission congestion.
ix. Identification of potential transmission lines and grid station for evacuation of power from generation entities to consumers.
x. Devise mechanism for coordinating with system operator for dispatch of generation facilities by use of PGC transmission lines on non-discriminatory basis.
xi. Facilitation mechanism to generator and consumers for wheeling the generator / received power / energy.
xii. Identify weak and no grid areas in Punjab. How PGC can electrify these areas.

1.9 Organization of Report

In light of the scope of scope of work and agreed terms and conditions, the Consultant developed this feasibility report which includes:

- ✓ Brief overview & background of the project have been covered in **Chapter 1** of the report.
- ✓ Historic power demand/supply and power market competition in Punjab have been discussed in **Chapter 2** of the report.
- ✓ Constraints/bottlenecks, future power demand, new generations plants, existing & future bulk power consumers and opportunities for PGC have been identified and discussed in detail in **Chapter 3** of the report.
- ✓ Role of PGC under NEPRA Act & National Electricity Policies and legal procedures for reliable operation of PGC in power sector have been elaborated in **Chapter 4** of the report.
- ✓ Corporate, organization structure, and functionalities of PGC have been provided in **Chapter 5** of the report.
- ✓ CTBCM model and role of PGC under CTBCM have been demonstrated in detailed in **Chapter 6** of the report.
- ✓ Business models & business plan for PGC have been formulated in **Chapter 7** of the report.
- ✓ Conclusion about establishment of PGC in light of technical, commercial, financial and regulatory feasibility has been drawn in **Chapter 8** of the report. Furthermore, way-forward for incorporation of the PGC is also elaborated in this chapter.

1.10 Stakeholders Consultation Meeting

After the preparation of first draft of this feasibility study report, 02 sessions of stakeholders' consultation (Public and Private sector) were conducted at PPDB office Lahore. In this regard, 1st stakeholders' consultation was conducted on 21st June 2022 with various public sector institutions including 05 DISCOs of Punjab and NTDC etc. Thereafter, on 22nd June 2022 another session of stakeholder consultation was conducted by taking on board various relevant private sector players including power plants, industrial estates and other players. The inputs of both public and private sector stakeholders were duly considered and appropriately addressed in the report.

1.11 Panel of Experts (PoEs) Meetings

PoEs meeting was held on 27th July 2022 to review the final draft report. PoEs raised various observations/comments on the report. The consultant after appropriately addressing PoEs comments submitted updated final draft report to PPDB.

1.12 2ND Panel of Experts (PoEs) Meetings

2nd PoEs meeting was held on 2nd September 2022 to review the observations addressed and incorporated in the updated final draft report by the consultant. PoEs after reviewing and detail discussion unanimously approved the updated final draft report with the direction to submit final report by consultant after incorporation of agreed observations for onward submission and approval of PPDB Board. The consultant after appropriately incorporating agreed observations, is now submitting this final feasibility report.

2. POWER MARKET ANALYSIS OF PUNJAB PROVINCE

In this chapter, power market of Pakistan with particular focus on Punjab has been discussed. This includes role of NTDC with respect to primary transmission system and DISCOs in Punjab with respect to power supply to end consumers. Power demand and supply situation in the country in general and for Punjab in particular has also been briefly discussed in this section. The description about power market analysis from demand and supply perspectives, within the context of Punjab, has been provided.

2.1 Brief description of Power System of Country

The power system of Pakistan as like any other country comprises of 03 segments including generation, transmission and distribution. A number of entities are involved in each of these segments to generate, transmit and distribute power to end consumers. The electric power is a regulated business in Pakistan and NEPRA regulates these entities.

Till 1993 WAPDA was the only entity responsible for power generation. However due to rapid industrialization and other socio-economic development, power demand increased rapidly and WAPDA was not able in keeping the momentum adding adequate power generation capacity resulting in heavy load shedding thereby affecting economic development of the country.

Consequently, in order keep the momentum of economic development, the government of Pakistan decided to tap national and international resources through an investor friendly power policy in 1994. This initiative proved very successful and a number of IPPs invested in the country's power generation projects which resulted in resolving load shedding issue by 1999. Whereas transmission and distribution segments solely remained in public/Govt. hands. due to which transmission and distribution system are facing various challenges including high losses, funds deficiency, lack of competition, poor service delivery, circular debt, and high-cost electricity etc.

In order to improve the power delivery system in the country, GoP took initiative by introducing Transmission Line Policy 2015 enabling the provinces and private sector players participation in the transmission business of the country. Further, under NEPRA Amendment Act 2018, provinces were empowered to incorporate their own provincial grid companies to undertake power transmission activities. The provinces of Sindh and Khyber Pakhtunkhwa have already established their own provincial grid companies.

The distribution segment which is the interface of power system with end consumers is still in public domain and yet there is no private sector participation in this segment. The licenses granted to DISCOs by NEPRA were on exclusive basis and they were thus

allocated a monopolistic status in their respective serving territories. Due to these challenges, it is likely that distribution segment would also open for competition in near future especially due to upcoming implementation of Competitive Trading Bilateral Contracts Market (CTBCM). The latest statistics about power system of Pakistan are provided in below sub-sections.

2.1.1 Generation

On generation side, there are various types of power plants including renewable and non-renewable which are generating power for further transmitting to consumers through NTDC and DISCOs systems. Presently, the power generation mix of Pakistan is contributed by both public and private sectors. The main electric power producers in public sector are thermal GENCOs, WAPDA, and PAEC, the operator of the three nuclear power plants. While in private sector, the key power producers are IPPs established since 1994 and K-Electric which are contributing significantly to the electricity sector of the country.

As per latest NEPRA state of industry report 2021, the total installed capacity of the country by June 30, 2021 was about 39,772 MW, which further bifurcated into 36,934 MW installed capacity at CPPA-G/NTDC system and 2,838 MW installed capacity at Karachi Electric (KE) system. The installed capacity of CPPA-G/NTDC system during 2021 further comprised of WAPDA hydel 9,443 MW, IPPs hydel 472 MW, GENCOs thermal 4,881 MW, IPPs thermals 17,276 MW, captive power plants 340 MW, nuclear power 2,475 MW, wind plants 1,248MW, solar plants 430MW and Bagasse plants 369 MW. Similarly, the installed capacity of K-Electric system during 2021 comprised of KE own plants 2,084 MW, IPPs 366 MW, captive plants 151 MW, KANUPP 137 MW and RE plants 100 MW.

Table-1 depicts the total installed capacity of Pakistan as of 30th June for 2 consecutive years, i.e. 2020 and 2021.

Table-1: Source-wise Installed Capacity by Type (MW) as on 30th June

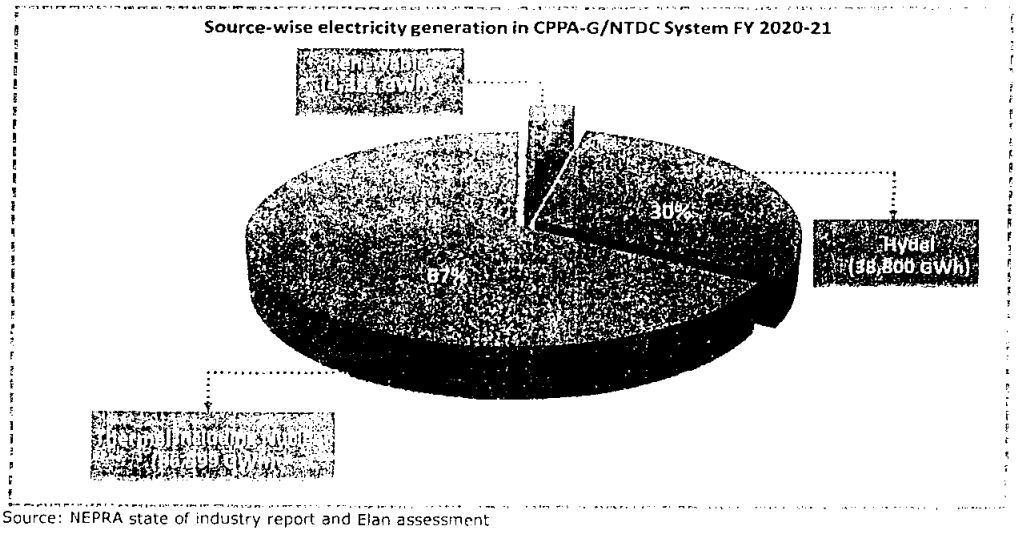
Generation Source	Capacity (MW) 2021	Capacity (MW) 2020	Variation Capacity (MW)	Variation %
A. CPPA-G/NTDC SYSTEM				
WAPDA Hydel	9,443	9,389	54	0.57
IPPs Hydel	472	472	0	0.00
Total Hydel	**9,915**	**9,861**	**54**	**0.54**
GENCOs connected with PEPCO	4,881	4,881	0	0.00
IPPs Connected with PEPCO	17,276	17,276	0	0.00
SPPs/CPPs Connected with PEPCO	340	340	0	0.00

Nuclear	2,475	1,330	1,145	86.10
Total Thermal including Nuclear	**24,972**	**23,827**	**1,145**	**4.80**
Wind	1,248	1,248	0	0.00
Solar	430	430	0	0.00
Bagasse/Biomass	369	369	0	0.00
Total CPPA-G/NTDC System	**36,934**	**35,735**	**1,199**	**3.36**
B. KE SYSTEM				
KE Own	2,084	2,294	-210	-9.15
IPPs Connected with KE	366	366	0	0.00
SPPs/CPPs connected with KE	151	87	64	73.56
Nuclear	137	137	0	0.00
Solar	100	100	0	0.00
Total KE	**2,838**	**2,984**	**-146**	**-4.89**
Total Installed Capacity of the Country	**39,772**	**38,719**	**1,053**	**2.72**

Source :NEPRA State of industry Report 2021

Through this installed capacity, the total electricity generated in power system Pakistan during FY 2020-21 was 143,588.60 GWh. Among the total generated electricity, 129,722.05 GWh was generated in power plants connected to CPPA-G/NTDC system and 13,368.59 GWh was generated in power plants connected to KE system. While 498.37 GWh electricity was imported from Iran during the same financial year. The power generated in CPPA-G/NTDC connected plants are of various sources including thermal, hydel and renewable etc. The chart in **Figure-2** illustrates source-wise electricity generated in power plants connected to CPPA-G/NTDC/ system during FY 2020-21.

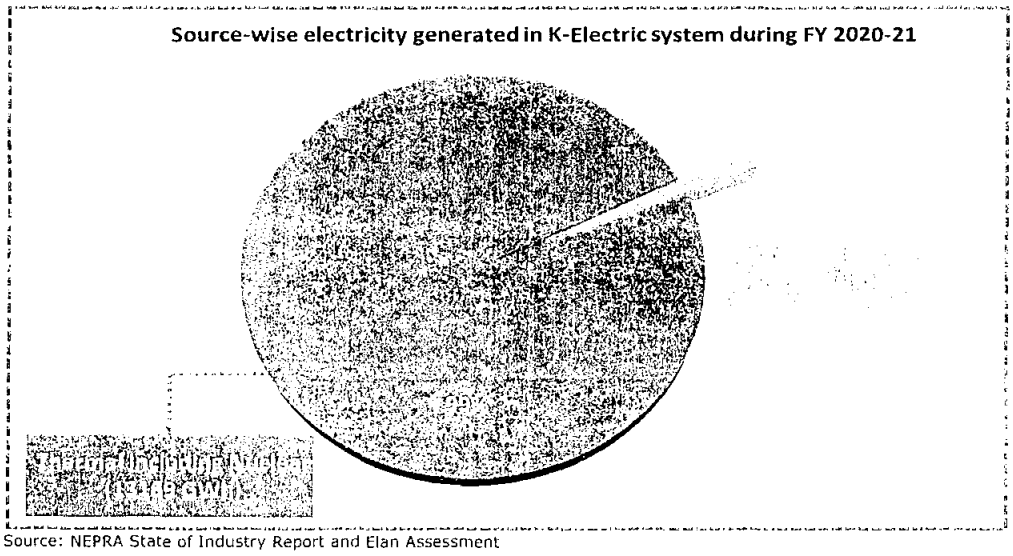
Figure-2: Source-wise electricity generated in power plants connected to CPPA-G



Source: NEPRA state of industry report and Elan assessment

In case of K-Electric system, during FY 2020-21, the electricity units were 13,368.59 GWh including 10,186 GWh from KE own plants, 2,184.57 GWh from IPPs, 579.02 GWh from captive plants, 219 GWh from KANUPP, and 200 GWh from renewable plants.
It is pertinent to mention that most of the power generated in plants connected to K-Electric system is from thermal resources including gas, oil and coal. The chart in **Figure-3** illustrates source-wise electricity generated in power plants connected to K-Electric system during FY 2020-21.

Figure-3: Source-wise Electricity Generated in Power Plants Connected to K-Electric System



Source: NEPRA State of Industry Report and Elan Assessment

2.1.2 Transmission

From the generation side, the power is dispatched through primary grid network having voltage of 220 kV and above. National Transmission & Dispatch Company (NTDC) is the grid owner of this primary network of the country excluding the area which comes under the jurisdiction of KE i.e., Karachi city and adjacent area. Central Power Purchasing Agency Guaranteed (CPPA-G) is the market operator while National Power Control Centre is being to be developed as the system operator of NTDC network. While, KE is the only integrated power utility in Pakistan which manages three core areas of its power business, i.e., generation, transmission and distribution under respective 03 licenses granted by NEPRA.

According to NEPRA state of industry report 2021, as of June 30th, 2021, the total number of 500 kV grid stations in NTDC system was 16 with a total transformation capacity of 30,610 MVA. The installed 500/220 kV and 220/132 kV transformers, at these grid stations, were 44 and 34 respectively. While total number of 220 kV grid stations owned by NTDC was 46 with total transformation capacity of 25,770 MVA. The total number of installed 220/132 kV transformers was 129 at 220 kV grid stations.

On the other hand, as of June 30th, 2021, the KE had a total of 11 grid stations of 220 kV, with total transformation capacity of 4,580 MVA and 69 grid stations of 132 kV with total transformation capacity of 7,135 MVA.

2.1.3 Distribution

From the primarily grid the power is dispatched to distribution network for onward distribution to end consumers. In CPPA-G system, the responsibility of operation and maintenance of 132 kV and below network is of 10 DISCOs. These DISCOs were established after unbundling of WAPDA and are fully owned by GoP. These DISCOs are operating and maintaining 132 kV and below network in respective jurisdiction. From the national grid, the power is then allocated to these DISCOs as per their pre-defined quota via CPPA-G. These DISCOs then sell the respective allocated/bought power to various customers in their respective jurisdictions under NEPRA's regulated slab prices assigned to different customers' categories. Following are existing 10 DISCOs connected with NTDC system in Pakistan. The delivery of power to end consumers via DISCOs network generally depends upon the adequacy of some key components including 132/11 kV power transformers, 11 kV feeders and distribution transformers. As of June 2021, the ownership of these 10 DISCOs include;

- 29,495 km long 132 kV Transmission Lines
- 882 Nos. of 132 kV grid stations, having 1,984 total power transformers with total transformation capacity of 55,063 MVA.
- 10,188 Nos. of 11 kV feeders with total length of 349,197 km
- 803,882 Nos. of Distribution Transformers with 51,555.295 MVA transformation capacity
- 31,569,589 Nos. of total consumers

Unlike, CPPA-G/national grid system, KE maintains and operates its distribution segment along with generation and transmission activities. As of June 2021, the ownership of KE include;

- 833 km long 132 kV Transmission Lines
- 69 Nos. of 132 kV grid stations, having 168 power transformers with total transformation capacity of 6,457 MVA.
- 1,937 Nos. of 11 kV feeders with total length of 10,283 km
- 29,702 Nos. of Distribution Transformers with 8,153 MVA transformation capacity
- 3,185,332 Nos. of total consumers

2.2 NTDC Network and Role of NTDC with Reference to Punjab

NTDC is national grid company of Pakistan and generally owns transmission infrastructure of 220 kV and above. Its service territory is whole country except Karachi city and surrounding area, which is served by KE. NTDC was granted transmission license by NEPRA and under which it undertakes transmission service which charging NEPRA determined service charges to concerned parties. The transmission service charges generally reflect the cost incurred by NTDC as well as a reasonable return margin. The statistics about the assets and other relevant infrastructure of NTDC for year 2019-2020 are provided in **Table-2** below.

Table-2: NTDC Infrastructure Related Data for Year 2019-2020

Parameter	Number
Length of 500 kV Transmission Lines	**7,470 km**
Length of 220 kV Transmission Lines	**11,281 km**
Number of Grid Stations 500 kV	**16**
Number of Grid Stations 220 kV	**45**
MVA Capacity 500 kV	**25,460**
MVA capacity 220 kV	**30,440**
Transmission losses	**3.3%**

Source: Power System Statistics 45th Edition-2021

The 500 kV transmission system further comprise of 6172 km single circuit and 1298 km double circuit transmission lines. The total number of 500 kV grid stations is 16 while for 220 kV grid stations (G/S) it is 45. A more holistic overview about NTDC system with specific reference to Punjab province is provided below in the **Table-3** below.

Table-3: NTDC System with Specific Reference to Punjab

Province	500 kV		220 kV		132 kV		66 kV		33 kV		Total	
	No. of G/S	Capacity (MVA)	No. of G/S	Capacity (MVA)	No. of G/S	Capacity (MVA)	No. of G/S	Capacity (MVA)	No. of G/S	Capacity (MVA)	No. of G/S	Capacity (MVA)
Punjab	10	16,650	37	20,900	532	36,587	30	667	2	24	611	74,828
Sindh	5	7,460	5	2,550	116	5,145	24	348	0	0	150	15,503
Khyber Pakhtunkhwa	1	1,350	8	4,960	89	6,582	23	497	5	32	126	13,421
Baluchistan	-	-	5	2,030	72	3,183	3	33	32	160	112	5,406
Total	**16**	**25,460**	**55**	**30,440**	**809**	**51,496**	**80**	**1,545**	**39**	**222**	**999**	**109,163**

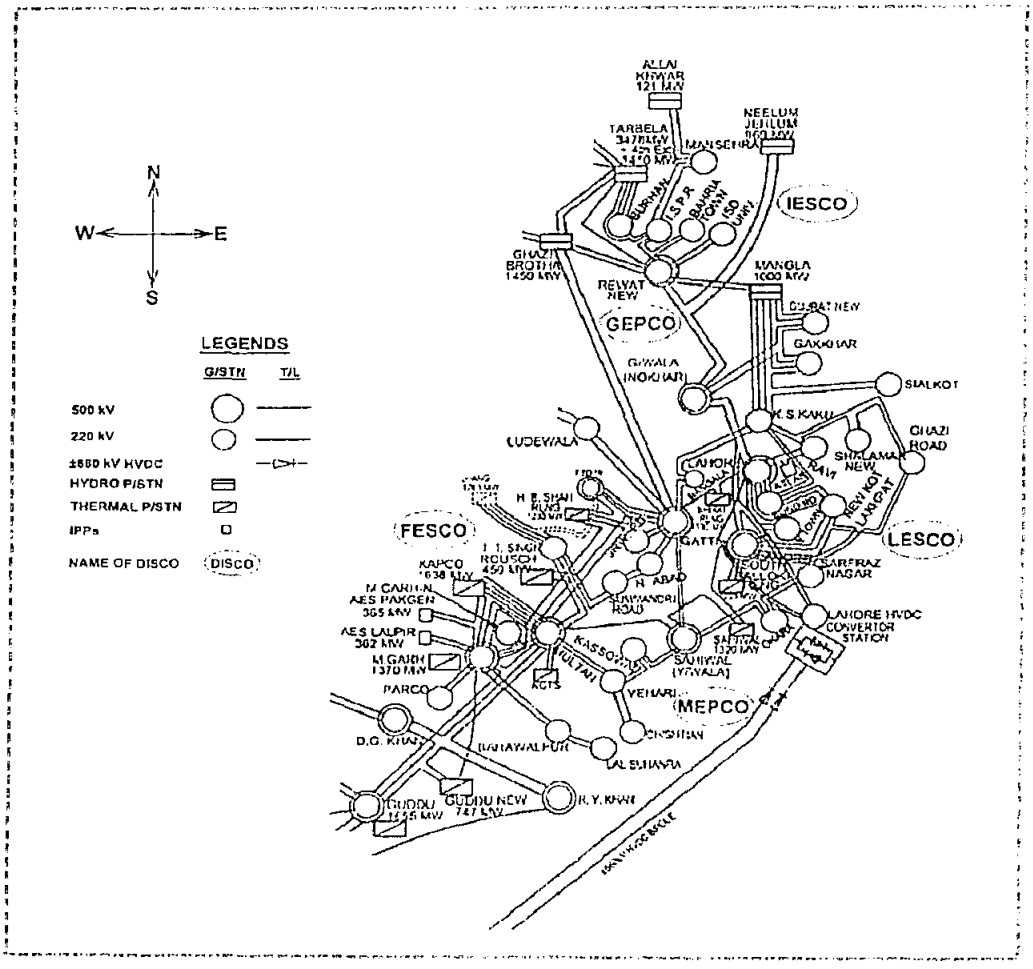
Source: NTDC

The province of Punjab is major transmission corridor where the assets of NTDC are installed. Out of total sixteen 500kV G/S 10 are installed in Punjab which are listed below:

- 500 kV Rawat G/S
- 500 kV Lahore (Sheikhupura) G/S
- 500 kV Gatti (Faisalabad) G/S
- 500 kV Nokhar G/S
- 500 kV Sahiwal (Yousafwala) G/S
- 500 kV Lahore south G/S
- 500 kV New Multan G/S
- 500 kV Muzafargarh G/S
- 500 kV Rahim Yar Khan G/S
- 500 kV Dera Ghazi Khan G/S

Existing NTDC transmission network installed in the province of Punjab is illustrated in **Figure-4** below.

Figure-4: NTDC Transmission Network of Punjab

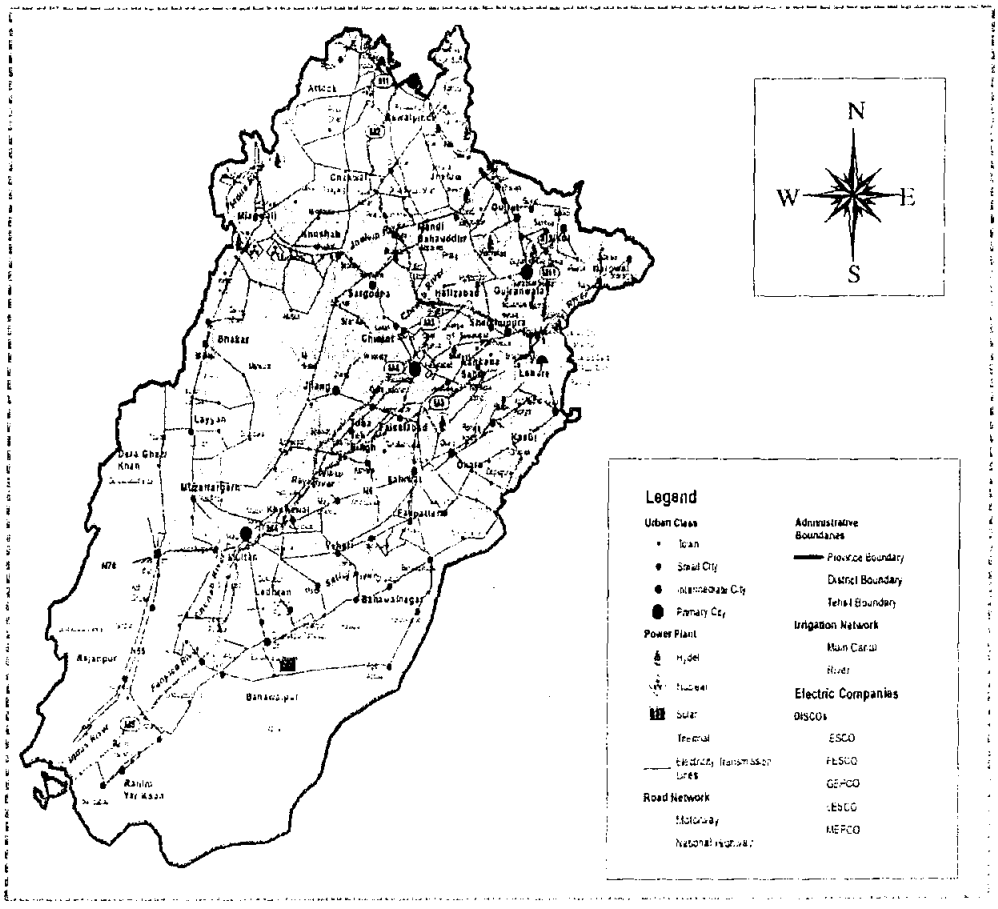


2.3 Distribution Companies in Punjab

The major load centres of the country are located in Punjab and being population-wise the largest province its electric power requirement is huge in comparison of other 03 provinces. Among total 10 DISCOs connected with NTDC system, 05 are located only in Punjab province i.e., FESCO, GEPCO, IESCO, LESCO and MEPCO.

The geographical locations of DISCOs in Punjab are shown in **Figure-5** below.

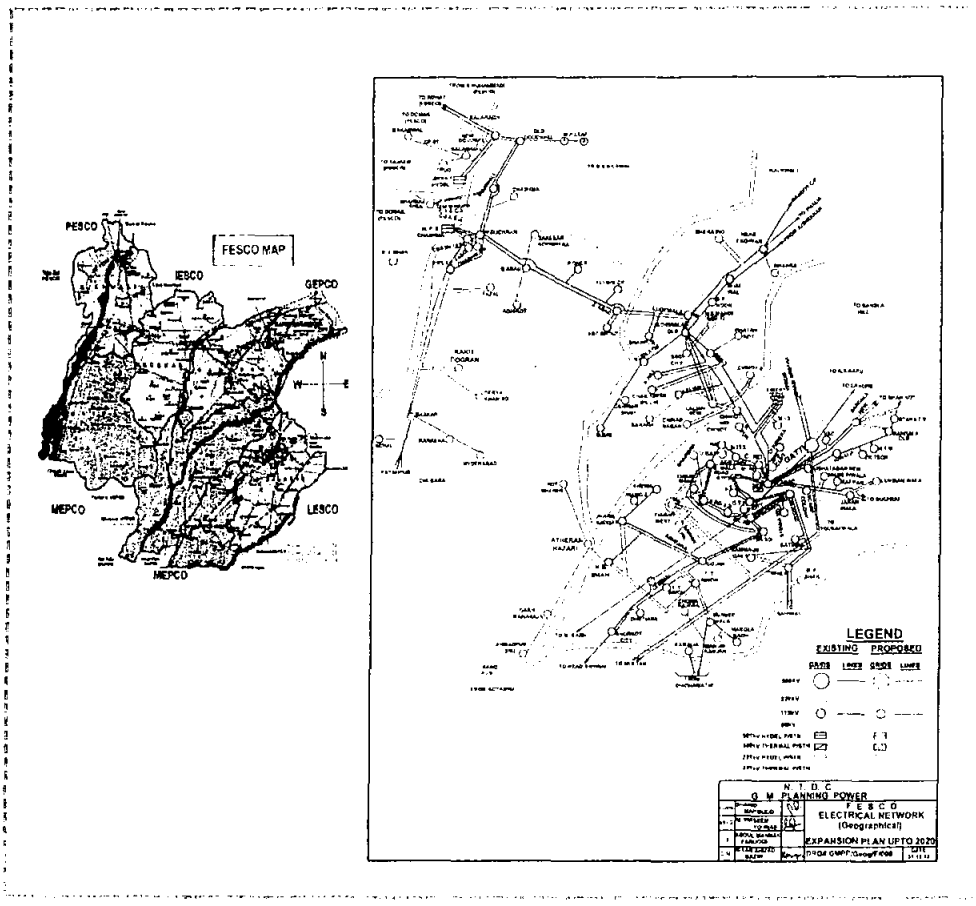
Figure-5: Punjab Electricity Distribution Companies Jurisdiction Map



2.3.1 Faisalabad Electric Power Company (FESCO)

The districts served by FESCO, under the granted license by NEPRA, are Faisalabad, Sargodha, Mianwali, Khushab, Jhang, Bhakker, and T.T Singh. The total length of its 132 kV distribution network is 2,337 km and it has total 102 number 132 kV grid stations. It has total 1,185 11 kV feeders with total length of 45,690 km. The consumers served by FESCO are 4,641,802 and the recorded sold units during FY 2020-21 are 14,501 GWh. The jurisdiction map of FESCO is shown in **Figure-6** below.

Figure-6: Jurisdiction Map of FESCO

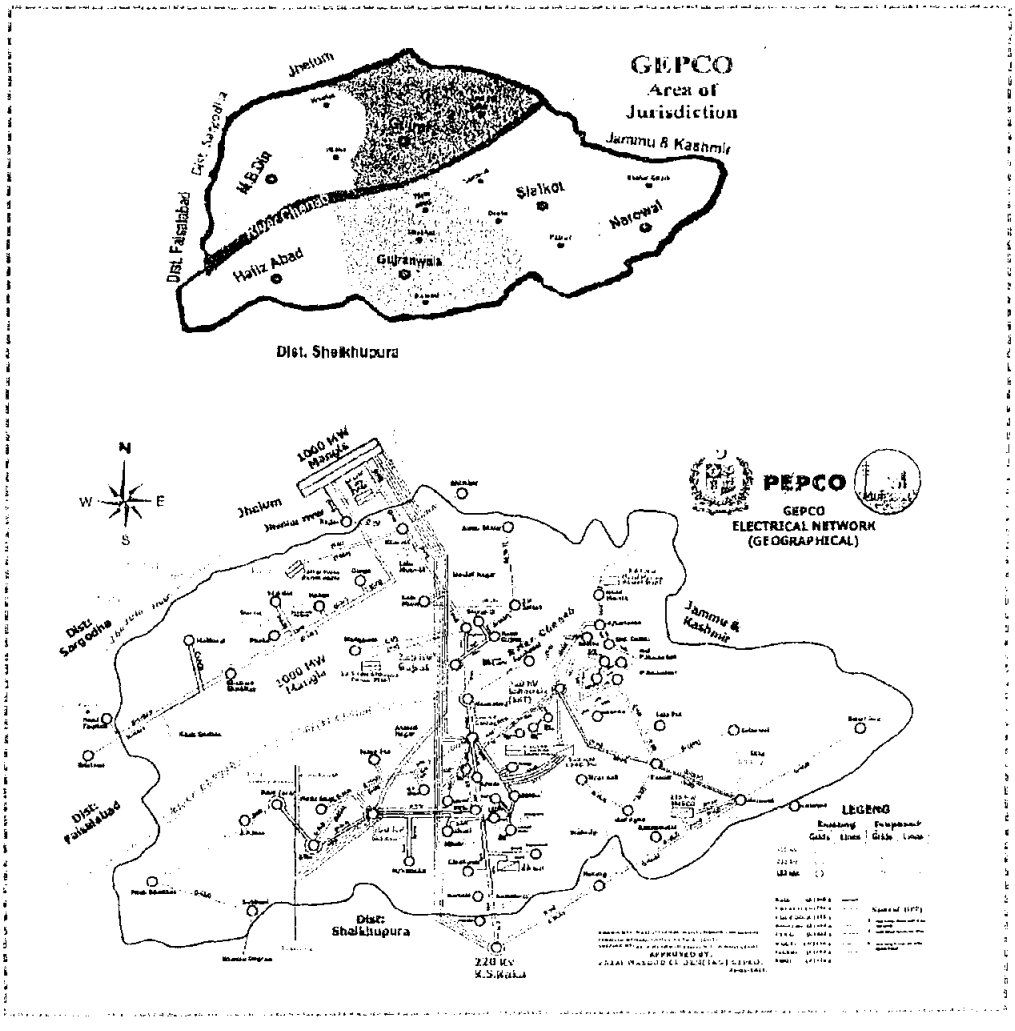


2.3.2 Gujranwala Electric Power Company (GEPCO)

The serving territory of GEPCO, under the granted license by NEPRA, area districts of Gujranwala, Hafizabad, Sialkot, Narowal, Gujrat and Mandi Bahauddin. The total length of its 132 kV distribution network is 2,611 km and it has total 59 number 132 kV grid stations. It has total 910, 11 kV feeders with total length of 24,659 km. The consumers served by GEPCO are 3,933,086 and the recorded sold units during FY 2020-21 are 10,922 GWh.

The jurisdiction map of GEPCO is shown in **Figure-7** below.

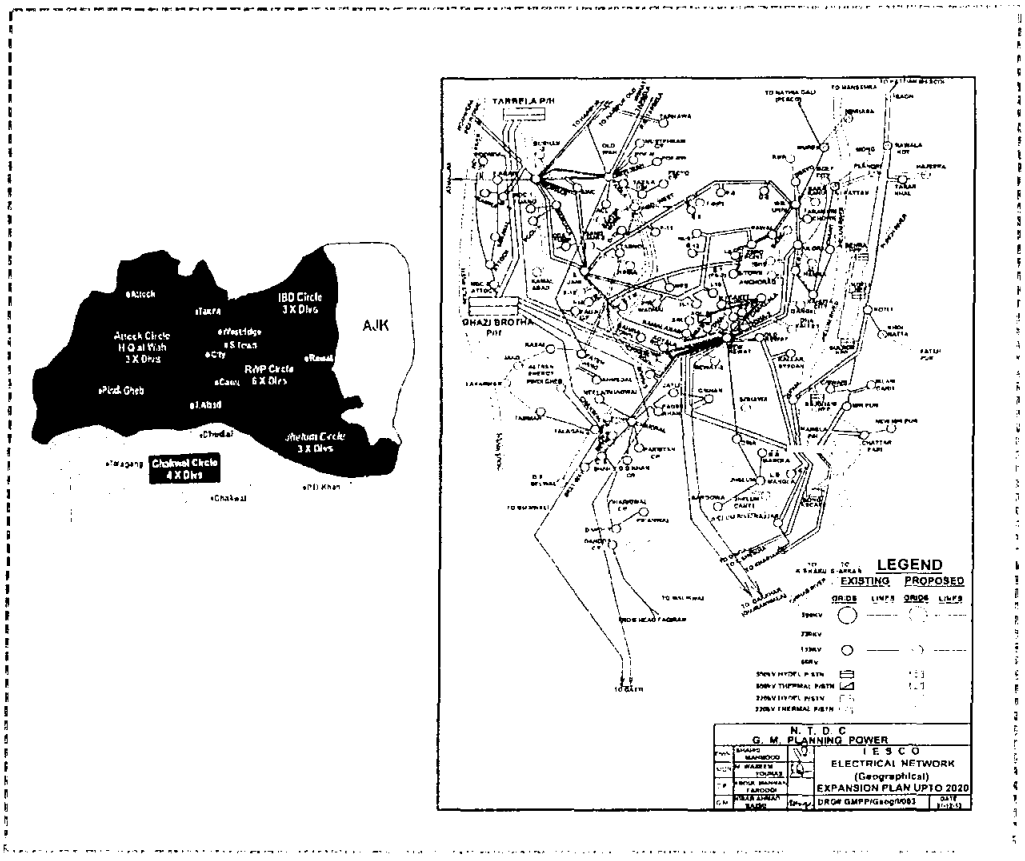
Figure-7: Jurisdiction Map of GEPCO



2.3.3 Islamabad Electric Power Company (IESCO)

In accordance to granted license by NEPRA, the districts of Rawalpindi, Chakwal, Attock, Jhelum and Federal Capital Islamabad are served by IESCO. The total length of its 132 kV distribution network is 3,482 km and it has total 111 number 132 kV grid stations. It has total 1,211 11 kV feeders with total length of 26,237 km. The consumers served by IESCO are 3,276,164 and the recorded sold units during FY 2020-21 are 10,944 GWh. The jurisdiction map of IESCO is shown in **Figure-8** below.

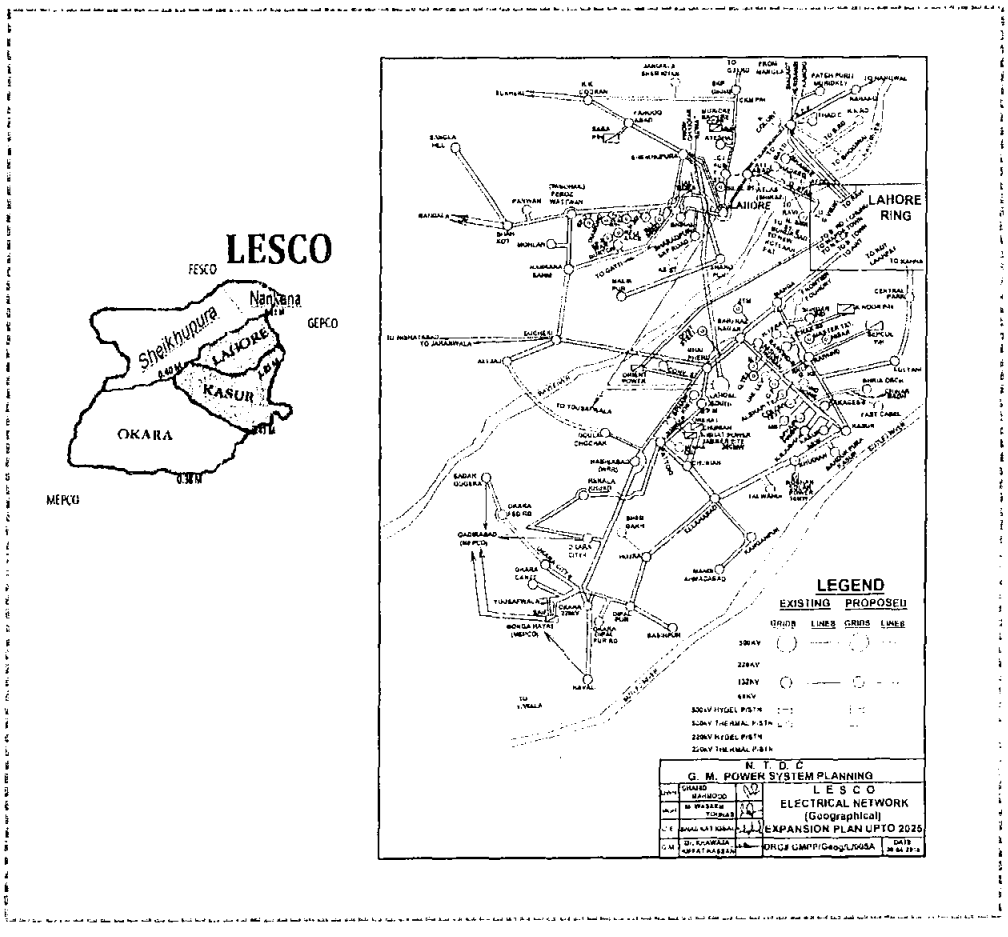
Figure-8: Jurisdiction Map of IESCO



2.3.4 Lahore Electric Supply Company (LESCO)

The service territory of LESCO, under the granted license by NEPRA, are districts of Lahore, Kasur, Okara and Sheikhupura. The total length of its 132 kV distribution network is 3,051 km and it has total 167 number 132 kV grid stations. It has total 2,011 11 kV feeders with total length of 30,055 km. The consumers served by LESCO are 5,527,854 and the recorded sold units during FY 2020-21 are 22,352 GWh. The jurisdiction map of LESCO is shown in **Figure-9** below.

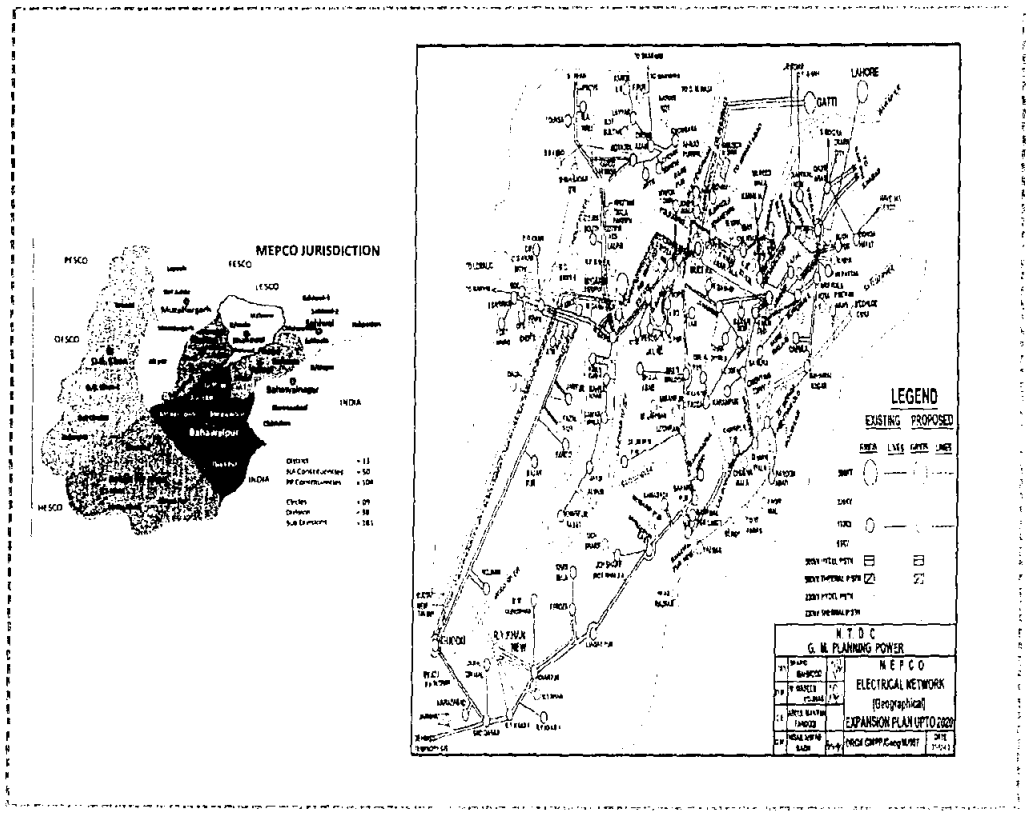
Figure-9: Jurisdiction Map of LESCO



2.3.5 Multan Electric Power Company (MEPCO)

The area of jurisdiction of MEPCO, under the granted license by NEPRA, are Multan, Muzaffargarh, Layyah, D.G. Khan, Rajanpur, Lodhran, Bahawalpur, R.Y. Khan, Khanewal, Sahiwal, Pakpattan, Vehari and Bahawalnagar districts. The total length of its 132 kV distribution network is 4,072 and it has total 134 number 132 kV grid stations. It has total 1,652 11 kV feeders with total length of 79,837 km. The consumers served by MESCO are 7,217,677 and the recorded sold units during FY 2020-21 are 17466 GWh. The jurisdiction map of MEPCO is shown in **Figure-10** below.

Figure-10: Jurisdiction Map of MEPCO



2.4 Power Market Analysis from Demand and Supply Perspectives

2.4.1 Single Buyer Market

Pakistan has a single buyer model that purchases electricity from public and private power sector generators and supplies to DISCOs. Whereas, NTDC plays a role of wheeling power from generators to DISCOs. The monopolistic status of power utilities does not incentivize efficiency and instead encourages them to pass on the cost of their losses to consumers in the form of high tariff. CPPA-G on behalf of DISCOs purchases power from power plants under PPAs. NTDC is responsible to prepare generation and transmission systems expansion plans while real time dispatch of power plants is managed by NPCC.

2.4.2 Competitive Trading Bilateral Contract Market (CTBCM)

Many countries started restructuring of their power sectors way-back in 1980s and finally ended up with competitive power market model. Some of the countries have successfully restructured their power sector while others are under process of restructuring. Pakistan conceived the idea of restructuring of power sector in 1990s. The GoP approved restructuring program for Pakistan's power sector in 1992. Internationally, such s restructuring program has been implemented and achieved the final target of competitive power market within 4 years. However due to one or other reasons, Pakistan could not introduce competitive market model till 2020 when NEPRA notified CTBCM rules in 2020. It is expected CTBCM model would be fully operational in a couple of years. The details of CTBCM model development in Pakistan have been comprehensively explained in **Chapter-6** of this report.

2.4.3 Demand Supply Analysis

The demand analysis is based on last 10 years historical data. Total no. of consumers with all the 10 DISCOs is around 31.5 million whereas number of consumers in 5 DISCOs only in Punjab is 24.5 million. Hence, Punjab has 78 % consumers of the total. During the last 10 year about 8.76 million consumers have been added in 5 DISCOs of Punjab.

The maximum demand of 10 DISCOs is 23,792 MW against computed demand of 27,193 MW as recorded in FY 2020-21. The maximum load demand of 5 DISCOs of Punjab is around 18,290 MW in summer whereas maximum supply by these DISCOs are around 17,043 MW. The gap in summer is about 1250 MW while in winter it narrows down to 300 MW between requested demand by DISCOs and supply. These gaps resulted in load shedding, which is due to system constraints, forced outage, or due to planned outages as per schedule given by the government.

It may be noticed that this recorded demand is suppressed demand. Because so many factors like ban on new big residential, commercial & industrial connections (pending applications) which were not added to the demand. In fact, the actual demand is more than the supressed demand which is called computed demand. The computed demand is calculated by factoring in these missing segments as mentioned above. The computed demand of 5 DISCOs in Punjab is about 20,450 MW which shows an actual gap around 3,000 MW. The PGC may play its role to narrow down this gap by removing some transmission and transformation constraints and to connect the new BPC with existing grid or nearest source of generation whichever is technically and economically feasible. The demand/supply deficit of DISCOs in Punjab is summarized in **Table-4** below.

Table-4: Demand / Supply Deficit - DISCOs in Punjab Year 2021

DISCO	Summer (MW)			Winter (MW)		
	Max Demand	Supply	Deficit	Max Demand	Supply	Deficit
IESCO	2438	2248	190	1351	1327	24
GEPCO	2814	2588	226	1398	1248	150
LESCO	4958	4572	386	2595	2531	64
FESCO	3351	3223	128	1634	1620	14
MEPCO	4729	4412	317	2036	1991	45
Total	**18290**	**17043**	**1247**	**9014**	**8717**	**297**

Source: NDTC

2.4.4 Energy Demand of DISCOs in Punjab

Similarly, while reviewing the energy consumption of 5 DISCOs of Punjab; it reveals that energy purchased by 5 DISCOs is about 85,192 GWh whereas energy sold is 76,184 GWh as recorded in FY 2020-21. The gap between the Purchase and sale shows the Loss of energy about 9000 GWh which translates the loss of 11.64% of DISCOs in Punjab. When the energy losses of 5 DISCOs of Punjab are compared with the all 10 DISCOS of the country, it is found that the losses occurred in Punjab's DISCOs are less than the losses of all 10 DISCOs which are around 17.32%.

While reviewing the last 10 years data it is observed that the DISCOs of Punjab are performing better as comparing to DISCOs of the other Provinces. The DISCO wise energy purchased, energy sold and losses in Punjab are given in the **Table-5**.

Table-5: DISCO Wise Energy Demand in Punjab FY 2020-21

DISCO	Unit Purchased	Unit Sold	Losses	
	GWh	GWh	GWh	%
LESCO	25,388	22,352	3,036	11.96%
GEPCO	12,032	10,922	1,110	9.23%
FESCO	15,985	14,501	1,484	9.28%
IESCO	11,965	10,943	1,022	8.54%
MEPCO	20,541	17,466	3,075	14.97%
Total	**85,911**	**76,184**	**9,727**	**11.32%**

Source: DISCOs

2.4.5 Bulk Power Consumers in Punjab

Due to implementation of multiple buyer power market in near future and as a first step to development of CTBCM, where in NEPRA allowed that Bulk Power Consumer (BPC) 1MW and above will be allowed to directly carry out a bilateral contract with a generator. BPC will be bound to have a firm generation capacity agreement equal to its projected Maximum Demand Indicator (MDI) with a non-PPA generator. These pairs will be potential scope of work for PGC. The Punjab Grid Company (PGC) may develop transmission link between the specific BPCs and Generators for power dispersal.

The historical record of all category consumers of DISCOs in Punjab is reviewed in general but focusing on the PGC, specifically reviewed and analysed the record of Bulk Power Consumers (BPC) and the Industrial consumers of these 5 DISCOs. The number of BPC in 5 DISCOs in FY 2011-12 was about 2168 which grows to 2300 by June 2021. The energy consumption of existing BPC in Punjab is about 3,917 GWh as recorded last year. The DISCO wise detail of BPCs is given in the **Table-6 & 7** as under:

Table-6: DISCO Wise Existing Load of Bulk Power Consumers (BPC)

Name of DISCOs	Number of Consumers
IESCO	974
FESCO	229
GEPCO	164
LESCO	469
MEPCO	459
Total	**2295**

Source: DISCOs

Table-7: DISCO Wise Energy Consumption (GWh) of BPCs in Punjab

DISCO	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
LESCO	415	427	446	469	514	572	661	667	627	654
GEPCO	261	267	275	293	326	355	382	399	396	411
FESCO	274	284	296	317	359	341	339	268	255	238
IESCO	1,569	1,669	1,798	1,756	1,913	2,071	2,284	2,359	2,277	2,338
MEPCO	158	156	173	200	224	252	293	295	276	276
Total	**2,677**	**2,803**	**2,988**	**3,035**	**3,336**	**3,591**	**3,959**	**3,988**	**3,831**	**3,917**

Source: DISCOs

2.4.6 Industrial Consumers in Punjab

The number of industrial consumers in Punjab was 226,755 in the year 2012 which is now grown to 293,111 till June 2021. It reveals that 66,000 new industrial consumers have been added in the 5 DISCOs of Punjab during last 10 years. Average growth rate of industrial consumers in Punjab is around 3%.

The industrial Clusters, Estates, Zones and SEZs are gradually growing in Punjab and they are seeking for reliable, continuous and economical electricity to run their industry. This is another potential area for PGC to wheel the power from generation source to these load clusters which are technically and economically viable. The information regarding load requirement and locations of such industrial estates/zones is given in the **Table-8** as under:

Table-8: Industrial Consumers of 5 DISCOs in Punjab

DISCO	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
LESCO	70,342	72,699	75,006	77,277	79,588	81,640	84,183	84,703	86,138	87,918
GEPCO	54,767	56,838	57,965	60,542	63,705	66,845	70,063	73,133	74,244	76,337
FESCO	42,099	43,836	45,120	46,602	47,909	49,350	49,314	50,027	50,911	52,253
IESCO	13,337	13,967	14,534	15,048	15,480	15,979	16,053	16,272	16,359	17,089
MEPCO	46,210	48,190	49,599	51,135	52,845	54,176	54,772	56,121	57,541	59,514
Total	226,755	235,530	242,224	250,604	259,527	267,990	274,385	280,256	285,193	293,111

Source: DISCOs

3. DEMAND PROJECTIONS AND NTDC PLANS

In this chapter NTDC's plan to evacuate from existing as well as upcoming power plants has been discussed at country level in general and the province of Punjab in particular. Further issues in meeting power demand of various category of consumers by DISCOs, due to constraints in transmission and distribution system and their plan to remove such constraints have also been discussed. In addition, upcoming power demand in Punjab, especially existing as well new BPCs and anticipated scope for PGC has also been highlighted.

3.1 Demand of Distribution Companies over Short to Medium Terms

The historical demand/supply of 5 DISCOs of Punjab has already been given in **Table-4** in **Sub-section 2.4.3** of the report. In fact, historical demand is a suppressed demand. Because there are many pending applications due to ban imposed on new large industrial, commercial, agricultural and residential schemes from time to time. Moreover, cities are expanding on fast pace by converting agricultural land into residential societies and industrial activities on the periphery of urban areas. Therefore, the actual demand of DISCOs is more than current historical demand. The data of 5 DISCOs in Punjab regarding short and medium term future load demand is provided in **Table-9** below.

Table-9: Short and Medium Term Demand of DISCOS in Punjab

Year	Demand (MW)				
	LESCO	GEPCO	FESCO	IESCO	MEPCO
2021 -22	5452	2,739	3359	2653	4493
2022 -23	5765	2,880	3660	2772	4785
2023 -24	6075	3,045	3886	2923	5093
2024 -25	6408	3,218	4086	3077	5399
2025 -26	6757	3,398	4322	3200	5715
2026 -27	7106	3,584	4569	3300	6066
2027 -28	7456	3761	4815	3500	6431

Source: DISCOs

3.2 DISCO's Ability to Meet Demand of Existing and New Load Centers

In the current scenario, the total generation capacity of public and private entities of country is surplus as declared by the Government. But still load shedding is being carried out because of inadequate transmission network and transformation capacity to evacuate power from generation companies to load centres in some areas. The DISCOs are mostly able to cater the demand but still there are many areas where demand is not being met due to some system constraints i.e., over loaded transmission, distribution lines and transformers. Moreover, in some areas the capacity of transmission network is not enhanced but due to political interference the low tension (L.T) network is extended unprofessionally. These unprofessional extensions in L.T network by violating normal practices caused increased load demand and network losses. In normal practice every DISCO has its own 5 year plan to cater the future load requirement and to remove the system constraints.

3.2.1 Plan to meet Future Demand of DISCOs in Punjab

It is a normal practice for DISCOs to prepare a 5 years, 132 kV STG Plan and get approved for the implementation on PC-1 from the government. Some of DISCOs are implementing 7th STG program and some or implementing 8th STG program e.g. IESCO is implementing 7th STG whereas LESCO implementing 8th STG program. These programs mainly contain addition of new grid stations, extension/augmentation of existing grid stations. It also includes new transmission lines, transmission bays, etc. as envisaged in their 5 year plans. These plans are normally to remove system constraints like overloaded transmission lines and transformers. The development of total projects envisaged in the 5 years plans rarely achieve 100% implementation. Some of the projects left over at approval stage mainly due to funds constraints. Many of projects achieve 100% completion, others got delay because of various reasons, e.g. late approvals, lack of funds, delays in fund release, late procurement of material, etc. After reviewing the 5 years plans of DISCOs in Punjab, the consultant keeping in view of PGC potential, extracted the new grid stations and new transmission lines projects to cater future load growth and to remove system constraints, the details of which are given in **Table-10** below.

Table-10: 132 kV STG Plans for DISCOs to Meet the Future Demand

DISCOs	Plans Duration	Upcoming G/S	Capacity Addition (MVA)	Upcoming T/L (Nos.)	Upcoming T/L (Km)
LESCO	2021-25	12	820	26	344
GEPCO	2021-26	19	1,466	38	412
FESCO	2021-26	35	1,414	64	1,038
IESCO	2022 -27	18	1,026	42	700
MEPCO	2021-26	20	1,452	20	717

Source: DISCOs

3.2.2 DISCOs Constraints / Bottlenecks in Punjab

The transmission system available mainly of NTDC/ DISCOs in Punjab has been reviewed with key focus on congestions/constraints which results in power load shedding in some areas. The consultant has analysed most of the constraints within 5 DISCOs of Punjab and short listed some constraints which needs to be removed in short term. This is another area where PGC may tap the potential projects from the constraints in 5 DISCOs. PGC may pick most feasible project and may check technical and economic viability before implementation. The PGC can pick up economically and technically viable projects. Such projects after its implementation can be good source of income by charging wheeling cost. The DISCO wise constraints/problems and potential projects for PGC are given in **Table-11** below.

Table-11: DISCO Wise Constraints/Problems and Potential Projects

Sr. No.	Grid Station	Problem		Constraint	Potential T/L Projects for PGC
MEPCO					
1	220kV Lal-Sohanra	Insufficient capacity and non-availability of 132kV circuits		Underutilized	Construction of additional new 132 kV lines to connect with BPC
2	500kV DG Khan	Insufficient capacity and non-availability of 132kV circuits		Underutilized	Construction of new 132kV T/L to connect with BPC
3	220kV Deharki	Insufficient capacity and non-availability of 132kV circuits		Underutilized	Construction of new 132 kV T/L to connect with BPC
4	132 kV Jehanian	132 kV Links between 220kV Vehari, 220 kV NGPS and Bahawalpur.	132 kV circuits emanating from 220 kV Vehari to Jehanian	Overloaded Circuits	Additional 132 kV T/L required
5	132 kV Lal-Sohanra	132 kV Links between 220 kV Chishtian, Bahawalpur and Vehari	132kV Lal-Sohanra to Hasilpur and Ludden circuits	Outages of Bahawalpur circuits since June 2018	New 132 kV line needed to provide N-1 contingency and dispersal of power from upcoming Solar projects to BPC
6	132 kV Qasimpur, Vehari Road, NGPS, New Multan	132 kV Links between 220 kV Vehari and Kassowal	Vehari Road, NGPS, New Multan	Overloaded	132kV New Multan - Qasimpur - MESCO Circuit 132kV New Multan - Vehari Road Circuit
7	132 kV Rahim Yar Khan	132 kV Links between 220 kV Vehari and Kassowal	132KV Rahim Yar Khan- I,II-Rahim Yar Khan (500KV) CCTs,	Overloaded	132kV circuit may be needed to avoid over loading
8	132kV Muzaffargarh	133 kV Links between 220 kV Vehari and Kassowal	132kV Muzaffargarh - Khangarh T/Line	Overloaded	132kV circuit may be needed to avoid over loading

FESCO					
9	132 kV Piplan	132kV Links between 220kV Daudkhel and D.I.Khan.	132kV Wanbuchran - Piplan (2) circuit	Overloaded since summer 2018	Addition/ Up gradation of link with enhanced current carrying capacity
10	132kV Daudkhel	132kV Links between 220kV Daudkhel and Ludewala.	132kV Daudkhel - Shahbaz Khel circuit	Overloaded since 2019 summer	132kV circuit needed to avoid over loading
11	132kV Ludewala	132kV Links between 220kV Ludewala to Nishatabad	132kV Ludewala to Sargodha-II G/S	Overloaded since 2019 summer	132kv circuit needed to avoid over loading
12	132 kV Ludewala	132kV circuit	132kV Ludewala to Kirana Hill G/S	Overloaded since 2019 summer	132kv circuit needed to avoid over loading
13	132kV Liberty Tech	132kV circuit	132kV Liberty Tech. to Chiniot Ind. G/S	Overloaded Circuit since 2019 summer	132kv circuit needed to avoid over loading
LESCO					
14	220kV New Shalimar	Insufficient capacity and non-availability of132kV circuits	Max. Utilization 66%	Under Utilization since energization	Addition of interlinks needed. 132kV T/L to BPC
15	132kV Shahdara	132 kV circuit emanating from 220kV Ravi to 132kV Shahdara	Overloaded Circuit	Since 2017	Addition/ Up gradation of link is needed.
16		132 kV Shahdara to 132kV Shahdara Scarp	Overloaded Circuit		Construction/ Re-routing of links with associated 132kV Network.
17	132kV Shahdara Scarp	132 kV cct emanating from 220kV Kala Shah Kaku to 132kV Shahdara Scarp	Overloaded Circuit	Since 2017	Addition/ Up gradation of link is needed
18	132kV Sheikhupura	132kV triple circuits emanating from 500kV Lahore Sheikhupura to 132kV Sheikhupura	Overloaded Circuit	Since 2019	Addition/ Up gradation of link is needed
19		132kV Sheikhupura to Firozabad circuit	Overloaded Circuit		Addition/ Up gradation of link is needed
20		132kV Sheikhupura to Halmore Bhikki P/H	Overloaded Circuit		Addition/ Up gradation of link is needed
21	132kV Khan ka Dogran	132kV Khan ka dogran to Sukheki circuit	Overloaded Circuit	Since 2019	Addition/ Up gradation of link is needed

22	132kV Blessed	132 kV Blessed to Halmore P/H circuit	Overloaded Circuit	Since 2019	Addition/ Up gradation of link is needed
23		132kV Blessed to Walgan Sohail circuit.	Overloaded Circuit		Addition/ Up gradation of link is needed
24	132kV Shahkot	132kV Shahkot to Walgan Sohail	Overloaded Circuit	Since 2019	Addition/ Up gradation of link is needed
25		132kV Shahkot to Halmore P/H	Overloaded Circuit		Addition/ Up gradation of link is needed
GEPCO					
26	220 kV Gujrat	Insufficient capacity and non-availability of 132kV circuits	Proposed circuits=12 whereas Actual Circuits=6	Addition of interlinks	Two new 132kV circuits from 132kV Hellan G/S are being proposed in 8th STG
27	132 kV Badomali	132kV circuit emanating from 220kV Kala Sha Kaku to 132kV Badomali	Old & deteriorated overloaded circuit	Circuits Overloaded	Addition/ Up gradation of link is needed
28	132 kV Gujrat-II	132kV circuit	132kV Gujrat-II-Ratti T-OFF Jalalpur Jatan circuit.	Overloaded	The estimate for installation of 2nd circuit is under approval.
IESCO					
29	132KV Kahuta City	132KV Links between 500KV New Rawat to Mansehra	132KV Kahuta City to 132KV Palandri G/S	Overloaded since 2019	Addition of new circuit is required

Source: NTDC 2021 & DISCOs

3.2.3 Potential Projects for PGC form Constrained T/L

Upon analysis of congestions/constraints in 500 kV, 220 kV and 132 kV T/L system of NTDC & DISCOs, many T/L were identified which require removal of their constraints which can be accomplished through either of the following options.

- Increasing size of conductors
- Converting single circuit into double circuit
- Placing extra circuit on existing towers
- New T/L

In case of PGC, in areas where existing circuits are overloaded and need new T/L, PGC can pick up economically and technically viable new T/L projects in collaboration with relevant DISCOs and NTDC. Consultant shortlisted few such potential projects for PGC from constrained T/L in parallel to NTDC through a collaborative mode instead of a competitor. The potential projects of 500 kV and 220 kV T/L for PGC are given in the **Table-12** below.

Table-12: Potential Projects for PGC from Constrained T/L

S. No.	Description	Target
1	500 kV- Sialkot - Lahore North D/C T/L (55km)	2024-26
2	220 kV D/C T/L from 500 kV Sialkot to 220 kV Gujranwala -II (36 km)	2024-26
3	220kV D/C T/L from 500kV Sialkot to 220kV Sahuwala (12 km)	2024-26
4	220kV D/C T/L from 220 kV Gujranwala to 500 kV Nokhar (80 km)	2024-25
5	In/out of existing 220kV Mangla - KSK S/C T/L at Gujranwala -II (30km)	2024-26
6	220kV Nagshah-Qasimpur - Multan	2024-26
7	220kV Qasimpur - Multan D/C T/L (12km)	2024-26
8	500 kV Ghazi Brotha - Faisalabad West D/C T/L (330km)	2024-26

3.3 Identification of Potential Projects for PGC

3.3.1 Criteria for Selection of Projects

Based upon detailed review of STGs and future T/L expansion plans of NTDC/DISCOs, the consultant recommends PGC may undertake newly upcoming transmission line projects of 500/220/132 kV in NTDC and 5 DISCOs of Punjab. Other T/L projects of both NTDC & DISCOs falling under the category of loop in & loop out, upgradation, augmentation, 2nd circuit on same tower etc., are not recommended as potential projects for PGC. However, it is suggested, before undertaking any T/L project, PGC may liaise and collaborate with NTDC and relevant DISCOs to avoid any overlapping issue. The details of potential projects are given in subsequent sections below.

3.3.2 Potential Projects of 132 kV T/L for PGC in STG Plans of DISCOs

The consultant has reviewed the 7th/8th STG plans of DISCOs of Punjab to extract the potential T/L projects for PGC. Based on broader criteria for shortlisting the potential projects for PGC as narrated in **Section 3.3.1** above, the total potential projects of 132 kV T/L in all 5 DISCOs are identified around 19 nos. having total length of 729 Km which are provided in **Table-13** below.

Table-13: Potential Projects of 132 kV T/L for PGC in STG Plans of DISCOs

Sr. No.	Name of Circuit	Voltage	Length (Km)
IESCO			
1	Dispersal of Power from 500/220/132 kV Chakwal Construction of Double Circuit using existing 66 kV Right way of 132 kV	132 kV	40
2	Dispersal of Power from 500/220/132 kV Chakwal Construction of Double Circuit using existing 66 kV Right way NPS for Talagang	132 kV	40
3	132 kV Sambli Bheramal to Muree (2nd Source)	132 kV	23
		Sub Total	**103**
MEPCO			
4	132KV Vehari-Burewala CCT-I, New 132KV Vehari 220KV - Burewala Old is proposed in 5 year plan to avoid over loading of 132KV Vehari 220KV-Burewala and 132KV Vehari-Burewala T/Ls Total length	132KV	47
5	132kV Lalsohanra to Hasilpur and Ludden circuits, a new 132 kV line to be constructed to provide N-1 contingency and for smooth dispersal of power of upcoming Solar projects as well.	132 kV	62
6	132 kV ccts emanating from 220 kV Vehari to Jehanian, a parallell circuit is planned	132 kV	65

7	Proposed a new circuit in parallel to 132kV Muzzaffargarh - Khangarh T/Line	132 kV	20
8	Proposed 3rd circuit parallel to 132KV Rahim Yar Khan- I,Ii - Rahim Yar Khan 500KV Grid	132 kV	15
		Sub Total	**209**
FESCO			
9	132kV Daudkhel - Shahbaz Khel circuit, Planned to construct a new cct. to avoid overloading	132 kV	127
10	132kV Ludewala to Sargodha-II G/S , A new circuit is parallel circuit is required to avoid over load	132 kV	25
11	132kV Ludewala to Kirana Hill G/S, Planned to construct a new cct. to avoid overloading	132 kV	35
12	132kV Liberty Tech. to Chiniot Ind. G/S , Planned to construct a new cct. to avoid overloading	132 kV	41
13	132kV Liberty Tech. to Kamalpur G/S, Planned to construct a new cct. to avoid overloading	132 kV	23
		Sub Total	**251**
GEPCO			
14	from 220 Kv Gujrat G.S, Two new 132kV circuits for 132kV Hellan G/S are being proposed in 8th STG	132 kV	54
15	132kV Gujrat-II-Ratti T-OFF Jalalpur Jatan circuit, Proposed secod cicuit to avoid over loading	132 kV	21
		Sub Total	**75**
LESCO			
16	Single Circuit Transmission Line from Shahkot – Sangla Hill	132 kV	18
17	Double Circuit Transmission Line Feed for Ex Air Avenue/ Barki	132 kV	34
18	Double Circuit Transmission Line from Fatepuri - 132 kV Lahore North	132 kV	18
19	Single Circuit Transmission Line from Farooqabad - Khanqa Dogran21	132 kV	21
		Sub Total	**91**
		Gross Total	**729**

Source: DISCOs

3.3.3 Potential Projects of T/L for PGC in Plans of NTDC

The consultant has reviewed NTDC plans up to 2026 and extracted the potential 500 kV & 220 kV T/L projects for PGC. Based on broader criteria for shortlisting the potential projects for PGC as narrated in **Section 3.3.1** above, 4 potential projects of 500 kV T/L having total length of 940 Km and 8 potential projects of 220 kV T/L having total length of 563 Km are identified in **Table-14** below.

Table-14: Potential Projects of T/L for PGC - NTDC Plan up to 2025-26

Sr. No.	Description of T/L	No. of S/C Lines	Length of T/L (Km)
	500 kV T/L Potential		
1	Maira – Islamabad West	2	130
2	Sialkot New – Lahore North	2	55
3	Ghazi Barotha – Faisalabad West	2	330
4	Ludewala – Nowshera	2	325
	Ludewala – Faisalabad West	2	100
		Sub Total	**940**
	220 kV T/L Potential		
1	H.Faqirian – Ludewala	1	88
2	500 kV Nokhar – Gujranwala-II	1	80
3	Dharki – Rahim Yar Khan	1	105
4	Rahim Yar Khan – Bahawalpur	1	150
5	Chishtian – Vehari S/C at Lal Sohanra	1	80
6	Sialkot New – Sialkot (Sahuwala)	1	12
7	Sialkot New – Gujranwala-II	1	36
8	Qasimpur – Multan	1	12
		Sub Total	**563**

Source: NTDC

3.4 Identification of Existing and New Bulk Power Consumers

3.4.1 Industrial Estates/EPZs/SEZs/BPCs

It is expected that after the implementation of CTBCM in near future, Bulk Power Consumers (BPCs) will be at liberty to procure power directly from generators under bilateral contract. Accordingly, transmission infrastructure would be needed to offtake power from generators to BPCs and this will provide the transmission business opportunity for PGC.

There are a number of existing Industrial Estates/ Export Processing Zones (EPZs)/ Special Economic Zones (SEZs) /BPCs in Punjab. In addition, new industrial zones are being planned in the province. Some of these are under development thereby power demand is increasing day by day. It is pertinent to mention here that industries in general

and export-oriented industries needs reliable, uninterrupted, and affordable electricity to be competitive in national and international market. These Zones/Estates as a Bulk Power Consumers may need to be connected with nearby IPPs/generators through dedicated transmission lines on wheeling principal. The ultimate load demand of the Industrial Estates/Zones/BPCs within DISCOs of Punjab is estimated around 2000 MW. Furthermore, the load requirement of housing schemes is huge, so the existing and upcoming large housing schemes as BPCs in DISCOs will also be potential projects for PGC due to requirement of T/L for feeding these schemes. This load demand depicts a great potential for PGC for wheeling transmission projects under CTBCM. The existing & future Industrial Estates/Zones/SEZs/BPCs within DISCOs in Punjab are given in **Table-15** below.

Table-15: Industrial Estates/EPZs/SEZs/BPCs in Punjab

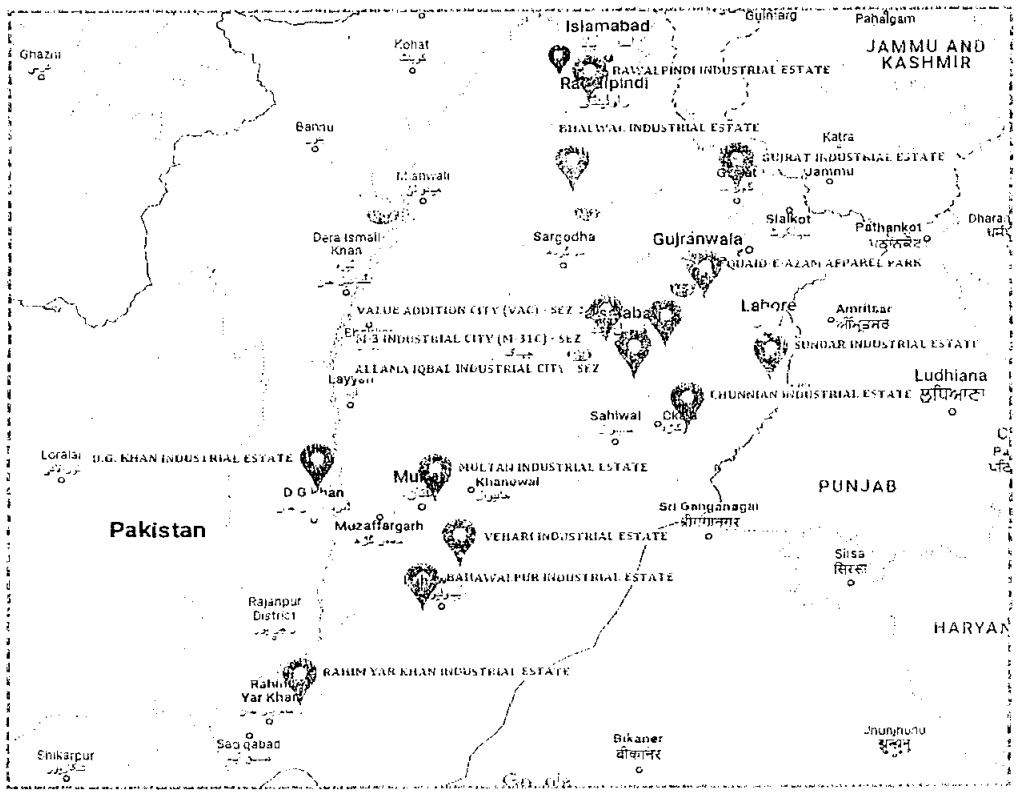
Sr. No.	Description	Ultimate Load (MW)
LESCO		
1	Rachna Industrial Park Shaikhupura SEZ	50
2	Quaid E Azam Apparel Park, M2, Sheikhupura	240
3	Sundar Industrial Estate	320
4	Chunnian Industrial Estate	35
5	Okara Industrial Estate	30
6	Leather Industrial Parkk at Sua Asil, Kasur	35
7	Chunnian Aqua Business Park	25
8	WASA Lahore	114
9	Orange Line Train	54
10	Lahore CBDA	94
	Sub-Total	**922**
MEPCO		
1	Rahim Yar Khan Industrial Estate	60
2	Vehari Industrial Estate	50
3	Bahawalpur Industrial Estate	60
4	D.G Khan Industrial Estate	50
5	Multan Industrial Estate	70
6	WASA. Multan	19
	Sub-Total	**259**
FESCO		
1	Bhalwal Industrial Estate	60
2	Allama Iqbal, Industrial Estate (PSEZ)	200
3	M3 Industrial City (SEZ)	160
4	Value Addition City (SEZ)	360
5	WASA, Faisalabad	25
	Sub-Total	**805**

GEPCO		
1	Gujrat Industrial Estate	35
2	SIE, Wazirabad (ready for inauguration)	25
3	SIE, Gujranwala -IV (ready for inauguration)	35
4	WASA Gujranwala	14
	Sub-Total	**109**
IESCO		
1	Rawalpindi Industrial Estate	35
2	WASA, Rawalpindi	16
	Sub-Total	**51**

Source: DISCOs

Short term industrial estates in Punjab are shown in the geographical map in **Figure-11** below.

Figure-11: Short Term Industrial Estates, Zones and SEZs at a Glance in Punjab



3.5 Identification of Generation Plans Including Renewable Energy Plants

The data provided by each DISCO containing existing generation and future generation projects in the Punjab province, was carefully reviewed. The generation power plant operated by IPPs which have their contract expiration in near future are identified and given **Table-16** below. Whereas the future generation power projects including renewable have also been identified which could be potential projects for PGC to supply electricity to the BPCs in Punjab.

Table-16: Existing & Future Generation Power Plants in Punjab

Sr. No.	Description	Capacity (MW)
LESCO		
1	Kohinoor Power House	131
2	Saba Power House	132
3	Nishat Power House	225
4	Orient Power House	225
5	Nishat Chunnian Power House	225
6	Sapphire Electric Company	225
7	Halmore Power House	225
8	Reshma Power House	97
9	Saif Power House	225
10	Atlas Power	214
11	Renala	1
12	Nishat Chunian	196
13	Bhikki (QATPL)	1156
14	Balloki	1198
15	Chichoki Mallian SHPP	13.2
	Sub-Total	**4488.2**
MEPCO		
1	Taunsa Hydropower Project, Taunsa Barrage, District Muzaffargarh	135
2	Kot Addu Power Company (KAPCO), Thermal	1345
3	Kot Addu Power Company (KAPCO), Coal Fired	660
4	Huaneng Shandong Power Generation Co. Ltd. Rahim Yar Khan	1320
5	M/s. Zorlu Solar Pakistan Pvt. Ltd.	100
6	QA solar Park	500
7	Rojhan (Phase-1) Wind/Solar Hybrid - Solar	200
8	Rojhan (Phase-1) Wind/Solar Hybrid - Wind	100
9	Rojhan (Phase-2) Wind/Solar Hybrid - Solar	500
10	Rojhan (Phase-2) Wind/Solar Hybrid - Wind	250
11	Bhawalpur energy Ltd	31.2
12	Hamza I sugar	15
13	Hamza-II, RYK	30

14	AES Lalpir	350
15	AES Pak Gen.	350
16	Muzaffargarh	730
17	Rousch	395
18	Fauji Kabirwala (FKPCL)	151
19	Saif Power, Sahiwal	204
20	Sahiwal (Coal)(HRS)	1250
21	JDW-II (Sadiq Abad)	24
22	RYK Energy Bagasse	25
23	Fatima Energy (FEL)	120
24	Thal Power Layyah	25
25	Quide-e-Azam Solar	100
26	Appolo Solar	100
27	Best Green Energy	100
28	Crest Energy Pakistan	100
	Sub-Total	**9210**
FESCO		
1	Liberty Power Tech.	202
2	Haveli Bahadur Shah	1230
3	Chanar Energy Limited	22
4	GTPS Faisalabad	16
5	Jinnah Hydel	68
6	Chashma Hydro	184
7	Sapphire Power	207
8	Davis Energon	10
9	Chiniot Power	36
10	Almoiz Industries Limited	20
	Sub-Total	**1995**
GEPCO		
1	Rasul HPP	22
2	Nandipur HPP	14
3	Shadiwal	14
4	Nandipur Combined Cycle	425
5	Hubco Narowal	214
	Sub-Total	**689**
IESCO		
1	AEL (Altern Energy Ltd.)	27
2	AGL (Attock Gen Ltd.)	156
	Sub-Total	**183**

Source: DISCOs

3.5.1 Hydropower Projects Plan in Punjab

PPDB has already initiated development of hydropower projects (HPPs). The upcoming hydropower generation projects in Punjab along with name of the project, location, capacity and name of sponsor are listed in **Table-17** below.

Table-17: Upcoming Hydropower Generation Projects in Punjab (IPP Mode)

Sr. No.	Name/Site of the Project	Capacity (MW)	Name of Company/Sponsor
1	Taunsa Hydropower Project, Taunsa Barrage, District Muzaffargarh	135	To be advertised afresh
2	Gugera HPP, Upper Gugera Branch Canal, Nankana	3.6	Gugera Power Company
3	Mandi Baha-ud-din HPP, Lower Chenab Canal, Gujranwala	3.3	Mandi Baha-Ud-Din Energy Limited
4	Khanewal Hydropower Project, LBDC, Khanewal	1	Khanewal Hydropower (Pvt.) Limited
5	MW Rasul HPP, Rasul Barrage, Mandi Baha-Ud-Din	18	S2 Hydro Ltd
6	Alka HPP, Jhang Branch Canal, Hafizabad	1.8	Alka Power (Pvt.) Limited
7	Mehar HPP, B.S. Link-I Canal, Kasur	10.49	Mehar Power (Pvt.) Limited
8	C.J. HPP, CJ Link Canal, District Khushab	25	C.J. Hydro Limited
9	Lucky HPP, Marala Barrage, Sialkot	20	Olympus Energy (Pvt.) Limited
10	Chichawatni HPP, LBDC, Sahiwal	1.6	Saigols (Pvt.) Limited & Associates
11	Murree HPP, Kanarkas Nallah, District Murree	12	Murree Hydropower (Pvt.) Limited
12	D.G. Khan Link – III HPP, D.G. Khan Canal, DG Khan	4.6	Engro Energy Limited
13	0.3 MW Data HPP, District Jhang	0.3	Data Oil Mills
14	Ravi HPP, Lower Bari Doab Canal, Sahiwal	4.6	Trident Power JB (Pvt.) Ltd.,
15	Kasur HPP, BRBD Link Canal, Kasur	2.45	Packages Power (Pvt.) Limited
16	LCC HPP, Lower Chenab Canal, Gujranwala	7.5	M/s Trident Power GR (Pvt.) Limited
17	Khokhra HPP, Gujrat Branch Canal, Gujrat	2.8	Blue Star Energy (Pvt.) Limited
	Total	**254.04 MW**	

Source: PPDB

3.5.2 Small Hydropower Projects in Punjab

The small hydropower projects to whom Letter of Intents (LoIs) have been issued by PPBD to be developed in near future along with their status are given in the following **Table-18** below.

Table-18: Captive Hydropower Projects (LOIs issued)

Sr. No.	Project	Capacity (MW)	Name of Company/Sponsor
1	HPP on Lower Gugera Canal at RD. 65+000	1	CAF Hydro
2	HPP on Lower Gugera Branch Canal at RD. 27+000	1.5	Wajid Iqbal & Co.
3	HPP on Lower Jhelum Canal (LJC) at RD. 142+000	1.89	Punjab Power Company
4	Pakpattan Canal at RD. 304+340	1.28	Punjab Power Company
5	Burala Branch Canal – RD. 166+000	1.55	Punjab Power Company
6	BRBD Link Canal – RD. 433+958	1	Punjab Power Company
		Total 8.22 MW	

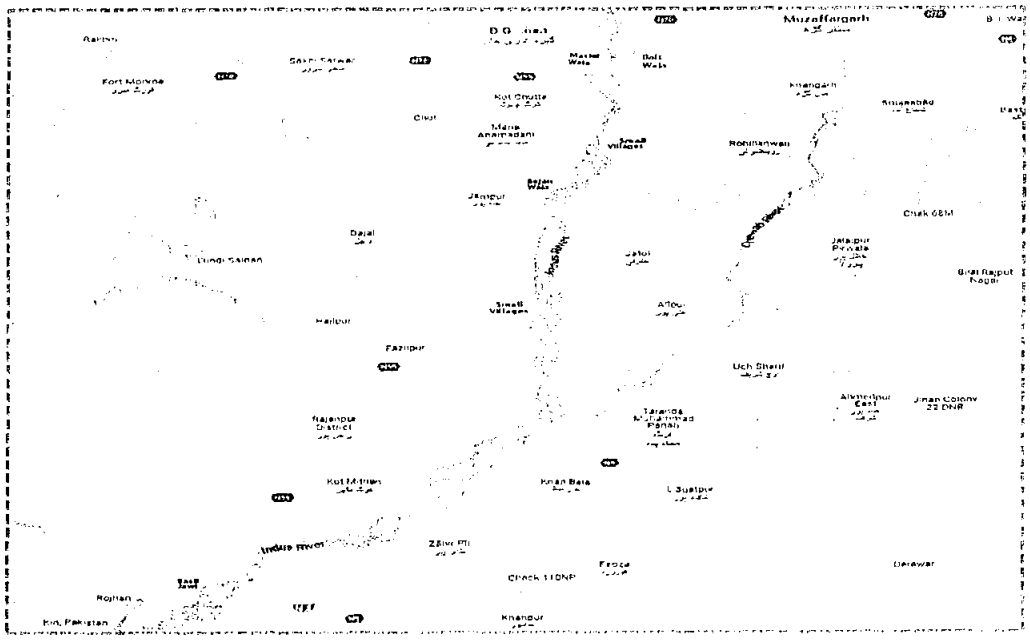
Source: PPDB

3.6 Identification of Weak and No Grid Areas in Punjab. How PGC can electrify these Areas.

Most of the areas of Punjab are electrified but yet there are some areas which are not electrified and there is no grid. On the other hand, there are some weak grid areas. These weak grids are not able to supply power to meet the load requirement of those areas due to many reasons. The one of the major reasons is transmission line constraints which is due to over loading or incapable old transmission lines to cater loads of expansion of existing and new loads in the surrounding areas. These areas can be electrified by solar and wind hybrid projects as indicated in the short-term generation plan in Rojhan, D.G. Khan and Muzaffargarh.

Identification of week grid areas and no grid areas in Punjab is done in general by analysing the historical record and projected plans for next 5 years of DISCOs. The assumption is made that in these areas electrification is not expected in near future. The non-electrified areas identified in district Muzaffargarh, Rajanpur and D.G. Khan along with Indus River with some of villages named as Baitwala, Gujabahar Sial, Patti Rid, Bhindi Hakeem, Moza Mondas etc. up to Rojhan which are yellow marked on map and shown in **Figure-12** below.

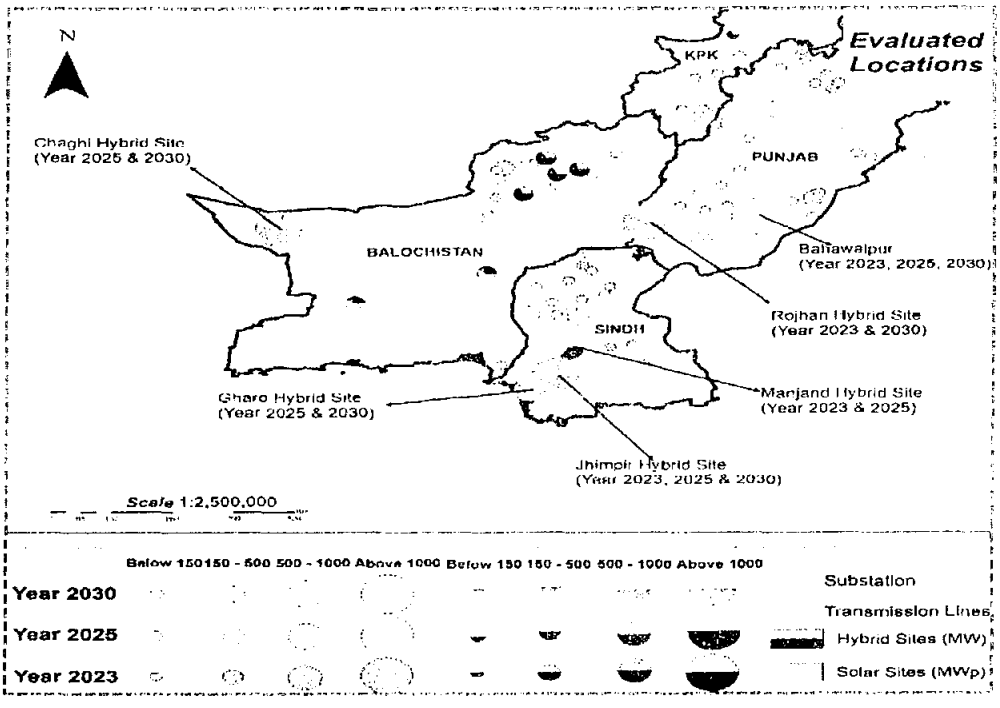
Figure-12: Non Gird Areas in Punjab



3.6.1 Solar/Wind Potential in Punjab

To assess the solar and wind potential in Pakistan, World Bank has recently conducted a study i.e., "Variable Renewable Energy Locational Study". The study has also identified the sites in Punjab suitable for solar power potential as detailed in **Figure–13** below.

Figure-13: Solar Power Potential in Punjab



There are various proposed project sites suitable for solar power which are close to the existing grid and can be exploited straightaway. Punjab has already exploited some solar sites during the last few years. The WB study envisages the solar projects for short term, medium term and long term. The grid connected opportunities for short term and medium term are tabulated below.

[illegible]

The sites for solar and wind power plants which are found technically feasible for grid integration in Punjab province for the short-term scenario of 2023 are given in **Table-19** below. The total potential in these 10 sites is around 1530 MW.

Table-19: Solar Sites for Short Term Scenario in Punjab

Sr. No.	Project Location	DISCO	Type	Capacity (MW)
1	QA solar Park	MEPCO/ NTDC	Solar	500
2	Chishtian	MEPCO/ NTDC	Solar	300
3	Dina	IESCO	Solar	100
4	Fateh Jhang	IESCO	Solar	100
5	Ahmadal	IESCO	Solar	50
6	Kharian	GEPCO	Solar	50
7	Dinga	GEPCO	Solar	50
8	Noorsar	MEPCO	Solar	30
9	Taunsa	MEPCO	Solar	50
10	Rojhan (Phase-1)	MEPCO	Wind / solar Hybrid	200 100
			Total	**1,530**

[illegible]

The sites identified for solar and wind power plants which are found technically feasible for grid integration in Punjab province for the medium-term scenario of 2025, are given in **Table-20** below. More grid infrastructure is needed in order to evacuate the power from large-scale solar parks. The total potential in these 16 sites is around 1390 MW.

Table-20: Solar Sites for Medium Term Scenario in Punjab

Sr. No.	Project Location	DISCO	Capacity (MW)
1	Chakkri	IESCO	100
2	Kalar Kahar		100
3	Pindi Gheb		100
4	Chunian	LESCO	30
5	Habibabad		30
6	Darya Khan	FESCO	100
7	Athran Hazari		100

8	Rangpur	MEPCO	50
9	Muzaffargarh		100
10	Alipur		100
11	Hasilpur		100
12	Lodhran		30
13	Fort Abbass		50
14	Firoza		50
15	Dajal		50
16	QA Solar (Phase-2)	MEPCO/NTDC	300
	Total		**1,390**

3.7 Mini/Micro Grid

The Consultant is of the view that Government of Punjab may consider implementation of Mini/Micro grid in Punjab. Punjab has a large irrigation system on canals which has potential of small /mini hydropower and this potential could be exploited for providing cheap electricity to population and small industry located in nearby areas. Moreover, solar and wind potential are also available both near to grid and in no grid areas as well. These potentials may be exploited and utilized economically by creating a Mini/Micro grid.

Most of areas in Punjab are electrified but still there are some areas of population which are yet to be electrified due to various reasons. Punjab has natural energy resource like small/mini hydropower, solar, wind, etc. which can be utilized to electrify those weeks or no grid areas of Punjab. Expansion of centralized grid is not economically viable in most of the remote un-electrified locations in Punjab. In this regard, Mini/Micro grids development offer an excellent opportunity to address this problem and to improve the life quality of people living in those areas, facilitating irrigation, local cottage industry, etc. and complement the economy thereof.

3.8 Projects Phasing for PGC

Based on the anticipated potential projects and information provided by PPDB, the phasing of projects for PGC is given **Table-21** below.

Table-21: Phasing of Potential Projects for PGC

Sr.	Project name	Voltage Level	Distance (Km)	Source
1	Rshma Power Plant to Sundar Industrial Estate	132 kV	4.5	96.96 MW
2	Rshma Power Plant to Orange Line Authority Lahore	132 kV	40	96.96 MW
3	Chishtian Solar Plant to Bahawalpur Industrial Estate	132 kV	149	250 MW
4	Chishtian Solar Plant to Multan Industrial Estate	132 kV	165	250 MW
5	Chishtian Solar Plant to Muzaffargarh Industrial Estate	132 kV	187	250 MW
6	Chishtian Solar Plant to Vehari Industrial Estate	132 kV	83	250 MW
7	Chishtian Solar Plant to Okara Industrial Estate	132 kV	129	250 MW
8	Chishtian Solar Plant to Chunnian Aqua Business Park	132 kV	166	250 MW
1	Taunsa to Multan Industrial State	132 kV	80	135 MW
2	Multan Industrial State to Vehari Industrial State	132 kV	80	135 MW
3	Taunsa to DGK Industrial State	132 kV	65	135 MW
4	Rojhan to RYK Industrial State	132 kV	40	300 MW
5	Rojhan to No Grid Areas	132 kV	10	300 MW
1	H.Faqirian – Ludewala	220 kV	88	-
2	500 kV Nokhar – Gujranwala-II	220 kV	80	-
3	Chishtian – Vehari S/C at Lal Sohanra	220 kV	80	-
4	Sialkot New – Sialkot (Sahuwala)	220 kV	12	-
5	Sialkot New – Gujranwala-II	220 kV	36	-

6	Qasimpur – Multan	220 kV	12	-
10	Maira – Islamabad West	500 kV	130	-
11	Sialkot New – Lahore North	500 kV	55	-
12	Ludewala – Faisalabad West	500 kV	100	-
13	T/L from Chakri to required load center from solar plant in future	-	-	100 MW
14	T/L from Kalar Kahar to required load center from solar plant in future	-	-	100 MW
15	T/L from Darya Khan to required load center from solar plant in future	-	-	100 MW
16	T/L from Ali Pur to required load center from solar plant in future	-	-	100 MW
17	T/L from Pindi Gheb to required load center from solar plant in future	-	-	100 MW
18	T/L from Hasil Pur to required load center from solar plant in future	-	-	100 MW
19	T/L from Athram Hazrai to required load center from solar plant in future	-	-	100 MW
20	T/L from Muzaffargarh to required load center from solar plant in future	-	-	100 MW
21	T/L from Rangpur to required load center from solar plant in future	-	-	50 MW
22	T/L from Fort Abbas to required load center from solar plant in future	-	-	50 MW
23	T/L from QA Solar Park to required load center from solar plant in future	-	-	300 MW

The single line diagrams/maps of the proposed short and medium term T/L projects are given in **Figures 14-19**.

Figure-14: Reshma Power Plant to Sundar Industrial Estate

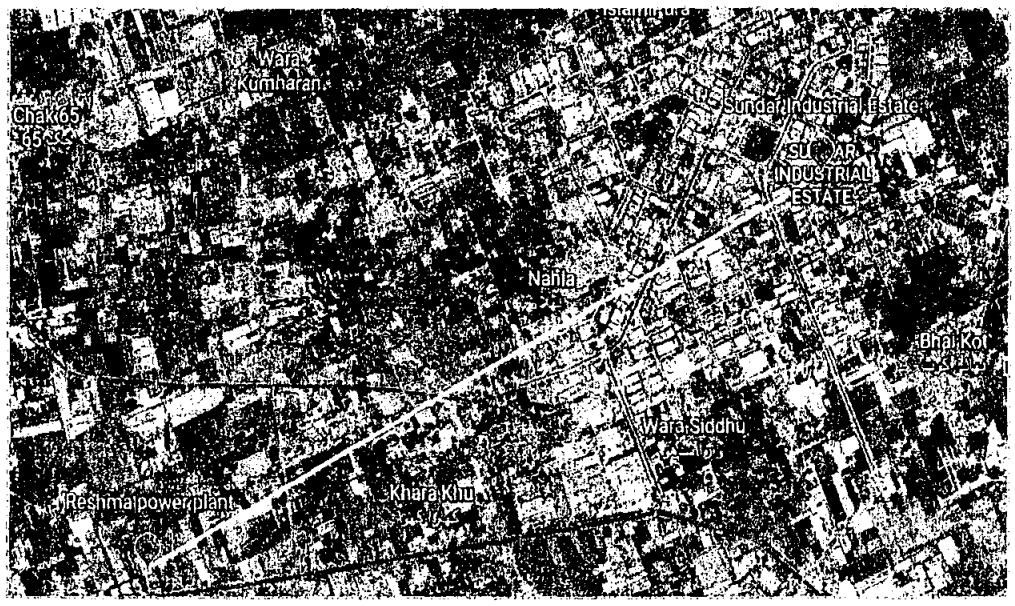
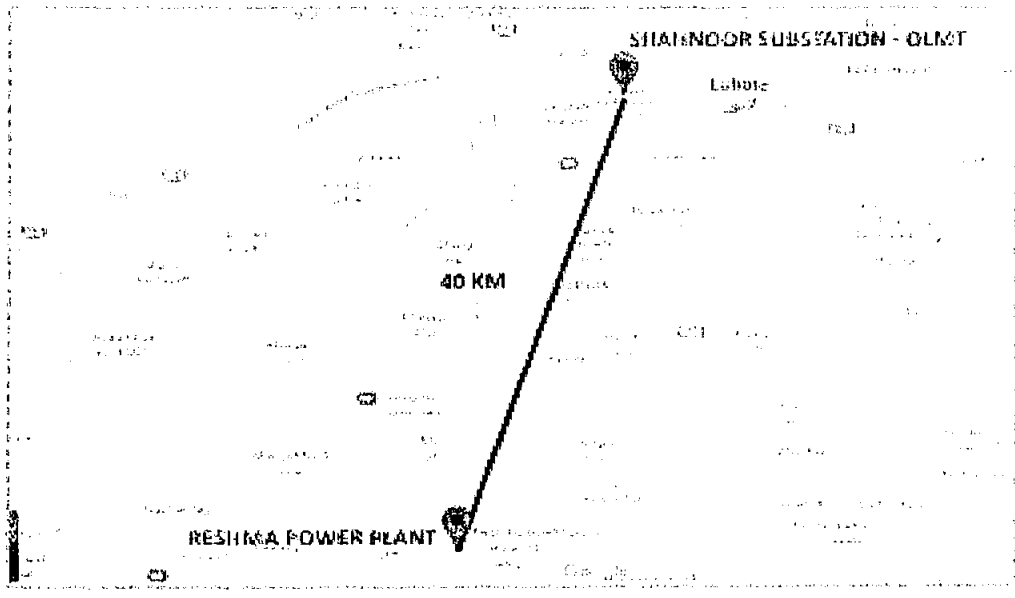


Figure-15: Reshma Power Plant to Orange Line Authority Lahore



Transmission Line for Chishtian Solar Plant

Proposed 250 MW Chishtian solar project can also be a potential project which would need power evacuation/transmission in near future. Thus, from PGC perspective the transmission infrastructure development from this power plant to nearby grid station could be a short run potential project. It is expected that the evacuated power from this plant can be supplied to WASA facilities located at Multan, Bahawalpur, Faisalabad, Lahore as well as Lahore Orange Line Metro Train (OLMT). As most of these facilities are spread throughout the province thus at the outset, the viable option can be to transmit power through NTDC/DISCO(s) system under a wheeling arrangement, as MEPCO 132 kV grid station is located at around 28 km and NTDC 220 kV grid station is located at around 12 km from proposed Chishtian solar plant as shown in **Figure-16** below.

In addition, the power can also be evacuated and supplied to the WASA installations, industrial estates as well as OLMT etc. by developing dedicated T/Ls of various length by PGC subject to its detailed feasibility study as shown in **Figure-17**.

Figure-16: Chishtian 250 MW Solar Plant to 132 kV MEPCO Grid Station

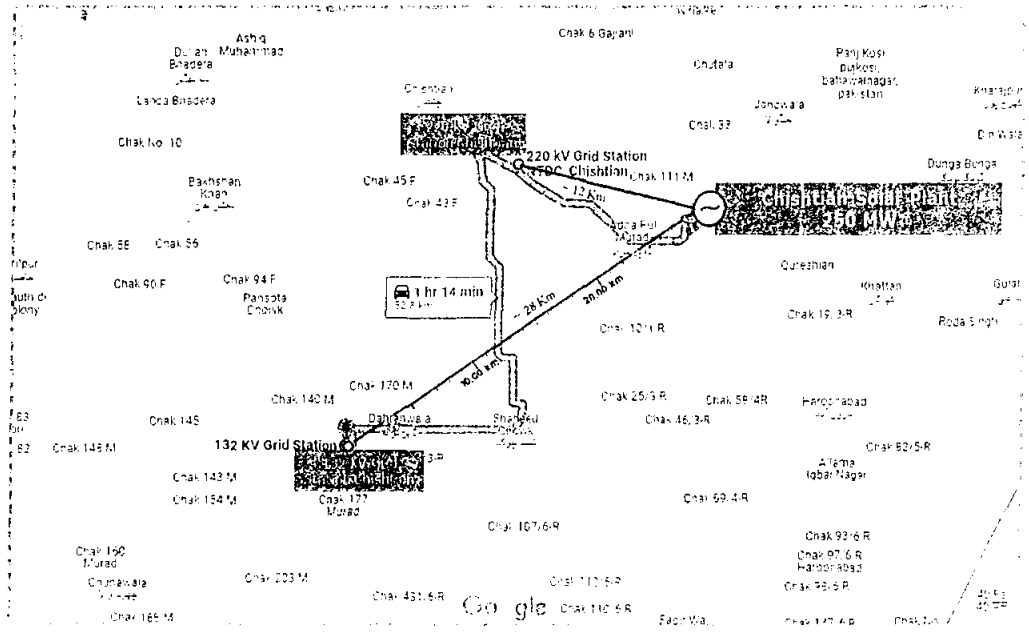


Figure-17: Chishtian Solar Plant to Bahawalpur, Multan, Muzaffargarh, Vehari & Okara Industrial Estates and Chunnian Aqua Business Park

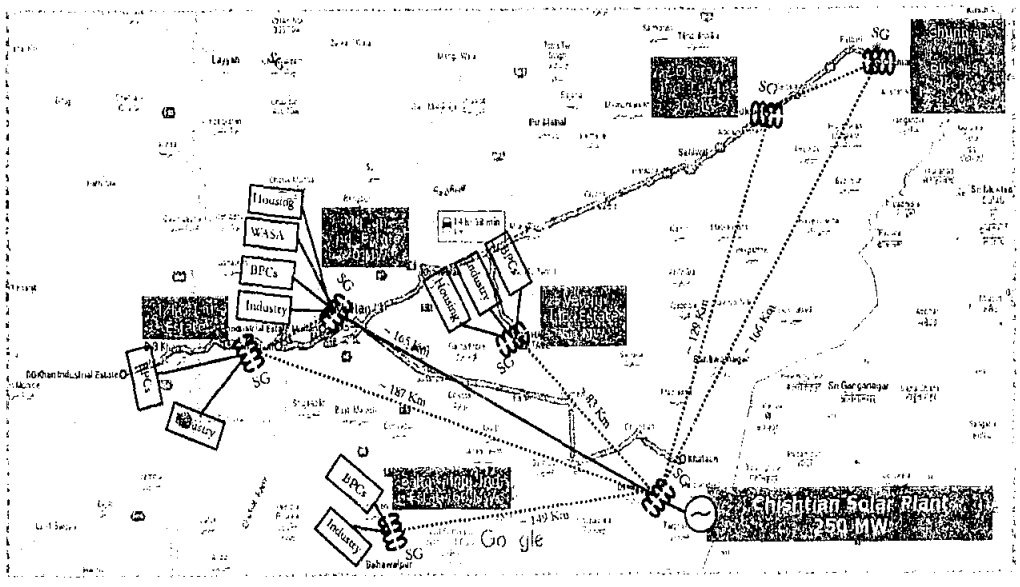


Figure-18: Taunsa to Multan, Vehari, DGK Industrial Estates

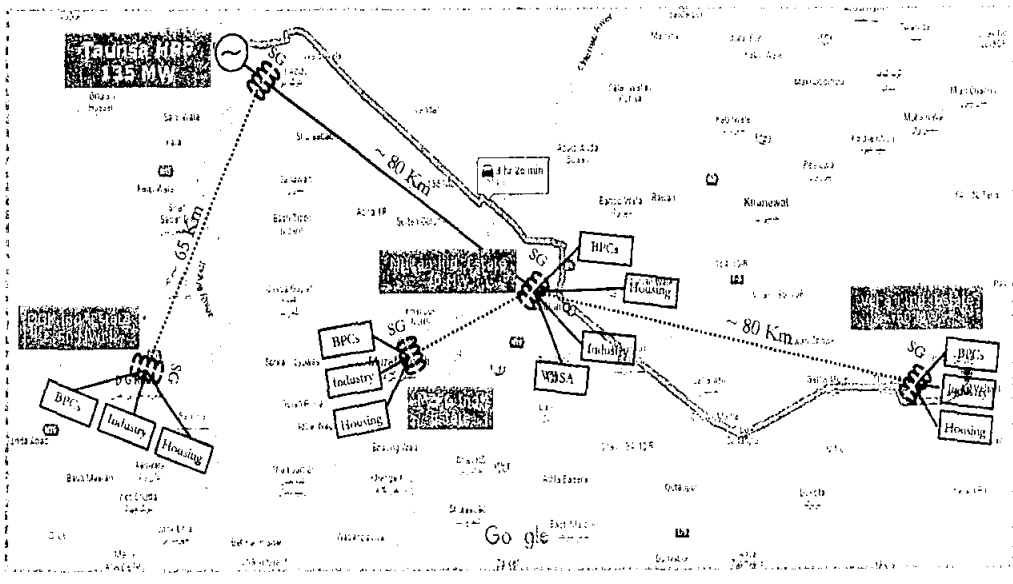
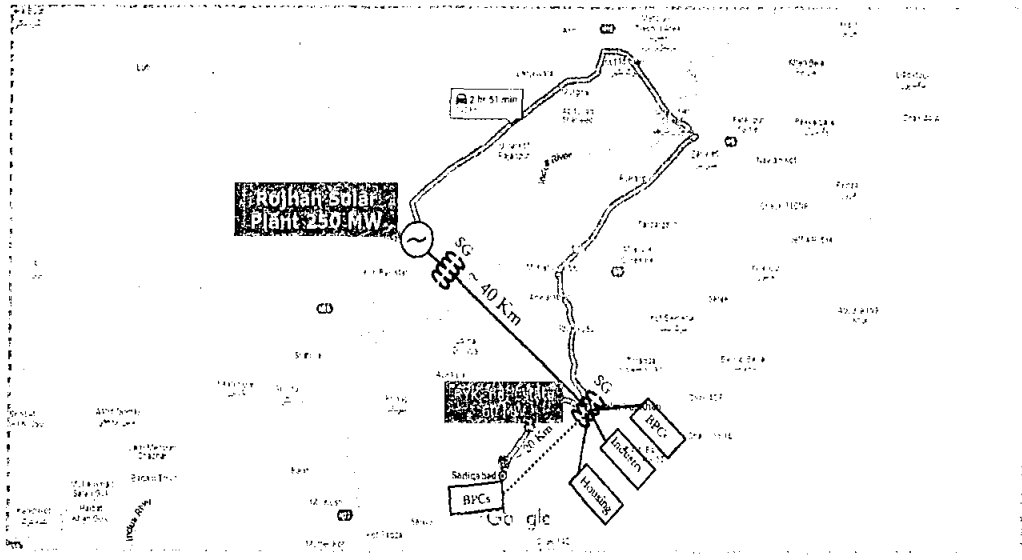


Figure-19: Rojhan to RYK Industrial Estate



4. PROVINCIAL GRID COMPANY

After unbundling of WAPDA, NTDC was incorporated as the grid owner entity. The system operations and payment settlements were also allocated to NTDC under the same license as to exercise grid and commercial codes. With the passage of time especially after the installations of private power plants the need was felt to isolate the various functions of NTDC and allocate them to specialized entities. Accordingly, CPPA-G was incorporated as a market licensee to oversee and implement the commercial code while for system operations activities an independent system operator in the form of NPCC was incorporated to implement grid code for safe and reliable power system. During the last decade numerous changes have occurred in power sector of Pakistan.

After 18th Amendment in the Constitution, provinces are encouraged to establish their own companies/entities for handling relevant activities in various sectors including transmission segment of power sector. Thus, in this direction Sindh and KPK provinces have already incorporated their provincial grid companies to develop transmission infrastructures in their provincial territories. Now, Punjab province is also envisaging to establish its own grid company as it has enormous potential in terms of load demand and unexplored energy resources. In the near future it is foreseen that a provincial grid company would be required to transmit the power from power plants to major load centers especially BPCs and unserved areas. The proposed Punjab Grid Company (PGC) would be required to interact with key stakeholders of power system of the country for smooth operations/functioning. This Chapter will provide a discussion on the electricity business in general and transmission of electric power in particular as relevant to provinces. The Constitution of Pakistan is the primary document containing broad provisions about the subject of electricity and role of provinces. The Regulation of Transmission and Distribution of Electric Power Act 1997 (NEPRA Act) also contained such provisions which broadly touched upon the role of provinces in undertaking functions of electricity business in a similar context as provided under the Constitution. The amended NEPRA Act 2018 provides specific provisions about transmission of electric power by provinces and overall regulatory framework for the sector. National Electricity Policy, which provides vision of the Government and defines access to affordable, secure and sustainable energy as the broad and overarching goals for power sector is another relevant high level instrument about the role of provinces.

Framework of regulatory regime as contained in the Act envisages a number of entities for the safe and reliable operation of power sector. These include generation companies, national grid company, national power control centre (NPCC), distribution companies, electric suppliers, electricity traders and other licensees functioning under the Act. More

importantly, to perform its functions, PGC would be required to keep a close coordination and working relationship with NEPRA.

The provincial grid company of Punjab in order to handle transmission projects would require unfailing financial and administrative support of province. Such important factors have also been identified and discussed in this Chapter.

4.1 Subject of Electricity under the Constitution

It may be noted that before 18th Amendment, Electricity was placed under 'concurrent list'. After 18th Amendment 'concurrent list' was taken out of the Constitution of Pakistan however, the subject of electricity has been placed under Federal Legislative List at serial no.4 in PART II of 4th SCHEDULE. Article 157 of the Constitution provides as under;

"Electricity
Article 157.
(1) The Federal Government may in any Province construct or cause to be constructed hydro-electric or thermal power installations or grid stations for the generation of electricity and lay or cause to be laid inter-Provincial transmission lines:
Provided that the Federal Government, prior to taking a decision to construct or cause to be constructed, hydro-electric power stations in any Province, shall consult the Provincial Government concerned.

(2) The Government of a Province may:
- (a) To the extent electricity is supplied to that Province from the national grid, require supply to be made in bulk for transmission and distribution within the province;
- (b) Levy tax on consumption of electricity within the province;
- (c) Construct power houses and grid stations and lay transmission lines for use within the province; and
- (d) Determine the tariff for distribution of electricity within the province.

(3) In case of any dispute between the Federal Government and a Provincial Government in respect of any matter under this Article, any of the said Governments may move the Council of Common Interests for resolution of the dispute. "

Therefore 18th Amendment has provided clarity to the subject while defining the roles of federal government and provinces.

4.2 Relevance of NEPRA Amendment Act 2018 and National Electricity Policy

As discussed earlier that although the Constitution of Pakistan allows provinces, undertaking generation, transmission and distribution of electricity functions, NEPRA Amended Act, 2018 (The Act) and the National Electricity Policy 2021 (NEP), have further elaborated such role and also the role of a provincial grid company.

4.2.1 NEPRA Amended Act 2018

Powers and Functions of the Authority are stipulated under section 7 of the Act. Under subsection (1) of section 7, the Authority is exclusively responsible for regulating the provision of electric power services. Under subsection (3) of section 7 of the Act;
"the Authority shall— (a) determine tariff, rates, charges and other terms and conditions for supply of electric power services by the generation, transmission and distribution companies and recommend to the Federal Government for notification;" Sub-section (4) of section 7 provides for the role of provinces as follows;

"Notwithstanding anything contained in this Act, the Government of a Province may construct power houses and grid stations and lay transmission lines for use within the province and determine the tariff for distribution of electricity within the province, and such tariff shall not be called into question by the Authority. (Emphasis added). It may be noted that above section of NEPRA Act takes strength of Article 157 (2) (c) and (d) of the constitution, while further clarifying the role of NEPRA as for its tariff determination powers.

The Act under Section 14A also provides features of policies to be developed under NEP on which the federal government may seek assistance and inputs from NEPRA. In this respect subsection (2) (c) of section 14(A) specifically provides for the integration of national and provincial transmission systems. The same section of the Act under subsection (4) also requires that the federal government shall prepare National Electricity Plan in accordance with the policies i.e. NEP, in consultation with the provincial governments.

To provide a regulatory cover to provincial role in transmission of electricity, the Act, under Sections 18A and 18B stipulates, requirement of a license to be granted by NEPRA and responsibilities of provincial grid company under the Act. It may be noted that the Act primarily assigns PGC the role of 'transmission service provider' on a non-discriminatory basis, including transmission, interconnection services and open access to the users of its system. It is also to be clarified that beyond above noted functions, no

other roles like dispatch of power plants have been foreseen in the Act for provincial grid company.

It may be noted that the Act have not addressed provincial grid company's role in isolated systems (systems not connected with national grid). It may therefore be argued that the regulatory regime of provincial grid company under the Act is limited to grid connected system.

4.2.2 National Electricity Policy

As discussed in earlier section, the Act under Section 14 contains those important factors expected to form basis of national electricity policies. The federal government has approved National Electricity Policy 2021 (NEP), containing a number of provisions about the role of provinces. According to section 5.1.10 of NEP;

"Subject to Article 157(2) of the Constitution, the Provincial Governments may make their own electricity policies (including generation, transmission & distribution) and execute related projects within their boundaries without the requirement of selection by Indicative Generation Capacity Expansion Plan (IGCEP), as long as such projects are not connected to the national grid and do not impose any obligation on any Federal Government entity. Such projects can subsequently be connected to the national grid, subject to the consent of the Federal Government, based on the principle of least cost and selection by IGCEP. "

Section 5.1.10 of NEP as reproduced above, leads to a clear path for a province for development of its generation, transmission and distribution projects. For independent implementation and operation of projects by a province, the only condition for such projects is that those are not connected with the national grid and which do not impose any obligation on any federal government entity. Further elaboration is provided for generation projects by a province, as it is stated that such projects will be exempt from satisfying the requirement of; to be part of Indicative Generation Capacity Expansion Plan (IGCEP). It may be noted that according to the Grid Code, a generation facility, to be connected with the national grid, must be a part of IGCEP. The principle will also be applicable to the transmission and distribution projects.

In view of above, a provincial grid company may operate under two regimes. If connected in a national grid, it will be a licensee under Section 18A of the Act, primarily operate in an integrated system and perform functions and duties as provided in the Act. Under the second regime, provincial grid company will be allowed to implement such projects which are to operate independently (isolated systems) while PGC will act as a service provider.

Specific provisions on 'transmission' of electricity have been covered under section 5.2 of NEP. The relevant sub-sections about provincial role are discussed in the following sections;

"5.2.2. Subject to Article 157(2) of Constitution of Pakistan and law, the provincial governments shall have the powers to construct grid stations, lay transmission lines, and engage in the transmission of electric power within the territorial limits of such Province. Wherever the Province intends to connect its transmission system to the national grid, the National Grid Company (NGC) will be solely responsible for the centralized Transmission System Expansion Plans (TSEP). The TSEP shall provide for integration of the national and provincial transmission systems. For such integration, the PGCs and Special Purpose Transmission Licensees (SPTLs) shall coordinate with the NGC and provide all relevant data required by the NGC, at the conception stage prior to any execution, to prepare the TSEP. The NGC, PGC and SPTL, while discharging their respective responsibilities, shall ensure compliance with TSEP approved by the Regulator."

It may be observed that the province has a choice to be involved in the transmission business under both scenarios. As long as it is involved in the transmission of electricity in isolated mode that may be done independently; without following NGC instructions and without the requirement of its projects to form part of TSEP prepared by NGC. However, when the province intends to connect its system with the national grid, it will be required to have such integration through TSEP i.e. in consultation with NGC.

The NEP otherwise also, expects that NGC to explore investment options including financing/investment by provincial governments (refer to section 5.2.3 for expansion of its transmission network. Therefore, for integrated networks NGC and provinces will have close coordination. Similar coordination has been envisaged for state owned distribution companies and provincial governments (refer to section 5.3.6) to implement their expansion plans as approved by the regulator and aligned with IGCEP and TSEP, where applicable.

NEP also elaborates (refer to section 5.8.2) the manner in which NGC will prepare and the regulator will approve IGCEP and TSEP. It is stipulated to have close coordination with provincial governments during preparation and approval, whereas all the stakeholders including one window facilitators (PPDB of Punjab Province) will be bound to follow these plans during implementation of their projects.

4.3 Role of Provincial Grid Company under NEPRA Act

Licensing requirement for a provincial grid company is contained under section 18A of the Act as reproduced here;

18A. Provincial Grid Company

(1) The Authority may, subject to the provisions of this Act and after such enquiry as it may deem appropriate, grant a licence authorizing a company owned by a provincial government to engage in the transmission of electric power within the territorial limits of such Province, subject to such conditions as it may impose:

Provided that only one such licence shall be granted for each Province at any one time.

(2) The eligibility criteria for grant of license as a provincial grid company shall be prescribed and shall include, without limitation

(a) Minimum solvency requirements;
(b) Minimum technical and human resource requirements.

It may be observed that under section 18A, one licence will be granted by the Authority for the provincial grid company to carry out its functions for its two regimes i.e. isolated mode as well as for integrated mode as and when required.

Section 18(B) stipulates responsibilities of provincial grid company as reproduced here;

18B. Responsibilities of Provincial Grid Company.

(1) The provincial grid company shall be responsible to operate and provide safe and reliable transmission services on a non-discriminatory basis, including to a bulk-power consumer who proposes to become directly connected to its facilities.

(2) Without prejudice to the foregoing responsibilities, the provincial grid company shall:

(a) Provide transmission and inter-connection services to the national grid company and to others, wherever necessary, at such rates, charges and terms and conditions as the Authority may determine;
(b) Purchase inter-connection service from the national grid company as may be necessary and to connect its facilities to the national transmission grid at the rates, charges and terms and conditions determined by the Authority;
(c) Follow the performance standards laid down by the Authority for transmission of electric power, including safety, health and environmental protection instructions issued by the Authority or any Governmental agency;

(d) Make available to the general public the tariff specifying the Authority's approved rates, charges and other terms and conditions for transmission services;
(e) Not levy any rate or charge or impose any condition for the transmission of electric power which has not been approved by the Authority as a tariff;
(f) Not cause a division or any associated undertaking to engage in generation and distribution; and
(g) Develop, maintain and publicly make available, with the prior approval of the Authority, an investment program for satisfying its service obligations and acquiring and selling its assets.

4.3.1 Provincial Grid Company and Relevant Sector Players

PGC as a licensee under NEPRA regulatory regime will be required to interact with a number of entities and licensees including NEPRA, NGC, generators, distribution companies and others depending on the regime (isolated or integrated mode) in which it is operating. Naturally it will be most important and critical for PGC to have a close interaction with NEPRA as it will grant license to PGC if it meets eligibility criteria under section 18A of the Act. Subsequent to obtaining license PGC will be required to file tariff petitions before NEPRA for its operations as well as for determination of rates and charges and other terms and conditions for interconnection services under different scenarios. Subject to licensing conditions PGC might be required to have regular reporting about adherence to performance standards laid down by NEPRA. In addition to above PGC will also be required to have interactions with other entities like electricity suppliers, traders and power dispatch control centre in view of the evolving market structure pursuant to the CTBCM approved by NEPRA in December 2019. A discussion about the relationship of PGC with some of the relevant players in the sector is as follows;

Transmission Service Providers

The existing regulatory regime in addition to PGC, allows two other entities to engage in transmission business namely; NGC and Special Purpose Transmission. Whereas NGC is responsible for operation and safe, reliable transmission and interconnection service for a territory, Special Purpose Transmission License will be granted by NEPRA for specific transmission facilities. Therefore 3 entities i.e., PGC, NTDC & SPTL will operate side by side in the transmission sector.

NGC/NTDC

Subject to section 17, NGC as a licensee is exclusively responsible for the transmission service in the territory as specified in its license. Essentially NGC is authorized to carryout transmission service all over Pakistan. Presently National Transmission and Dispatch Company (NTDC) is holding the license under section 17 of the Act. NEP also recognizes

this role of NGC and states that it is responsible for laying inter-provincial transmission Lines. According to section 18 of the Act, some of the key responsibilities of the national grid company include;

- Carryout transmission and inter-connection services,
- Charge only approved rates by the Authority,
- Not cause a division or any associated undertaking to engage in generation and distribution: and
- Perform the functions of a system operator.

Special Purpose Transmission (SPT)

Section 19 of the Act provides provisions for Special purpose transmission. According to section 19, the Authority may, in the public interest, grant a licence authorizing the licensee to engage in the construction, ownership, maintenance and operation of specified transmission facilities and shall:

(a) Provide transmission and inter-connection services to the national grid company and to others, wherever necessary, at such rates, charges and terms and conditions as the Authority may determine;

(b) Purchase inter-connection service from the national grid company as may be necessary and to connect its facilities to the national transmission grid at the rates, charges and terms and conditions determined by the Authority;

(c) Make its transmission facilities available for operation by the national grid company consistent with applicable instructions established by such company;

(d) Follow the performance standards laid down by the Authority for transmission of electric power, including safety, health and environmental protection instructions issued by the Authority or any Governmental agency;

Comparison of functions of NGC, PGC and SPT

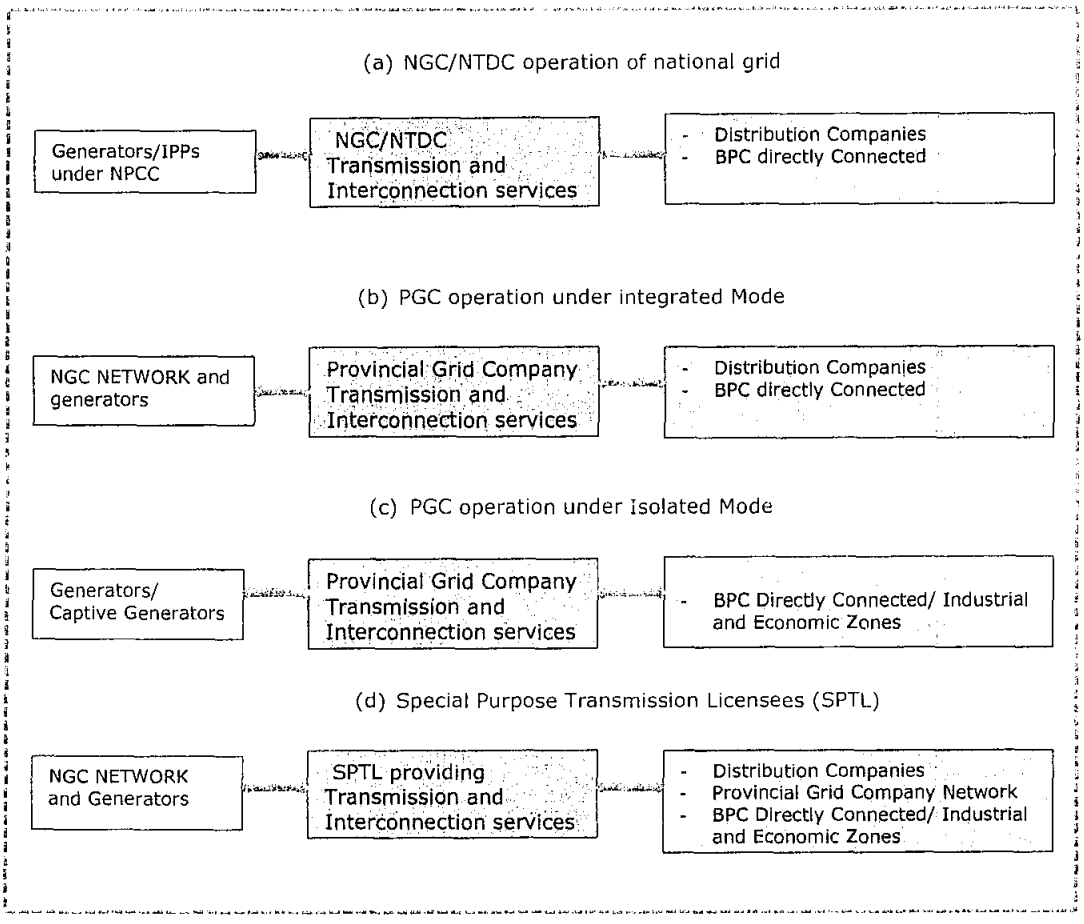
Before a comparison of the three transmission service providers is made, a look at their responsibilities as contained in the Act, shows that all the three entities will be required to carry out transmission and interconnection services.

According to section 2 (xxvi) of the Act, '**transmission**' means the ownership, operation, management or control of transmission facilities, whereas according to section 2(xxvii) —**transmission facilities** mean electrical transmission facilities including electrical circuits, transformers and sub- stations operating at or above the minimum transmission voltage. Minimum transmission voltage according section 2 (xix) means sixty-six kilovolts or such other voltage that the Authority may determine to be the minimum voltage at which electrical facilities are operated when used to deliver electric power in bulk.

The other key responsibility of PGC, NGC and SPTL for providing **inter-connection service** is defined under section 2 (xiv) as the connection of one company's electrical facilities to another company's electrical facilities. Therefore NGC, PGC and SPTL are expected to carry out above noted two functions although under different domains.

The following **Figure-20** present schematic explanation of NGC/NTDC, PGC and SPTL and their relationship with other entities.

Figure-20: Schematic Explanation of NGC/NTDC, PGC and SPTL and their Relationship with other Entities



From the discussion above, though it may appear that the three entities (NGC, PGC, SPTL) overlap in all respect in performing these functions, however it is also to be noted that in addition to above key functions, there are a number of provisions in the Act, which differentiate their roles.

The following **Table-22** shows overall comparison of three licensees under the Act;

Table-22: Overall Comparison of 3 Licensees

Description	Responsibilities Under the Act			
		Punjab Grid Company (PGC)		
	NGC	Isolated Regime	Integrated Regime	SPTL
NEPRA Licensing Requirement	Yes	Single License for Both Regimes		Yes
provide transmission and Interconnection services	To the users of its system	To be provided to the users of provincial grid company system other than NGC	To be provided to the users of provincial grid company system including NGC	To be provided to the users of SPTL facilities including NGC
Purchase interconnection services	For using systems of PGC and SPTL	Not Required	From NGC for using NGC system	From NGC for using NGC system
Dispatch and operate system	Yes -- as System Operator till separate license is granted to SO	NO	NO	NO
Follow Instructions of NGC for Operation	Not Applicable	No	No explicit requirement	Offer its facilities to NGC for Operation
Investment Programme	Yes	Yes	Yes	No
Generation & Distribution	No	No	No	No
Grid Code Development	Yes -- till separate license is granted to SO	No	No	No
IGCEP Development	Yes	No	No direct role of PGC but Province is required to be consulted as per NEP	No
TSEP Development	Yes	Consultation may be required	Consultation is mandatory with NGC	No

It may be noted from above comparison that role of NGC is quite distinct from PGC and SPTL, as long as it is also responsible for system operation which at a later date is foreseen to be carried out by System Operator.

Expanded Role of PGC under Isolated Regime; Maintaining Secondary Grid

Responsibilities and functions of PGC under isolated regime have been discussed above. It is also observed that though NEP envisages isolated mode for PGC, it expects that subsequently PGC will connect its system with national networks so as to have integrated network and operation. It is a reasonable consideration for smaller networks, as practically for a reliable supply of electricity, multiple supply sources and mesh of transmission lines will be required, which may not be feasible for provinces with relatively smaller electricity demand. Punjab province on the other hand has a major share of electricity demand. Therefore, it is likely that the provincial grid can grow to an extent where it includes independent networks for supply, transmission and consumption without connecting to national grid. For such a scenario i.e. isolated mode, PGC will be required to have expanded functions and responsibilities. For instance, power generation dispatch and other transmission system operation will be required to be carried out independently by PGC. Under the existing regulatory regime however, that would not be possible unless provincial regulators are introduced. A provincial regulatory regime would allow development of grid code for its secondary grid including dispatch of generation facilities for a reliable network. For the intervening period however, PGC may have to adopt existing grid code developed by NTDC and approved by NEPRA.

4.3.2 Generators

Generation of electricity and its transmission is integral to the overall part of the sector. The existing generation facilities consist of a number of sets of power plants in private sector set up under 1994 power policy, 2002 policy and under China–Pakistan Economic Corridor (CPEC) regime. Renewable energy generation includes solar and wind energy power plants. In addition, public sector thermal plants i.e. 'GENCOs' and hydro power plants also form part of generation mix. These generation facilities have been granted licenses by NEPRA for a specific period, depending on their useful operating life. Under the Act, generation business is to be gradually delicensed, therefore generation facilities will be setup in view of sector conditions, whereas procurement is generally foreseen through competitive bidding mode.

As required in the NEP, generation power plants to be connected to national grid will be inducted through an integrated energy planning process and those need to form part of the least cost expansion plan (IGCEP).

The Act under section 14C has specifically allowed captive generation. Section 14 C is reproduced as under;

"

Captive generation

(1) Notwithstanding anything contained in this Act, a person may construct, maintain or operate a captive generating plant and dedicated transmission lines:

Provided that the supply of electricity from the captive generating plant through the grid shall be regulated in the same manner as the generating facility of a generating company.

(2) Every person, who has constructed a captive generating plant and maintains and operates such plant, shall have the right to open access for the purposes of carrying electricity from his captive generating plant to the destination of his use:

Provided that such open access shall be subject to availability of adequate transmission facility and such availability of transmission facility shall be determined by the national grid company or the provincial grid company, as the case may be:
Provided further that any dispute regarding the availability of transmission facility shall be adjudicated upon by the Authority. "

Captive generation plants therefore represent a real opportunity for PGC as construction of dedicated transmission have been allowed under section 14 C of the Act as shown above.

4.3.3 Distribution Companies

Distribution companies are required to provide network services by receiving electricity in bulk at their delivery points for distribution to lower voltage networks. Therefore, PGC will have to undertake transmission projects to facilitate delivery of power to distribution companies.

4.3.4 Bulk Power Consumers

A bulk power consumer (BPC) under the Act has defined in section 2 (ii) has been defined as follows;
"bulk-power consumer means a consumer who purchases or receives electric power, at one premises, in an amount of one megawatt or more or in such other amount and voltage level and with such other characteristics as the Authority may specify and the Authority may specify different amounts and voltage levels and with such other characteristics for different areas; "

Since BPCs may receive power directly from generators and other relevant entities, therefore it will be useful to keep track of BPCs.

4.3.5 Provincial Government

The provincial government will not only be the owner of the PGC but may facilitate PGC in a number of ways and will be deliberated in succeeding sections.

4.3.6 Relationship of PGC with Other Entities

NEPRA

The most important stakeholder for setting up PGC and during its functioning will be regulator/ NEPRA. As discussed earlier, the requirement under the Act to be satisfied for its eligibility as a licensee and subsequent responsibilities during operations requires that PGC will maintain continuous interaction with NEPRA. In this respect the following minimum areas are identified;

- Petition for obtaining license from NEPRA and requirement to meet obligations contained in license
- Filing of tariff petition including short to medium term plans for its operation and management (use-of-service charges) as a company
- Filing of tariff petition and data submission for every transmission project that PGC decides to undertake
- Submission of regular operational performance reports to NEPRA
- Submission of progress reports on its ongoing projects
- Submission of its future plans before NEPRA
- Providing inputs on NEPRA concept papers for developing regulatory regime and participation in conferences, hearings for promoting its position on key issues
- Information sharing as desired by regulator
- Sharing of its rates and charges and other terms and conditions approved by NEPRA with public

PGC vs NGC/NTDC

According to the regulatory regime, also discussed in earlier sections, PGC will operate under two regimes which may work in parallel. As a transmission and interconnection service provider PGC may have a number of projects which are not connected with the national grid representing an isolated regime. At the same time however, PGC may decide to link its other projects with the national grid thereby operating in an integrated regime for such projects. The relationship of PGC with NGC will have different perspectives.

Irrespective of any regime, for processing of every project PGC will be required to take a number of steps. During the planning phase, the role of the project will have to be ascertained while also deciding about the time frame over which it will operate as a standalone project or otherwise.

Isolated Regime

If PGC decides to undertake a project in isolated regime, it will target those entities which plan to operate without connecting with the national grid. In this respect entities like generation facilities, providing electricity to isolated areas may request PGC for provision of transmission and interconnection services and there may not be any real requirement of coordination with NGC. NEP also outlines similar concept about isolated generation facilities viz a viz relevance of IGCEP. However, in a broader perspective and long term scenario, information and data exchange between PGC and NGC would be useful. It is therefore observed that information and data about PGC prospective projects, be shared and exchanged with NGC, enabling it for a coherent transmission planning at country level.

Provincial Load Dispatcher (PLD)/Control Centre

Initially, under the isolated mode, unless a grid is developed, no dispatcher would be required but after development of grid infrastructure there will be requirement to establish a provincial load dispatcher/control centre in order to control the frequency and voltage level of PGC transmission system for safe and reliable power dispatch.

Integrated Regime

When operating under integrated regime there are obvious factors which necessitate a close coordination with NGC/NTDC and with National Power Control Centre (when a separate license is granted). According to the existing NEPRA approved Grid Code, NTDC will be responsible for preparing transmission expansion plans for different future scenarios. PGC will not only provide its own future expansion plans to NTDC but it would be able to earmark those, which NTDC could not complete as scheduled. Further progress and for future projects, PGC may need to demonstrate that, for the safe and reliable operation of the sector, it may offer better solutions. Therefore, PGC's interaction with NTDC and NPCC will, as a minimum include the following;

- Information and data exchange for planning and future transmission expansion plans
- Information and data exchange during construction and on completion of projects
- Information and data exchange for the safe and reliable operation
- Information and data exchange for technical parameters i.e. metering record
- Information and data exchange for financial settlements

PGC vs. SPTL

The Act also envisages Special Purpose transmission license (SPTL) for ownership and construction of specific transmission facilities by private sector. While SPTL under the Act will be required to completely follow NGC instruction for operation of its facility, it will not be expected to have direct interaction with PGC. However, SPTL may present business

opportunities for PGC for undertaking construction or operation and maintenance activities. Therefore, it will be advisable that PGC to have knowledge and details of such licensees so that its operations are well organized and coordinated.

NTDC Concerns viz a viz Business Opportunities

Concerns have been shown that NTDC might view PGC as a threat to its business opportunities. NTDC per its licence is solely responsible for the provision of transmission services in the country. Therefore under the existing regime transmission plans and for their implementation, NTDC will have the first right of refusal on any transmission project. It may be noted that the role of PGC is essentially foreseen to support NTDC in expansion of its networks. This would be accomplished through;

- Increased and focused facilitation by the provincial government/PGC on projects under construction, which are critical for the expansion of NTDC's network and provision of reliable electricity to grid,
- Close coordination on future projects with NTDC, regarding technical and financial capability. Such coordination will be on mutual terms, meaning thereby that either party will have opportunity to benefit from other's support. Such cooperation may also include, offering of equity share in future projects so that funding needs are met, support in tendering process and sharing of resources i.e. hardware/software and human resources etc.

It is proposed to have protocol agreements between PGC and NTDC, delineating, specific boundaries of coordination and business operations.

Bulk Power Consumers/ Industrial Estates/ Economic Zones

In the context of PGC, BPC and industrial zones present many opportunities for providing transmission services. BPCs can receive electric power directly from a number of entities including suppliers, generators and traders etc. therefore for their physical delivery of power, PGC will be in an advantageous position, relative to distribution companies and NGC to implement such arrangements. Industrial estates and economic zones also require transmission lines for their power supply. In view of above, PGC will be required to maintain a close coordination with such consumers and incentivize them to take advantage of the evolving market structure, regulatory regime and other relevant policies.

Distribution Companies

PGC will also be required to have close interaction with relevant public sector distribution companies as those carry power in bulk from their delivery points to lower voltage networks. The current inferior performance of distribution companies is due to network operational issues as well as poor governance. Failure to timely complete grid stations

and transmission lines, delays in projects tendering process are some of the major reasons for;

- Poor quality of supply and
- Transmission constraints resulting in inadequate drawl of power than allocated by NPCC

PGC may facilitate distribution companies by undertaking transmission projects. Therefore, PGC would be required to collect important information about different factors like; supply and demand position at delivery points, ability of distribution companies for timely completion of projects, nature of constraints, for instance; right of way issues, institutional capacity limitations, historical performance about investment allowed by NEPRA etc.

It is also important to analyse the overall relationship between distribution companies and PGC. It is apprehended by various stakeholders that the existing public sector distribution companies might view PGC as a threat to their business opportunities. It may however be noted that the role of PGC is essentially foreseen to support DISCOs in expansion of their networks. This would be accomplished through;

- increased and focused facilitation by the provincial government/PGC on projects under construction, which are critical for the expansion of DISCOs' network and provision of reliable electricity to end consumers,
- Close coordination on future projects with DISCOs, regarding technical and financial capability. Such coordination will be on mutual terms, meaning thereby that either party will have opportunity to benefit from other's support. Such cooperation may also include, offering of equity share in future projects so that funding needs are met, support in tendering process and sharing of equipment i.e. hardware/software and human resources etc.
- It is proposed to have protocol agreements between PGC and DISCOs, delineating, specific boundaries of coordination and business operations.

Other Licensees and Entities

Depending on the market structure and pursuant to the Act, NEPRA may grant licenses to new entities to perform per the provisions of the Act. Similarly other entities like Private Power and Infrastructure Board and Alternative Energy Development Board (PPIB/AEDB) will have details about forthcoming generation projects and procurement of power per the requirements of distribution companies. PGC would therefore need to keep a close interaction with all such licensees and relevant entities.

The following **Table-23** provides summary of the interaction requirements between PGC and other entities in the sector;

Table-23: Summary of Interaction Requirements Between PGC and Other Entities

INTERACTION OF PGC WITH OTHER ENTITIES				
Entities	**Main activities and Interaction**			**Remarks**
NEPRA	- Filing of License Application - Filing of tariff petition for use-of- service charges - Filing of tariff petitions for project(s) for transmission and interconnection services - Submission of performance reports - Providing clarifications on comments, participation in hearings, - Participation in NEPRA proceedings on all relevant regulatory matters including conferences and workshops			PGC will be required to obtain License from NEPRA under Section 18 A of the Act
Transmission Service Providers		**Operating Regime**		NPCC will control system operation as part of NGC till it is granted separate license by NEPRA
		Isolated	**Integrated**	
	NGC/NTDC	Useful to have data exchange about future plans	Information and data exchange for; - Future plans (TSEP) - Progress on existing projects - Operational performance - Availability to NPCC - Metering data - Financial settlement	
	SPTL	Record of location and number of SPTL projects in the province		
BPCs	Identification of existing and new consumers data/ coordination with DISCOs			
Industrial Zones	Identification of existing and new consumers data/ coordination with DISCOs and provincial government			
Generators	Identification of existing and new Generator data/ coordination with NTDC (IGCEP), PPIB, AEDB and provincial government			
Market Operator	Information exchange for transmission services and use of system			Separate license by NEPRA
Distribution companies	Information about transformation capacity and transmission lines at delivery points. New transmission lines plans			

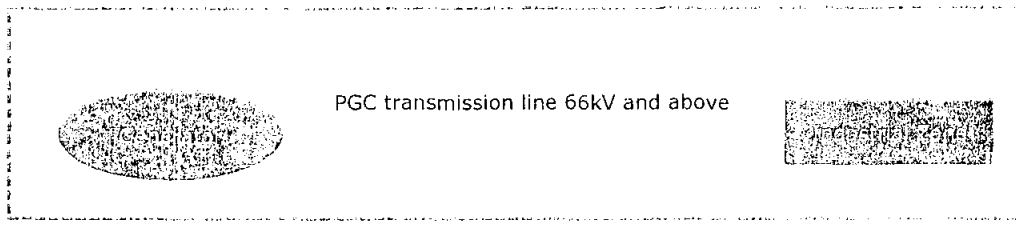
PGC as a Service Provider in other Provinces

NEPRA Act under Section 18A and 18B does not prohibit cooperation between provinces for sharing of information, knowledge and expertise. Therefore PGC may offer its services to other provinces on mutually agreed terms and conditions. Necessary framework documents may be developed in consultation with other provinces. It is proposed that legal opinion may also be sought for inclusion of such and other services in the Memorandum of Association at the time of incorporation of PGC.

4.4 Modus Operandi for Undertaking New Projects

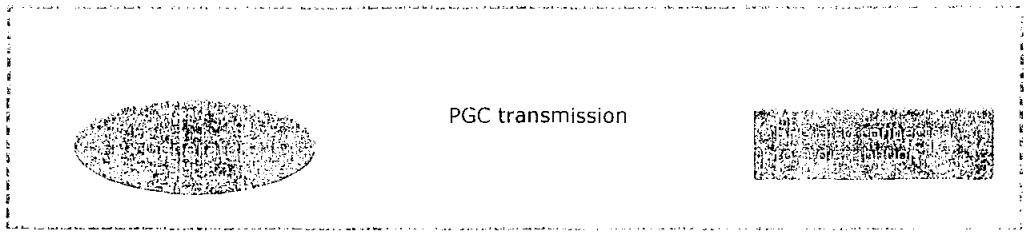
PGC may undertake transmission projects through a number of options available to it as discussed hereunder;

The projects under isolated regime (not connected with national grid) present opportunity for fast-track development. These will consist of generation facilities intending to provide power to isolated areas or industrial estates/zones/captive consumers not intending to take supply from any of the public sector distribution companies in Punjab. These may include small renewable energy-based projects and projects built on canals supplying electricity to above consumers.



Therefore, as a first step data about such schemes needs to be collected.

Under the next option, such projects may be considered, where the generation facilities are to be connected to bulk consumers or industrial zones, which are also to be connected to distribution companies or NGC networks.



There are such projects which NTDC/NGC has planned but could not start construction due to any of the reasons discussed earlier, which led to its failure to initiate work. Similarly due to power system dynamics, requirement of additional transmission facilities has emerged including inadequacy of transmission lines, quality of supply issues, but NGC/NTDC is unable to undertake work on these. PGC can offer its services in implementing such projects. A similar scenario exists for distribution companies having serious constraints of power dispersal to consumers at their delivery points due to lack of transmission lines, however distribution companies are not in a position to timely resolve those. In addition, inter-DISCO transmission lines may also be required in the

system, which may not be added due to various reasons. PGC can help in overcoming such problems for a smooth and efficient supply to end-consumers.

As per the Grid Code, NGC/NTDC will develop annual and TSEP for the national grid and on such projects NTDC will be the body to undertake construction. PGC may offer to implement any of these projects if NTDC shows its inability (first right of refusal) to do that, therefore a clear understanding and protocol with NTDC to be approved by the Regulator, will be needed to be in place. For isolated systems (not connected with national grid), PGC will have the right for provision of transmission services but for that scenario also, PGC will provide relevant information to NTDC and other stakeholders. Similarly, distribution companies also prepare their plans for construction of transmission systems. In this case also PGC will coordinate with distribution companies for undertaking transmission projects.

As part of the feasibility study, detailed information from NTDC, distribution companies and PPDB has been collected and analysed in view of the options discussed above.

4.5 Development of Joint T/L Projects by PGC and NTDC

The development of T/L projects by PGC with NTDC would be a promising option regarding optimal utilization of resources as well as getting efficiency resultantly the end consumers and public at large could be beneficial. The NEPRA Amendment Act 2018 under sub-section 18A allows provincial grid company to engage in transmission service within the territorial limits of the concerned province and under sub-section 18B further states that a provincial grid company will provide transmission and interconnection service to national grid company/NTDC.

In the absence of National Electricity Plan which is yet to be notified by the government, National Electricity Policy 2021, provides overarching guiding principles about role of the provinces in developing transmission networks. The Policy under Sub-Section 5.2.3 highlights about the cooperation between NTDC and provincial government/PGC and states;

"Different financing or investment options may be explored by the NGC to facilitate expansion of the transmission network, including financing / investment by Provincial Governments, PPP models and Government to Government arrangements."

Overall, the National Electricity Policy and the regulatory regime do not restrict PGC or NTDC, to develop joint T/L projects. Therefore, PGC and NTDC may look into joint development of transmission line projects for efficient and timely expansion of network. Further details can be firmed after due consultations between the parties.

4.6 Role of Provincial Government

4.6.1 Relevance of NEPRA Act

A clear role for the provincial government as the owner of provincial grid company is contained under section 18A of the Act. However, the provincial government will be required to play other roles though not defined explicitly, for a financially viable PGC.

To elaborate the matter, the responsibilities of PGC under section 18B of the Act are to be deliberated further. It may be noted that PGC is mainly obligated to engage in transmission and interconnection services to other users including to NGC, wherever necessary. At the same time, according to subsection 2(f) of Section 18B, PGC is explicitly barred from engaging in generation and distribution.

4.6.2 Promotion of Generation Facilities and Bulk Consumers

As discussed earlier, it may be seen that PGC will be offering transmission and interconnection services in isolated as well as in integrated modes. For the integrated operation it will mainly coordinate with NGC and distribution companies however its role may be seen at subordinate level, as NGC and distribution companies also provide transmission and interconnection services, which in a way makes PGC their competitor. To remain financially viable, it is therefore in the interest of PGC to also focus on the isolated regime of operation.

4.6.3 Facilitation to PGC on Other Issues

A number of factors contribute to the inferior performance of distribution companies and NTDC. These include capacity issues of these entities to make timely progress on implementation and construction of transmission projects. Issues like delays in tendering process, right of way problems and inability in particular of distribution companies, to make investment in their transmission system, in spite of huge investments allowed by NEPRA over past years. Provincial government's continuous support on these issues therefore will provide huge advantage to PGC over NGC and distribution companies, in handling transmission projects in the Punjab province.

4.6.4 Energy Department of the Government of Punjab (ED)

As concluded above that for its financial viability, continued operation and resolution of other issues PGC would require full time support of the provincial government in the areas which are not the functions of PGC. A look at the provincial setup shows that the Energy Department of the government of Punjab is primarily looking in the energy, electricity and related matters.

The functions of ED as appearing on its web site also contain the following;

"Matters relating to the following entities:

- Punjab Power Development Board
- Punjab Power Development Company
- Quaid-e-Azam Solar Power Company (Pvt.) Ltd.
- Quaid-e-Azam Thermal Power Company (Pvt.) Ltd.
- Punjab Energy Holding Company
- Quaid-e-Azam Wind Power Company
- Punjab Coal Power Company Ltd.
- Punjab Renewable Energy Company Ltd.

- All relevant matters under Articles 157, 158 & 161 of the Constitution and policy making for the province in respect thereof
- Development of power generation by exploiting hydel, thermal and renewable energy resources
- Monitoring of electricity tariff in Punjab"

Punjab Power Development Board (PPDB) may be noted as one of the entities under the ED. PPDB was established through an Act in 2011. The purpose of the Board as contained in preamble of the Act reads as follows;

"**Preamble**. Whereas it is expedient to establish the Punjab Power Development Board for the purposes of implementation of policies, programs and projects in the field of energy in the Province and to facilitate the private investors in power sector through one window facility; to harness the available sources of energy generation in the Province; and to provide for ancillary matters."

According to section 8 Chapter II of the Act, functions of the Board are reproduced hereunder. "

4.6.5 Functions of the PPDB Board

The Board shall

(a) Facilitate the private investors on behalf of the Government in matters relating to the setting up of power projects in accordance with the policy of the Government.

(b) Implement the policy of the Government relating to power generation and coordinate with various departments and agencies of the Government in the field of power generation.

(c) Negotiate and finalize, with the prospective private investors in the power sector, the implementation plans, feasibility studies and operational plans.
(d) Receive fees and charges from private investors in processing of their applications for power projects and shall deposit and disburse the fees or charges.
(e) Correspond with the local or international agencies in the performance of its functions under this Act.
(f) Issue no objection certificate, permission or licence for use of canal or river water or land of the Government for power generation.
(g) Explore potential sites for hydel and coal power generation and develop non-conventional sources of energy including solar, wind, biomass, biogas and solid waste.
(h) Examine energy policies of the Federal Government and advise the Government on effect of the policies of the Federal Government.
(i) Co-ordinate with the Federal Government or any authority or agency of the Federal Government for installation of power houses, grid stations and transmission lines according to needs of the province.
(j) Encourage and ensure exploitation of indigenous resources for development of thermal or hydel power projects in the province.
(k) Encourage the local and foreign entities to form joint ventures for participation in the development of the power projects.
(l) Advise the Government on bulk power supply from the national grid for transmission and distribution within the province, levy of tax on consumption of electricity, laying of transmission lines and determination of power tariff for distribution of electricity within the province.
(m) Acquire, where necessary, land for power projects.
(n) Perform such other functions as may be prescribed to promote power generation in the province."

In view of functions of Energy Department of the government of Punjab and PPDB, as provided above, it is evident that much needed facilitation for PGC has to come from PPDB, who inter-alia is responsible for:

- Framing of regulations for giving effect to the provisions of the PPDB Act and rules framed by the government of Punjab,
- Examining energy policies of the federal government and advising the government of Punjab
- Exploring and encouraging exploitation of indigenous resources for development of power projects
- Coordination with others including federal government agencies
- Accordingly, PPDB must gear up and gather resources for urgently taking up the work in relevant areas before license application is filed by PGC before NEPRA.

4.6.6 Regulatory Functions

As discussed in earlier sections, PPDB will be required to take multiple steps on different fronts for the success of not only PGC but for enabling the province to play its role as provided under the Constitution, NEPRA Act and National Electricity Policy. Accordingly, it is highly desirable that work on forming provincial regulator be initiated forthwith to streamline development of power sector as a whole in the province. In the intervening period, PPDB is expected to;

- Assist the government of Punjab in framing policies and rules to encourage investment in the development of power generation and transmission facilities through private or public-private mode.
- Assist the government of Punjab in framing policies and rules to encourage investment in developing industrial estates and bulk consumers.
- Develop regulations to support rules framed and policies of the government of Punjab. Prepare necessary framework for tariff determination for the electricity to be used in the province.

4.6.7 Guidelines

PPDB is also expected to;

- Develop guidelines and necessary protocols for coordination between PGC and NGC/NTDC and between PGC and distribution companies for information exchange on existing projects and future plans. Broad framework templates for such protocol are given at the end of this chapter.
- Develop necessary protocols for coordination between PGC and other federal government entities like PPIB/AEDB.
- Presently inter-DISCO 132 kV transmission lines exist between different DISCOs, which also cross adjoining provincial boundaries for electric power exchange, reliability and meeting consumers' demand. It is foreseen that after formation of provincial grid companies, inter-provincial power exchange would be essential. For meeting this objective, necessary guidelines and legal instruments have to be developed thorough consultative process between provincial grid companies and respective provincial authorities like PPDB etc.

4.6.8 Contracts

For providing transmission and interconnection services PGC will be required to enter into contractual relationship with a number of entities including NGC/NTDC, distribution companies, generators, bulk consumers. PPDB will be required to be develop these on priority.

It is also important to highlight that in order to initiate work on above mentioned areas, PPDB must undertake aggressive steps including setting up of core group consisting of experienced regulatory, technical, legal and financial professionals on war-footing by hiring of these professionals on priority.

4.7 Framework for Coordination between PGC and NTDC

1. A Protocol/Agreement will be entered between PGC and NTDC for streamlining coordination for expansion of transmission network in the province. For all the transmission projects 220 kV and above, to be connected with national grid, NTDC shall have the first right of ownership and implementation.
2. Both parties will cooperate with each other by providing relevant information in respect of planning, design and implementation of transmission projects, which will include but not limited to the following;

4.7.1 Obligations of NTDC

1. NTDC shall be obliged to provide the following details to PGC:

- **Projects under Construction**
  - Name and details of all Projects including technical specifications, length of the projects, starting and termination points in the national network and allied additions or alterations in network
  - Scheduled and Actual Start Dates.
  - If actual Start Dates are different than the scheduled dates, then reasons for delays by identifying any procedural constraints like delays in tendering process, non-availability of funds, etc.
  - Scheduled and Expected Completion Dates
  - If expected completion dates are different than the scheduled dates, then reasons for such delays. For instance, Right of Way issues, Force majeure events, other construction and implementation bottlenecks.
  - Progress Reports
  - Progress Reports will be shared with PGC for all relevant under construction projects.
  - Project Completion Delays (time graded)

- Provide list of projects which have been delayed for more than 1 year

- **Existing System Details**
  Details about overloading of transmission lines and grid stations and other quality issues will be included. Similarly planning and design standards will be shared.
- **Projects Planning (future projects)**
  - NTDC while preparing Transmission System Expansion Plans under the Grid Code, will share details with PGC of projects planned in the Punjab Province. The information will be prepared for short, medium and long terms and also required to include funding requirements and details of fund availability.

4.7.2 Obligations of PGC

PGC will provide the following details about its transmission projects

- Technical information about Projects, location, scheduled completion, interconnection points if proposed to be connected with national grid or otherwise.
- In case of single corridor where PGC intends to construct its transmission line prior to NTDC construction of transmission line, PGC shall share complete transmission line route survey details along with profiles to NTDC, so that both entities agree to optimized solution for the existing and future infrastructure.
- PGC shall share its planning and construction information with NTDC and in case of reservations of NTDC, parties will work together to devise a workable solution acceptable to both.
- In a corridor where PGC has already constructed transmission line and where NTDC also requires its transmission line PGC shall extend its support for a hybrid design so that multiple transmission circuits are accommodated.
- PGC shall extend right-of-way support to NTDC

4.7.3 Progress and Coordination Meetings

Parties will agree to hold progress and coordination meetings on six monthly bases for identifying issues and necessary facilitations on mutually agreed terms and conditions.

4.8 Framework for Coordination between PGC and DISCO

1. A Protocol/Agreement will be entered between PGC and DISCO for streamlining coordination for expansion of transmission network in the province. For all the transmission projects from 66kV up to 132 kV to be connected with national grid, DISCO shall have the first right of ownership and implementation.

2. Both parties will cooperate with each other by providing relevant information in respect of planning, design and implementation of transmission projects, which will include but not limited to the following;

4.8.1 Obligations of DISCO

1. DISCO shall be obliged to provide the following details to PGC:

- **Projects under Construction**
  - Name and details of all Projects including technical specifications, length of the projects, starting and termination points and allied additions or alterations in network
  - Scheduled and Actual Start Dates.
  - If actual Start Dates are different than the scheduled dates, then reasons for delays by identifying any procedural constraints like delays in tendering process, non-availability of funds, etc.
  - Scheduled and Expected Completion Dates
  - If expected completion dates are different than the scheduled dates, then reasons for such delays. For instance, Right of Way issues, Force majeure events, other construction and implementation bottlenecks.
  - Progress Reports
  - Progress Reports will be shared with PGC for all relevant under construction projects.
  - Project Completion Delays (time graded)
  - Provide list of projects which have been delayed for more than 1 year
- **Existing System Details**
  - Details about overloading of transmission lines and grid stations and other quality issues will be included. Similarly planning and design standards will be shared.
- **Projects Planning (future projects)**
  - DISCO while preparing Transmission System Expansion Plans, will share details with PGC of projects planned. The information will be prepared for short, medium and long terms and also required to include funding requirements and details of fund availability.

4.8.2 Obligations of PGC

PGC will provide the following details about its transmission projects

- Technical information about Projects, location, interconnection points if proposed to be connected with national grid or otherwise.

4.8.3 Progress and Coordination Meetings

Parties will agree to hold progress and coordination meetings on six monthly bases for identifying issues and necessary facilitations on mutually agreed terms and conditions.

5. SETTING UP OF PUNJAB GRID COMPANY (PGC)

Corporate and organization structure of a transmission company essentially depends on ownership and functions to be carried out by the organization. The company may be governed through a Board comprising of directors from government and other independent professionals in the field. With the opening of the market, representation of the stakeholders may be also be included in the Board. Essentially general functions and strategic objectives of a transmission company require it to provide transmission services for use of system transmission fee/tariff/charged on users of the transmission system; connect users; expand / rehabilitate the system (business plans and investments) while under all scenarios the control of the transmission system must follow the basic principle of open access and non- discrimination to new connections and users of the grid.

5.1 Relevance of Scope of Functions

Based on detailed review of literature on transmission business including relevant information of different countries, the following functions linked to different areas are identified.

5.1.1 Transmission Company as System Planner

Long term Expansion Planning

- Long term demand projections and load growth assumptions
- Indicative generation expansion plan
- Transmission system expansion plan, including system studies to ensure compliance with reliability and quality standards / indicators

5.1.2 Transmission Company also as System Operator

Operational Planning and Assessment;

- Medium term load forecast
- Coordination of maintenance outages and agree annual maintenance outages generation and transmission plan
- Operational power system studies to determine system security / transmission constraints

Generation Scheduling and Dispatch;

- Short term load forecast
- Coordination of weekly and daily maintenance outages
- Day Ahead Economic dispatch and generation scheduling
- Assigning and management of ancillary services
- Real time operation and dispatch

Real Time Operation;

- Control Centre(s)
- Real time operation, real time metering and communication systems (SCADA, including energy management system and automatic generation control
- Administration of emergencies and fault/ system collapse
- Ex-post analysis and reporting of daily operation
- Ex-post Analysis and reporting of emergencies and events

5.1.3 Investment Planning and Project Management

If only Transmission Operator (not as system operator)
Connections and Maintenance,

- Develop transmission maintenance plan (annual, updates)
- Plan and coordinate actual transmission maintenance outage (weekly, daily, hourly)
- Receive and process connection requests, including when applicable grid impact studies

5.1.4 Real Time Operation and Performance of the Transmission System

Real time operation and performance of the transmission system (may vary if transmission infrastructure fully controlled and operated by the System Operator)
Transmission Control Centre(s)

- Transmission system SCADA
- Administration of emergencies and transmission faults
- Ex post Analysis of faults in its transmission system (causes, impact, mitigation measures)
- Data collection, validation and calculation of transmission performance indicators

5.1.5 Information Technology

- Power system Models/tools and data bases;
- Enterprise Resource Planning (ERP) and commercial managements systems

5.2 Requirements and Objectives of World Class Transmission Company

- Management commitment, motivation, leadership
- Operate as a commercial company - maximize profits:
- Provide high quality transmission services to transmission users
- Timely and quality connection of transmission users;
- Accurate and timely invoicing and collection of transmission fees

- Control and/or reduction of operation, maintenance and administration costs to achieve required performance standards and quality of transmission service
- Efficient real time operation
- Investment plans and administer costs and profitable investment projects
- Qualified managers and staff – training programs for excellence staffing
- Technological innovation
- Efficient financial management and accounting practices

5.3 Business Plan Expectations

The above noted objectives grouped hereunder, may form basis for enabling PGC to achieve its vision:

5.3.1 Customer & Community Satisfaction

✓ To provide adequate transmission capacity and service that are at par with industry standards and expand transmission capacity

Actions Needed

- Deliver reliable, safe and secure transmission
- Minimize frequency and duration of interruptions of power supply from transmission network
- Deliver high quality transmission service
- Comply with following Power Quality Standards on:
  - Voltage Variation
  - Transient voltage variation
  - Frequency variation
  - Harmonics
  - Voltage imbalance
  - Voltage fluctuation and flicker severity
- Involve the community and/or its representatives in the whole planning and project implementation cycle

✓ Build harmonious, inter-active and participatory relationship with the community especially those that are most impacted by the company's projects.

Actions Needed

- This will be done through regular consultations/dialogues with the community/representatives during the project preparatory,

implementation, and post-implementation stages to inform the community on planned projects and to consider their views on the matter;

- Introduce corporate and social responsibility (CSR) policy

5.3.2 Financial Performance

✓ Manage controllable costs while meeting business objectives

Actions Needed

- Reduce systems loss
- Eliminate project cost overruns

✓ Improve collection efficiency

Actions Needed

- Reduce outstanding receivables

✓ Increase revenue base

Actions Needed

- Increase transmission capacity
- Provide equity from internally generated funds for project finance

5.3.3 Business Processes

✓ To adopt and implement industry best practices for efficient and effective business practices:

Actions Needed

- Project Planning and Management;
  - Reduce bid evaluation time and lag between bid acceptance and start of project implementation in line with industry standard
  - Reduce time between evaluation of work order and project closing in line with industry standard
- Operations, Maintenance and Asset Management
  - Draw up a comprehensive operations and maintenance plan
  - Draw up and regularly update a comprehensive fixed asset registry
- Commercial Practices and Management
- Financial Management and Accounting Systems

5.3.4 Staff & Company Culture

✓ Improve management and technical skills of management and staff

Actions Needed

- Draw up a comprehensive knowledge and skills framework and job descriptions for all positions

- Undertake competency mapping and assessment of the training needs of current management and staff based on the knowledge and skills framework and job description
- Where necessary, recruit new officers and staff and/or create new positions based on the knowledge and skills framework identified.
- Draw up a training plan based on the training needs.

✓ Pay staff equitably according to Industry Standard and Performance

Actions Needed

- Undertake a comprehensive, comparative pay audit of all positions relative to their peers in the industry
- Draw up a performance assessment system that will among others,
  - provide the rating criteria;
  - criteria for pay raises and/or promotions

✓ Ensure staff safety, i.e., minimize risk to their physical and mental health while in the work place

Actions Needed

- Document, achieve understanding and apply workplace safety procedures as required in the safety code approved by NEPRA and as developed internally;
- Provide adequate safety equipment and other infrastructure; and formulate fitness criteria corresponding to job positions especially for jobs with high physical risk.
- Provide adequate occupational injury and compensation insurance for high risk jobs.

5.4 Corporate and Organization Structure

As discussed in preceding sections, organization structure of a transmission company will depend on the scope of functions to be performed by it. The scope of functions for provincial grid company as contained in NEPRA Act clearly establishes that PGC will not be expected to carryout dispatch of generation facilities; a function under the domain of NGC/NTDC (as long as it is responsible for system operation) and later on system operator. Therefore, organization structure of PGC may be finalized as discussed in the following sections.

5.4.1 Broad Areas/Requirements

✓ Long Term Planning and Design

- Long term forecasting;

1. The long term load forecasting to be made every year to facilitate any changes/revisions/modifications to be made for the long term transmission planning before taking up any project for execution.

- Long term transmission planning study;
- Transmission system design;
- It is highly desirable that a standardized the design of towers. In this respect PGC may develop design internally or through outsourcing or it may adopt designs being used by NTDC and DISCOs for different voltages terrains, zones, conductor sizes and tower foundations.
- Technical specifications of Transmission system equipment and materials;
  The technical specifications of transmission system equipment and materials are to be revised annually, incorporating the latest techniques and feedback from the Engineering and the Operation Services departments.

✓ Procurement, Construction, Operation and Maintenance

- Procurement;

2. E-Tendering should be introduced/adopted for all purchases in order to reduce advertisement costs, reduce the bid opening and closing time, reduce the time for technical and commercial evolutions, and reduce the time for placing Purchase orders.

- Construction
- Operations and maintenance of transmission system

✓ Regulatory Compliance

- Performance standards
- Reporting requirements
- Tariffs/use of system charges

✓ System Operation

- SCADA;

3. PGC will have SCADA for data acquisition and substation breaker operations.

- Operating Procedures;

4. For maintaining availability of transmission system, restoration of system protocols, metering equipment, reduction of losses

✓ Allied and support areas

5.4.2 Proposed Departments

Transmission Planning Department: Interaction with NGC/NTDC, distribution companies and other entities at federal and provincial level for preparation and exchange of plans, Interaction with captive and other generation facilities, BPCs.

Procurement, Construction and O&M Department: Procurement of equipment, design requirement for new equipment; Asset management, Operation and Maintenance of transmission system.

Connections and User Services Department: Standard connection agreements, standard connection process, receive and administer request for new connections or changes to existing connections to the transmission system, registration and monitoring of signed connection agreements, administration of operational and connection complaints

Operations Department

- Control Centre(s) and SCADA
- Operational Planning and Performance:
  Reliability and system quality studies, such as power flow and stability studies, to determine system security and transmission capacity constraints;
  Requirements of protection schemes and coordination (procedures), and
  Quantity and requirements for each Ancillary Services.
  Calculation, supervision and reporting of transmission performance standards

Information Technology Department: Administration of computer resources and communications systems. Organization and maintenance of Data Bases. Implementation and maintenance of server and net, software development and maintenance.

Commercial Department: Billing and collection of connection charges when applicable; metering data of transmission users, invoicing and collection of transmission use of system charges from relevant transmission users.

Regulatory and Legal Department: Prepare petitions for transmission charges; review and feedback to regulator on proposed new regulations or amendment of existing regulations and Codes applicable to transmission.

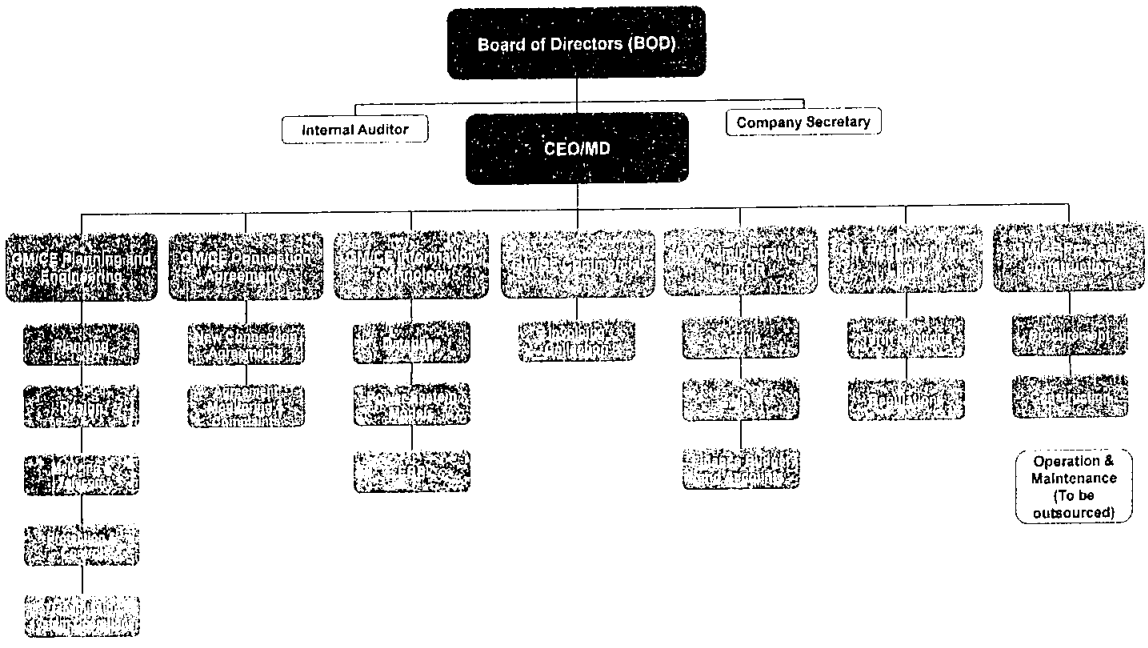
Administration and Human Resources Department: Responsible for management of internal human resources, including promotions, selections, and training programs.

Finance Department: Responsible for financial management, including finance associated a proposed business plan, accounting, and budget.

5.4.3 Organization Structure of PGC

An organization structure of PGC is proposed as under. It may be noted that this is the final stage of organization structure and in the first phase only planning and engineering, commercial and administration departments will oversee other functions also. Other departments may be introduced as the PGC is gradually evolved.

Proposed Organogram of Punjab Grid Company (PGC)



5.5 Human Resources

As discussed earlier during the 1st phase (up to 3 years) all the positions as shown in the organogram will not be required. It is proposed that only core departments may be developed to carryout initial activities which mainly include hiring of essential staff, preparation and filing of license application before NEPRA and coordination with other departments. Accordingly, appointment at the top slots of CE/GMs in the areas of Technical, Administration & HR and Commercial will be hired along with minimum support staff so as to meet the requirement of license application. It is also worth mentioning that according to industry best practices, for efficient and effective working, PGC may outsource some of its functions. For instance, O&M of transmission system may be carried out in relatively cost effective and efficient manner if it is done through specialist groups than if done by PGC teams. Main job requirements are included here for technical, administration and human resource and commercial.

5.5.1 General Manager/CE — Technical (Overseeing a Number of Areas during Initial Phase)

Responsibilities:

- Planning and design of transmission lines and grid stations
- Oversee operation of transmission lines and grid stations
- Supervise connection agreements with users of transmission system
- Identification of potential projects for development by the provincial government or under Public Private Partnership (PPP) mode.
- Selection and monitoring of consultants, contractors and or developers/private partners.
- Represent the company at various fora.
- Liaison with relevant authorities on laying of transmission lines from the proposed power generating units to the National Grid or in isolated mode.
- Overall supervision of Operation and Maintenance of transmission lines and grid system internally by PGC or through outsourcing

Qualification and Experience:

- Preferably a master's degree in Electrical Engineering from HEC recognized university; with at least twenty years of experience at management level with a utility, with regulator or with a reputable consultant

5.5.2 CE/General Manager Commercial

Responsibilities

- Supervise tariff petitions and use of system charges
- Prepare business and investment plans
- Develop financial procedures
- Collection of revenue and cash flow management
- During initial phase responsible for supervising accounts department, prepare annual budget and financial statements

Qualification and Experience

- Advanced degree in accounting, finance, engineering plus MBA, ACA, ACCA, CIMA with at least 20 years of proven work track record in lead positions in reputable organizations

5.5.3 General Manager Administration and Human Resource

Responsibilities

- Overall administrative matters of the company
- Responsible for reviewing and implementing policies of management
- Lead procurement/hiring of consultants, RFPs, evaluation of bids and award of contract
- Signatory on behalf of company on all the contracts of the company.
- Responsible for logistic matters for procurement contracts, interacting with vendors and insurance companies
- Human resource management, induction of employees, service structure
- Training needs
- On job assessment of employees and appraisal mechanism
- Pay structure analysis

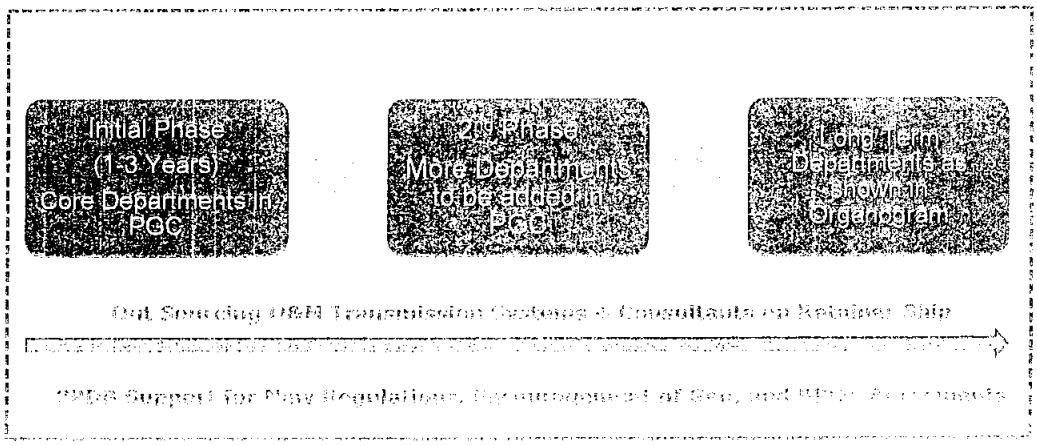
Qualification and Experience

- Master degree in business, human resource, public administration and legal with at least 20 years' experience at management level positions in public or private organizations.

In addition to the above senior positions, other support staff will be inducted as and when required through relevant departments. Support of legal firms and technical and financial consultants will also be acquired on 'retainership' basis to complete tasks expeditiously. Outsourcing of O&M of transmission system will be undertaken to have a cost effective structure.

A continued support will be provided through PPDB where a dedicated group/team will be created to review federal government policies and make new regulations, prepare template of agreements to be used by PGC with different entities in the sector and in view of evolving competitive market.

The addition of departments in PGC will be done in phases as shown below. In the 1st phase of 3 years, dedicated departments will be created. The hiring of consultants, legal support and outsourcing of O&M of transmission systems will be done as per industry practice.



5.6 Legal Requirement

5.6.1 Creation of Company

Pursuant to Section 18A of the Act, a provincial grid company owned by provincial government is authorized to engage in the transmission of electric power in the province. Therefore, the first step is to start the process of creation of a company. PPDB in its role to provide overall development of power in the province is required to hire legal firm(s) to take up this matter on priority.

5.6.2 Preparation and Filing of License Application

It is also critical that PPDB initiate the process of gathering necessary data and resources as required under section 18A of NEPRA Act for filing a license application. PPDB may create a cell to provide necessary support for obtaining NEPRA license by PGC.

5.7 Challenges for PGC and Solutions

According to section 18A (2), the eligibility criteria for grant of license as a provincial grid company shall be prescribed and shall include, without limitation, - (a) minimum solvency requirements; and (b) minimum technical and human resource requirements.

(a) Challenge to meet Minimum Solvency Requirements

PGC will be required to demonstrate that as an ongoing concern it will remain financially viable. Therefore, it will be critical for PGC to have sufficient cash flows and liquidity to run its day-to-day affairs. PGC will have two sources of funds in this respect;

- Initial support as well as funding from the provincial government
- Rates and charges as determined by NEPRA under section 18B of the Act for providing transmission services to its users.

The following sections provide a number of initiatives by PGC and the provincial government (through PPDB) to overcome initial challenges expected to be encountered by PGC.

Provincial Government Financial Support

Since PGC will not have funds through its own operations at the time of proceedings for application of PGC license before NEPRA, therefore PGC is required to urgently seek firm commitments by the provincial government for an initial seed money and funding at later stages on 'as and when' need basis to satisfy solvency requirements for its license application under the Act.

Funds though Rates and Charges by NEPRA

PGC will generate its revenue through approved rates and charges (determined by NEPRA) paid by the users of its transmission systems. The list of users of PGC transmission systems include NGC/NTDC, distribution companies, Generators and bulk power consumers while also connected with national grid. In addition, PGC will also provide transmission services for wheeling of power in isolated mode for Industrial Estates and bulk consumers and consumers of captive power generation. Therefore, it is critical that PGC expand its user base, also duly supported by the provincial government by announcing attractive policies for relevant entities of the sector.

Expansion in Transmission System

For its financial viability as a going concern, PGC would require to expand its transmission system thereby expanding network users' base. It will be critical to have harmonious relationship with NGC/NTDC and distribution companies in the province so that PGC offer its services to complement their efforts for an integrated operation of a reliable system.

Proactive Role of PPDB on IGCEP and TSEP

For expanding its transmission system PGC can take up projects which otherwise fall under the domain of NGC/NTDC or distribution companies, however they are unable to implement such projects due to a variety of reasons. To elaborate, NTDC is responsible for preparing Indicated Generation Capacity Expansion Plans (IGCEP) and TSEP to be approved by NEPRA. The transmission systems are required to be developed by NTDC for connecting to national grid. Similarly, distribution companies also prepare their future transmission expansion plans with the approval of NEPRA. NGC/NTDC or distribution companies may face the problem of insufficient funds or capacity issues which may affect their plans for completion of these projects. Furthermore, projects in other areas may replace some original projects which in turn push original project out of priority list. PGC may offer its services by targeting such areas by making out detailed business plans to achieve harmonious development of transmission networks. The provincial government (through PPDB) will have a major role to play in the development of IGCEP and TSEP so that generation resources of Punjab province also have due share in the optimal mix of the country.

PPDB Role for encouraging Generators and Large Consumers/Industrial Estates

Similarly, PGC may take up transmission projects which are not connected to national grid by providing interconnections to generators and Bulk Power Consumers or Industrial Estates. The provincial government can encourage both the generators and consumers through investor friendly policies by offering those, specific incentives, proposals for public-private partnerships, etc.

Statutory Role of Province (through PPDB) under National Electricity Policy

National Electricity Policy 2021(NEP) identifies a number of areas where statutory work by provinces is required. Section 5.1.10 of NEP reads as follows;

"Subject to Article 157(2) of the Constitution, the Provincial Governments may make their own electricity policies (including generation, transmission & distribution) and execute related projects within their boundaries without the requirement of selection by IGCEP, as long as such projects are not connected to the national grid and do not impose any obligation on any Federal Government entity. Such projects can subsequently be connected to the national grid, subject to the consent of the Federal Government, based on the principle of least cost and selection by IGCEP."

In view of above requirement and as stressed earlier, for financial viability of PGC, PPDB will be required to urgently setup a department to develop relevant policies for the encouragement of power projects in generation, transmission and distribution sectors.

For interacting with various entities, it is also required that necessary agreements are drawn. PPDB will also be required to provide its support to PGC in the areas of;

- Connection agreements with NTDC, distribution companies and consumers
- Use of system agreements
- Developing Wheeling regime
- Preparation of RFPs for technical services including construction activities for transmission systems
- Documents for procurement of equipment
- Protocols for meter reading and communicating with users

Participation of Provincial Government with NGC/NTDC in Transmission Investment

Section 5.2.3 of NEP reads as follows;

"Different financing or investment options may be explored by the NGC to facilitate expansion of the transmission network, including financing / investment by Provincial Governments, PPP models and Government to Government arrangements. All developments under the PPP model will be carried out on competitive basis, providing equal opportunity to all interested parties."

The provincial government (through PPDB) therefore need to coordinate with NGC/NTDC for identification and expansion of transmission networks for mutual financial benefit of PGC and NGC/NTDC.

(b) Challenge to Meet Minimum Technical and Human Resource

Minimum technical and human resource requirements also present a major challenge for PGC to meet. As presented in organization chart, highly qualified and experienced professionals in the field of engineering planning, design and construction, Finance, accounting, legal and administration would be required to be included in the PGC setup. At the time of filing of application for license with NEPRA, a core team must be in place to supervise essential areas of work. Accordingly hiring of key professionals may be initiated forthwith to meet filing requirements as early as possible.

A survey of the market shows that highly experienced professionals having long standing associations with utilities including NTDC, distribution companies and reputable consultants will be able to offer services to PGC. These professionals include engineers in planning, design and construction, accountants, finance, legal and administration matters. It is therefore imperative that identification of consultants and contractors and preparation of data base about human resource be completed as early as possible to save on time at later stages. PPDB in this respect can provide the necessary initial working by offering its platform to PGC.

Technical support is also needed for the running of PGC. This will include equipment at the time of inception of PGC and also long-term requirements as follows;

Immediate Requirement of;

- Hardware and software including computers, printers, photocopiers, scanners and communication networks

Medium and long term requirements of;

- Power system studies software including load flow, short circuit and transient stability analysis for AC and DC systems
- Hardware to run above software and capacity building of human resources
- ERP for efficient operations, centralized data base and other functions.

6. PGC ROLE IN COMPETITIVE TRADING BILATERAL CONTRACT MARKET (CTBCM)

Regulation of Generation, Transmission and Distribution Act 1997 (NEPRA Act) provided a broad framework for development of the Pakistan Power Sector; unbundled following the 1992 power sector Reform Process. NEPRA Act contained a number of provisions and obligations for regulating generation, transmission and distribution entities including the following.

- Separation of generation, transmission and distribution functions
- Licensing requirement for entities for doing business in power sector
- Obligations to obtain Tariff from NEPRA
- Obligations to follow performance standards prescribed by NEPRA
- Granting exclusivity to distribution licensees in their areas of operation
- Introducing Special Purpose Transmission License

In addition to above, NEPRA Act also defined Bulk Power Consumers (BPC) as a distinct entity from other end-consumers and introduced an element of competition by allowing BPCs the possibility to obtain power directly from generation companies; wheeling of power by generation companies. Similarly relevant entities are obligated to offer 'open accesses for delivery of power. There are however certain areas which were not touched upon in NEPRA Act, although those were introduced and implemented successfully in other developed regulatory regimes of the world. For instance, distribution business has been defined as to include 'network' and 'supply' functions, although in most of the regulatory regimes 'network' and 'supply' have been categorized as separate functions. NEPRA Act also did not lead to independent market and system operations which are key to moving towards a competitive regime.

The amendment in 2018, brought major changes to NEPRA Act, like opening of the sector and wholesale competition in the market. A separate section has been included to define the role of provinces specifically in transmission of electric power. The following sections provide an overview of the amendment Act 2018 and deliberate on the role of Punjab Grid Company (PGC) in future competitive market.

6.1 NEPRA Amendment Act, 2018

The Regulation of Generation, Transmission and Distribution of Electric Power (Amendment) Act, 2018 [Act No. XII of 2018] (the "Amendment Act"), that was passed by the National Assembly on 15th March, 2018, received assent of the President of the Islamic Republic of Pakistan on 27th April 2018 and finally published in the official Gazette on 30th April 2018. The Amendment Act has restructured and evolved the power sector in material respects and completely reformed the role and responsibilities of the National

Electric Power Regulatory Authority (the "Authority" or "NEPRA") and other stakeholders in the sector.

6.1.1 Separation of Network and Supply Functions

The Amendment Act has separated network and supply function which were earlier bundled in distribution business. The Amendment Act defines 'distribution' as related to network ownership and operation whereas 'supply' is for sales to end consumers. Segregation of distribution and supply functions is expected to bring more transparency and efficiency in the overall regulations of distribution sector.

No Exclusivity for Distribution Companies
The Amendment Act has also ended the exclusivity of distribution companies, earlier allowed in their licenses under NEPRA Act 1997. Therefore, under the revised scheme of things, other supply license holders, may also supply to consumers in the service territory of another supplier.

6.1.2 Cessation of Generation Licenses

The Amendment Act has provided a mechanism that shall implement a gradual cessation of generation licenses in the forthcoming years, with the Generation license requirement to be abolished gradually under a mechanism to be formulated by the Federal Government after consultation with the Authority. Licensing is a core function of NEPRA, and cessation of a licensing regime for generation companies will effectively remove a significant portion of the regulator's function and work. This has been done for liberalizing the sector by removal of barriers for new entrants.

6.1.3 Steps for Liberalization of Markets

Alongside cessation of generation licenses, there are a number of additional licenses and entity classes introduced in the Amendment Act, which are envisioned to fundamentally shift the entire power sector towards a more competition-based regime. NEPRA will now grant System Operator and Market Operator licenses, who will be tasked with overseeing transmission systems and dispatch and market transactions respectively. The Authority will also be granting Provincial Transmission licenses where required. The Amendment Act further introduces 2 new class of licensees, namely the Electric Power Trader and Electric Power Supply. The Electric Power Supply license will be authorized to sell electric power to end consumers.

6.1.4 The National Electricity Policy and Plan

The Amendment Act has introduced the concepts of the National Electricity Policy and the National Electricity Plan under Section 14A. The National Electricity Policy is a policy document that shall be prepared by the Federal Government, with the approval of the Council of Common Interest (CCI). The Policy's scope shall be focused inter alia on development of power markets, energy sustainability, transmission systems and optimal utilization of resources. The National Electricity Plan, however, is a document that shall be prepared and prescribed by the Federal Government, which has no set parameters or heads under which it shall be formulated. As such, the Plan has unrestricted freedom to address and cover any subject matter deemed relevant by the Federal Government.

6.2 Market Concept

The Amendment Act while providing a framework for a market through a number of steps for liberalization, like allowing new players and allowing BPCs to have choice of their supplier, has not mentioned about the specific type of competitive market to be evolved.

Section 14A of the Amendment Act provides a broad guideline about market design. Section 14 A (1) provides that the Federal Government shall, from time to time, with the approval of the Council of Common Interests, prepare and prescribe a national electricity policy for development of the power markets. Section 14A (2) (b) stipulates that the policies to be prescribed by the federal government shall provide for, inter alia– development of efficient and liquid power market design.

National Electricity Policy (NEP) provides detailed features of a competitive market. Sections 5.5.1 and 5.5.2 give detailed features of a CTBCM.

Sections 5.5.1 reads as follows.

The efficient and liquid power market design, as approved by the Regulator (CTBCM), will contribute for attaining the policy goals. The approved wholesale market design ensures the following objectives:

a. Providing open access to all market participants on a non-discriminatory basis;
b. Creating an environment to attract investment;
c. Contribute in improving power sector security of supply;
d. Ensuring further evolution of wholesale market to advanced phases;
e. Promoting competitive arrangements, both for and in the market;
f. Promoting payment discipline among market participants;
g. Eliminating sovereign guarantees for purchase of power over time through improvement in market conditions;

h. Ensuring compatibility of wholesale market design for operation of retail market in the future;
i. Ensuring transparency, predictability and accountability in the market; and
j. Creating an environment for compatibility / participation in regional electricity market.

Section 5.5.2 reads as follows;

"The approved wholesale market design, its implementation and subsequent development takes into account the following:

a. Enabling the choice of changing supplier of electricity, initially only for large or Bulk Power Consumers, followed by gradual liberalization of the retail market;
b. Creating incentives to promote entry and sustainability of the most efficient generation in the system;
c. No anomalies shall be created that allow any participant to take undue advantage of market conditions;
d. Creating minimum burden for the government in the form of subsidies through liberalization of the market;
e. Maintaining investor confidence by honouring the existing contracts (Energy / Power Purchase Agreements) and / or seamless transition of such contracts in the market design by mutual consent;
f. Providing a level playing field to all market participants through uniform application of cross-subsidization and other grid charges to consumers of all suppliers;
g. The Government shall take a decision on the recovery of costs that arise due to advent of the open access and market liberalization;
h. Ensuring open access to information and undertaking other transparency measures in the market especially providing for credible and independent service providers in the market;
i. Standardizing trading instruments to enhance liquidity;
j. Commercialization of strategic projects;
k. Ensuring proper settlement mechanisms for the imbalances resulting from trade among different market participants;
l. Ensuring accountability of market participants to bring discipline in the market;
m. Building on experiences of international market development and local market conditions;
n. Allowing, through simple regulatory adjustments, the future evolution towards increasing competition for and/or in the market; and
o. Fair allocation of risks amongst market participants."

Section 5.5.4 of NEP deliberates on the role of the regulator and obligations of stakeholders subsequent to implementation of CTBCM.

Section 5.5.4 of NEP reads as follows:

"In order to ensure implementation of wholesale market design and its further evolution, the Regulator shall in a timely manner frame, modify and evolve regulatory framework for, inter alia, supply, procurement, open access / wheeling, competitive bidding, import of power, and ensure effective market monitoring and enforcement. Provided that after implementation of CTBCM, every transmission licensee and distribution licensee shall offer, to all market participants, non-discriminatory open access / wheeling to its respective transmission or distribution system and interconnection services in accordance with CTBCM on the terms determined under the policy and legal framework."

As discussed above, NEP refers to a bilateral market (CTBCM), which when implemented will put obligations on market players and consequently, as a transmission licensee, PGC will be obliged to offer its systems in accordance with the provisions contained under CTBCM.

6.3 Market Development

According to NEP, Ministry of Energy (Power Division) will be responsible for the overall monitoring and implementation of market development. Central Power Purchasing Agency (CPPA-G), entrusted with the development of competitive market design has been engaged in preparation of concept papers for possible market structures, trainings to public sector entities and relevant private sector stake holders through conferences and workshops and meetings and presentations before NEPRA Authority and its professionals for the last three years. A Consultant appointed by Asian Development Bank (ADB) is fully associated with CPPA-G teams and other entities for knowledge sharing and capacity building to come up with a model which takes into account the ground realities of Pakistan Power Sector before venturing into an era of competitive electricity market.

CPPA-G submitted its high level/conceptual design for a Bilateral Contract Market, which the Authority approved through its Determination dated December 5, 2019. The Authority in its determination, also directed CPPA-G to submit the detailed design of the CTBCM (the "Detailed Design" or the "Design") along with its Implementation Roadmap (the "IRM" or the "Roadmap") for its approval. In compliance with the above direction of the Authority, CPPA-G submitted the Detailed Design along with its IRM on February 5, 2020.

The Authority made its determination on the detailed design submitted by CPPA-G on November 12, 2020. The Authority granted its approval subject to a number of actionable steps to be taken and time lines before implementation phase.

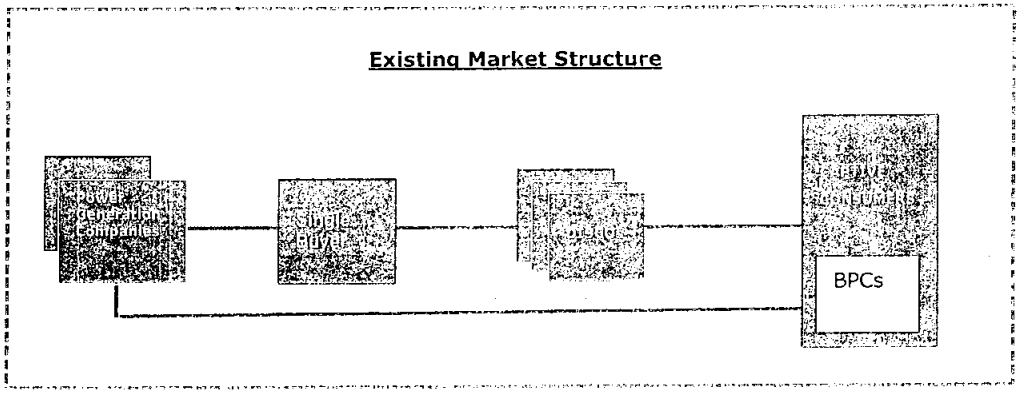
Broadly the objectives of detailed CTBCM design submitted by CCPPA-G are detailed as follows:

- Development and alignment of policy, regulatory and institutional frameworks.
- Providing non-discriminatory open access to all market participants.
- Improve conditions to attract investments and move away from sovereign guarantees.
- Provide a trading environment that seamlessly transits into reduced consumer tariff.
- Improve power system planning, procurement to ensure adequacy and security of supply.
- Improve efficiency and liquidity arising from competition in market.
- Improve payment discipline in power market through bilateral contracts and credit covers.
- Improve transparency, predictability and accountability in the market.

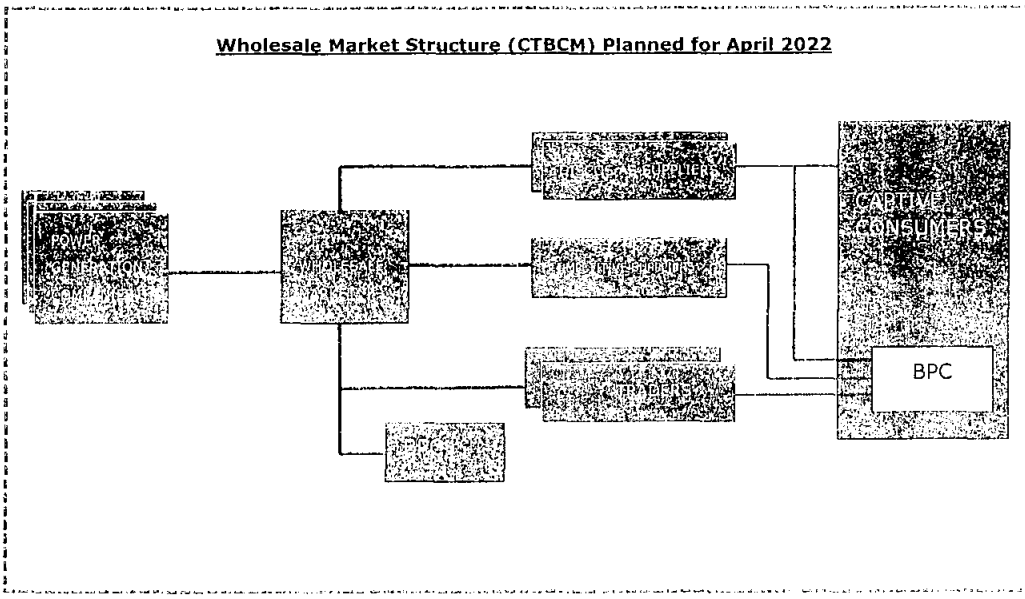
6.4 Market Structures

The following sections provide an overview of the markets structures those are existing and CTBCM

The existing market structure which is very close to a single buyer model is shown in the following schematic.



The model proposed under CTBCM includes a wholesale market and a number of buyers and sellers for supplying electricity to end-consumers. The proposed structure is shown in the following diagram;



It may be noted that according to the approved timelines by NEPRA, the wholesale market structure was to be active by April 2022, however as such no notification has been made to that effect. Notwithstanding any delays, the CTBCM will facilitate bilateral contracts between market players. Power generation companies will interact (through bilateral contracts) in the wholesale market with 'Traders', 'Competitive Suppliers', DISCOs and Bulk Power Consumers. Similarly, 'Traders' may have bilateral contracts with 'Competitive Suppliers' for the provision of electric power.

For physical delivery of power, all of these entities will be required to use NGC/NTDC, PGC and DISCOs' transmission network systems. Accordingly, the Act requires these entities (transmission and distribution license holders) to provide open access to all the users of their systems.

6.5 Role and Opportunities for PGC under CTBCM

As discussed above, CTBCM will liberalize the sector as a number of new entities will enter the market for delivery and supply between different parties. The transmission of power is mainly the responsibility of NGC/NTDC and distribution companies, however it may be noted that even under the present structure, NTDC and DISCOs are unable to meet the level of adequacy and reliability of power supply. Before the Amendment Act 2018, the concept of Special Purpose Transmission License was also introduced to bring

more competition in the transmission business to have a more reliable supply system. The PGC therefore, will be required a play a major role not only under the present market structure, but under CTBCM also when its opportunities for providing transmission and interconnection services will increase manifold as shown in the **Table-24** below.

Table-24: Opportunities for Punjab Grid Company (PGC)

Sr. No.	Under Present Structure	Under CTBCM
1	Transmission Projects under NTDC domain, which could not be completed/undertaken by NTDC	Transmission Projects under NTDC domain, which could not be completed/undertaken by NTDC
2	Transmission Projects under DISCOs' domain, which could not be completed/undertaken by DISCOs.	Transmission Projects under DISCOs' domain, which could not be completed/undertaken by DISCOs.
3	Transmission Projects not connected with the National Grid (Isolated Mode)	Transmission Projects not connected with the National Grid (Isolated Mode)
4	-	Transmission Projects needed for 'Competitive Suppliers'
5	-	Transmission Projects needed for 'Traders'
6	-	Transmission Projects needed for 'Captive Generation'

Further, the opportunities for PGC will expand with the increase in number of Competitive Suppliers and Traders in service territory of different distribution companies, as those will create demand for transmission corridors. When compared with the existing structure, it may be seen that PGC will be required to have close coordination, database and information about BPCs and their plans for power procurement, whereas under CTBCM, the efforts by PGC would be more focused towards Competitive Suppliers and Traders which in a way will ease the burden on PGC for new opportunities for its business.

At the same time however, PGC will need to have strong group of engineering, legal, information technology and financial professionals to finalize contractual arrangements with other market players.

7. PGC BUSINESS PLAN FOR SUSTAINABLE OPERATION

Financing needs in the power sector are enormous, particularly in developing countries like Pakistan. Government faces huge and competing demands on its scarce available capital.

This has long been recognized in respect of power generation and Pakistan is among those countries that have used private sector financing for the development of IPPs. But for various reasons, reliance on private sector participation (PSP) has not been a feature of transmission networks in developing countries like Pakistan. The national transmission grid is often seen as having national strategic importance, with an incumbent monopoly operator, hence the default/historic position is often to view the grid (and transmission projects generally) as not being a suitable arena for private participation.

In the sections below, an overview of the four business models used in the transmission sector around the world is provided and most relevant model(s) for PGC is suggested. In the next section a business plan for PGC is formulated while in the last section of the chapter a financial plan for the company is also provided.

7.1 Overview of the Business Models

There are four basic business models that can be used for developing transformation assets using PSP. These are:

i. EPC+ – Engineering, Procurement, Construction plus more
ii. BOOT – Build-own-operate (transfer)
iii. Transco – Private transmission company
iv. Merchant – BOOT but without a long term agreement

The EPC approach is well known and needs no explanation other than to note that EPC is a basic form of PSP and will be a component of each of the other three models. The EPC plus model involves add-ons to the EPC, including financing and operation and maintenance of a specific transmission asset.

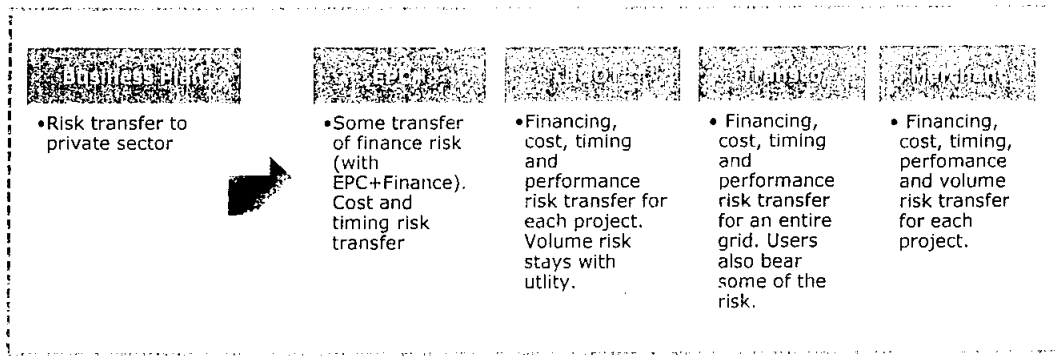
The key difference between the EPC+ and BOOT models is ownership. The EPC+ ownership of the assets is transferred to the utility on commissioning, but with the BOOT model, the developer retains ownership, in some form, for a period after commissioning. The term "operate" in BOOT is used loosely. Planning and day-to-day operation/dispatch of the network will be the responsibility of the utility/transmission system operator (TSO) but the developer will be responsible for maintenance of its transmission assets and will operate the substations, if any.

The Transco model is perhaps the most distinct model. Here the private sector is invited to take over a complete utility. However, even here the boundary between this and BOOT could be blurred where the grid that is taken over by the private sector is relatively small. Because the Transco is a natural monopoly, the price is charged or regulated by an independent regulator, normally with at least some discretionary powers. A BOOT arrangement is typically regulated through a legally binding contract.

The Merchant model involves significant risk in developing transmission assets without the involvement of a TSO/utility. The developers identify an opportunity, often based on a significant differential in market prices in two different parts of competitive markets or in order to bring large volumes of cheap electricity to a market where it is needed. The volumes and prices are determined either:

- By the market where the developer must take the full volume and price risk, or;
- Bilateral negotiation between two parties

The model is only suited to define transmission lines. This can work in complex competitive markets, but examples are limited to a few geographies.



7.2 Characteristics of the Models

Below we discuss these models and some of their variants in terms of bankability, replicability and implementability. These terms should be interpreted as follows:

- Bankability – will it be possible to obtain funding for the development of the asset?
- Replicability – can the model be repeated?
- Implementability/ acceptability – the development costs for transmission projects are significant and pursuing a certain model is only worthwhile if there is a reasonable probability of success. Implementability asks if the prospects of success are good.

7.3 Drivers for the Choice of Model

Often the decisions are driven by financing needs but may face political resistance from those opposed to privatization or others just opposed to change the utility for whom the simpler forms, such as BOOT or EPC+ are often preferred.

Model design decisions depend on legal and regulatory constraints, such as whether the primary legislation allows the private sector to own electricity assets which then pushes the choice of model the word concession or lease agreements.

7.4 Design, Finance, Build, Operate

This group of business models represent the minimalist approach to transmission and the most basic of these – engineering, procurement and construction (EPC) is already a standard practice for the development of major transmission assets in Pakistan. The sub-variants of this category include:

- EPC
- EPC + Finance
- EPC + Operation
- EPC + Finance + Operation

These values are often used as a subcomponent of the other main business model of interest – the BOOT model.

7.4.1 Engineering, Procurement, Construction (EPC)

Also referred to as turnkey construction contracts because the owner only needs to turn the key to initiate operation.

Features

The contractor is provided with a specification for the asset and is responsible for design, procurement of materials and construction for a given price by a given date and to a minimum standard confirmed at commissioning by independent engineers.

Risk Allocation

The EPC contractor is responsible for procurement and construction risks. The developer, which is often the utility, is responsible for financing the project and for making payment to the contractor. Final payment to the contractor is made following commissioning. Post commissioning, developer operates and maintains the transmission assets, recovers the cost, services loans, and is exposed to risk on its equity. If the developer is state owned, the government will be at risk on its equity.

Where the developer is a utility, the utility will normally be responsible for obtaining right of way, environmental approvals and other permissions.

Bankability

If the developer is a utility, the loans will be to the corporate entity and bankability will depend on the creditworthiness of that entity. Often, for state owned utilities, sovereign guarantees are required for bankability. If the developer is a SPV this will involve project based finance and bankability depends among other things on the reliability of payment flows to the SPV from the ultimate beneficiary of the transmission assets (often the utility and indirectly end consumers of electricity). Bankability in this case, as when the developer is a utility, also depends on the creditworthiness of the utility and/or on guarantees available.

Replicability

EPC arrangements have been demonstrated throughout the world and can clearly be part of any transmission arrangement. However, EPC contract arrangements do not, by themselves, overcome problems of financing major transmission projects.

Implementability

EPC arrangements have been demonstrated throughout the world and can clearly be part of any transmission arrangement.

7.4.2 EPC+FINANCE

With this variant, the EPC contractor may organize, or help organize, financing for a project. Often this will involve supplier finance and export credit guarantee agencies in the suppliers own country.

Risk allocation

The risk allocation is the same as for EPC arrangement, but in this case the EPC contractor helps arrange financing. This will often be through export credit agencies which, as with simple EPC contracts, will be at risk until the loans are repaid by the utility.

Bankability and Replicability

The bankability of this arrangement is similar to that of EPC contracts. EPC + Finance helps solve the problem of financing of power transmission projects. However, it tends to be used for larger projects and where large national contractors are able to supply a large part of the equipment to be used, or in instances where export or supplier finance can be deployed. The latter two inherently limit competition and reduced replicability.

The use of this form of financing, however, limits the opportunities to minimize costs through competitive international bidding.

Implementability

EPC + Finance arrangements have been demonstrated and, where they can be applied, do not generally face resistance from the stakeholders.

7.4.3 EPC+OPERATE

Features

With this variant, the EPC contractor will be responsible for the maintenance of the transmission asset following commissioning (but will not only asset). They may operate the substation or maintain the transmission line themselves or they may contract an operator to provide these services. Often the EPC contractor will partner with an international utility that offers such services.

Risk allocation

The risk allocation is the same as for the EPC arrangement, but in this case the EPC contractor is responsible for operation and maintenance of the transmission assets for a defined period. The contract will normally provide financial penalties for poor availability of asset thereby incentivizing the contractor/ operator to ensure the quality of the construction.

Final payment to the contractor is made by the developer following commissioning. The developer is responsible for servicing loans.

Bankability

Bankability of this arrangement is similar to that of EPC contracts.

Replicable

EPC + Operate arrangements could easily be replicated though, as noted below, they are not widely used (except as part of the other business models discussed below). This is probably because the utility that owns the asset will normally expect to operate the asset themselves.

EPC + Operate contract arrangements do not, by themselves, overcome problems of financing major transmission projects.

Implementability

EPC + Operate arrangements are relatively rare. This is probably because of resistance from utilities.

7.4.4 EPC+FINANCE+OPERATE

Key features

With this variant, the EPC contractor will additionally be responsible for both arranging the financing and the operation of the transmission as it following commissioning. The financing is arranged on behalf of the utility.

The key difference between this variant and the BOOT model below is that with the EPC + Finance + Operate variant, the transmission assets are owned by the utility following handover.

The risk allocation, bankability and sustainability combine the features of the two previous variants.

Replicability

EPC+ Finance + Operate arrangements could easily be replicated but they will only help overcome problems of financing major transmission projects if the utility for whom the assets are developed is creditworthy.

Implementability

Although EPC + Finance + Operate arrangements offer a good balance, they are relatively rare. This is perhaps because:

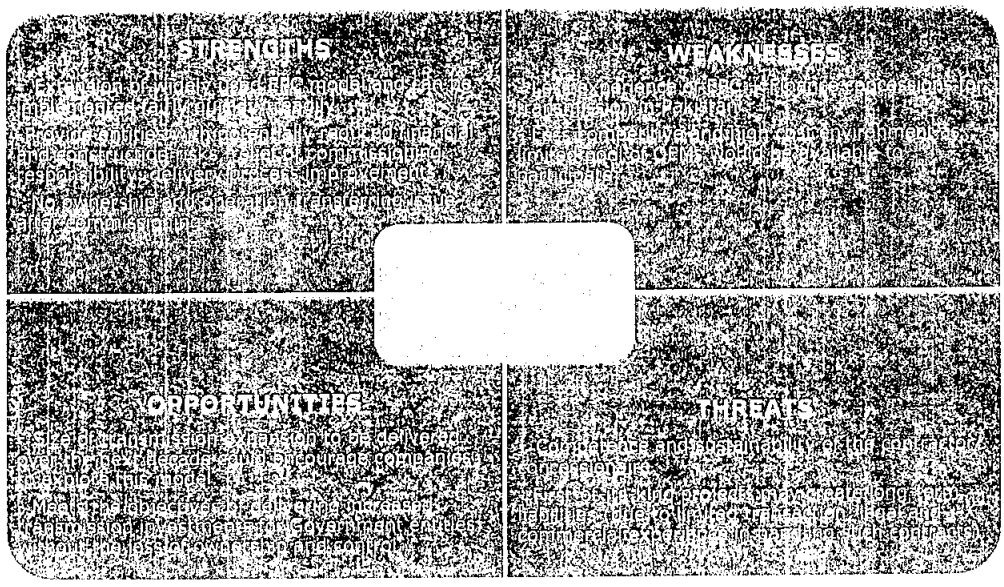
- There is resistance from utilities to giving responsibility for operation to the contractor;
- Commercial lending by IFIs targeting private lending is limited because utilities are frequently not operated on a commercial basis;
- Multilateral lending will preclude restrictive tendering which is the basis for involvement of export credit agencies and supplier credit.

Design, (Finance), Build, Operate / EPC and variants in context of Pakistan

The rise in popularity of this model across South Asia is based on the ability to pass significant development risks to the private sector at little/no loss of control (ownership) of critical national infrastructure (Bangladesh for example has DBFOM IPP T/Lines). However, there is limited experience with the operation and maintenance contracts while these assets remain under public ownership. In the context of Pakistan, this model could

be viable, up to EPC + Finance level due to reluctance towards allocating operational risks to the private sector.

7.4.5 SWOT Analysis of the Model



7.5 Build-Own-Operate (Transfer)

In some ways it is a small step from EPC+ Finance + Operate model described above, to the BOOT model described here. The key difference is that with the BOOT model to transmission asset is independently owned, or to all intents and purposes, old following commissioning (at least for a period of time).

7.5.1 Key Features of BOOT Arrangements

The typical features of this arrangement are:

- The transmission asset to be developed is usually connected to a larger network that is owned by a utility;
- The developer is an SPV and will engage a contractor using EPC contract arrangements to design, procure and construct the asset;
- The SPV will additionally engage a subcontractor / operator to maintain the assets and operate substations following commissioning and the operator will face financial penalties for failing to satisfy the performance and reliability standards specified in the contract;

- Usually the asset is new but sometimes it is an existing asset that requires rehabilitation, reinforcement or upgrading. In either case it requires investment financing;
- The project will be financed on the basis of the expected revenues to the developer;
- There will be a contract between the developer and the utility (that owns the larger network) for a number of years (15-20 years is relatively common). In some cases, there may instead be a contract with an IPP.

The term operate in BOOT is used loosely. Planning and day-to-day operation / dispatch of the network will be the responsibility of the host utility / transmission system operator but the developer will be responsible for maintenance of its transmission assets and will operate the substations if any.

There are a number of variations of the BOOT category covering:

- Pricing arrangements and counterparties
- Right-of-way and approvals
- Asset ownership forms
- BOO versus BOOT
- Leases
- Partners involved and their roles
- Size of the asset
- Type of the asset

These are discussed below but begin by providing some general examples of typical BOOT arrangements and asking about risk allocation, replicability and implementability / acceptability of the broad BOOT model. These characteristics vary to some degree depending on the details of each (e.g. Implementability/ acceptability is enhanced by adopting the BOOT rather than the BOO model)

7.5.2 Risk Allocation

The BOOT model will typically use an EPC + Operate arrangement and the risk allocation applicable to EPC + Operate therefore also attaches to the BOOT model. The key difference in terms of risk allocation is that the responsibility for servicing loan lies with the SPV and relies on the flow of revenues to the SPV. The revenues ultimately derive from the utility that contracts the SPV though there are alternative sources including:

- And IPP or large consumer where the transmission asset is primarily used to transport electricity to/ from the main grid, or;

- A power pool where the asset is used for Wheeling power.
- The SPV equity partners are also at risk for their equity investments though, as discussed below, the utility may sometimes be a partner in the SPV and may therefore also continue to share in those risks.

A concession agreement will often be signed that will provide assurances from the government and will commit the government to provide certain guarantees over changes to legislation, regulations and, in cases where the revenue flows depend on a state owned entity.

7.5.3 Bankability

Bankability of this arrangement depends in large part on the security of the revenue flows to the SPV, which in turn depends on the details of the contract and payments forms discussed below. It also depends on the creditworthiness of the counterparty to that contract – the utility, IPP(s) or large customer(s).

Power pools may also be the source of revenues and will have measures in place to ensure that obligations by Wheeling parties can be fulfilled, but if the revenues depend on Wheeling charges these credit security arrangements would need to be confirmed. The payment forms through power pooles may, however exposed the BOOT SPVs and their financial backers to substantial market risk that will often be unsustainable. However, Wheeling may provide additional revenues to the SPVs if there are more secure payments that are protected from market risk.

Bankability can be enhanced in some instances by the use of escrow arrangements to secure revenues to pay for transmission services. This is particularly the case where counterparties are IPPs and/or large customers.

7.5.4 Replicability and Implementability /Acceptability

BOOT models can easily be replicated and have been used extensively around the world. BOOT offers a compromise solution that does not require a high profile privatization of transmission companies that may invite controversy.

7.5.5 Pricing Arrangements and Counterparties

Pricing arrangements for BOOT models will differ depending on the entity that contracts for the asset. Counterparties to the BOOT model maybe:

- A host utility (usually a state owned company)
- An IPP

- A large electricity consumer or a group of such consumers

COMBINATION EPC+BOOT

Multiple permutations and combinations are possible and innovative solutions to legislative, regulatory or other problems can be often found. For example, difficulties in obtaining right-of-way and permits can be a headache for many BOOT developers. To overcome this, a combination of an EPC plus a partial BOOT arrangement could be proposed (without the 'build' part of BOOT). The host utility/TSO might develop the asset using an EPC arrangement with a temporary loan to the utility/TSO, but on commissioning the asset and the debt are immediately sold to a private investor, thereby taking the debt off the balance sheet of the host utility/TSO. The permitting risk is removed from the developer and the balance sheet of the utility/TSO is improved.

BOO VS BOOT

Build-Own-Operate transmission assets, where there is no transfer of the assets to the host utility or TSO at the end of the term of the contract, are less common than BOOT.

A BOO arrangement means that the asset remains in private ownership indefinitely. The annual availability fee with the BOO contract may be slightly lower than with a BOOT contract because, at the end of the contract, 25 or so years later, the developer may keep the asset and continue to earn revenues from it. However, because revenue streams in the distant future are normally heavily discounted, the availability fee for a BOO project will normally be very similar to an availability fee for a BOOT project.

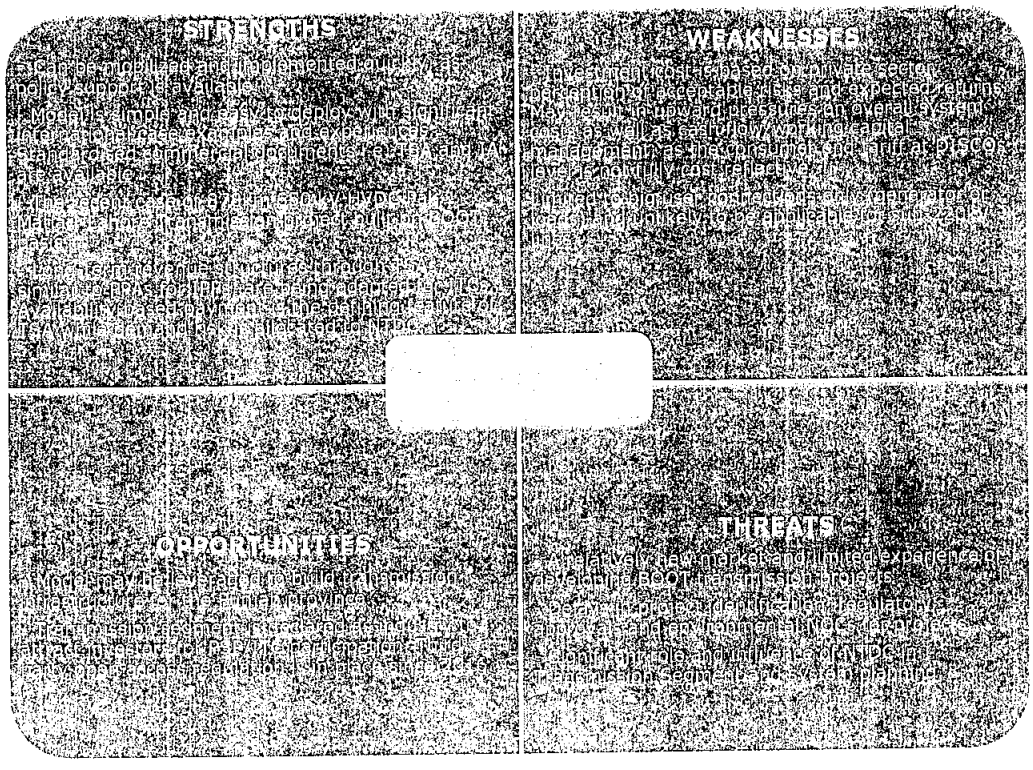
7.5.6 Build-Own-Operate (Transfer) and Variants in Context of Pakistan

T/L Policy adopted in 2015 provides the baseline to develop projects under the BOOT model. The Lahore–Matiari HVDC line project is the only example, however the current situation in the power sector - in the context of competitive market development roadmap and delays in generation projects commissioning delays - indicates a clear need.

The well-defined long-term revenue contractual structure offered through Transmission line policy 2015 improves the bankability of the potential projects. Furthermore, payments are guaranteed by GOP under TSA subject to availability of the Transmission Line.

Government remains supportive of BOOT projects based on defined transmission capacities of BOOT transmission line projects. The period of BOOT agreement is current set at 25 years.

7.5.7 SWOT Analysis of the Model



7.6 Transco Model

7.6.1 Key Features of Transco Arrangements

Under a Transco (Transmission Company) model, a distinct legal entity is responsible for operating transmission assets, with actual or effective ownership of those assets. The development of new assets is undertaken by the same entity, with assets typically aggregated under a common ownership structure. While ownership of assets usually resides with the same entity, this is not required for the model. The Transco may be state-owned, privately owned, or a combination of the two.

The Transco will usually operate under a license or concession that:

- Defines an exclusive geographic area covered;
- Is distinguished from distribution by the voltage of the assets;
- Is for a given period.

It is unusual for two or more licenses/concessions to develop/operate the same type of assets (e.g. transmission) in the same geographic area except through a BOOT arrangement. A Transco will typically operate a contiguous network in only one country

unless it receives licenses also to operate its contiguous network in neighboring countries. Where its assets reach a national border and are interconnected with the neighboring country, a specific agreement will be reached with the transmission network owner/ operator in that country.

The Transco will be responsible for all operations of the transmission assets (except BOOT assets if the BOOT model is adopted in addition to the Transco model).

A Transco will have few customers, being those entities wishing to transmit or receive energy through its network: generation companies, large customers, distribution companies, and neighboring utilities within the country or outside.

In addition to developing, owning, maintaining and operating the assets the transfer may include other functions including the single buyer, system operator and market operator, though when a Transco is privatized these are often separated from the Transco.

7.6.2 Risk Allocation

Under a Transco model, single entity typically has sole responsibility for operating, maintaining, and developing a transmission network. This focuses risks with a single entity, reducing contractual relationships with third parties and creating the sole focus for performance monitoring.

Separating the transmission assets from other parts of the electricity supply chain (generation, distribution, and supply) allows for pricing structures that reflect the fixed nature of transmission costs. With revenue cap regulation it reduces the exposure of these assets to volume risk from customer demand. This is appropriate when its costs are largely fixed regardless of volumes of energy transmitted.

As with the reduction in volume risk, or transcode that is separated from the distribution and supply business of a utility will have little direct customer nonpayment risk as its customers are not small households or businesses for whom the cost of collecting payment may outweigh the size of those payments. However, it remains at risk if there are shortfalls in revenues entering the electricity supply system and the distribution/supply end of the chain alongside IPPs the Transco is paid. Payment risks can be reduced through securities over assets or revenue streams.

Transco owners may reassign risks appropriately through contracting arrangements such as EPC contracts for construction or management contracts for the operational management of the network.

The regulatory arrangements for Transco should be designed to ensure that risks are appropriately allocated between the Transco users and the Government. Independent regulation is designed to reduce political risks for the private investors in the electricity sectors, but inevitably some decisions are let to the discretion of the regulator and this can create regulatory risk for private participation in Transcos. Regulatory risk replaces political risk and should generally be lower with independent regulation, at least to some extent, than without because private Transcos are more conspicuous than other forms of PSP transmission (BOOT or EPC+) even with independent regulation political risk will inevitably be greater with the Transco model than with other forms of transmission.

7.6.3 Bankability and Replicability

Transmission assets have long operating lives. Ring-fencing such assets in a single Transco entity, without smaller and shorter – life assets commonly found in distribution companies, can allow for longer – term financing, which is typically lower cost than shorter term financing.

With an asset structure of large, long lived assets, developing a capital structure of long term financing and ring fenced equity will increase the attraction of the Transco to international companies with specialized interest in Transco businesses.

Transco models have larger financing requirements and have the potential to be of greater interest to lenders than smaller transactions of the BOOT type. Offsetting this, as described above, the exposure to political risk of a Transco model, as opposed to BOOT or EPC+ arrangements, will make a Transco less bankable.

The Transco model, if established successfully in a strong and stable country should be replicable in other countries following the demonstration of the first transactions.

7.6.4 Implementability

The establishment of corporate Transco follows part of a familiar unbundling process for a national utility, progressively moving from:

- Ring-fencing transmission assets;
- To creating separate operating entities under the national utility;
- To distinct legal entities under the national utility;
- To distinct legal entities under direct Government ownership;
- To include private debt in the capital structure;
- To including private ownership of equity in the capital structure;
- To full private sale of the equity of the legal entity.

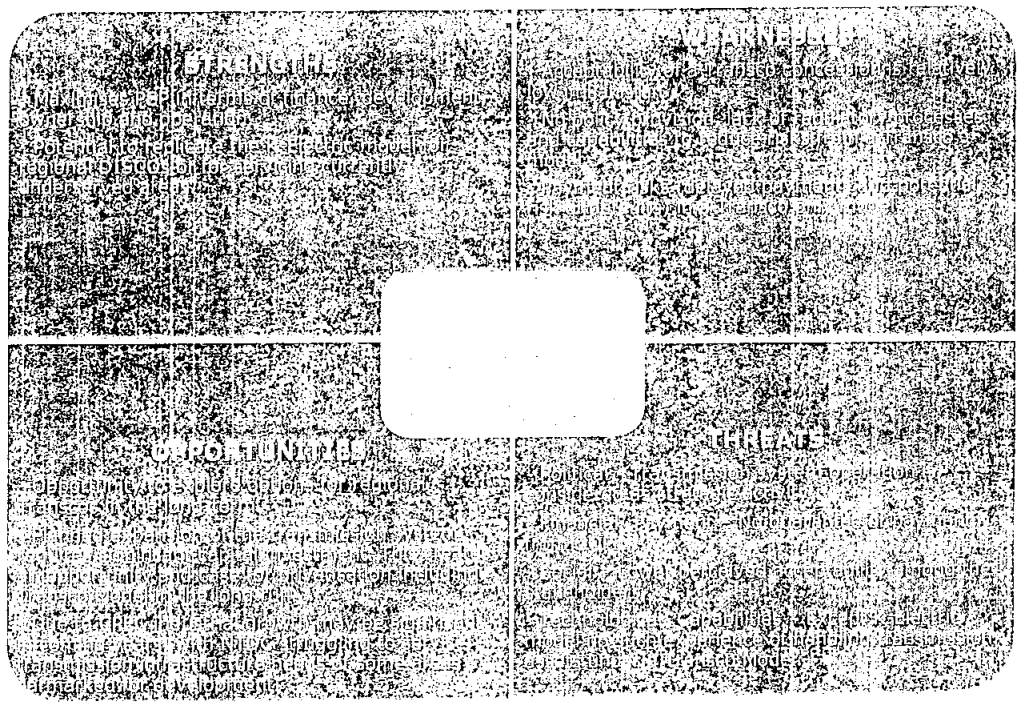
7.6.5 Transco Model in Context of Pakistan

Transmission assets are considered as strategic assets and hence, the focus/ interest in maintaining certain level national grid company/state involvement in operation and ownership. Given that risk allocation under the Transco model rests solely on the private sector makes this model less attractive to various key stakeholder/ influence groups in Pakistan.

As an example, K-Electric is not a typical Transco but an integrated entity having a transmission license. Policy is silent about Transco mode of transmission business in the private sector. Adopting a K-Electric-styled transmission license (with integrated utility operations) would provide reasonable returns on investment. A Transco+ business would enjoy a monopoly status for its jurisdiction and could avail profitable income from its wire business. A Transco could collect a use of system charge, as is the case for K-Electric, reflecting its investment, O&M and ROI etc.

Key concerns associated with the Transco model relate to perceived lack of government support, a lack of competition and domestic capabilities in the transmission segment. A stand-alone Transco model is expected to face long-term sustainability challenges. However, an integrated utility model may be explored for some regional DISCOs.

7.6.6 SWOT Analysis of the Model



7.7 Merchant Model

7.7.1 Two Variants of the Merchant Model

There is no universal definition of the merchant model. For generation assets, a merchant power plant is one that competes in a competitive market without a long term PPA.

For transmission investments, the term merchant is used more broadly to be situations where the asset is developed independently of an existing TSO/Utility. These merchant project can be either:

- Built as part of a competitive market in which a transmission capacity is auctioned and revenues are earned through those auctions (i.e. without long term contacts that fix quantities and prices),
- Built independently of the TSO/utility but with long term contracts for the transportation of large volumes of power from regions with low market prices or low cost resources to regions with higher market prices.

7.7.2 Risk Allocation

With the merchant model compared with BOOT model, even more of the risks are transferred to the transmission asset developer including the market volume risks. The precise allocation of risks will depend on the nature of the transmission contracts. Right of way and Environmental approval risks will lie with the developer. Other risks are largely the same as those of the BOOT model.

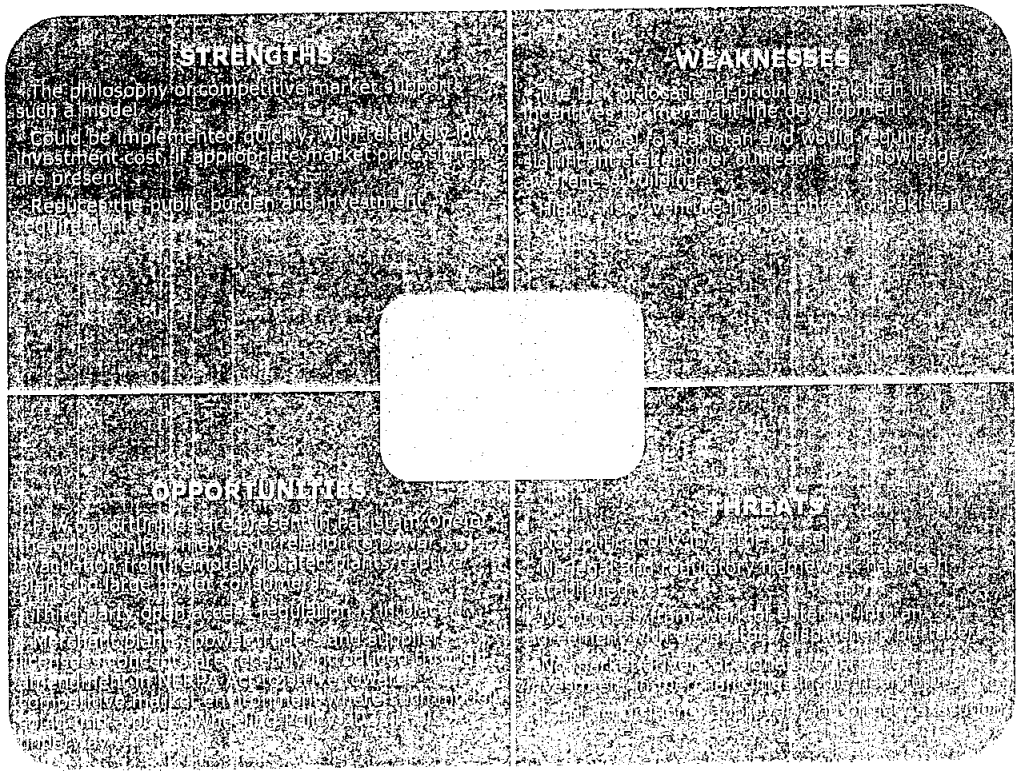
7.7.3 Merchant Model in context of Pakistan

Currently, there is no established mechanism for securing commercial agreements with Utilities/generators and customers for long term TSAs. Similarly, for short term operation especially during peak hours, various energy intensive industries operate captive power plants on site, with limited opportunity for IDNOs (independent distribution network operators) to service this market at present. These would significantly limit the bankability and the overall viability of merchant transmission lines. There are no locational price differences in Pakistan (Central pool/basket price mechanism), indicating little / no incentives for this model. Therefore, there are no market incentives for such a model.

Significant risks are associated with a merchant model for transmission investments in Pakistan due to the lack of competitive power market. Merchant models allocate nearly all risks to the private sector. The lack of a clear mechanism for obtaining transmission

licenses, land acquisition and other regulatory approvals for transmission project developments would be among highest risk factors.

7.7.4 SWOT Analysis of the Model



7.8 Most Suited Business Model in the Context of Pakistan

In determining the optimal business model, the full range of options have been considered. Based on the detailed analysis of the business models and their possibility of being adopted in Pakistan it can be concluded that considering the technical, commercial and regulatory aspects, the most viable business model at this stage of time seems to be Build-Own-Operate-Transfer (BOOT).

The projects under this business model can be implemented by the public sector itself or through private sector intervention. There is a possibility of Government undertaking the projects itself while ensuring that returns are optimized, however, the likelihood of this option might remain limited to 132 kV transmission lines as the investment quantum for the higher voltage transmission lines is significantly higher.

Given the budget constraints currently faced by the Government, the most likely option for the implementation of the projects is to be undertaken through a hybrid of public and private participation i.e. is on Public Private Partnership (PPP) modality whereby while retaining the ownership of its land and ensuring commitment to the overall objectives of the transaction, the Government can provide the right of use to the private partner to develop the facility and operate the same for such period necessary to recover their investment plus reasonable return and then transfer the project back to the Government.

From a legal and regulatory perspective, as a licensee under Section 18 of NEPRA Amendment Act, PGC will be authorized to engage in transmission of electric power. According to definition of 'transmission' under the Act, there are possibilities for PGC of involving private sector including sharing of equity, operation or management and control, however T/L projects under BOOT mode may require additional legal and regulatory cover. Accordingly, the provincial government would be expected to announce not only, policies for incentivizing such investments, it will be important for it to also create enabling environment by developing regulatory and legal regime at a sooner date.

7.9 Business Plan

Like any other corporate entity, PGC will need to a have a prudent way of working in place. Since the objective of establishment of PGC is to undertake power transmission activities and supplying power to off-grid or low gird areas in the province, therefore it is recommended that after registration of the company with Securities Exchange Commission of Pakistan (SECP), next step would be to obtain transmission license from the NEPRA as to become eligible for undertaking transmission business activities. Prior to applying to SECP and NEPRA, PGC would require to put in place its key positions i.e. chief executive officer (CEO), Board of Directors along with key management team.
PGC would then may proceed to construct, own and operate transmission infrastructure mainly of 132kV, 220kV and 500 kV etc. and charge a service fee to parties who avail its service. The transmission service fee would be a regulated tariff as under the prevailing NEPRA regulations.

7.9.1 Formation of Board of Directors (BoD)

Formation of the BoD is one of the most important components of the corporate good governance to get successful results and achieve the mission set out by the shareholders of the company. BoD needs to be empowered and made independent to function freely and professionally.

To start with, the Government of Punjab may constitute/nominate BoD of PGC to take decisions relating to initial hiring, funding, financing legal, commercial, technical, HR and administrative matters. Proposed composition of the BoD is as under:

- Chief Secretary (Chairman)
- Secretary, Energy
- Secretary, Finance
- Secretary, Law
- Managing Director, PPDB
- CEO
- Transmission and Grid Professional
- Corporate Lawyer
- Nominee of Chamber of Commerce
- Any other member depending on need

Sub-Committees of the BoD

The BoD may form following sub-committees:

- Audit & Finance Committee
- HR Committee
- Technical Committee
- Procurement Committee
- Marketing and Business Committee
- Any other committee depending on need

BoD will draft appropriate rules of business, ToRs for sub-committees, annual budget, job descriptions and remuneration of employees, and various operating procedures.
PGC will build its team as per the organogram proposed by the Consultant in this feasibility study report. PGC, however may review the organogram and improve this as per their requirements.

7.9.2 Key Performance Indicators

PGC will be grid and transmission company which would provide wheeling facility to power dispatchers including DISCOs, BPCs and generation companies. The source of revenue will be transmission tariff/ wheeling charges which it could charge to the concerned parties. Besides technical Key Performance Indicators (KPIs), financial KPIs as listed below which will be highlighted in the company's financial statements. These KPIs need to be approved by the BoD.

Revenues

Revenues of PGC will be the total amount of money received from wheeling service delivery during the fiscal year. It is the gross income, from which operating costs, expenditures, capital investments and liabilities will be subtracted to determine net income (losses). For grid and transmission companies, gross income is related to the quantum of power transmitted through its transmission lines and allied infrastructure.

Operating Costs

The operating costs, which include cost of transmission service, amortization, taxes, depreciation and interest on debt etc. O&M cost will be the main operating cost of PGC. The O&M cost will further comprise costs due of employees' remunerations, offices rent, vehicles expenditures, consumables, transmission infrastructure surveillance and spares etc. The operating costs will be deducted from the revenues to identify the financial position of PGC during a particular period of time.

Balance Sheet

Assess equity, which on a financial balance sheet represents funds from stockholders plus retained earnings (losses). Retained earnings are the money held by the company and not paid out as dividends. It is the money available for the company to invest in growth, such as developing transmission infrastructure by constructing transmission lines and grid stations in the province, and paying interest on debt.

Debt Servicing

Allocate debt, including loans and commercial paper. Besides construction phase activities, debt is used to finance operations and growth, and is a good indicator of fiscal health when compared to equity. Capitalization is the ratio between long-term debt and shareholder equity. While smart use of debt increases resources for constructing transmission infrastructure, the company would be able to make timely payments. Even in the case of PGC transmission business would likely be in a predictable environment, due to long term transmission service agreements with offtakes, but PGC should consider the transmission business market potential when taking on long-term debt obligations.

Investment through Capital Expenditure

An equity of around $ 200 million proposed to be injected into PGC for undertaking some of 132kV, 220kV and 500kV transmission lines projects along with establishment cost. The equity part could be arranged by the provincial government through its own funding and also from private shareholders by allocating them shares of the company. In addition to transmission infrastructure development, PGC would need to have a proper corporate office on suitable location in Lahore along with necessary equipment, tools and office

necessities including but not limited to furniture, IT equipment, software, communication devices, and cars/vans etc.

The Provincial Government/PPDB needs to take prudent and well-judged steps regarding implementing transparency mechanism in PGC, so that later accountability of the Company officers and directors does not hamper with the progress of the Company. However, if the foundation is laid with rules of transparency and clarity, the management would have greater liberty to be enterprising and to take innovative measures to generate the maximum cash flows for the proposed company.

7.9.3 Project Development Plan

In order to make PGC a success story, it is imperative to have a target-oriented project development plan with the company. At the outset, it is expected that transmission projects will be developed either in public sector or through Public-Private Participation (PPP) by PGC. Due to financial constraints of the provincial government, some of the projects could be developed through PPP mode. The key steps require under project development plan are:

- First, to identify projects list for development.
- Then projects would further be categorized in to Type-A and Type-B projects. Type-A projects should be those projects for which PGC could arrange funds by its own resources. Whereas all others projects will fall under the category of Type-B projects.
- Type-A projects should be developed by PGC under its 100% ownership. The equity party will be provided by company own equity. The loan part will be arranged through various international and national funding agencies/banks.
- Type-B projects should be offered to private sector to develop on BOOT mode for a specified concession period and after the expiry of concession period the ownership would be transferred to PGC at no cost or at Pakistani 01 Rupee as in the case of Matiari to Lahore HVDC transmission project line.
- For development of Type-A projects, PGC may should hire the services of EPC contractors under competitive bidding mechanism.
- In the case of Type-B projects, competitive bidding mechanism may be adopted during the award of concession agreements to select qualified project developers.
- Detailed feasibility study would be required to conduct for each project. For any Type-A project, feasibility study could be conducted by PGC through its own resources/project allocated fund while for Type-B project any such feasibility would be conducted by the investor/concessioner. PGC could facilitate the private investor regarding any such feasibility study and regulatory processing.

7.9.4 Operation & Maintenance (O&M) Plan

Along with projects development, it is equally imperative to have a proper plan for O&M of projects particularly Type-A projects (funded by PGC own resources). At the outset, it is suggested to outsource the O&M of projects to competent O&M contractors till such time PGC adequately equip itself technically and financially by preparing pool of in-house professionals who may undertake O&M of its projects in longer term.

7.9.5 Marketing Plan

After the formation of PGC the management will visit all the potential clients and present its services and pricing/wheeling charges regarding transmission services. PGC with the help of PPDB and other provincial entities may inform the national and international stakeholders about its operations and services. PGC will require to approach BPCs, under-construction as well as the nearby retiring power plants, DISCOs and other potential clients to avail the its services. Long run transmission service agreements will be keenly focused to sign with potential clients in order to provide a predictable and secure market position for PGC. Such agreements would entertain both capacity and energy related services which would be provided by the company.

PGC must aggressively market its transmission services by using all options. In the given scenario, following market strategy may be adopted:

- After incorporation and establishing the company, print media such as widely circulated national daily English newspapers could provide great benefit by issuing a supplement on key potential benefits of PGC.
- Social and digital media campaigning should need to be equally focused in order to provide information about the company and its services. A secured and quality website will need to be developed for PGC under the domain name of https://PGC.punjab.gov.pk or any other such name.
- The government of Punjab may arrange a power conference e relating to efficient power transmission in the province just after incorporation of the company. This would give opportunity to introduce new company with local and multinationals.
- Management of PGC may invite heads and technical teams of all power plants, BPCs, DISCOs and other companies working in Punjab to introduce its team, capabilities and services or make presentations in their office.
- It may be prudent to invite heads of power plants, BPCs, DISCOs, and NTDC for a dinner wherein Chief Minister be the Chief Guest. They may be ensured of smooth activities and apprehensions of security hazards while working with PGC.
- In order to get into the market, competitive rates (lower than NTDC charges if possible) be offered at initial stage.
- a conference to offer an opportunity for learning and sharing information on the critical issues affecting business growth in the power sector especially due to

transmission congestions. Provide latest information on research and development initiatives and incentives, technical and financial parameters, system overloading and losses, succession planning, aboriginal community relations and more.

PGC will put a marketing plan to the BoD for approval.

7.9.6 Human Resource Plan

After incorporation PGC would need to be staffed by specialized and experience people hired on market-based salaries. Fortunately, a good number of energy and power professionals are working in NTDC and a pool of retired advisors is also available.
Grid and transmission Company is a highly technical organization as it requires experts in electrical engineering, power systems, simulation, instrumentation and control, competitive market and power trading besides administration, management, accounts, audit, business development, environment, infrastructure/civil engineering, mechanical engineering, and land acquisition etc. Accordingly, the Company will have following main formations:

- ✓ Head office,
- ✓ Project Management,
- ✓ Operations, and
- ✓ Billing and metering team.

Whereas the head office work will be supervised by the CEO, who will work under the directive and guidance of the BoD.

The project management department will be headed by General Manager (GM) /CE procurement & construction, who will be stationed at head office and report to BoD through CEO. The Operations department will be led by GM/Chief Engineer planning & operations and will be responsible to ensure the smooth operations of the system as per the applicable grid code and safety standards. The billing and metering team will be responsible to note down the meter readings regarding power dispatch of different clients though PGC transmission system and bill them as per the agreed terms and conditions under TSA among PGC and respective client. This collection of the billed amount will also be the duty of the billing and metering team.

As already mentioned, the power transmission business is highly technical and its success is a function of experience. The envisaged PGC would need to have the requisite experienced professionals who could undertake the operations and business of the company in a best possible way. Best possible HR policy would need to be devised for

hiring and then retaining the pool of competent professionals from the market to undertake these activities.

The BoD will be the highest decision-making body within the Company. Day-to-day management of the Company may be entrusted on the Chief Executive Officer, Chief Financial Officer (CFO), General Managers and other Officers of the Company. The BoD will delegate powers as it deems necessary to the Chief Executive Officer, who in turn will delegate appropriate powers to other senior officials of the Company through a notification of delegation of powers. The CEO, CFO, General Managers/Chief Engineers and other officers will exercise their powers delegated to them. The performance of employees and management of the company would need vigilant monitoring through proper SOPs.

The performance of the employees should be aligned with the company strategies and objectives, so as to assess the progress against laid down strategies and objectives which may consist, but not limited to, the following:

- ✓ Company/business specific
- ✓ Quantifiable
- ✓ Achievable
- ✓ Time-based

7.9.7 Information Technology Policy

For PGC an Information Technology (IT) policy will be needed as it will establish the IT usage guidelines and mechanism for the company. PGC would offer a wide array of computing, networking, and telecommunications resources and services to stakeholders. These services would be in place to facilitate secure transmission system operations, employees' professionalism, and administrative efficiency. IT policy should articulate the company's vision, strategy, and principles as it relates to the use of information and information technology resources. IT policy interpret applicable laws and regulations and ensure that the policy is consistent with legal and contractual requirements. In addition, such policy would specify the requirements and standards for the consistent use of IT resources across the company. The IT Policy of PGC should broadly cover following aspects:

- Information Security
- System security and protection
- Hardware & Software
- Messaging & Collaboration
- Network and communication
- Data protection and backup

7.10 Financial Plan

The Consultant has developed three (3) independent models using the cost-plus approach to establish a tariff for all three voltage types assumed. For this purpose, the largest transmission lines available in the plan for all three voltage types was chosen. This approach was adopted in order to provide an estimated tariff and the financial results that can be expected for projects of each voltage type.

7.10.1 Project Cost

Cost estimation is based on (i) the latest PC-1 available for the projects planned by NTDC and DISCOs and (ii) in-house data. Cost estimation classification system recommended by American Association of Cost Engineers (IR-97) has been adopted in which Class 5 is chosen as the benchmark for costing estimations. Class 5 indicates that the project is at a concept screening stage with an accuracy level of +/-20%-100%.

The total capital cost of the Project incorporates the cost of the main project packages:

- EPC Cost
- Non-EPC Cost
- Development Costs (Including Project Management, Engineering, Site Supervision, Topographical survey, Soil Investigation, Fees, Permits Insurance cost and Overhead Cost.
- Debt Service Reserve
- Insurance During Construction
- Financing Fees and Charges
- Contingencies
- Interest During Construction

Overhead Cost

In order to setup and commence the operations of PGC, an initial budget of **PKR. 400 million** is estimated. This includes office setup, rental for 2 years, utilities, vehicles purchase & associated running cost and salaries for the officials and staff for 2 years. This shall be considered as '**seed-money**' for initial operations and does not cover any sort of development costs for the actual construction of the transmission lines.

Project Cost Details

Table-25 below provides a breakdown of the total project cost for all three voltage types.

Table-25: Project Cost

PROJECT COST (PKR)	132KV	220KV	500KV
EPC Cost	4,314,556,278	20,362,656,788	70,152,404,691
Non-EPC Cost	479,395,142	2,262,517,421	7,794,711,632
Development Costs	183,690,280	198,846,787	317,462,932
Debt Service Reserve	-	-	-
Insurance During Construction	71,909,271	339,377,613	1,169,206,745
Financing Fees & Charges	-	-	-
Contingencies	100,991,019	463,267,972	1,588,675,720
Project Cost Before IDC	5,150,541,991	23,626,666,581	81,022,461,721
Interest During Construction	30,242,975	257,147,955	5,337,154,065
Total Project Cost	5,180,784,966	23,883,814,536	86,359,615,785

The total length of the lines chosen for calculations were as follows:

132 kV: 127 KM

220 kV: 150 KM

500 kV: 330 KM

Project Implementation Timeline

The total timeframe for implementation/ construction of the Project is estimated at 1 year for voltage type 132 kV, 2 years for 220 kV and 3 years for 500 kV projects during which the complete transmission line will be laid and energised.

Interest during Construction

Interest arising on loans during the construction period is projected to be accrued and rolled over into the debt principal and carried forward up to the completion of the Project. Accordingly, it is capitalized as part of Project Cost. Interest during construction is calculated on the basis of the total debt outstanding at each month end during the development period. The financing rate used for computation of this cost is as per the secured terms of financing, taken at 3-month KIBOR interest rate of 14.54% + 3.50% Spread. Interest during construction is given in **Table-26** below.

Table-26: Interest during Construction (IDC)

	132 kV	220 kV	500 kV
Interest During Construction	**PKR Mn**	**PKR Mn**	**PKR Mn**
	30.24	257.15	5,337.15

7.11 Financing Plan

7.11.1 Assumptions

The assumptions given in **Table-27** have been used in the financial model to conduct the analysis.

Table-27: Assumptions

Financing Assumptions			
Equity			25.0%
Foreign Debt			
Foreign Debt % of Project Cost			67.5%
Base rate: 3 Month LIBOR			1.610%
Spread			4.000%
Total Cost of Foreign Debt			5.61%
Tenor (Years)			10.00
Payments per Annum			12.00
Local Debt			
Local Debt % of Total Debt			7.5%
Base Rate			14.540%
Spread			3.500%
Total Local Debt Cost			18.04%
Three Months' KIBOR			14.54%
Spread			3.50%
Operations and Maintenance (O&M) Assumptions			
O&M percentage – cost basis			3%
Fixed management fee (% of PC)			2%
Fixed O&M percentage			95%
Variable O&M percentage			5%
Currency Assumptions			
USD/PKR Parity			1:200
Annual PKR Devaluation			5%
General Assumptions			
Hours in a year			8760
Project Operational Life (Years)			25
Technical Assumptions			
Voltage Type	**132Kv**	**220Kv**	**500kV**
Gross Capacity	150	800	4,000
Capacity after Load Factor	120	640	3,200
Gross Capacity KWh	1,314,000,000	7,008,000,000	35,040,000,000
Monthly Capacity KWh	109,500,000	584,000,000	2,920,000,000
Capacity after Load Factor Kwh	1,051,200,000	5,606,400,000	28,032,000,000

Actual Energy Transmitted MW	999,271	5,411,858	13,529,645
Actual Energy Transmitted KWh	8,753,611,507,200	47,407,875,379,200	118,519,688,448,000
Total Hours	8,760	8,760	8,760
T/L Loading factor	80%	80.00%	80%
Project Operational Life	25	25	25

7.11.2 Financing Structure

The project is proposed to be financed through a combination of debt and equity with the expectation of a debt-to-equity ratio of 75:25.
The financing structure is given in **Table-28** below.

Table-28: Financing Structure

Source of Finance	Percentage Share	132 kV PKR Mn	220 kV PKR Mln	500 kV PKR Mln
Debt - Foreign	67.5%	3497.03	16,121.57	58,292.74
Debt - Local	7.5%	388.56	1,791.29	6,476.97
Equity	25%	1295.20	5,970.95	21,589.90
Total	**100%**	**5180.79**	**23,883.81**	**86,359.61**

7.11.3 Financing Framework

The most likely option for the implementation to be undertaken through a hybrid of public and private participation i.e. is on public private partnership (PPP) modality whereby while retaining the ownership of its land and ensuring commitment to the overall objectives of the transaction, GOP can provide the right of use to the private partner to develop the facility and operate the same for such period necessary to recover their investment plus reasonable return and then transfer the project back to GOP. Therefore, it seems to be most likely arrangement for the transaction to be undertaken.

7.11.4 Equity Financing

25% of the Project cost is envisioned to be financed through equity component. This requirement shall be met through the injection of equity during implementation phase and is deemed to be invested at the time of Project execution. The investor shall invest in the Project in terms of cash or equipment or provision of services of installation activities.

7.11.5 Debt Financing

Since this is an Energy sector project, which ensures the payment of debt as part of the tariff regime under capacity charge, there is a good possibility of securing long term debt financing. However, the terms of the debt are likely to be at the rates which reflect a higher level of risk and exposure. It is estimated that the financing facility made available would be at the following terms:

- **Interest / Mark Up** @ Three (3) month LIBOR @ 1.610% + 4.0 basis points i.e. 5.61% per annum payable on quarterly basis;
- The debt will be secured by the investor on the strength of its future cash flows and concession agreement.

The computation of debt repayment is based on the provision of equalized repayment of principal over 40 equal quarterly instalments while interest is computed on the balance outstanding at the beginning of each period as given in **Table-29** below.

Table-29: Details of Debt Financing

Particulars	Terms (Foreign)	Terms (Local)
Debt Facility	Long-term debt	Long-term debt
Period of Debt Facility	10 Years	10 years
Three-month LIBOR - KIBOR	1.610%	14.54%
Spread	4.0%	3.50%
Interest Rate / Financing Rate	**5.61%**	**18.04%**

7.11.6 Project Drawdowns

Project cost has been distributed over the construction period of 5 years based on actual disbursements during the period. The disbursement of project cost is made from the debt and equity components in proportion to the debt equity mix assumed in financing plan. The rationale for the proportional usage of debt and equity component is that the equity only cannot be used due to high cost associated with it, Therefore, a mix of equity and debt needs to be employed. Similarly, project cost cannot be financed solely from debt facility because lenders may be reluctant to provide the debt in the absence of matching equity injections.

7.11.7 Weighted Average Cost of Capital (WACC)

This is defined as the weighted average of the various capital forms used for financing of the Project. Based on the consultative session by NEPRA with regards to the determination of Rate of Return, the rate of 15% is adopted as return on equity for as

current return in PKR and debt carrying a cost of 7.6% the weighted average cost of capital is calculated at 7.40% and given in **Table-30** below.

Table-30: Weighted Average Capital Cost (WACC)

Particulars	Weightage	Required Return
Debt	75%	7.6%
Equity	25%	15%
WACC		**7.40%**

This WACC has been used to discount post tax cash flows to arrive at the NPV of the Project.

7.11.8 Return on Equity (ROE)

For reference purposes, ROE mechanism generally applied in the Power sector has been used.

NEPRA decided to review the return offered to power sector for which NEPRA obtained opinion of general public and stakeholders on the returns worked out to for different technology and accordingly decided to hold a consultative session on 14 November 2018.

A concept paper was developed & placed on NEPRA's Official website seeking comments from stakeholders. Major parameters used to quantify IRR were:

Return = RF + Beta (MRP) + CRP = 8.59% to 13.57%

In response following comments were received on the paper by several organizations:

Organization	Salient Recommendations
CPPA-G	Risk Free Rate to be aligned with project life. (5 – Years)
WAPDA	CDS supported with caveat to review if breached +0.5%
K-Electric	Normalized Rate of Return of 10-15 years may be considered for market risk premium
Asia Petroleum	A PKR based return to be considered (RF & RM)
Gharo Solar	While using beta (According Pakistan Environment) there is no need to separate country risk premium
Bridge Factor	NEPRA to provide returns close to be offered neighbouring countries (14% - 23%)
Aequitas Pvt Ltd	Model does not account for Unsystematic Risk (Green Field Projects)

Based on the recommendation NEPRA calculated the base return by using Pakistani Data as follows:

- Rf: 9.95% current yield of 10-yr Pakistan Investment Bond Issued 08.08.2018
- 0.84 (US Power Market)
- (Rm-RF): 6.5% market consensus 6% to 7%. Historic 6.43%
- Return: 15.47%

Then NEPRA used US Data to verify/check the result as follows:

Risk free rate (Rf)	2.96% Risk free rate of US Treasury bond issued Aug 15, 2018 for 10 years: 0.84 US Power Market
(Rm-RF)	5% generally used (Historic 4.77%)
Country Risk Premium (Bond Market)	5.15% (8.10%-2.96%)
Return	12.30% (US$ Based)
Return	15.41% (PKR converted)

Conclusion: The return of 15.47% using Pak data is similar to return of 15.41% arrived using US Data.

At the end NEPRA made a detailed summary of proposed return for the major Tech/Fuel Industries as given in **Table-31** below.

Table-31: Proposed Return for the Major Tech/Fuel

Technology	Proposed Return	Current Return
Imported Coal	12.50% -15.67%	17.00% - 20.30%
Imported Gas RLNG	13.25% -16.44%	15.00% - 18.24%
Local Gas	14.00% -17.21%	15.00% - 18.24%
Thar/Local Coal	14.00% - 17.21%	18.00% - 21.33%
Bagasse	14.00% - 17.21%	15.00% - 18.24%
Solar/Wind	14.00% - 17.21%	14.00% - 17.21%
Small Hydro (Take or Pay)	14.25% - 17.47%	17.00% - 20.30%
Small Hydro (Take & Pay)	14.50% - 17.73%	17.00% - 20.30%
Large Hydro (Take or Pay)	15.00% - 18.24%	17.00% - 20.30%
Large Hydro (Take & Pay)	16.00% - 19.27%	17.00% - 20.30%

7.12 Tariff Regime

Various tariff options were considered at the start of this feasibility. Amongst all, Cost-plus regime was selected to be the most preferred option. The typical Cost-plus tariff consists of actual cost and an agreed return to be paid to the investor. In Pakistan, this type of tariff is generally used in the Power sector where Independent Power Producers (IPPs) operate under this tariff regime.

In the Cost-plus tariff regime, the project revenues are primarily derived from the capacity charge and the energy cost which are the two main components of "Cost-Plus" regime. Such tariff is usually the multiple of fixed and variable cost factors combining the Capacity requirement aligning with fixed cost and the variable cost related to the injection and withdrawal aligning with the variable factor. Added to this is the allowed rate of return ("IRR") on investment which will be calculated to reflect the weighted cost of capital ("WACC"), i.e. the expected cost of capital relates to equity investors and cost of capital related to debt such as interest rate from the debt investors.

The cost-plus method requires that the cost is allocated to the specific user according to their related activity and the cost associated therewith. Therefore, a tariff is appropriately calculated for each type of user and hence the cost allocation depends on the user type of storage.

Table-32 below provides a brief overview of the tariff heads where the costs have been levelized over a period of 25 years. During the early years of operation, tariff will generally tend to be on the higher side based on factors such as Debt repayments which will end in year 10.

Table-32: Tariff Calculation

Levelized Tariff	132 kV	220 kV	500 kV
Capacity Charge			
Debt Principal Repayment - Foreign	0.2124	0.1836	0.1388
Debt Interest Payment - Foreign	0.1359	0.1175	0.0693
Debt Principal Repayment - Local	0.0018	0.0015	0.0011
Debt Interest Payment - Local	0.0076	0.0066	0.0046
Fixed O&M	0.1828	0.1448	0.0916
Insurance tariff	0.0547	0.0484	0.0334
ROE	0.1479	0.1278	0.0924
Total Capacity Charge (PKRs.)	0.7431	0.6302	0.4311

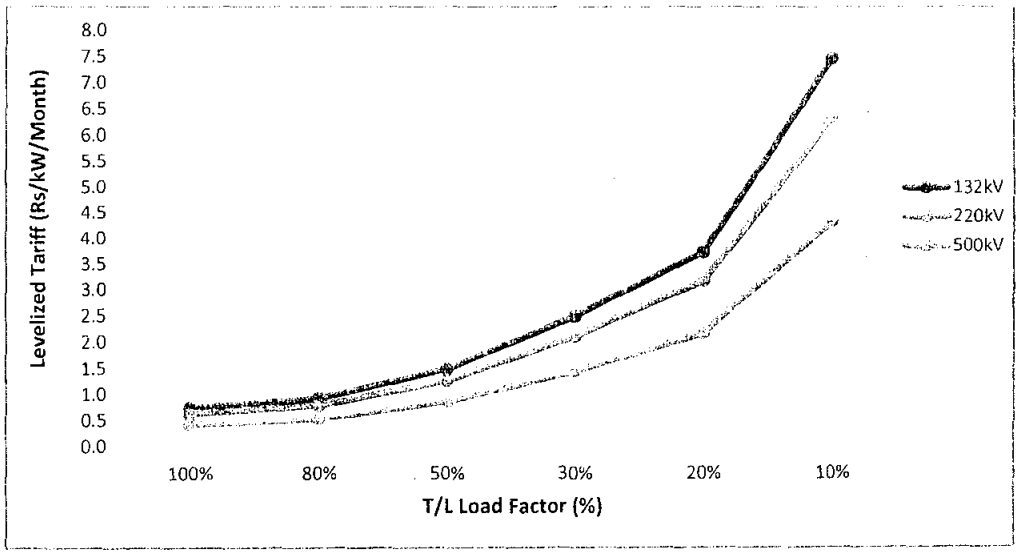
Total Capacity Charge (80% LF)	0.9288	0.7878	0.5389
Energy Charge			
Variable O&M	0.0000	0.0000	0.0000
Total Energy Charge	0.0000	0.0000	0.0000
Total Base Tariff (PKRs.)	0.9288	0.7878	0.5389

7.12.1 Transmission Line Loading Factor (%) and Applicable Levelized Tariff (Rs. /kW/Hr.) Relationship

This section provides an analysis of interrelation between load factor (LF) and levelized tariff. The financial models developed by the Consultant for all three-voltage level T/L projects (132 kV, 220 kV and 500 kV) of PGC reflect that any decrease in LF is inversely related to per unit levelized transmission tariff as illustrated in **Figure-21** below. At 100% LF, the transmission tariff is Rs. 0.74, per kW per hour in case of 132 kV T/L, Rs. 0.63 in case of 220 kV T/L and Rs. 0.43 in case of 500 kV circuit. To avoid any overloading of T/L, the base case has been considered at 80% LF for each voltage line and thus corresponding tariff, under base case scenario, stands at Rs. 0.93 in case of 132 kV circuit, Rs. 0.79 in case of 220 kV T/L and Rs. 0.54 for 500 kV circuit.

Under the circumstances of any underutilization of the line by the party availing the wheeling service of PGC would have to pay relatively higher tariff. The below graph shows that a decrease in LF of each line is associated with corresponding increase in levelized tariff. A decrease of 50% in the LF almost doubles the applicable tariff for each voltage level transmission line, as compare to applicable tariff at 100% LF of the line, and thus stands Rs. 1.49 in case of 132 kV T/L, Rs. 1.26 in case of 220 kV T/L and Rs. 0.86 in case of 500 kV T/L. By further decreasing LF of the line, the applicable tariff continues to rise a LF of 10% results in a tariff of Rs. 7.43 for 132 kV T/L, Rs. 6.30 for 220 kV T/L and Rs. 4.31 for 500 kV T/L is reflected which is almost 10 times higher of the tariff applicable at 100% LF of the respective line. Regarding thermal power projects like gas, oil and coal fired power plants, the LF of the T/L would be high i.e. 60-80% due to firm supply all the time while in case of Renewable Projects like wind and solar power plants the LF of the lines will comparatively low i.e., 20-30% due to less availability factors and intermittency issues of RE plants. Subsequently, the estimated levelized transmission tariff for thermal based power plants would be low in comparison of applicable tariff for RE plants.

Figure-21: Loading Factor Impact on Levelized Tariff



7.12.2 Impact on Tariff

As a base case, Equity of 25%, Local Debt of 7.5% and Foreign Debt of 67.5% has been assumed. Any change in the ratio of local and foreign debt will have a direct impact on the tariff, IRR, NPV and Payback Period.

To present this, two scenarios have been assumed and results presented in the **Table-33** below.

Table-33: Impact on Tariff

Local & Foreign Financing Sensitivity	Total Project Cost	Tariff PKR/Kw	NPV (PKR)	IRR (%)	Payback (Years)
Local Debt 7.5%, Foreign Debt 67.5% (Base Case)	5,180,784,966	0.9288	1,396,132,153.44	5.5%	11.5
Local Debt 20%, Foreign Debt 55%	5,231,189,925	0.8762	235,252,763.18	4.40%	13.5
Local Debt 35%, Foreign Debt 40%	5,291,675,875	0.8145	(691,876,406.05)	6.40%	17.17
Local Debt 55%, Foreign Debt 20%	5,372,323,809	0.7347	(1,606,766,811.69)	2.80%	22
Local Debt 67.5%, Foreign Debt 7.5%	5,422,728,768	0.6863	(2,080,208,226.89)	1.00%	25.08

7.13 Project Net Earnings

The Project net earnings are generated as a difference between income from its core operations and expenditures incurred to meet its operations and the other non-operating expenditures principally the Project financing cost. The results indicate a substantially viable Project as is demonstrated through the summary results of the income and expenditure flows in the periodical average results shown in **Table-34**.

Table-34: Projected Income Statement (25 year average)

PROJECTED INCOME STATEMENT (25 Years Average)	132 kV PKR Mn	220 kV PKR Mn	500 kV PKR Mn
REVENUE	699.77	3,160.36	10,748.74
OPERATING COSTS	319.34	1,406.57	4,541.70
O&M Costs	247.43	1,067.19	3,372.49
Insurance	71.91	339.38	1,169.21
EBITDA	**380.43**	**1,753.80**	**6,207.04**
Depreciation	234.60	886.72	2,933.57
Other Income	-	-	-
Financing Fees	-	-	-
EBIT	**145.83**	**867.08**	**3,273.47**
Interest on Long term Debt	44.93	207.12	614.54
Interest on Short term Debt	-	-	-
Profit Before Tax	100.90	659.96	2,658.93
Taxation	13.47	87.14	348.04
Net Profit	**87.43**	**572.81**	**2,310.89**

7.14 Financial Analysis

7.14.1 Quantitative Assessment of the Project

In this section, a comprehensive analysis has been carried out of the Project to assess its economic and financial viability and to determine its feasibility with reference to various risks present and mitigation of such risks thereof. Different basis has been used, relying primarily on the results of the financial model.

Base Case Parameters and Financial Profitability Analysis

Free Cash Flows (FCF) and free cash flow to equity (FCFE) of the Project have been used to determine the key financial indicators of the Project and of the equity holders respectively. The financial model based on free cash flows, both for the Project and the investor, is provided separately.

Using the free cash flow model, **Table-35** below shows the key financial indicators for the Project appraisal:

Table-35: Key Financial Indicators (Project)

Key Financial Indicators (Project)	132kV	220kV	500kV
Net Present Value (NPV – PKR)	1,396,132,153	3,797,225,441	18,758,412,236
Internal Rate of Return (IRR – %)	5.52	4.63	4.36
Project Payback Period (Years)	11.50	12.83	13.92

Net Present Value (NPV) of the Project is calculated without considering cash flows beyond project life if any in form of terminal value and are based on the net benefit arising from the Project after meeting all the liabilities and commitments as well as the cost of operations and other expenditures during the 25 years' life of the project.

Internal rate of return (IRR) is calculated at 5.52% for 132 kV, 4.63% for 220 kV and 4.36% for 500 kV.

Payback Period of the Project is estimated at 11.5 years for 132 kV voltage type, 12.83 years for 220 kV voltage type and 13.92 years for 500 kV from COD.

7.15 Financial Model Manual

Three independent financial models have been developed for each voltage type and have been **submitted/attached separately** with this report. Financial model /feasibility is developed on the basis of numbers /data /charts /figures /calculations collected /developed by the Consultant. All figures, numbers /data /charts /figures /calculations contained in excel based financial model are computed by consultants based on best estimates and market studies. Actual figures and results may vary and consultants shall bear no responsibility.

This financial model is developed keeping in view international best practices and requirement of PPDB. Basis of development of financial model is provided as follows.

Consultant has provided in total 3 models for each voltage type (132 kV, 220 kV and 500 kV) based on which various calculations can be performed.

For the purpose of invoicing and computing monthly revenues, corresponding tariff for the said month is used (For instance, January 2030 transmission revenues will be calculated using tariff for the month of January 2030). Levelized tariff is only the present value of average tariff to be charged on monthly basis. In any case or scenario, Levelized tariff shall not be used to compute revenues or costs.

Sensitivity Analysis

The financial model allows for the sensitivity analysis to be carried out in order to ascertain the impacts on various project parameters. Project sensitivity analysis is calculated for total project cost, foreign interest rate, local interest rate and PKR devaluation. This can be conducted through selection of sensitivity parameters included in the 'Dashboard & Assumptions' sheet in the financial model under the head 'Sensitivity Triggers'.

7.15.1 Financial Model Dashboard

Punjab Grid Company - Financial Model

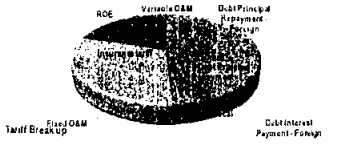
Key Project Dates	
Project Start	July 1, 2022
Months	12
Time Till Company Setup and Constru	July 1, 2023
Months	24
Construction End Date	July 1, 2025
Planned COD	July 1, 2025

Line Selected as Reference	
	150

Key Model Inputs	
Assumed Upfront ROE (Subject to PP	15%
Discount Rate for Levelized Tariff (W	7%
Net Enterprise Value	3,797,225,441
Project Payback Year	12.83
Project IRR	4.6%
Net Equity Value	1,771,320,432
Equity Payback Year	11.83
Project IRR	10.6%

Technical Assumptions	
Gross Capacity	800
Capacity after Load Factor	400
Gross Capacity KWh	7,008,000,000
Monthly Capacity KWh	584,000,000
Capacity after Load Factor Kwh	3,504,000,000
Actual Energy Transmitted MW	3,382,411
Actual Energy Transmitted KWh	29,629,822,112,000
Total Hours	8,760
f/L Loading Factor	70%
Project Operational Life	25.00

Levelized Tariff - PKR/kWh	
Capacity Charge	
Debt Principal Repayment - Foreign	0.1836
Debt Interest Payment - Foreign	0.1179
Debt Principal Repayment - Local	0.0015
Debt Interest Payment - Local	0.0066
Fixed O&M	0.1448
Insurance tariff	0.0484
ROE	0.1276
Total Capacity Charge (100%)	0.6302
Total Capacity Charge (Utilisation)	1.2604
Energy Charge	
Variable O&M	0.0000
Total Energy Charge	0.0000
Total Base Tariff	1.2604



O&M Assumptions	
200Kv Line - Cost Basis	2.5%
Fixed Management Fee (%age of PC)	2.0%

O&M Assumptions	
200Kv Line - Cost Basis	565,629,355
Management Fee	477,678,291

Fixed and Variable O&M Split	
Fixed	5.0%
Variable	5.0%

Working Capital Assumptions	
Account Receivable Days	-
Spread	1.50%
Working Capital Rate	1.50%

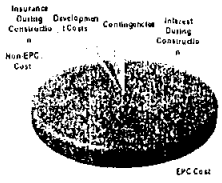
Taxation Assumptions	
Withholding tax on dividends	15.00%
Income Tax	29.00%
Minimum Turnover Tax	1.00%

Please Note:
- Model is calculated using the lengthiest line from the 220KV Transmission Lines data available
- No indexations assumed in model and tariff calculated on straight line basis
- 220 KV transmission line gestation period assumed 1+2 years (1 year for project development and company setup) plus 2 years of actual construction period
- Tariff period has been assumed to be 25 years

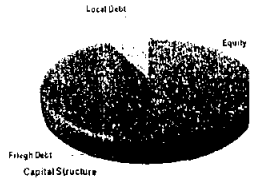
- This dashboard includes all assumptions used in the model
- Only change : all colored hard coded figures in this sheet
- No other changes should be made where numbers are calculated, otherwise model will not work efficiently

Project Cost Assumptions	PKR
EPC Cost Percentage	80%
Total EPC Cost USD	20,362,656,788
Onshore EPC Cost USD	20,362,656,788
Offshore EPC Cost USD	0
Taxes on EPC (% of EPC)	0.00%
Taxes on EPC USD	0
Non-EPC Costs USD	2,262,517,421
Non-EPC Costs USD	2,262,517,421
Residential Civil Works USD	0
Development Costs USD	198,846,787
Financing Fees & Charges USD	0
Consultant's Fees	50,000,000
Company Registration Charges	10,000,000
NEPRA Licensing Fee	10,000,000
Insurance During Construction (% of EPC)	1.50%
Insurance During Construction USD	339,377,613
Contingencies	4.00%

General Assumptions	
Annual Increase in OE	0.00%
PKR USD Rate	200.00
Annual PKR Devaluatio	5.00%



Financing Assumptions (PKR)	
Project Cost	23,883,814,536
Equity	25.0%
Equity	5,970,953,634
Foreign Debt	
Foreign Debt % of Project Cost	67.8%
Foreign Debt	16,121,574,812
Base rate: 3 Month LIBOR	1.10%
Spread	4.51%
Total Cost of Foreign Debt	5.61%
Tenor (Years)	10.00
Payments per Annum	12.00
Monthly Installment	175,841,472
Local Debt	
Local Debt % of Total Debt	7.5%
Local Debt	1,791,286,090
Base Rate	14.40%
Spread	3.60%
Total Local Debt Cost	18.04%
Three Months' KIBOR	14.54%
Spread	3.50%
Total Local Debt Cost linked to KIBOR	18.04%
Tenor (Years)	10.00
Payments per Annum	12.00
Monthly Installment	32,322,467



Debt Service Reserve	
Months	6
Funding	Cash Flow
DSRA Amount USD	
L/C Cost Per Annum	1.00%
Annual Profit on Cash (3 month KIBOR less 3%)	11.54%

Sensitivity Triggers	
Project Cost	0.0%
Interest Rate	
Foreign Interest Rate	0.0%
Local Interest Rate	0.0%
PKR Devaluation	0.0%

Sensitivity Results	
Project Cost	23,883,814,536
Equity	5,970,953,634
Debt	17,912,860,902
Levelized Tariff	1.2604
WACC	7.46%
Project Present Value Net	3,797,225,441
Project IRR	4.63%
Project Payback Period	12.83
Equity Present Value Net	1,771,320,432
Project IRR	10.55%
Project Payback Period	11.83

PGC Financial Model ("FM") is controlled from the assumption sheet and voltage type and sensitivities can be selected from the assumption sheet as well. All the items in the red highlighted cells in assumptions are manual inputs/hardcoded values and can be changed based on the requirements of desired results. Levelized tariff table is linked with monthly tariff sheet and can only be changed when manual input items are revised/changed.

Financial model end user can only change base numbers and data from the assumption sheet only. All other modules/sheets in the financial model are calculated from the

dashboard and assumptions and any changes made other than assumptions may lead to malfunctioning of the financial model.

Tariff Module

Monthly tariff calculations and levelized tariff has been calculated taking account all the necessary cost items and inputs from assumption and dashboard. Changes which impact tariff calculations are already linked to the tariff calculations and automatically update the tariff. No change need to be made in the monthly tariff sheet/module.

Project Cost and IDC

Project cost and IDC provides CAPEX requirements including interest during construction on monthly basis and compounded on quarterly basis. Site selection and changes in assumption and/or dashboard on capital nature will updated project cost and IDC sheet. Project cost and IDC also highlight investment breakdown month on month basis for all CAPEX items.

Interest during construction has been calculated keeping in the financial framework of the project sources of finances i.e. equity and debt. Project cost has been built on the basis that for any month the capital cost will be first financed from equity and then via loan disbursement to minimize the interest during construction ('IDC").

Financial Statements

Projected financial statement make the most important part of the financial model. These financial statements have been developed taking all the necessary inputs from all the modules/sheets of the financial model.

Projected profit and loss, cash flow statement and balance sheets have been providing separately in financial statement module of the model. Furthermore, financial model also accounts for monthly and yearly financial statements for the said project.

All the numbers provided in financial statements have converted to nearest thousand rupees (PKR '000). Project free cash flows, internal rate of return and payback have also been computed at the end of financial statements in the financial statement sheet. Ratio analysis has been separately calculated in the ratio analysis sheet.

Financial model also includes a detailed debt schedule for the project. Changes made to interest rates, debt tenor, debt amounts, CAPEX items will also update projected debt schedule.

8. CONCLUSION AND WAYFORWARD

8.1 Conclusion

This feasibility study concludes that establishment of Punjab Grid Company (PGC) is viable from technical, financial, commercial and regulatory perspectives. All these perspectives are summarized below:

- The establishment of PGC is technically viable and may develop transmission infrastructure mainly of 132 kV, 220 kV and 500 kV lines and grid stations for providing wheeling services to various power plants, BPCs and DISCOs etc. The Consultant analyzed the potential power market of Punjab province and identified existing transmission system constraints. The supply and demand parameters were thoroughly studied and various transmission projects have been identified which may be undertaken by PGC. From technical perspective, it is concluded that due to existing system constraints, it is needed to immediately establish a provincial grid company which may protect the interest of the province for supplying power to off-grid and low grid areas.
- From financial perspective, it is feasible to establish PGC as financial models developed by the consultant for transmission lines of all 03 voltage levels show attractive results as detailed below.
    - For 132 kV transmission project, the IRR is 5.5%, NPV is around Rs. 1,396.1 million and payback period is 11.5 years.
    - For 220 kV transmission project, the IRR is 4.6%, NPV is around Rs. 3,797.2 million and payback period is 12.83 years.
    - For 500 kV transmission project, the IRR is 4.36%, NPV is around Rs. 18,758.4 million and payback period is 13.92 years.
- The potential transmission market availability for tapping and also in view of upcoming competitive market environment reflects that establishment of PGC would be commercially viable for supplying electricity to off-grid, low grid and BPCs under commercial terms and conditions.
- From legal and regulatory perspective, the consultant foresee on issue in establishing of PGC as there are provisions in the constitution of Pakistan as well as in NEPRA Amended Act to establish provincial grid company (PGC) by the province.
- It is therefore recommended that the Government of Punjab may proceed to establish its own transmission and grid company like other 02 provinces, (i.e., Sindh and KPK) as the province possess sufficient market opportunities in expansion of transmission and grid system in its territory.

8.2 Way Forward

In light of the above conclusion, various steps to be taken for the establishment and operationalization of Punjab Grid Company (PGC) are summarized below.

Step-1: Establishment of PGC and its registration with SECP along with appointment of key man power including BoD, top management, key technical team and administrative persons etc.

Step-2: Obtaining transmission license, tariff approval and fulfilling other applicable regulatory requirements.

Step-3: Formulation and approval of transmission policy for Punjab

Step-4:
- Drafting of standard documents including bidding documents, EPC and O&M contracts documents (in case of public mode/own projects)
- Drafting of concession agreement (in case of PPP mode/BOOT projects)
- Drafting of TSA in light of approved transmission policy.

Step-5: Preparation of list of identified transmission lines projects, their categorization (projects to develop in public mode and in PPP/BOOT mode) and obtaining approval in-principle thereof from BoD.

Step-6:
- Selection of transmission project(s), which are to be developed in public mode, conducting feasibility study to ascertain the technical and economic viability before development / Implementation.
- LoI issuance to concessioner to conduct feasibility study by itself in case of BOOT project(s)

Step-7: Obtaining approval from BoD for each feasible project.

Step-8:
- Signing of TSA with power off-taker/dispatcher in case of public project
- Signing of concession agreement with investor/concessioner in case of BOOT project

Step-9: Arrangement of funds for approved public mode project: government funding, donor agencies funding or blending of funds.

Step-10: Selection of EPC contractor for project development in case of public mode project; bidding, evaluation, award of contract.

Step-11: Coordination & monitoring of the project (s)

Step-12: Testing & commissioning of the T/L project as per agreed terms and conditions of contract

Step-13: O&M of public sector projects; decision on whether O&M will be done through public/internal sources or through private sector/third party outsourcing.

Step-14: Approval of O&M contract and project operation.

ANNEX-"F"

No. PPDB/ 501 /2022

PUNJAB POWER DEVELOPMENT BOARD

ENERGY DEPARTMENT

1st Floor, Irrigation Secretariat,
Old Anarkali, Lahore
(Ph: 042-99213885 Fax: 99213875)

Date 16/09/2022

To,

1. **The Secretary**
   Energy Department, GoPb
   8th Floor EFU House, Jail Road

2. **Member Energy**
   P&D Department
   P&D Board, Lahore

3. **Managing Director, NTDC**
   Room No. 414, WAPDA House,
   Lahore

4. **Mr. Tila Muhammad Khan**
   Advisor, KPK Transmission &
   Grid System Company (Pvt.) Ltd.
   2nd Floor, Block A Abdul Wali
   Khan Multiplex, Civil Secretariat,
   Peshawar

5. **Mr. Muhammad Arif**
   Chief Engineer Transmission
   Lines
   National Engineering Services
   Pakistan (Pvt.) Ltd. (NESPAK)
   1-C, Block –N Model Town Ext.
   Lahore

6. **Mr. Imran Ali Shah**
   Manager Research
   Centre for Energy Research and
   Development (CERAD)
   UET, Kala Shah Kaku Campus

Subject: **MINUTES OF THE 2nd PANEL OF EXPERTS (POEs) MEETING TO REVIEW THE UPDATED FEASIBILITY STUDY FOR ESTABLISHMENT OF PUNJAB GRID COMPANY**

Please find enclosed the minutes of the 2nd Panel of Experts (POE) Meeting held on September 07, 2022 in the Committee Room of Punjab Power Development Board (PPDB), Energy Department Government of the Punjab for review of Technical, Financial & Commercial aspects of updated Feasibility Study (FS) for establishment of Punjab Grid Company (PGC).

It is shared for your kind information.

Best Regards,

MANAGING DIRECTOR
Punjab Power Development Board (PPDB)

D/A As Above

CC:

i. *P.S to Secretary (Energy), Energy Department, Government of Punjab, Lahore*
ii. *The Consultant (JV of Elan Partners, AIBV & Co., NTEGRATION Environment & Energy GmbH)*

PUNJAB POWER DEVELOPMENT BOARD
ENERGY DEPARTMENT

Subject: **2nd MEETING OF PANEL OF EXPERTS (POE) OF PPDB TO REVIEW THE TECHNICAL, FINANCIAL & COMMERCIAL FEASIBILITY STUDY FOR ESTABLISHMENT OF PUNJAB GRID COMPANY (PGC) (THE CONSULTANT JV OF ELAN PARTNER, AHW & CO. INTEGRATION ENVIRONMENT & ENERGY GMBH)**

The 2nd meeting of Panel of Experts (PoEs) was held on September 02, 2022 in the Committee Room of Punjab Power Development Board (PPDB), Energy Department, Government of the Punjab. The Managing Director, PPDB, being convener of the PoEs, chaired the meeting. The following participated in the meeting proceedings:

PANEL OF EXPERTS:

Sr. #	Name	Designation	Department/Organization
1.	Mrs. Saniya Awais	Managing Director	Punjab Power Development Board
2.	Mr. Tila Muhammad Khan	Advisor	KP Transmission & Grid Company -attended via video link
3.	Mr. Khursheed Ahmad	Chief Engineer	NESPAK
4.	Ms. Mahjabeen	SO (Solar)	Energy Department, GoPb
5.	Mr. Farooq Rashid	Chief Engineer	NTDC, Planning
6.	M. Osman Nasir	Chief (Energy)	Planning & Development Department, GoPb.
7.	Mr. Imran Ali Shah	Senior Manager	CERAD, UET, Lahore

OTHER PARTICIPANTS

Sr. #	Name	Designation	Department/Organization
PPDB Officers:			
1.	Mr. Ahmad Salman	Director Technical Coordination	PPDB
2.	Mr. Saqib Rasul	Manager Planning	PPDB
3.	Mr. Shahzaib Ahmad	Manager Thermal/Tariff	PPDB

4.	Ms. Maryam Sher Hassan	Manager PR & Marketing	PPDB
5.	Mr. Muhammad Abu Bakar	Assistant Manager Thermal	PPDB
Consultants:			
1.	Mr. Muhammad Ziauddin	Chief Executive Officer	Elan Partners (Pvt.) Ltd.
2.	Mr. Anwar Zeb	Senior Energy Analyst	Elan Partners (Pvt.) Ltd.
3.	Mr. Hussain Zaigham Alvi	Senior Consultant	Elan Partners (Pvt.) Ltd.
4.	Mr. Muhammad Umar	Senior Financial Analyst	Elan Partners (Pvt.) Ltd.
5.	Mr. Waqar Sharif	Partner	A.H.W. & Co.

PROCEEDINGS:

Meeting started with the Name of the Almighty ALLAH. Thereafter, agenda of the meeting was steered with the permission of the Chairperson, proceedings of which have been narrated as follows:

After introduction, the chair welcomed the participants and briefly discussed the background of the project and the previous PoEs meeting held on 27th July, 2022 in which some observations/suggestions were made by the PoEs in order to make the study more comprehensive. In this regard, it was stated by the Director Technical that most of the observations made by PoE members in the last meeting have been attended by the Consultant and incorporated in the report. However, two major observations/suggestions made in the earlier meeting had to be attended by the Consultant and to be presented in another meeting of PoEs which is being held now.

The following points were discussed and clarified by the Consultant;

Item#	Observation/Comments	Consultant Response/ Clarification
1.	MD PPDB, referring to the previous PoEs meeting, inquired about the identification of projects in short and long term so as to provide the company with a clear roadmap for the activities to be conducted after establishment of PGC. MD PPDB mentioned that in chishtian space for 250 MW Solar power project is available. A transmission network to off-take electricity from here can also be a viable project for PGC. It was recommended that the study should include	Consultant clarified that this aspect highlighted in the previous PoEs has been duly taken care of in the report and both short and long term projects have been identified and incorporated in the report. To provide a clear picture, Consultant also presented the relevant table containing the list of identified projects.

	the development of a transmission line from the Solar Park to the nearest NTDC 220 kV Grid station in Phase - 1 since this seems to be a low hanging fruit for PGC.	Consultant agreed to examine & include, if feasible, this project in the list of proposed projects in the final report.
2.	MD PPDB inquired about the source of the projects which were categorized into phasing. MD PPDB asked the Consultant to include relevant references from National Electricity Plan (NEP) which provides the provision of these projects being developed jointly.	Consultant clarified that all these projects have been identified from the NTDC plans (220 and 500 kV) and STGs plans of relevant DISCOs using the relevant framework developed by the Consultant. With regard to including relevant references from NEP, the Consultant will look in to and attend this observation.
3.	MD PPDB inquired whether under the legal and regulatory framework PGC can act as a service provider under contract with other provincial Energy departments/provincial grid companies such as Balochistan and AJK? This can be another business avenue for PGC as it will ensure optimum utilization of resources.	Consultant agreed that this aspect will be looked into from regulatory aspect and incorporated in the final report, whereas legal aspect could be looked while incorporating with SECP.
4.	MD PPDB requested the clarifications about cost calculations in the financial models of 132 kV, 220 kV & 500 kV and the sensitivities to be made part of the analysis for RE & Thermal based projects.	Consultant agreed to incorporate the suggestions made by MD PPDB.
5.	MD PPDB emphasized that the transmission line cost may be worked out as PKR/MW/km, in view of line loading with due regard of capacity utilization of transmission lines for RE & Thermal based projects.	Consultant agreed to incorporate the suggestions made by MD PPDB.
Following the discussion and response to all queries raised, MD PPDB requested views of each PoEs member regarding the Feasibility Study and Establishment of PGC, details of which are provided below:		
6.	Chief Energy, Planning & Development Department, GoPb commented that the Feasibility Study covers all the relevant aspects and it is concluded that PGC should be established. However, it is very important that Feasibility Study	MD PPDB commented it is very much important that viability of each Transmission line project should be checked and this will be done through Feasibility Study of the planned

	should be carried out for each individual transmission line at the time of development.	Transmission line after which approval will be sought from relevant forums. Consultant agreed with the above view.
7.	Chief Engineer, NTDC appreciated the initiative of PPDB to establish PGC and its intension to undertake T/L projects in close consultation with NTDC, DISCOs etc.	Response was acknowledged by the PPDB and the Consultant.
8.	Energy Department agreed that there is certainly a need for the establishment of PGC and Feasibility Studies for each Transmission Line should be carried out at the time of implementation based on which necessary approvals will be sought.	Response was acknowledged by the Consultant.
9.	Senior Manager, CERAD, UET Lahore appreciated the efforts for development of the comprehensive feasibility study of PGC and commented that there is a definite need of PGC in Punjab. Furthermore, adding to the discussion detailed in Sr. No. 3, he stated that UET as a university is providing services in Gambia, Senegal and other countries. Similarly, once PGC enough capabilities, it should also act as a service provider. He also highlighted the issue of transmission constraints during the development of coal & salt mines and urged that PGC after establishment, should consider development of T/L projects for supplying power to mining areas.	MD PPDB agreed with the view and reiterated that the idea of PGC acting as a service provider will ensure the optimum utilization of public resources. Response was acknowledged by the Consultant.
10.	CE NESPAK commented that the Feasibility Study covers the various aspects and agreed with the conclusion that PGC should be established. In addition to the above, he suggested that the position for the metering & protection to be placed under the design and planning department in the organogram.	Consultant responded that suggestion of the honorable member will be incorporated in the final report of the study.

11.	Advisor, KP Transmission & Grid Company supported the establishment of PGC and in addition also suggested that it is important to include financial projections of PGC for next 5-10 years.	Consultant agreed to include financial projections of PGC for next 5-10 years.

DECISIONS

In light of the above discussions and deliberations, following was concluded:

- The Panel of Experts unanimously approved the Feasibility Study conducted for Establishment of Punjab Grid Company and appreciated the efforts of PPDB in the better interest of the province of Punjab.
- The Consultant shall submit the final report of the study after incorporation of agreed observations for onward submission and approval of PPDB Board.

The meeting ended with vote of thanks to and by the Chair.

Meeting of Panel of Experts (POE) of PPDB to review the Technical, Financial & Commercial Feasibility Study for Establishment of Punjab Grid Company (the Consultant JV of Elan Partner, AHW & Co. Integration Environment & Energy Gmbh) held on 02.09.2022 at 2:30 p.m.

Sr.#	Name	Designation	Department	Cell No.	Email ID	Signature
1.	Ms. Saniya Awais	Managing Director / Chairperson	Punjab Power Development Board			
2.	FAROOQ RASHID	Chief Engineer	PSPNTDC	0335 7402219	ce.tpentdc.com.pk	
3.	Mahjabeen	SO (Solar)	Energy	0323-4007149		
4.	IMRAN ALI SHAH	Snr Manager Resrch	UET, Lahore	0323-4320000	admin@kics.edu.pk	
5.	Khursheed Ahmad	CE, PSM	NESPAK	03055631201	khanespak@gmail.com	
6.	Ahmad Salman	DTC,	PPDB	03000335085		
7.	SHAHZEB AHMAD	MANAGER TARIFF/TECH	PPDB	0300-0335051		
8.	Muhammad Zeeshan	CEO Elan Partners	Elan Partners (Pvt) Ltd	0331-5033545	ceo@elan.com.pk	

9.	Masoom Shah Hassan	Manager PR & Marketing	PPDB	0300 4767876	ppdb.inf[illegible]@energy.punjab.gov.pk	[signature]
10.	M. Usman Nasir	Chief (Energy)	P&D Board	0301 5048661	totheosmank@gmail.com	[signature]
11.	WAQAR SHARIF	Partner	AHW & Co	0321 6650369	waqarsharif@gmail.com	[signature]
12.	Muhammad Umar	Senior Financial Analyst	Elan Partners	0331-8661110	muhammad.umar@elan.com.pk	[signature]
13.	Anwar Zeb	Energy Specialist	//	0315-9090610	anwar.zeb@elan.com.pk	[signature]
14.	Husnain Zaighan	Consultant	ELAN	03008301437	ziman24@gmail.com	[signature]
15.	Saqib Raeed	MP	PPDB			[signature]
16.	M. Abu Bakar	AMT	PPDB			[signature]
17.						
18.						

ANNEX-"G" -292-

The province of Punjab is major transmission corridor where the assets of NTDC are installed. Out of total sixteen 500kV G/S 10 are installed in Punjab which are listed below:

- 500 kV Rawat G/S
- 500 kV Lahore (Sheikhupura) G/S
- 500 kV Gatti (Faisalabad) G/S
- 500 kV Nokhar G/S
- 500 kV Sahiwal (Yousafwala) G/S
- 500 kV Lahore south G/S
- 500 kV New Multan G/S
- 500 kV Muzafargarh G/S
- 500 kV Rahim Yar Khan G/S
- 500 kV Dera Ghazi Khan G/S

3.2.2 DISCOs Constraints / Bottlenecks in Punjab

The transmission system available mainly of NTDC/ DISCOs in Punjab has been reviewed with key focus on congestions/constraints which results in power load shedding in some areas. The consultant has analysed most of the constraints within 5 DISCOs of Punjab and short listed some constraints which needs to be removed in short term. This is another area where PGC may tap the potential projects from the constraints in 5 DISCOs. PGC may pick most feasible project and may check technical and economic viability before implementation. The PGC can pick up economically and technically viable projects. Such projects after its implementation can be good source of income by charging wheeling cost. The DISCO wise constraints/problems and potential projects for PGC are given in **Table-11** below.

Table-11: DISCO Wise Constraints/Problems and Potential Projects

Sr. No.	Grid Station	Problem		Constraint	Potential T/L Projects for PGC
MEPCO					
1	220kV Lal-Sohanra	Insufficient capacity and non-availability of 132kV circuits		Underutilized	Construction of additional new 132 kV lines to connect with BPC
2	500kV DG Khan	Insufficient capacity and non-availability of 132kV circuits		Underutilized	Construction of new 132kV T/L to connect with BPC
3	220kV Deharki	Insufficient capacity and non-availability of 132kV circuits		Underutilized	Construction of new 132 kV T/L to connect with BPC
4	132 kV Jehanian	132 kV Links between 220kV Vehari, 220 kV NGPS and Bahawalpur.	132 kV circuits emanating from 220 kV Vehari to Jehanian	Overloaded Circuits	Additional 132 kV T/L required
5	132 kV Lal-Sohanra	132 kV Links between 220 kV Chishtian, Bahawalpur and Vehari	132kV Lal-Sohanra to Hasilpur and Ludden circuits	Outages of Bahawalpur circuits since June 2018	New 132 kV line needed to provide N-1 contingency and dispersal of power from upcoming Solar projects to BPC
6	132 kV Qasimpur, Vehari Road, NGPS, New Multan	132 kV Links between 220 kV Vehari and Kassowal	Vehari Road, NGPS, New Multan	Overloaded	132kV New Multan - Qasimpur - MESCO Circuit 132kV New Multan - Vehari Road Circuit
7	132 kV Rahim Yar Khan	132 kV Links between 220 kV Vehari and Kassowal	132KV Rahim Yar Khan- I,II- Rahim Yar Khan (500KV) CCTs,	Overloaded	132kV circuit may be needed to avoid over loading
8	132kV Muzaffargarh	133 kV Links between 220 kV Vehari and Kassowal	132kV Muzaffargarh - Khangarh T/Line	Overloaded	132kV circuit may be needed to avoid over loading

FESCO					
9	132 kV Piplan	132kV Links between 220kV Daudkhel and D.I.Khan.	132kV Wanbuchran - Piplan (2) circuit	Overloaded since summer 2018	Addition/ Up gradation of link with enhanced current carrying capacity
10	132kV Daudkhel	132kV Links between 220kV Daudkhel and Ludewala.	132kV Daudkhel - Shahbaz Khel circuit	Overloaded since 2019 summer	132kV circuit needed to avoid over loading
11	132kV Ludewala	132kV Links between 220kV Ludewala to Nishatabad	132kV Ludewala to Sargodha-II G/S	Overloaded since 2019 summer	132kv circuit needed to avoid over loading
12	132 kV Ludewala	132kV circuit	132kV Ludewala to Kirana Hill G/S	Overloaded since 2019 summer	132kv circuit needed to avoid over loading
13	132kV Liberty Tech	132kV circuit	132kV Liberty Tech. to Chiniot Ind. G/S	Overloaded Circuit since 2019 summer	132kv circuit needed to avoid over loading
LESCO					
14	220kV New Shalimar	Insufficient capacity and non-availability of132kV circuits	Max. Utilization 66%	Under Utilization since energization	Addition of interlinks needed. 132kV T/L to BPC
15	132kV Shahdara	132 kV circuit emanating from 220kV Ravi to 132kV Shahdara	Overloaded Circuit	Since 2017	Addition/ Up gradation of link is needed.
16		132 kV Shahdara to 132kV Shahdara Scarp	Overloaded Circuit		Construction/ Re-routing of links with associated 132kV Network.
17	132kV Shahdara Scarp	132 kV cct emanating from 220kV Kala Shah Kaku to 132kV Shahdara Scarp	Overloaded Circuit	Since 2017	Addition/ Up gradation of link is needed
18	132kV Sheikhupura	132kV triple circuits emanating from 500kV Lahore Sheikhupura to 132kV Sheikhupura	Overloaded Circuit	Since 2019	Addition/ Up gradation of link is needed
19		132kV Sheikhupura to Firozabad circuit	Overloaded Circuit		Addition/ Up gradation of link is needed
20		132kV Sheikhupura to Halmore Bhikki P/H	Overloaded Circuit		Addition/ Up gradation of link is needed
21	132kV Khan ka Dogran	132kV Khan ka dogran to Sukheki circuit	Overloaded Circuit	Since 2019	Addition/ Up gradation of link is needed

22	132kV Blessed	132 kV Blessed to Halmore P/H circuit	Overloaded Circuit	Since 2019	Addition/ Up gradation of link is needed
23		132kV Blessed to Walgan Sohail circuit.	Overloaded Circuit		Addition/ Up gradation of link is needed
24	132kV Shahkot	132kV Shahkot to Walgan Sohail	Overloaded Circuit	Since 2019	Addition/ Up gradation of link is needed
25		132kV Shahkot to Halmore P/H	Overloaded Circuit		Addition/ Up gradation of link is needed
GEPCO					
26	220 kV Gujrat	Insufficient capacity and non-availability of 132kV circuits	Proposed circuits=12 whereas Actual Circuits=6	Addition of interlinks	Two new 132kV circuits from 132kV Hellan G/S are being proposed in 8th STG
27	132 kV Badomali	132kV circuit emanating from 220kV Kala Sha Kaku to 132kV Badomali	Old & deteriorated overloaded circuit	Circuits Overloaded	Addition/ Up gradation of link is needed
28	132 kV Gujrat-II	132kV circuit	132kV Gujrat-II-Ratti T-OFF Jalalpur Jatan circuit.	Overloaded	The estimate for installation of 2nd circuit is under approval.
IESCO					
29	132KV Kahuta City	132KV Links between 500KV New Rawat to Mansehra	132KV Kahuta City to 132KV Palandri G/S	Overloaded since 2019	Addition of new circuit is required

Source: NTDC 2021 & DISCOs

Proactive Role of PPDB on IGCEP and TSEP

For expanding its transmission system PGC can take up projects which otherwise fall under the domain of NGC/NTDC or distribution companies, however they are unable to implement such projects due to a variety of reasons. To elaborate, NTDC is responsible for preparing Indicated Generation Capacity Expansion Plans (IGCEP) and TSEP to be approved by NEPRA. The transmission systems are required to be developed by NTDC for connecting to national grid. Similarly, distribution companies also prepare their future transmission expansion plans with the approval of NEPRA. NGC/NTDC or distribution companies may face the problem of insufficient funds or capacity issues which may affect their plans for completion of these projects. Furthermore, projects in other areas may replace some original projects which in turn push original project out of priority list. PGC may offer its services by targeting such areas by making out detailed business plans to achieve harmonious development of transmission networks. The provincial government (through PPDB) will have a major role to play in the development of IGCEP and TSEP so that generation resources of Punjab province also have due share in the optimal mix of the country.

PPDB Role for encouraging Generators and Large Consumers/Industrial Estates

Similarly, PGC may take up transmission projects which are not connected to national grid by providing interconnections to generators and Bulk Power Consumers or Industrial Estates. The provincial government can encourage both the generators and consumers through investor friendly policies by offering those, specific incentives, proposals for public-private partnerships, etc.

Statutory Role of Province (through PPDB) under National Electricity Policy

National Electricity Policy 2021(NEP) identifies a number of areas where statutory work by provinces is required. Section 5.1.10 of NEP reads as follows;

"Subject to Article 157(2) of the Constitution, the Provincial Governments may make their own electricity policies (including generation, transmission & distribution) and execute related projects within their boundaries without the requirement of selection by IGCEP, as long as such projects are not connected to the national grid and do not impose any obligation on any Federal Government entity. Such projects can subsequently be connected to the national grid, subject to the consent of the Federal Government, based on the principle of least cost and selection by IGCEP."

In view of above requirement and as stressed earlier, for financial viability of PGC, PPDB will be required to urgently setup a department to develop relevant policies for the encouragement of power projects in generation, transmission and distribution sectors.

For interacting with various entities, it is also required that necessary agreements are drawn. PPDB will also be required to provide its support to PGC in the areas of;

- Connection agreements with NTDC, distribution companies and consumers
- Use of system agreements
- Developing Wheeling regime
- Preparation of RFPs for technical services including construction activities for transmission systems
- Documents for procurement of equipment
- Protocols for meter reading and communicating with users

Participation of Provincial Government with NGC/NTDC in Transmission Investment

Section 5.2.3 of NEP reads as follows;

"Different financing or investment options may be explored by the NGC to facilitate expansion of the transmission network, including financing / investment by Provincial Governments, PPP models and Government to Government arrangements. All developments under the PPP model will be carried out on competitive basis, providing equal opportunity to all interested parties."

The provincial government (through PPDB) therefore need to coordinate with NGC/NTDC for identification and expansion of transmission networks for mutual financial benefit of PGC and NGC/NTDC.

6.1.4 The National Electricity Policy and Plan

The Amendment Act has introduced the concepts of the National Electricity Policy and the National Electricity Plan under Section 14A. The National Electricity Policy is a policy document that shall be prepared by the Federal Government, with the approval of the Council of Common Interest (CCI). The Policy's scope shall be focused inter alia on development of power markets, energy sustainability, transmission systems and optimal utilization of resources. The National Electricity Plan, however, is a document that shall be prepared and prescribed by the Federal Government, which has no set parameters or heads under which it shall be formulated. As such, the Plan has unrestricted freedom to address and cover any subject matter deemed relevant by the Federal Government.

6.2 Market Concept

The Amendment Act while providing a framework for a market through a number of steps for liberalization, like allowing new players and allowing BPCs to have choice of their supplier, has not mentioned about the specific type of competitive market to be evolved.

Section 14A of the Amendment Act provides a broad guideline about market design. Section 14 A (1) provides that the Federal Government shall, from time to time, with the approval of the Council of Common Interests, prepare and prescribe a national electricity policy for development of the power markets. Section 14A (2) (b) stipulates that the policies to be prescribed by the federal government shall provide for, inter alia– development of efficient and liquid power market design.

National Electricity Policy (NEP) provides detailed features of a competitive market. Sections 5.5.1 and 5.5.2 give detailed features of a CTBCM.

Sections 5.5.1 reads as follows.

The efficient and liquid power market design, as approved by the Regulator (CTBCM), will contribute for attaining the policy goals. The approved wholesale market design ensures the following objectives:

a. Providing open access to all market participants on a non-discriminatory basis;
b. Creating an environment to attract investment;
c. Contribute in improving power sector security of supply;
d. Ensuring further evolution of wholesale market to advanced phases;
e. Promoting competitive arrangements, both for and in the market;
f. Promoting payment discipline among market participants;
g. Eliminating sovereign guarantees for purchase of power over time through improvement in market conditions;

h. Ensuring compatibility of wholesale market design for operation of retail market in the future;
i. Ensuring transparency, predictability and accountability in the market; and
j. Creating an environment for compatibility / participation in regional electricity market.

Section 5.5.2 reads as follows;

"The approved wholesale market design, its implementation and subsequent development takes into account the following:

a. Enabling the choice of changing supplier of electricity, initially only for large or Bulk Power Consumers, followed by gradual liberalization of the retail market;
b. Creating incentives to promote entry and sustainability of the most efficient generation in the system;
c. No anomalies shall be created that allow any participant to take undue advantage of market conditions;
d. Creating minimum burden for the government in the form of subsidies through liberalization of the market;
e. Maintaining investor confidence by honouring the existing contracts (Energy / Power Purchase Agreements) and / or seamless transition of such contracts in the market design by mutual consent;
f. Providing a level playing field to all market participants through uniform application of cross-subsidization and other grid charges to consumers of all suppliers;
g. The Government shall take a decision on the recovery of costs that arise due to advent of the open access and market liberalization;
h. Ensuring open access to information and undertaking other transparency measures in the market especially providing for credible and independent service providers in the market;
i. Standardizing trading instruments to enhance liquidity;
j. Commercialization of strategic projects;
k. Ensuring proper settlement mechanisms for the imbalances resulting from trade among different market participants;
l. Ensuring accountability of market participants to bring discipline in the market;
m. Building on experiences of international market development and local market conditions;
n. Allowing, through simple regulatory adjustments, the future evolution towards increasing competition for and/or in the market; and
o. Fair allocation of risks amongst market participants."

Section 5.5.4 of NEP deliberates on the role of the regulator and obligations of stakeholders subsequent to implementation of CTBCM.

Section 5.5.4 of NEP reads as follows;

"In order to ensure implementation of wholesale market design and its further evolution, the Regulator shall in a timely manner frame, modify and evolve regulatory framework for, inter alia, supply, procurement, open access / wheeling, competitive bidding, import of power, and ensure effective market monitoring and enforcement. Provided that after implementation of CTBCM, every transmission licensee and distribution licensee shall offer, to all market participants, non-discriminatory open access / wheeling to its respective transmission or distribution system and interconnection services in accordance with CTBCM on the terms determined under the policy and legal framework."

As discussed above, NEP refers to a bilateral market (CTBCM), which when implemented will put obligations on market players and consequently, as a transmission licensee, PGC will be obliged to offer its systems in accordance with the provisions contained under CTBCM.

6.3 Market Development

According to NEP, Ministry of Energy (Power Division) will be responsible for the overall monitoring and implementation of market development. Central Power Purchasing Agency (CPPA-G), entrusted with the development of competitive market design has been engaged in preparation of concept papers for possible market structures, trainings to public sector entities and relevant private sector stake holders through conferences and workshops and meetings and presentations before NEPRA Authority and its professionals for the last three years. A Consultant appointed by Asian Development Bank (ADB) is fully associated with CPPA-G teams and other entities for knowledge sharing and capacity building to come up with a model which takes into account the ground realities of Pakistan Power Sector before venturing into an era of competitive electricity market.

CPPA-G submitted its high level/conceptual design for a Bilateral Contract Market, which the Authority approved through its Determination dated December 5, 2019. The Authority in its determination, also directed CPPA-G to submit the detailed design of the CTBCM (the "Detailed Design" or the "Design") along with its Implementation Roadmap (the "IRM" or the "Roadmap") for its approval. In compliance with the above direction of the Authority, CPPA-G submitted the Detailed Design along with its IRM on February 5, 2020.

3.2.3 Potential Projects for PGC form Constrained T/L

Upon analysis of congestions/constraints in 500 kV, 220 kV and 132 kV T/L system of NTDC & DISCOs, many T/L were identified which require removal of their constraints which can be accomplished through either of the following options.

- Increasing size of conductors
- Converting single circuit into double circuit
- Placing extra circuit on existing towers
- New T/L

In case of PGC, in areas where existing circuits are overloaded and need new T/L, PGC can pick up economically and technically viable new T/L projects in collaboration with relevant DISCOs and NTDC. Consultant shortlisted few such potential projects for PGC from constrained T/L in parallel to NTDC through a collaborative mode instead of a competitor. The potential projects of 500 kV and 220 kV T/L for PGC are given in the **Table-12** below.

Table-12: Potential Projects for PGC from Constrained T/L

S. No.	Description	Target
1	500 kV- Sialkot - Lahore North D/C T/L (55km)	2024-26
2	220 kV D/C T/L from 500 kV Sialkot to 220 kV Gujranwala -II (36 km)	2024-26
3	220kV D/C T/L from 500kV Sialkot to 220kV Sahuwala (12 km)	2024-26
4	220kV D/C T/L from 220 kV Gujranwala to 500 kV Nokhar (80 km)	2024-25
5	In/out of existing 220kV Mangla - KSK S/C T/L at Gujranwala -II (30km)	2024-26
6	220kV Nagshah-Qasimpur - Multan	2024-26
7	220kV Qasimpur - Multan D/C T/L (12km)	2024-26
8	500 kV Ghazi Brotha - Faisalabad West D/C T/L (330km)	2024-26

3.3 Identification of Potential Projects for PGC

3.3.1 Criteria for Selection of Projects

Based upon detailed review of STGs and future T/L expansion plans of NTDC/DISCOs, the consultant recommends PGC may undertake newly upcoming transmission line projects of 500/220/132 kV in NTDC and 5 DISCOs of Punjab. Other T/L projects of both NTDC & DISCOs falling under the category of loop in & loop out, upgradation, augmentation, 2nd circuit on same tower etc., are not recommended as potential projects for PGC. However, it is suggested, before undertaking any T/L project, PGC may liaise and collaborate with NTDC and relevant DISCOs to avoid any overlapping issue. The details of potential projects are given in subsequent sections below.

3.3.2 Potential Projects of 132 kV T/L for PGC in STG Plans of DISCOs

The consultant has reviewed the 7th/8th STG plans of DISCOs of Punjab to extract the potential T/L projects for PGC. Based on broader criteria for shortlisting the potential projects for PGC as narrated in **Section 3.3.1** above, the total potential projects of 132 kV T/L in all 5 DISCOs are identified around 19 nos. having total length of 729 Km which are provided in **Table-13** below.

Table-13: Potential Projects of 132 kV T/L for PGC in STG Plans of DISCOs

Sr. No.	Name of Circuit	Voltage	Length (km)
IESCO			
1	Dispersal of Power from 500/220/132 kV Chakwal Construction of Double Circuit using existing 66 kV Right way of 132 kV	132 kV	40
2	Dispersal of Power from 500/220/132 kV Chakwal Construction of Double Circuit using existing 66 kV Right way NPS for Talagang	132 kV	40
3	132 kV Sambli Bheramal to Muree (2nd Source)	132 kV	23
		Sub Total	**103**
MEPCO			
4	132KV Vehari-Burewala CCT-I, New 132KV Vehari 220KV - Burewala Old is proposed in 5 year plan to avoid over loading of 132KV Vehari 220KV-Burewala and 132KV Vehari-Burewala T/Ls Total length	132KV	47
5	132kV Lalsohanra to Hasilpur and Ludden circuits, a new 132 kV line to be constructed to provide N-1 contingency and for smooth dispersal of power of upcoming Solar projects as well.	132 kV	62
6	132 kV ccts emanating from 220 kV Vehari to Jehanian, a parallell circuit is planned	132 kV	65

7	Proposed a new circuit in parallel to 132kV Muzzaffargarh - Khangarh T/Line	132 kV	20
8	Proposed 3rd circuit parallel to 132KV Rahim Yar Khan- I,Ii - Rahim Yar Khan 500KV Grid	132 kV	15
		Sub Total	**209**
FESCO			
9	132kV Daudkhel - Shahbaz Khel circuit, Planned to construct a new cct. to avoid overloading	132 kV	127
10	132kV Ludewala to Sargodha-II G/S , A new circuit is parallel circuit is required to avoid over load	132 kV	25
11	132kV Ludewala to Kirana Hill G/S, Planned to construct a new cct. to avoid overloading	132 kV	35
12	132kV Liberty Tech. to Chiniot Ind. G/S , Planned to construct a new cct. to avoid overloading	132 kV	41
13	132kV Liberty Tech. to Kamalpur G/S, Planned to construct a new cct. to avoid overloading	132 kV	23
		Sub Total	**251**
GEPCO			
14	from 220 Kv Gujrat G.S, Two new 132kV circuits for 132kV Hellan G/S are being proposed in 8th STG	132 kV	54
15	132kV Gujrat-II-Ratti T-OFF Jalalpur Jatan circuit, Proposed secod cicuit to avoid over loading	132 kV	21
		Sub Total	**75**
LESCO			
16	Single Circuit Transmission Line from Shahkot – Sangla Hill	132 kV	18
17	Double Circuit Transmission Line Feed for Ex Air Avenue/ Barki	132 kV	34
18	Double Circuit Transmission Line from Fatepuri - 132 kV Lahore North	132 kV	18
19	Single Circuit Transmission Line from Farooqabad - Khanqa Dogran21	132 kV	21
		Sub Total	**91**
		Gross Total	**729**

Source: DISCOs

3.3.3 Potential Projects of T/L for PGC in Plans of NTDC

The consultant has reviewed NTDC plans up to 2026 and extracted the potential 500 kV & 220 kV T/L projects for PGC. Based on broader criteria for shortlisting the potential projects for PGC as narrated in **Section 3.3.1** above, 4 potential projects of 500 kV T/L having total length of 940 Km and 8 potential projects of 220 kV T/L having total length of 563 Km are identified in **Table-14** below.

Table-14: Potential Projects of T/L for PGC - NTDC Plan up to 2025-26

Sr. No.	Description of T/L	No. of S/C Lines	Length of T/L (Km)
	500 kV T/L Potential		
1	Maira – Islamabad West	2	130
2	Sialkot New – Lahore North	2	55
3	Ghazi Barotha – Faisalabad West	2	330
4	Ludewala – Nowshera	2	325
	Ludewala – Faisalabad West	2	100
		Sub Total	**940**
	220 kV T/L Potential		
1	H.Faqirian – Ludewala	1	88
2	500 kV Nokhar – Gujranwala-II	1	80
3	Dharki – Rahim Yar Khan	1	105
4	Rahim Yar Khan – Bahawalpur	1	150
5	Chishtian – Vehari S/C at Lal Sohanra	1	80
6	Sialkot New – Sialkot (Sahuwala)	1	12
7	Sialkot New – Gujranwala-II	1	36
8	Qasimpur – Multan	1	12
		Sub Total	**563**

Source: NTDC

3.4 Identification of Existing and New Bulk Power Consumers

3.4.1 Industrial Estates/EPZs/SEZs/BPCs

It is expected that after the implementation of CTBCM in near future, Bulk Power Consumers (BPCs) will be at liberty to procure power directly from generators under bilateral contract. Accordingly, transmission infrastructure would be needed to offtake power from generators to BPCs and this will provide the transmission business opportunity for PGC.

There are a number of existing Industrial Estates/ Export Processing Zones (EPZs)/ Special Economic Zones (SEZs) /BPCs in Punjab. In addition, new industrial zones are being planned in the province. Some of these are under development thereby power demand is increasing day by day. It is pertinent to mention here that industries in general

and export-oriented industries needs reliable, uninterrupted, and affordable electricity to be competitive in national and international market. These Zones/Estates as a Bulk Power Consumers may need to be connected with nearby IPPs/generators through dedicated transmission lines on wheeling principal. The ultimate load demand of the Industrial Estates/Zones/BPCs within DISCOs of Punjab is estimated around 2000 MW. Furthermore, the load requirement of housing schemes is huge, so the existing and upcoming large housing schemes as BPCs in DISCOs will also be potential projects for PGC due to requirement of T/L for feeding these schemes. This load demand depicts a great potential for PGC for wheeling transmission projects under CTBCM. The existing & future Industrial Estates/Zones/SEZs/BPCs within DISCOs in Punjab are given in **Table-15** below.

Table-15: Industrial Estates/EPZs/SEZs/BPCs in Punjab

Sr. No.	Description	Ultimate Load (MW)
LESCO		
1	Rachna Industrial Park Shaikhupura SEZ	50
2	Quaid E Azam Apparel Park, M2, Sheikhupura	240
3	Sundar Industrial Estate	320
4	Chunnian Industrial Estate	35
5	Okara Industrial Estate	30
6	Leather Industrial Parkk at Sua Asil, Kasur	35
7	Chunnian Aqua Business Park	25
8	WASA Lahore	114
9	Orange Line Train	54
10	Lahore CBDA	94
	Sub-Total	**922**
MEPCO		
1	Rahim Yar Khan Industrial Estate	60
2	Vehari Industrial Estate	50
3	Bahawalpur Industrial Estate	60
4	D.G Khan Industrial Estate	50
5	Multan Industrial Estate	70
6	WASA. Multan	19
	Sub-Total	**259**
FESCO		
1	Bhalwal Industrial Estate	60
2	Allama Iqbal, Industrial Estate (PSEZ)	200
3	M3 Industrial City (SEZ)	160
4	Value Addition City (SEZ)	360
5	WASA, Faisalabad	25
	Sub-Total	**805**

GEPCO			
1	Gujrat Industrial Estate		35
2	SIE, Wazirabad (ready for inauguration)		25
3	SIE, Gujranwala –IV (ready for inauguration)		35
4	WASA Gujranwala		14
		Sub-Total	**109**
IESCO			
1	Rawalpindi Industrial Estate		35
2	WASA, Rawalpindi		16
		Sub-Total	**51**

Source: DISCOs

3.5 Identification of Generation Plans Including Renewable Energy Plants

The data provided by each DISCO containing existing generation and future generation projects in the Punjab province, was carefully reviewed. The generation power plant operated by IPPs which have their contract expiration in near future are identified and given **Table-16** below. Whereas the future generation power projects including renewable have also been identified which could be potential projects for PGC to supply electricity to the BPCs in Punjab.

Table-16: Existing & Future Generation Power Plants in Punjab

Sr. No.	Description	Capacity (MW)
LESCO		
1	Kohinoor Power House	131
2	Saba Power House	132
3	Nishat Power House	225
4	Orient Power House	225
5	Nishat Chunnian Power House	225
6	Sapphire Electric Company	225
7	Halmore Power House	225
8	Reshma Power House	97
9	Saif Power House	225
10	Atlas Power	214
11	Renala	1
12	Nishat Chunian	196
13	Bhikki (QATPL)	1156
14	Balloki	1198
15	Chichoki Mallian SHPP	13.2
	Sub-Total	**4488.2**
MEPCO		
1	Taunsa Hydropower Project, Taunsa Barrage, District Muzaffargarh	135
2	Kot Addu Power Company (KAPCO), Thermal	1345
3	Kot Addu Power Company (KAPCO), Coal Fired	660
4	Huaneng Shandong Power Generation Co. Ltd. Rahim Yar Khan	1320
5	M/s. Zorlu Solar Pakistan Pvt. Ltd.	100
6	QA solar Park	500
7	Rojhan (Phase-1) Wind/Solar Hybrid - Solar	200
8	Rojhan (Phase-1) Wind/Solar Hybrid - Wind	100
9	Rojhan (Phase-2) Wind/Solar Hybrid - Solar	500
10	Rojhan (Phase-2) Wind/Solar Hybrid - Wind	250
11	Bhawalpur energy Ltd	31.2
12	Hamza I sugar	15
13	Hamza-II, RYK	30

14	AES Lalpir	350
15	AES Pak Gen.	350
16	Muzaffargarh	730
17	Rousch	395
18	Fauji Kabirwala (FKPCL)	151
19	Saif Power, Sahiwal	204
20	Sahiwal (Coal)(HRS)	1250
21	JDW-II (Sadiq Abad)	24
22	RYK Energy Bagasse	25
23	Fatima Energy (FEL)	120
24	Thal Power Layyah	25
25	Quide-e-Azam Solar	100
26	Appolo Solar	100
27	Best Green Energy	100
28	Crest Energy Pakistan	100
	Sub-Total	**9210**
FESCO		
1	Liberty Power Tech.	202
2	Haveli Bahadur Shah	1230
3	Chanar Energy Limited	22
4	GTPS Faisalabad	16
5	Jinnah Hydel	68
6	Chashma Hydro	184
7	Sapphire Power	207
8	Davis Energon	10
9	Chiniot Power	36
10	Almoiz Industries Limited	20
	Sub-Total	**1995**
GEPCO		
1	Rasul HPP	22
2	Nandipur HPP	14
3	Shadiwal	14
4	Nandipur Combined Cycle	425
5	Hubco Narowal	214
	Sub-Total	**689**
IESCO		
1	AEL (Altern Energy Ltd.)	27
2	AGL (Attock Gen Ltd.)	156
	Sub-Total	**183**

Source: DISCOs

3.5.1 Hydropower Projects Plan in Punjab

PPDB has already initiated development of hydropower projects (HPPs). The upcoming hydropower generation projects in Punjab along with name of the project, location, capacity and name of sponsor are listed in **Table-17** below.

Table-17: Upcoming Hydropower Generation Projects in Punjab (IPP Mode)

Sr. No.	Name/Site of the Project	Capacity (MW)	Name of Company/Sponsor
1	Taunsa Hydropower Project, Taunsa Barrage, District Muzaffargarh	135	To be advertised afresh
2	Gugera HPP, Upper Gugera Branch Canal, Nankana	3.6	Gugera Power Company
3	Mandi Baha-ud-din HPP, Lower Chenab Canal, Gujranwala	3.3	Mandi Baha-Ud-Din Energy Limited
4	Khanewal Hydropower Project, LBDC, Khanewal	1	Khanewal Hydropower (Pvt.) Limited
5	MW Rasul HPP, Rasul Barrage, Mandi Baha-Ud-Din	18	S2 Hydro Ltd
6	Alka HPP, Jhang Branch Canal, Hafizabad	1.8	Alka Power (Pvt.) Limited
7	Mehar HPP, B.S. Link-I Canal, Kasur	10.49	Mehar Power (Pvt.) Limited
8	C.J. HPP, CJ Link Canal, District Khushab	25	C.J. Hydro Limited
9	Lucky HPP, Marala Barrage, Sialkot	20	Olympus Energy (Pvt.) Limited
10	Chichawatni HPP, LBDC, Sahiwal	1.6	Saigols (Pvt.) Limited & Associates
11	Murree HPP, Kanarkas Nallah, District Murree	12	Murree Hydropower (Pvt.) Limited
12	D.G. Khan Link – III HPP, D.G. Khan Canal, DG Khan	4.6	Engro Energy Limited
13	0.3 MW Data HPP, District Jhang	0.3	Data Oil Mills
14	Ravi HPP, Lower Bari Doab Canal, Sahiwal	4.6	Trident Power JB (Pvt.) Ltd.,
15	Kasur HPP, BRBD Link Canal, Kasur	2.45	Packages Power (Pvt.) Limited
16	LCC HPP, Lower Chenab Canal, Gujranwala	7.5	M/s Trident Power GR (Pvt.) Limited
17	Khokhra HPP, Gujrat Branch Canal, Gujrat	2.8	Blue Star Energy (Pvt.) Limited
	Total	**254.04 MW**	

Source: PPDB

3.5.2 Small Hydropower Projects in Punjab

The small hydropower projects to whom Letter of Intents (LoIs) have been issued by PPBD to be developed in near future along with their status are given in the following **Table-18** below.

Table-18: Captive Hydropower Projects (LOIs issued)

Sr. No.	Project	Capacity (MW)	Name of Company/Sponsor
1	HPP on Lower Gugera Canal at RD. 65+000	1	CAF Hydro
2	HPP on Lower Gugera Branch Canal at RD. 27+000	1.5	Wajid Iqbal & Co.
3	HPP on Lower Jhelum Canal (LJC) at RD. 142+000	1.89	Punjab Power Company
4	Pakpattan Canal at RD. 304+340	1.28	Punjab Power Company
5	Burala Branch Canal – RD. 166+000	1.55	Punjab Power Company
6	BRBD Link Canal – RD. 433+958	1	Punjab Power Company
	Total	**8.22 MW**	

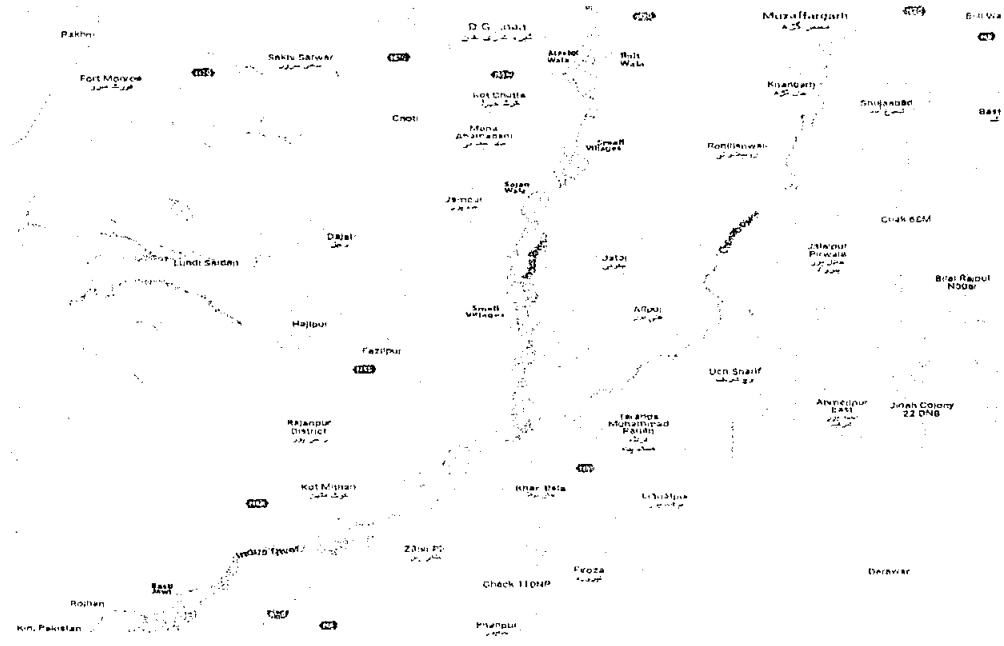
Source: PPDB

3.6 Identification of Weak and No Grid Areas in Punjab. How PGC can electrify these Areas.

Most of the areas of Punjab are electrified but yet there are some areas which are not electrified and there is no grid. On the other hand, there are some weak grid areas. These weak grids are not able to supply power to meet the load requirement of those areas due to many reasons. The one of the major reasons is transmission line constraints which is due to over loading or incapable old transmission lines to cater loads of expansion of existing and new loads in the surrounding areas. These areas can be electrified by solar and wind hybrid projects as indicated in the short-term generation plan in Rojhan, D.G. Khan and Muzaffargarh.

Identification of week grid areas and no grid areas in Punjab is done in general by analysing the historical record and projected plans for next 5 years of DISCOs. The assumption is made that in these areas electrification is not expected in near future. The non-electrified areas identified in district Muzaffargarh, Rajanpur and D.G. Khan along with Indus River with some of villages named as Baitwala, Gujabahar Sial, Patti Rid, Bhindi Hakeem, Moza Mondas etc. up to Rojhan which are yellow marked on map and shown in **Figure-12** below.

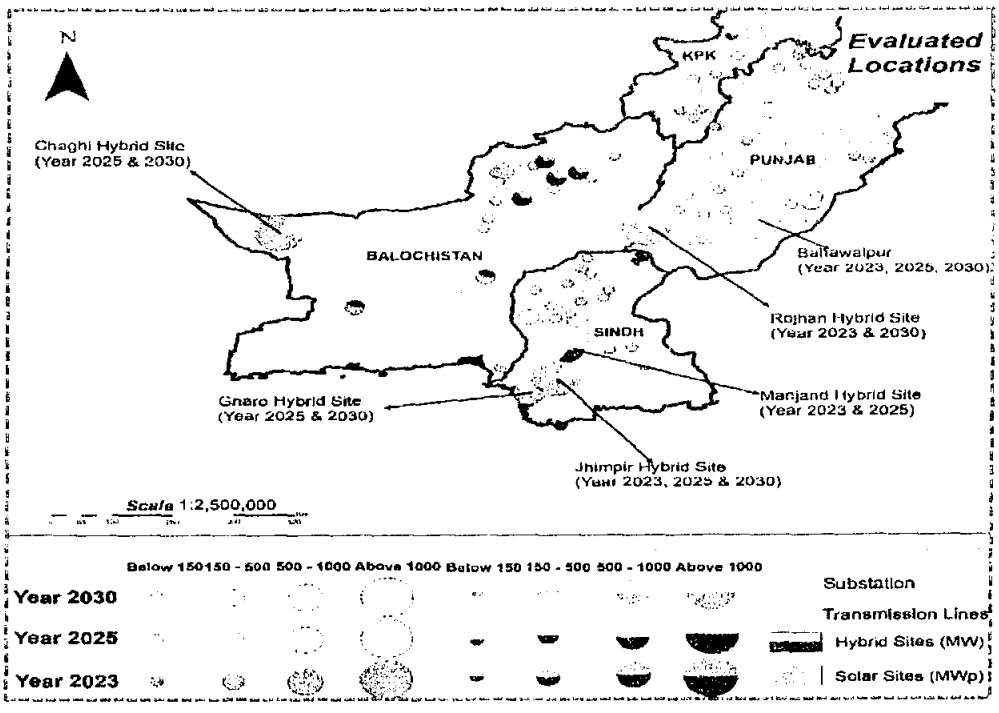
Figure-12: Non Gird Areas in Punjab



3.6.1 Solar/Wind Potential in Punjab

To assess the solar and wind potential in Pakistan, World Bank has recently conducted a study i.e., "Variable Renewable Energy Locational Study". The study has also identified the sites in Punjab suitable for solar power potential as detailed in **Figure-13** below.

Figure-13: Solar Power Potential in Punjab



3.8 Projects Phasing for PGC

Based on the anticipated potential projects and information provided by PPDB, the phasing of projects for PGC is given **Table-21** below.

Table-21: Phasing of Potential Projects for PGC

Sr.	Project name	Voltage Level	Distance (Km)	Source
1	Rshma Power Plant to Sundar Industrial Estate	132 kV	4.5	96.96 MW
2	Rshma Power Plant to Orange Line Authority Lahore	132 kV	40	96.96 MW
3	Chishtian Solar Plant to Bahawalpur Industrial Estate	132 kV	149	250 MW
4	Chishtian Solar Plant to Multan Industrial Estate	132 kV	165	250 MW
5	Chishtian Solar Plant to Muzaffargarh Industrial Estate	132 kV	187	250 MW
6	Chishtian Solar Plant to Vehari Industrial Estate	132 kV	83	250 MW
7	Chishtian Solar Plant to Okara Industrial Estate	132 kV	129	250 MW
8	Chishtian Solar Plant to Chunnian Aqua Business Park	132 kV	166	250 MW
1	Taunsa to Multan Industrial State	132 kV	80	135 MW
2	Multan Industrial State to Vehari Industrial State	132 kV	80	135 MW
3	Taunsa to DGK Industrial State	132 kV	65	135 MW
4	Rojhan to RYK Industrial State	132 kV	40	300 MW
5	Rojhan to No Grid Areas	132 kV	10	300 MW
1	H.Faqirian – Ludewala	220 kV	88	-
2	500 kV Nokhar – Gujranwala-II	220 kV	80	-
3	Chishtian – Vehari S/C at Lal Sohanra	220 kV	80	-
4	Sialkot New – Sialkot (Sahuwala)	220 kV	12	-
5	Sialkot New – Gujranwala-II	220 kV	36	-

6	Qasimpur – Multan	220 kV	12	-
10	Maira – Islamabad West	500 kV	130	-
11	Sialkot New – Lahore North	500 kV	55	-
12	Ludewala – Faisalabad West	500 kV	100	-
13	T/L from Chakri to required load center from solar plant in future	-	-	100 MW
14	T/L from Kalar Kahar to required load center from solar plant in future	-	-	100 MW
15	T/L from Darya Khan to required load center from solar plant in future	-	-	100 MW
16	T/L from Ali Pur to required load center from solar plant in future	-	-	100 MW
17	T/L from Pindi Gheb to required load center from solar plant in future	-	-	100 MW
18	T/L from Hasil Pur to required load center from solar plant in future	-	-	100 MW
19	T/L from Athram Hazrai to required load center from solar plant in future	-	-	100 MW
20	T/L from Muzaffargarh to required load center from solar plant in future	-	-	100 MW
21	T/L from Rangpur to required load center from solar plant in future	-	-	50 MW
22	T/L from Fort Abbas to required load center from solar plant in future	-	-	50 MW
23	T/L from QA Solar Park to required load center from solar plant in future	-	-	300 MW

The single line diagrams/maps of the proposed short and medium term T/L projects are given in **Figures 14-19**.

Figure-14: Reshma Power Plant to Sundar Industrial Estate

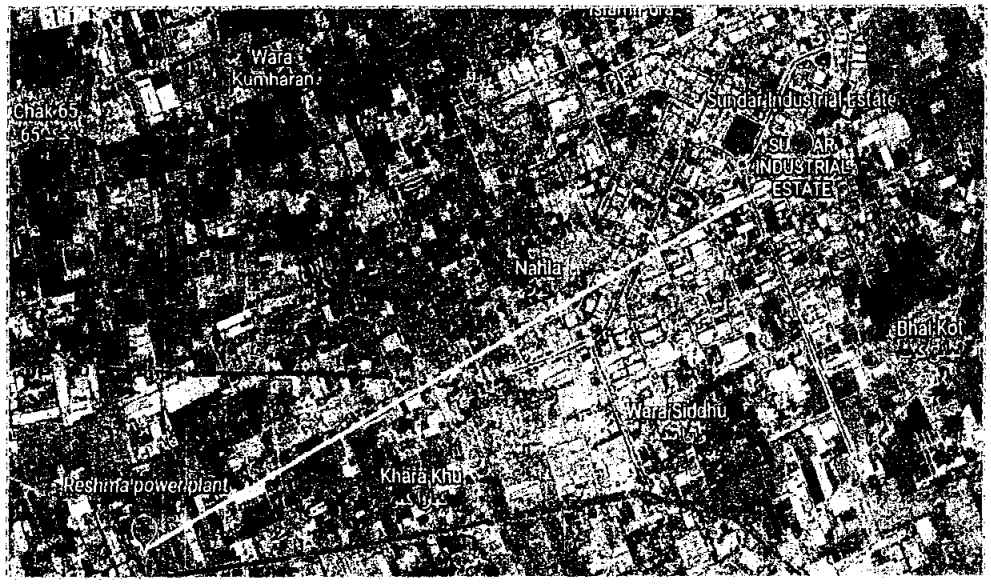
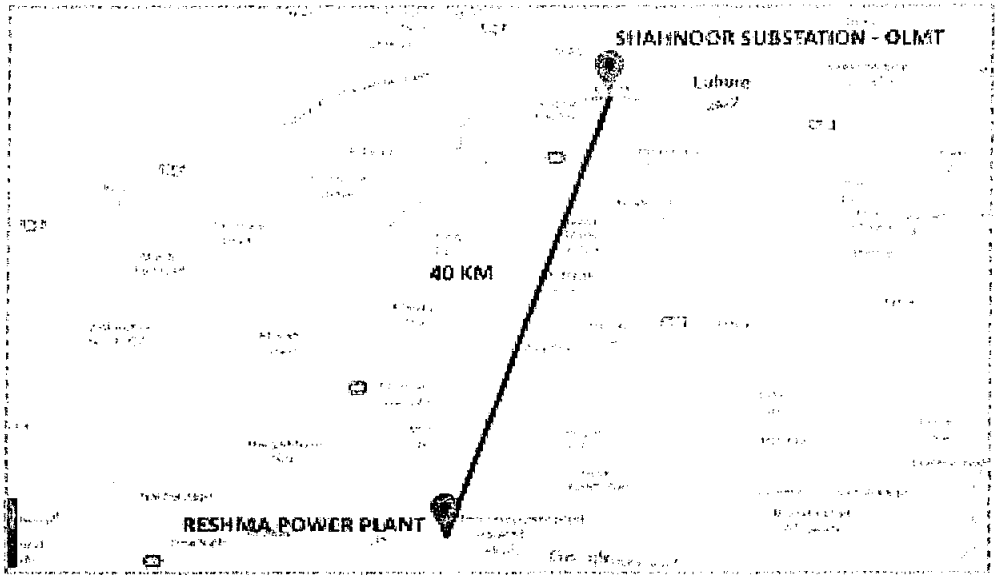


Figure-15: Reshma Power Plant to Orange Line Authority Lahore



Transmission Line for Chishtian Solar Plant

Proposed 250 MW Chishtian solar project can also be a potential project which would need power evacuation/transmission in near future. Thus, from PGC perspective the transmission infrastructure development from this power plant to nearby grid station could be a short run potential project. It is expected that the evacuated power from this plant can be supplied to WASA facilities located at Multan, Bahawalpur, Faisalabad, Lahore as well as Lahore Orange Line Metro Train (OLMT). As most of these facilities are spread throughout the province thus at the outset, the viable option can be to transmit power through NTDC/DISCO(s) system under a wheeling arrangement, as MEPCO 132 kV grid station is located at around 28 km and NTDC 220 kV grid station is located at around 12 km from proposed Chishtian solar plant as shown in **Figure-16** below.

In addition, the power can also be evacuated and supplied to the WASA installations, industrial estates as well as OLMT etc. by developing dedicated T/Ls of various length by PGC subject to its detailed feasibility study as shown in **Figure-17**.

Figure-16: Chishtian 250 MW Solar Plant to 132 kV MEPCO Grid Station

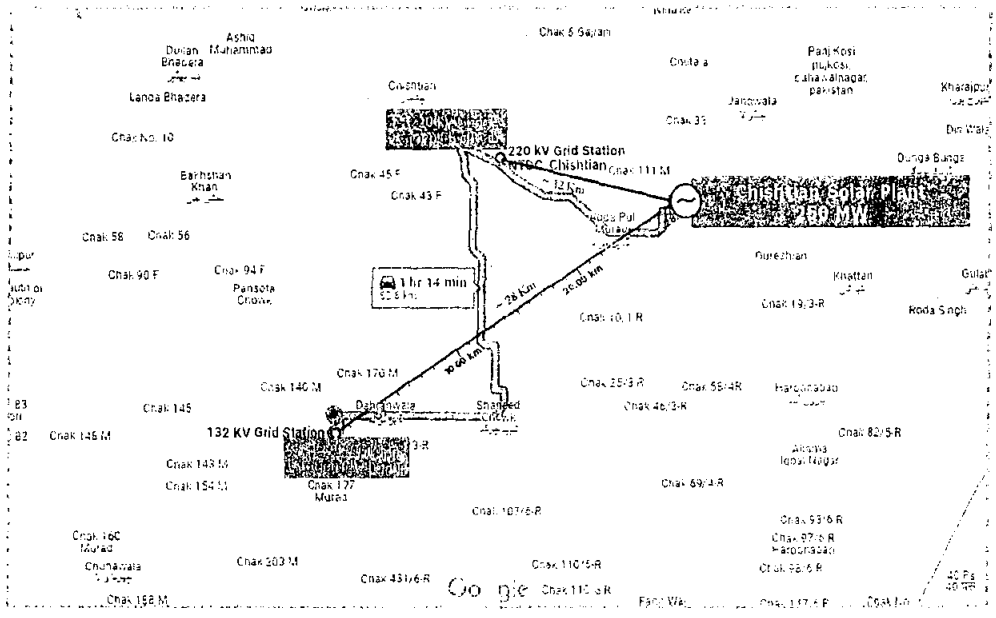


Figure-17: Chishtian Solar Plant to Bahawalpur, Multan, Muzaffargarh, Vehari & Okara Industrial Estates and Chunnian Aqua Business Park

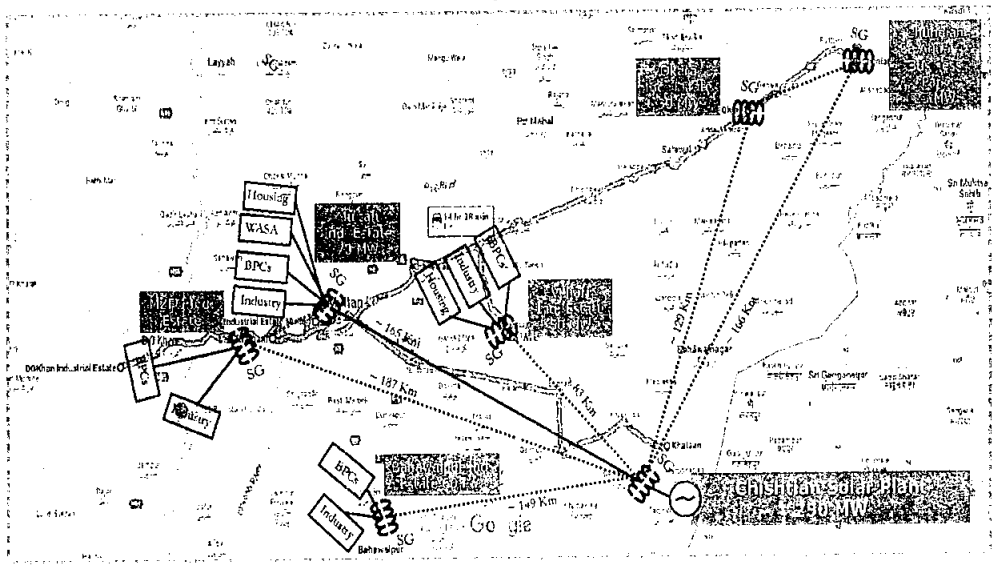


Figure-18: Taunsa to Multan, Vehari, DGK Industrial Estates

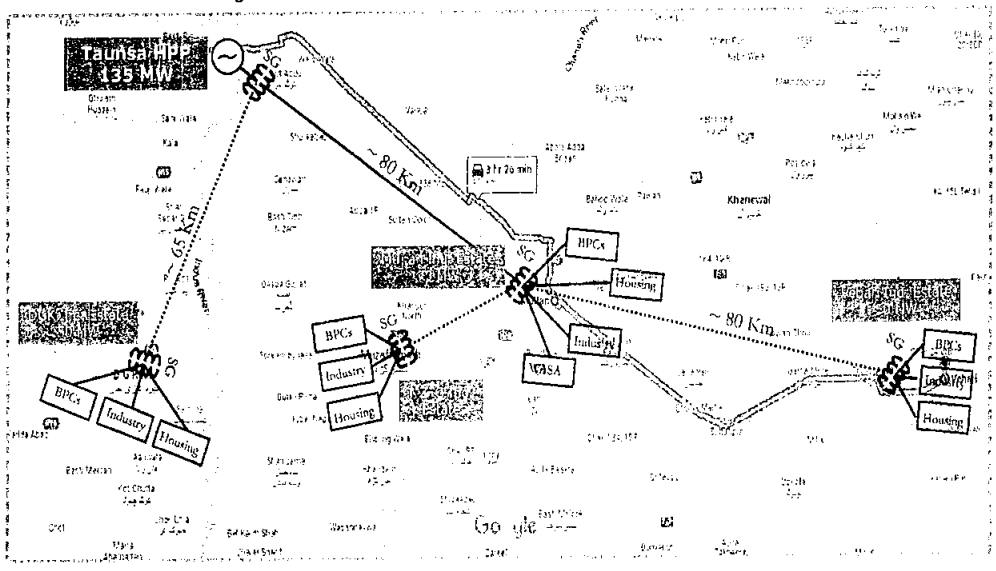
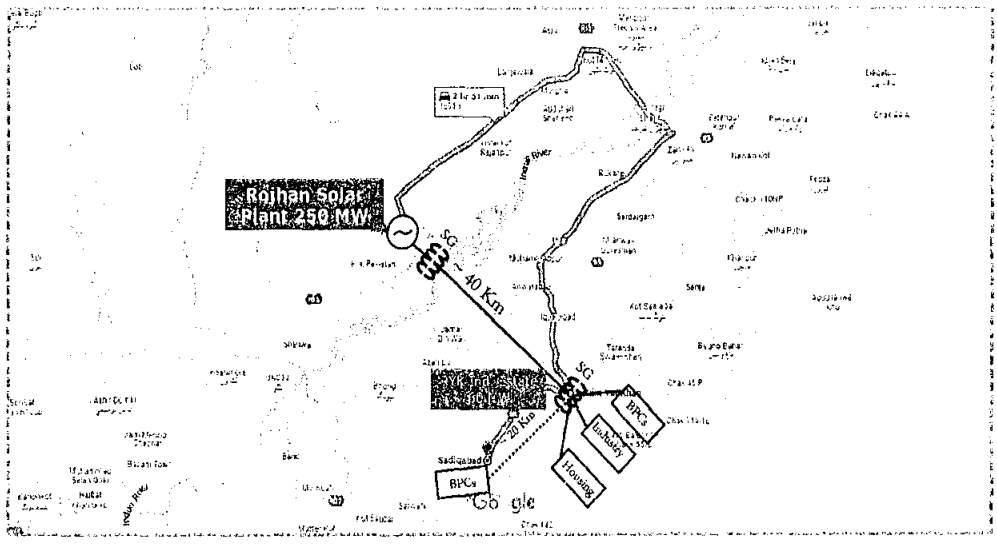


Figure-19: Rojhan to RYK Industrial Estate



Transmission Line for Chishtian Solar Plant

Proposed 250 MW Chishtian solar project can also be a potential project which would need power evacuation/transmission in near future. Thus, from PGC perspective the transmission infrastructure development from this power plant to nearby grid station could be a short run potential project. It is expected that the evacuated power from this plant can be supplied to WASA facilities located at Multan, Bahawalpur, Faisalabad, Lahore as well as Lahore Orange Line Metro Train (OLMT). As most of these facilities are spread throughout the province thus at the outset, the viable option can be to transmit power through NTDC/DISCO(s) system under a wheeling arrangement, as MEPCO 132 kV grid station is located at around 28 km and NTDC 220 kV grid station is located at around 12 km from proposed Chishtian solar plant as shown in **Figure-16** below.

In addition, the power can also be evacuated and supplied to the WASA installations, industrial estates as well as OLMT etc. by developing dedicated T/Ls of various length by PGC subject to its detailed feasibility study as shown in **Figure-17**.

Figure-16: Chishtian 250 MW Solar Plant to 132 kV MEPCO Grid Station

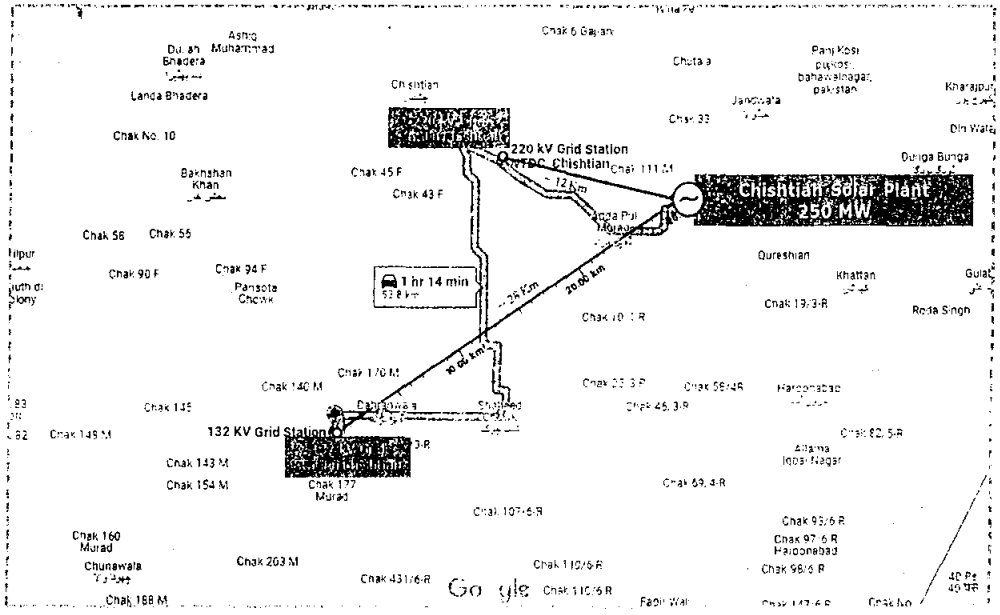


Figure-17: Chishtian Solar Plant to Bahawalpur, Multan, Muzaffargarh, Vehari & Okara Industrial Estates and Chunnian Aqua Business Park

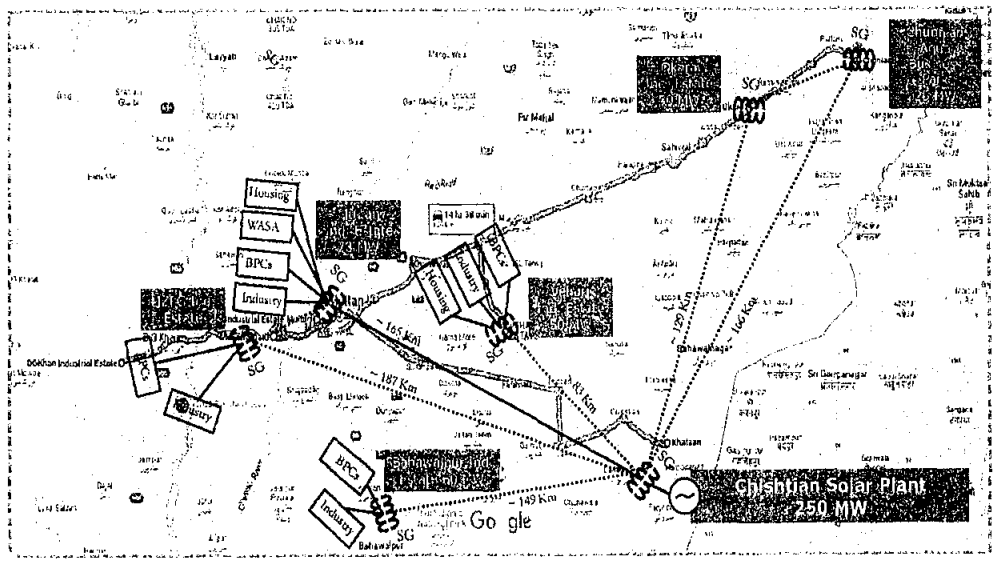


Figure-18: Taunsa to Multan, Vehari, DGK Industrial Estates

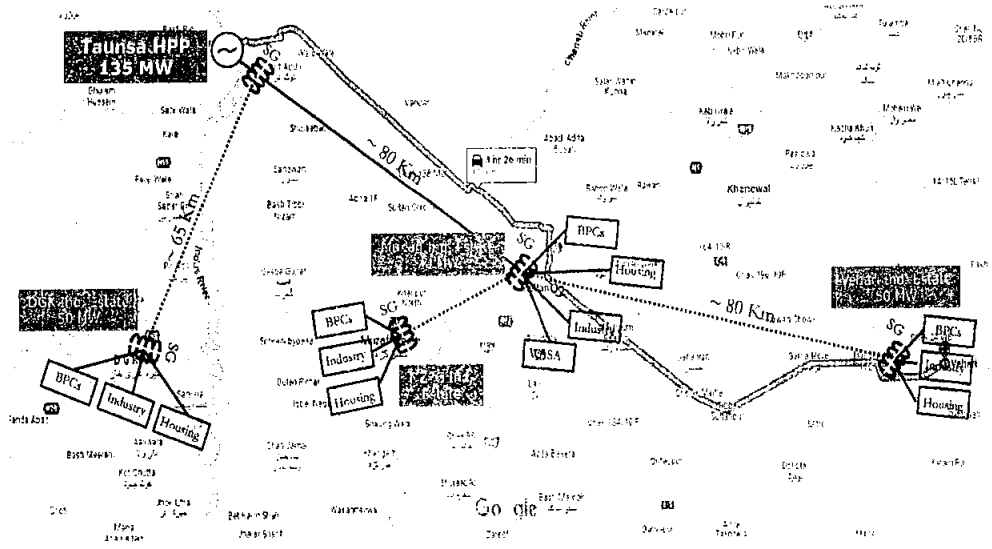
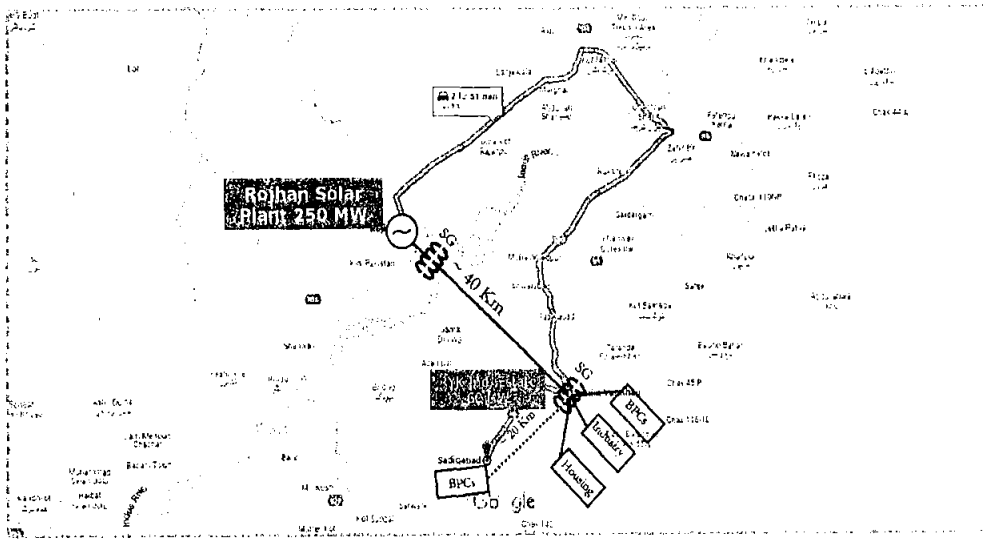


Figure-19: Rojhan to RYK Industrial Estate



3. DEMAND PROJECTIONS AND NTDC PLANS

In this chapter NTDC's plan to evacuate from existing as well as upcoming power plants has been discussed at country level in general and the province of Punjab in particular. Further issues in meeting power demand of various category of consumers by DISCOs, due to constraints in transmission and distribution system and their plan to remove such constraints have also been discussed. In addition, upcoming power demand in Punjab, especially existing as well new BPCs and anticipated scope for PGC has also been highlighted.

3.1 Demand of Distribution Companies over Short to Medium Terms

The historical demand/supply of 5 DISCOs of Punjab has already been given in **Table-4** in **Sub-section 2.4.3** of the report. In fact, historical demand is a suppressed demand. Because there are many pending applications due to ban imposed on new large industrial, commercial, agricultural and residential schemes from time to time. Moreover, cities are expanding on fast pace by converting agricultural land into residential societies and industrial activities on the periphery of urban areas. Therefore, the actual demand of DISCOs is more than current historical demand. The data of 5 DISCOs in Punjab regarding short and medium term future load demand is provided in **Table-9** below.

Table-9: Short and Medium Term Demand of DISCOS in Punjab

Year	Demand (MW)				
	LESCO	GEPCO	FESCO	IESCO	MEPCO
2021 -22	5452	2,739	3359	2653	4493
2022 -23	5765	2,880	3660	2772	4785
2023 -24	6075	3,045	3886	2923	5093
2024 -25	6408	3,218	4086	3077	5399
2025 -26	6757	3,398	4322	3200	5715
2026 -27	7106	3,584	4569	3300	6066
2027 -28	7456	3761	4815	3500	6431

Source: DISCOs

3.2 DISCO's Ability to Meet Demand of Existing and New Load Centers

In the current scenario, the total generation capacity of public and private entities of country is surplus as declared by the Government. But still load shedding is being carried out because of inadequate transmission network and transformation capacity to evacuate power from generation companies to load centres in some areas. The DISCOs are mostly able to cater the demand but still there are many areas where demand is not being met due to some system constraints i.e., over loaded transmission, distribution lines and transformers. Moreover, in some areas the capacity of transmission network is not enhanced but due to political interference the low tension (L.T) network is extended unprofessionally. These unprofessional extensions in L.T network by violating normal practices caused increased load demand and network losses. In normal practice every DISCO has its own 5 year plan to cater the future load requirement and to remove the system constraints.

3.2.1 Plan to meet Future Demand of DISCOs in Punjab

It is a normal practice for DISCOs to prepare a 5 years, 132 kV STG Plan and get approved for the implementation on PC-1 from the government. Some of DISCOs are implementing 7th STG program and some or implementing 8th STG program e.g. IESCO is implementing 7th STG whereas LESCO implementing 8th STG program. These programs mainly contain addition of new grid stations, extension/augmentation of existing grid stations. It also includes new transmission lines, transmission bays, etc. as envisaged in their 5 year plans. These plans are normally to remove system constraints like overloaded transmission lines and transformers. The development of total projects envisaged in the 5 years plans rarely achieve 100% implementation. Some of the projects left over at approval stage mainly due to funds constraints. Many of projects achieve 100% completion, others got delay because of various reasons, e.g. late approvals, lack of funds, delays in fund release, late procurement of material, etc. After reviewing the 5 years plans of DISCOs in Punjab, the consultant keeping in view of PGC potential, extracted the new grid stations and new transmission lines projects to cater future load growth and to remove system constraints, the details of which are given in **Table-10** below.

Table-10: 132 kV STG Plans for DISCOs to Meet the Future Demand

DISCOs	Plans Duration	Upcoming G/S	Capacity Addition (MVA)	Upcoming T/L (Nos.)	Upcoming T/L (Km)
LESCO	2021-25	12	820	26	344
GEPCO	2021-26	19	1,466	38	412
FESCO	2021-26	35	1,414	64	1,038
IESCO	2022 -27	18	1,026	42	700
MEPCO	2021-26	20	1,452	20	717

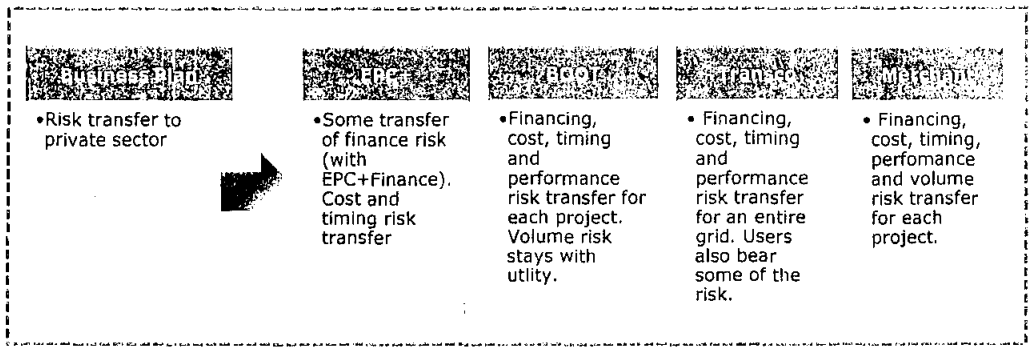
Source: DISCOs

The Transco model is perhaps the most distinct model. Here the private sector is invited to take over a complete utility. However, even here the boundary between this and BOOT could be blurred where the grid that is taken over by the private sector is relatively small. Because the Transco is a natural monopoly, the price is charged or regulated by an independent regulator, normally with at least some discretionary powers. A BOOT arrangement is typically regulated through a legally binding contract.

The Merchant model involves significant risk in developing transmission assets without the involvement of a TSO/utility. The developers identify an opportunity, often based on a significant differential in market prices in two different parts of competitive markets or in order to bring large volumes of cheap electricity to a market where it is needed. The volumes and prices are determined either:

- By the market where the developer must take the full volume and price risk, or;
- Bilateral negotiation between two parties

The model is only suited to define transmission lines. This can work in complex competitive markets, but examples are limited to a few geographies.



7.2 Characteristics of the Models

Below we discuss these models and some of their variants in terms of bankability, replicability and implementability. These terms should be interpreted as follows:

- Bankability – will it be possible to obtain funding for the development of the asset?
- Replicability – can the model be repeated?
- Implementability/ acceptability – the development costs for transmission projects are significant and pursuing a certain model is only worthwhile if there is a reasonable probability of success. Implementability asks if the prospects of success are good.

7.3 Drivers for the Choice of Model

Often the decisions are driven by financing needs but may face political resistance from those opposed to privatization or others just opposed to change the utility for whom the simpler forms, such as BOOT or EPC+ are often preferred.

Model design decisions depend on legal and regulatory constraints, such as whether the primary legislation allows the private sector to own electricity assets which then pushes the choice of model the word concession or lease agreements.

7.4 Design, Finance, Build, Operate

This group of business models represent the minimalist approach to transmission and the most basic of these – engineering, procurement and construction (EPC) is already a standard practice for the development of major transmission assets in Pakistan. The sub-variants of this category include:

- EPC
- EPC + Finance
- EPC + Operation
- EPC + Finance + Operation

These values are often used as a subcomponent of the other main business model of interest – the BOOT model.

7.4.1 Engineering, Procurement, Construction (EPC)

Also referred to as turnkey construction contracts because the owner only needs to turn the key to initiate operation.

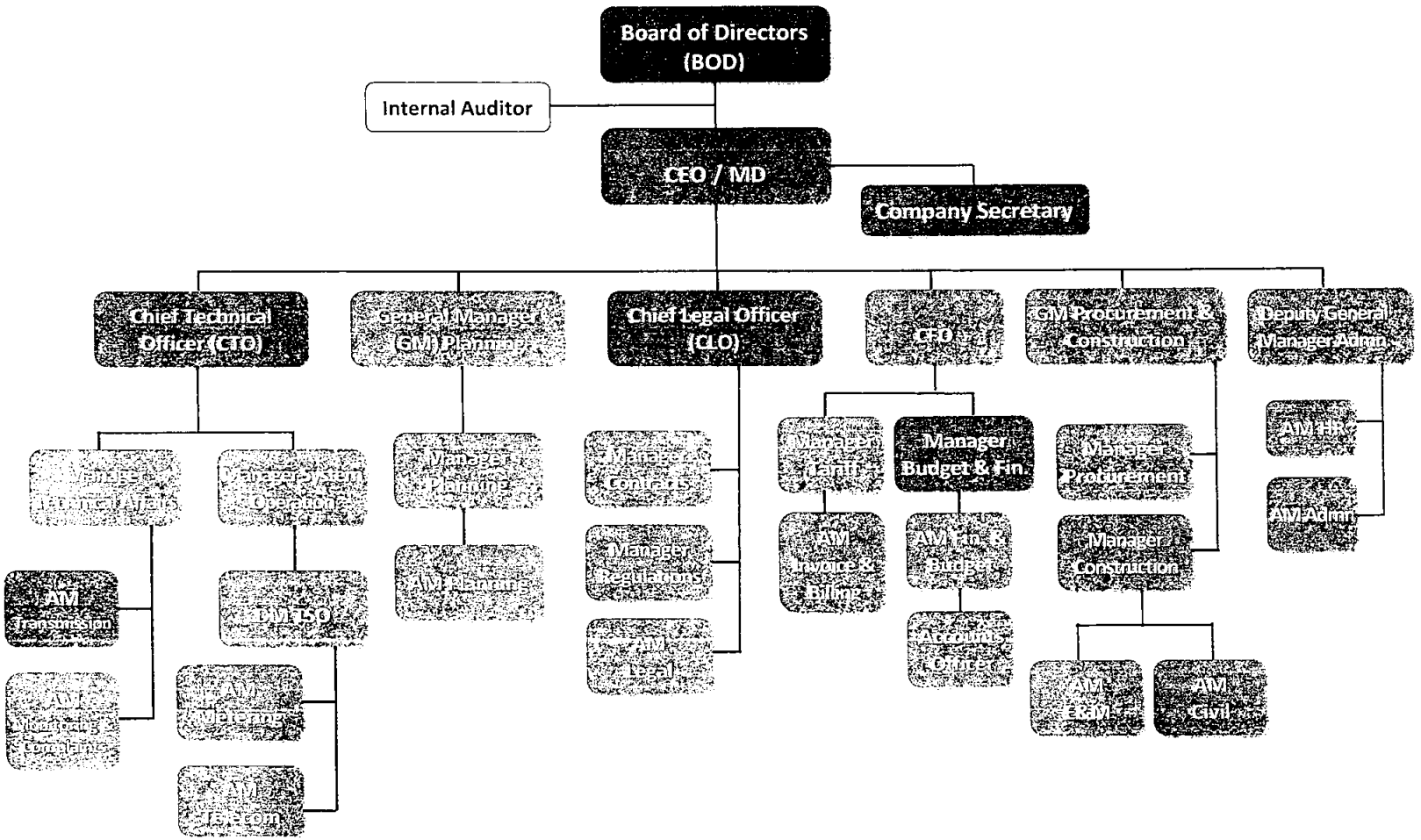
Features

The contractor is provided with a specification for the asset and is responsible for design, procurement of materials and construction for a given price by a given date and to a minimum standard confirmed at commissioning by independent engineers.

Risk Allocation

The EPC contractor is responsible for procurement and construction risks. The developer, which is often the utility, is responsible for financing the project and for making payment to the contractor. Final payment to the contractor is made following commissioning. Post commissioning, developer operates and maintains the transmission assets, recovers the cost, services loans, and is exposed to risk on its equity. If the developer is state owned, the government will be at risk on its equity.

Updated Organogram of Punjab Grid Company (PGC)



JOB DESCRIPTIONS OF MINIMUM HR FOR PGC

1. Chief Executive Officer (CEO)

Responsibilities:

- Report to the Company's Board of Directors and actively work to support the growth of the Company's business through expansion of power market in the province as well as in the country.
- In addition to management of operations, responsible for extension in the network, development and implementation of strategic plans and initiatives to achieve the performance targets set by the provincial government and the Board.
- Provide vision and leadership for development of a progressive company and building dedicated and energetic professionals, future leadership and succession planning.
- Engage with stakeholders and other players in the sector at top levels by having close liaison with the regulator, federal government, and relevant agencies in other provinces, private sector investors, financial institutions and bulk power consumers.
- Keep abreast with the market development initiatives like Competitive Trading Bilateral Contract Market (CTBCM) and role of the company.
- Diligently monitor and supervise its core teams for ensuring a profitable company on long term basis.

Qualification and Experience:

- A Bachelor's degree in Engineering would be the minimum requirement. In addition preference will be given for a Master's degree in Engineering or Business Management from HEC recognized/accredited Universities. A post qualification experience of twenty years in corporate entities, preferably in the utility management sector, out of which five years' experience must be at senior management position as CEO or directly reporting to the CEO is desirable.

2. Company Secretary

Responsibilities:

- To maintain the company's books of accounts,
- Conduct audit of the company's tax returns,
- Advise the board of directors relating to the legal and financial risks of the company and
- Ensure that the company complies with statutory regulations.

Qualification and Experience:

- A law graduate from a university recognised by HEC OR a member of recognised body of Chartered Accountants OR Master's in Business Administration or Commerce from a university recognised by HEC. A minimum post qualification experience of 10 years in corporate organizations in public or private sector. Must be well versed with Companies' Law and SECP regulations.

3. Chief Technical Officer (Overseeing a Number of Areas during Initial Phase)

Responsibilities:

- Planning and design of transmission lines and grid stations
- Oversee operation of transmission lines and grid stations
- Supervise connection agreements with users of transmission system
- Identification of potential projects for development by the provincial government or under Public Private Partnership (PPP) mode.
- Selection and monitoring of consultants, contractors and or developers/private partners.
- Represent the company at various fora.
- Liaison with relevant authorities on laying of transmission lines from the proposed power generating units to the National Grid or in isolated mode.
- Overall supervision of Operation and Maintenance of transmission lines and grid system internally by PGC or through outsourcing

Qualification and Experience:

- A Bachelor Degree in Electrical Engineering (Preferably a master's degree) from HEC recognized university; with at least twenty years of experience at management level with a utility, with regulator or with a reputable consultant

4. Chief Legal Officer

Responsibilities

- Report to Chief Executive Officer and furnish legal opinions on matters pertaining to interpretation of statutes and agreements and analysis on various legal issues
- Provide strategic support in the management of legal affairs of Punjab Grid Company
- Review all policies, strategies, laws and procedures
- Responsible for drafting, updating and vetting of PGC related legislations, rules, contract(s)/ agreement(s) etc.
- Represent PGC in negotiations with public and potential private sector stakeholders.
- Supervise preparation of petitions before NEPRA
- Represent and contest PGC cases in court of law

Qualification and Experience

- Minimum degree requirement of LLB from a University recognized by HEC. A higher qualification like LLM will be given preference. Minimum experience of 18 years in the relevant field will be required.

5. Manager Budget and Accounts

Responsibilities

- Responsible for supervising accounts department, prepare annual budget and financial statements
- Prepare business and investment plans
- Develop financial procedures
- Collection of revenue and cash flow management

Qualification and Experience

- Advanced degree in accounting, finance, engineering plus MBA, ACA, ACCA, CIMA with at least 10 years of proven work track record in reputable organization

6. Assistant Manager Transmission

Responsibilities

- Implement system modelling, develop procedures, perform system studies and develop solutions to current or future system issues.

- Develop database in respect of PGC transmission projects. Interact with other stakeholders for sharing of technical information and data.
- Coordinate, Perform, and review technical studies for expansion PGC transmission facilities and interconnection of generation, NTDC network and loads/Bulk Power Consumers.

Qualification and Experience

- Bachelor's degree in Electrical Engineering is essential (Master's degree preferable) with a minimum of eight year experience with computer programs used transmission planning or interconnection studies such as power flow, short circuit and transient stability studies.

Saniya Awais

Current Posting:
Managing Director
PPDB, Energy Dept.
Gov. of Punjab

Date of Birth: 26/01/1967

Home Address
E-153, Street No.7, Officer's
Colony Lahore Cantt., Lahore
Tel: 042-36620786
Mobile: 0300-0335080

Business Address
Punjab Power Development
Board Irrigation Secretariat
Old Anarkali, Lahore, Pakistan.
Tel: 042-9913885
Email: ppdb.md@energy.punjab.gov.pk

Professional Experience

Managing Director
Punjab Power Development Board (PPDB)
Energy Department, Government of Punjab **October 2013 - Present**

- Representing Government of Punjab in preparation of Integrated Power Policy and Plan for Pakistan.
- Technical representative of Government of Punjab during update of Electricity Act in Pakistan – Legislation approved by Nation Parliament of Pakistan.
- Focal person for Master Energy Planning for Punjab by Hydro China Ltd.
- Assisting National Electric Power Regulatory Authority Pakistan during regulatory approvals of Punjab facilitated power projects – 1720 MW already started commercial operation.
- Development of legal instruments for grid connected solar and coal power projects in Pakistan – including Power Purchase Agreement, Land Lease Agreement, Water Use Agreement, Transportation Agreement, etc.
- Introduced Punjab Coal Initiative 2014 for development of six 2x660 MW imported coal fired power projects in IPP mode.
- Supervised completion of 2x660 MW Sahiwal Coal Power Project in Punjab, Pakistan after successful completion of project activities including feasibility study, tariff determination, generation license and execution of project agreements (Power Purchase Agreement, Implementation Agreement, Water Use Agreement, and Coal Supply & Transportation Agreement). Project started commercial operation in October, 2017.
- Focal person for China-Pakistan Economic Corridor (CPEC) coal fired power projects in Punjab. Projects with a total capacity of 3080 MW have been selected and included in Category 1 of CPEC with assured financing.
- Lead person for development of the Quaid-e-Azam Solar Power Park in Bahawalpur, Pakistan with a total capacity of 1000 MW. First 400 MW started commercial operation in May, 2016 – First grid connected solar power project in Pakistan. Next 100 MW awarded generation license and tariff.
- Steered development of first tariff based bidding documents in Pakistan - Award of 135 MW Taunsa Hydropower Project under International Competitive Tariff Based Bidding Regulations.
- Revalidation of Punjab hydropower potential through World Bank Technical Assistance Program. Based on rapid appraisal of the sites, the total 35 projects (43 sites) have been declared technically and commercially viable with total estimated capacity of 419 MW (with combined generation potential of 2087 GWhr per annum). An investment opportunity of about 1589 Million US Dollars.
- Focal person for wind resource mapping of Punjab, Pakistan, for a joint collaboration program between VESTAS, Denmark (world's largest wind power turbine manufacturer) and the Government of Punjab. Wind power generation potential of about 1000 MW at four different locations in Punjab. First 250 MW project has completed feasibility study and applied for tariff.
- Focal person for Regulatory Reform Program, a joint venture between the World Bank Group and the Government of the Punjab.
- Supervised award of 20 MW biomass based power project in Punjab – feasibility study in progress.

Honors & Awards

Award of Excellence in Engineering
2017 – Institute of Electrical & Electronics Engineers (IEEE), Pakistan.

- Initiated first grid connected waste to energy power project in Pakistan (40 MW / 2000 tons MSW per day) – awarded after bidding, feasibility complete, tariff & generation license in process.

Project Manager - Thermal, Hydropower, Biomass Projects
Punjab Power Development Board (PPDB)
Energy Department, Government of Punjab **2010 - 2013**

- Facilitation and support to 28 ongoing hydropower projects with a total capacity of 236 MW. Feasibility studies for 18 of these projects have been completed. Generation license has been accorded to six projects. Tariff for three projects has been approved.
- Initiation of expressions of interest and evaluation of Pre-Qualification Documents (PQD) for thermal power projects in Punjab.
- Facilitation to 4x50 MW Punjab coal based power projects. Feasibility studies for all four of these projects have been completed.
- Coordination and support to China Machinery & Electrical Company (CMEC), China during development of pre-feasibility study for 300 MW Baluchistan Coal Based Power Project at District Muzaffargarh.
- Preparation of project information memorandum for 300 MW imported coal based power project at District Rahim Yar Khan.
- Design of RFPs, consultancy contracts and project information digests for 50 MW M3 Industrial Estate, 25 MW Value Added City, Faisalabad and 3x3 MW Punjab small industrial estate multifuel (waste+biomass) projects.
- Member of the support committee working on drafting the Punjab Power Regulatory Act.
- Participation in Turkey-Pakistan Energy Cooperation Road Show and presentation on upcoming investment opportunities in Punjab.
- Adoption and negotiation of Power Purchase Agreement (PPA) and Coal Supply Agreement (CSA) for indigenous and imported coal based power projects.

Deputy Director, Reconciliation
Energy Monitoring Cell, Irrigation and Power Department,
Govt. of Punjab **2010 - 2013**

- Contributing to drafting the Punjab Power Generation Policy 2006.
- Monitoring of around 62000 Government of Punjab electricity connections against over and fudge billing - Liaison to Lahore Electric Supply.
- Compilation of public electricity billing data and ensuring its electronic access to Government of Punjab departments.
- Initiation and reconciliation of billing disputes.
- Reduction of IOTs (inter office transactions) by improving payments at gross root level.
- Technical support during automation of Punjab billing system

Assistant Electric Inspector
Irrigation and Power Department, Govt. of Punjab **1992 - 2000**

- Implementation of Electricity Act 1910, Electricity Rules 1937, NEPRA Act 1997, Cinematograph Rules 1984 and Finance Act 1964.

References

Available on request.

Trainings & Workshops

- Power Week Conference – Singapore, 2016
- Energy Market Investment & Financing – InFocus, Singapore, 2016
- Mastering Power Contracts & Negotiations – InFocus, Singapore, 2016
- Political Economy of Power Sector – NIPA, 2016
- Twenty-Third In-Service Training Course – Engineering Academy Punjab, 2014
- Power System Analysis Modules of Load Flow, Short Circuit and Transient Stability using PSS/E – UNDP / Alternate Energy Development Board, 2010
- Introduction to PSCAD – UNDP / Alternate Energy Development, 2010
- Introduction to Project Management – Business Management Consultants, Houston, USA, 2008
- Medium Term Budgetary Framework – Punjab Resource Management Program, 2008
- Sixteenth In-Service Training Course – Engineering Academy Punjab, 2006

Education

M.Sc. Engineering Management
University of Engineering and Tech. Lahore, Pakistan

B.Sc. Electrical Engineering
University of Engineering and Tech. Lahore, Pakistan - Deans' List

Bio Data

Mahmood Subhani
Date of Birth: 1st February 1977
Punjab Power Development Board
1st floor, irrigation Secretariat, Old Anarkali Lahore
Email: ppdb.ml@energy.punjab.gov.pk
Mobile: 03334376320

Profile:

I am a hardened professional having 17 years of experience in corporate commercial legal practice/service. I have served magnitude of clients/organizations in Pakistan and United Kingdom including my recent job in one of the most challenging sector in Pakistan i.e. Energy Department, Government of Punjab. I have earned prestige both in education and work while securing awards for integrity and hard work.

Education & Qualifications

2008 – 2009, Glasgow Caledonian University Glasgow, United Kingdom

LLM in **European and international Trade Law**, Main Subjects included: European Union Law, European Union trade and Competition Law, Islamic Commercial Law, International Contract Law and arbitration, International Trade Law. **Awarded, best LL.M student by the University**

2007 - 2008, Glasgow College Glasgow, UK

DBM, (Diploma in Business Management), Main subjects included: business strategy and communication, Business law, Management and practice.

2001 - 2004, University of the Punjab, Lahore. Pakistan

LLB, Main subjects included: English Jurisprudence, Law of contracts, Constitutional Law, torts, equity, conveyance and pleading, law of transfer of property, Mercantile Law. International Law

2002- 2003, International Islamic University Islamabad Pakistan

DIL, (Diploma in Islamic Law) correspondence

1999- 2001, University of the Punjab, Lahore

MA, Philosophy, Main Subjects included: Philosophy of Law, History of western and Greek philosophy, Philosophy of Art, philosophy of Mind, Logic, Ethics, Muslim Philosophy and Modern philosophical Movements. **Awarded best thesis writer of the year.**

CPD Qualification

2022 Project Management Institute, USA, **Certificate in Intellectual Property Law**

2022 Alison, Ireland, **Diploma in Alternate Dispute Resolution** Secured 93 percent marks.

2021 Harvard University, USA interactive lesson on **Designing Organizational Structure**

2019, Management and Professional Development department, (MPDD) Government of Punjab, **Certificate in Procurement Rules**

2018, Alison Ireland, Certificate **in Solar Energy, Solar Technology and its use worldwide**

2017 Alison Ireland, certificate in **Practicing sustainable development**

2017, Alison, Ireland **Diploma in Project Management**

2016, Alison, Ireland **Certification in Alternate dispute resolution**

2016, Management and Professional Development department, (MPDD) Government of Punjab, **Certificate in Chinese Language.**

Skills and Work Experiences

May 2015 till date: Manager Legal/Contracts at Punjab Power Development Board, Energy Department, Government of Punjab. The work includes providing Legal facilitation to domestic and International Investors for development of Power/Energy Projects throughout the Province; Commercial Arbitration, participate in drafting Legislative bills, MOU's, vetting sovereign guarantees, drafting contracts, rules and regulations. Presenting the department in Courts of law, conducting arbitration proceeding,

July 2014 till date; Assistant Professor, Visiting Faculty Member at school of advance legal studies, Lahore Leads University,

September 2011 May 2015, Asad Law Associates, Lahore: worked as an advocate of High court, also responsible for research and development chair at Asad Law Associates. Managing corporate commercial practice, including international contract drafting, vetting of contracts, MOU's,providing one window solution to corporate clients, including Health Care Commission Punjab, EOBI, Water and Power Development Authority, Alternate Energy development Board,

August 2009-August 2011, Khan Solicitors, United Kingdom: drafting international contracts for international organizations like OECD , Management of external relations and providing interpretations of the Laws of European Union.

September 2009 and August 2010, Radio Ramadhan Glasgow, United Kingdom: worked as producer and Host of different live programs. Awarded **Best producer of the year Award 2009**

Jan 2008 –July 2009, Securi Group, Glasgow, United Kingdom: Worked as facilitation Officer. (Part time)

July 2004- Dec 2007 Asad Law Associates Lahore, Started working as a lower court solicitor and progressed up to the level of an **Advocate of High courts** of Pakistan. Responsibilities: Taking customer cases and processing using skills learned in LLB. Dealing with; customer queries and complaints, setting up new customer accounts, monitoring corporate litigation.

Recent Tasks achieved

- Prepared and filed Objections on Arbitration award issued against govt of Punjab September, 2022
- Prepared security package for the small hydro power projects in Captive Mode in Pakistan
- Provided provincial input in updating of national electricity Policy 2021
- Facilitated and updated the draft Punjab Power Generation Policy 2022
- Co- Drafted Prequalification Documents for 135 MW Taunsa Hydro Power Project
- Prepared Punjab Power Generation Policy 2018
- Prepared a draft of Punjab Guidelines for development of small Hydro Power Projects in captive mode 2019
- drafted Procurement Guide lines 2017, for Punjab Power Development Board
- Worked to prepare Climate Change Policy of the Government of Punjab 2016

- Prepared Punjab Power Development Board regulation 2016
- Prepared Template for Letter of Support (LOS) for Micro Hydro Power Projects for the approval of the Cabinet
- Prepared medical insurance policy for the employees of PPDB 2016
- Worked for preparation of the Power Purchase agreement for different PPP and IPP projects
- Worked for preparation of the Water Use agreement for different PPP and IPP hydro power projects
- Drafted, vetted numerous contract agreements of the projects of the national interest.
- Disposed of more than 60 cases in courts of Law with the time spam of five years, never a single adverse order passed against the represented department.

Continual professional development and achievements

- Successfully intercepted illegal Arbitration proceedings of 4 REDSIP Hydro Power Project at the court of law.
- Successfully got reconstituted the penal of arbitration in favour of Govt of Punjab
- Awarded **best Thesis writer** award of the year, Punjab University. 2001
- Awarded **Certificate of appreciation** for outstanding volunteer services by Government of AJ&K on implanting first field surgical hospital for earth quake victims in Bagh during earth quake in AJ&K and Northern areas of Pakistan 2005.
- Awarded **best LLM student** award, Glasgow Caledonian University.2009
- Awarded best producer of the year, by Radio Ramadhan, Glasgow. 2009
- Awarded employee of the year at Khan Solicitors, United Kingdom2010.
- Attended Microsoft Office, training at Glasgow Caledonian University.
- Participation in OECD group leading seminar on 'law and developing countries' in Paris.
- Attended full court hearing of European Court of Justice at Luxembourg.
- Attended seminar on EU policy at Committee of Regions Brussels.
- Briefings at EESC Brussels, Belgium
- Participated occasionally in conducting the seminars about mentoring the law students at Glasgow Caledonian University.
- BTEC Award from Edexcel UK in conflict Management. March 2007
- Attended 3 months Chines Language Learning Course at Management and Professional Development Department Government of Punjab.

Devotion

- Member Amnesty International, United Kingdom
- Life Member Lahore High Court Bar Association Lahore
- Member Lahore Bar Association
- Member Advisory Board, Leads School of advance legal &Political Studies
- Member Global Out Sourcing Association of Lawyers
- Ex Member International Bar Association London
- Focal Person at High Courts to liaise with Advocate General Punjab on behalf of Energy Department, Government of Punjab & all its attached Departments
- Member Greenpeace International. Netherlands
- Member Electricity Advisory Board, Government of Punjab.
- Convenor Procurement Committee, Punjab Power Development Board,

Interests and Hobbies

- Special ability for Innovation, Research and development.
- Emergency relief works as volunteer.(worked for the rehabilitation of Earth Quake victims in AJ&K. also worked for flood victims in Punjab).
- Can manage the role of team leader in different situations
- Creative, energetic and Innovative.
- Internet surfing for the purpose of CPD and exploring emerging sciences.
- Teaching and provide counselling on research and development.

Afifa Jabeen

-340-

House No 128, Askari IX, Lahore Cantt
Mobile +92-321-4698787; ppdb.aml@energy.gov.punjab.pk

QUALIFICATION

- *Bachelors of Law, 2005*
  University of Central Punjab, Lahore,

- Master in Political Sinces,2012
  Punjab University, Lahore

PROFESSIONAL ACHIEVEMENTS

Successful Commissioned 1320 MW Sahiwal Coal Power Project

- Prepared and negotiated Inland Coal Transportation Agreement (ICTA) between Pakistan Railway and Huaneng Shandong Ruyi (Sponsor)
- Implementation Agreement (IA) between Federal Government (PPIB) and Huaneng Shandong Ruyi
- Power Purchase Agreement (PPA) between CCPA-G & Huaneng Shandong Ruyi
- Water Use Agreement Negotiated Contingent Sale Agreement (CSA) with Board of Revenue
- Assigned acknowledgment of Land and Water rights with Irrigation and Board of Revenue for achievement of Financial Close of the project.

Successful Commissioned 100 MW Zhenfa Solar Power Project, Layyah

- Negotiated IA and EPA with AEDB and CPPA-G
- Negotiated Land Lease Agreement with BOR
- Tax /Custom duties related matters

Successful Commissioned 100 MW (Public Sector Project) Quaid-e-Azam Solar Park, Bahawalpur

- Negotiated IA, EPA AEDB and CPPA-G
- Negotiated Land Lease Agreement Cholistan Development Authority, Punjab

Successful Commissioned 300 MW Out of 900 (Private Investment) Quaid-e-Azam Solar Park, Bahawalpur

- Negotiated IA and EPA with AEDB and CPPA-G
- Negotiated Land Lease Agreement with Cholistan Development Authority (CDA)
- Tax /Custom duties related matters

CAREER EXPERIENCE

Punjab Power Development Board (PPDB), Energy Department, Government of Punjab

DIRECTOR LEGAL /REGULATORY AFFAIRS - JUNE 2015 TO DATE

- Focal person for interaction with power regulator NEPRA and other relevant Government Department in legal. regulatory matters
- Focal person for interaction with Advocate General Punjab Office in litigation in Supreme Court, High Courts & Service tribunals
- Focal person for interaction Law & Parliamentary Affairs Department in all legal, taxation matters in province of Punjab related to Power sector

POWER PROJECTS

- Completion of **1320 MW Sahiwal Coal** Power Project

- Completion of **100 MW (Public Sector Project) at Quaid-e-Azam Solar** Park, Bahawalpur
- Completion of **300 MW out of 900 MW (IPP) at Quaid-e-Azam Solar** Park, Bahawalpur
- **Successful Commissioned 100 MW Zhenfa Solar Power Project, Layyah**

40 MW Waste to Energy (WtE) Project at Lakhodair, Punjab

Prepared bidding documents (Legal, Technical, Financial evaluation criteria) for inviting Expression of Interest (EOI) for development of WtE Power Project

- Drafted Waste Supply Agreement with Lahore Waste Management Company for development Biomass /Waste Power Projects
- Drafted IA and PPA
- Member of Panel of Expert Committee for approval of Feasibility Study

135 MW Taunsa Hydro Power Project

- Prepared Prequalification Document (PQD) under NEPRA Tariff based Bidding Regulations,2017
- Prepared Request for Proposal (RFP) for selection of successful bidder under NEPRA Tariff based Bidding Regulations,2017
- Structuring of Provincial legal contracts (Water Use Agreement & Land lease, sale Agreement)

Facilitation to Federal Power Projects - 720 MW Karot HPP

- Negotiated Water Use Agreement between KPCL and Irrigation Department, for 720 MW Karot HPP.
- Negotiated Direct Water Use Agreement between KPCL & China Exim Bank (lenders)
- Negotiated Contingent Sale Agreement between KPCL and BOR
- Resolve Provincial sales tax issues regarding provincial sales tax on construction services

ACTS/LAWS

- Member in committee to present Punjab's view point in NEPRA amendment Act,2018
- Member for formulation and finalization of Punjab Electricity Regulatory Act,2012
- Member for formulation and finalization of Punjab Conservation Act, 2012
- Committee Member for finalization the comments on behalf of Province of Punjab on fresh draft of Electricity Act,2013

RULES /REGULATION & GUIDELINES

i. Bulk Supply RE guidelines 2020
ii. Captive Guidelines for development of Hydro power project for industry,2019
iii. Procurement Guidelines 2018(in line with Punjab PPRA Rules)
iv. PPDB Financial Rules 2018 (Draft)
v. PPDB Employees Service Regulations, 2016
vi. Comment on CTBCM
vii. Energy Plan

POLICY WORK

Provincial Polies

- Punjab Power Generation Policy 2020

- Drafted Statement of Conditions (SOCs) Land Policy for development of Power Projects under Colonization Act, 2012

Committee Member to provide Punjab's view point in following Federal Power Policies

- National Electricity Policy 2020
- Federal ARE Policy 2019
- Federal Power Policy 2015
- Committee Member for preparation and finalization of Punjab Imported Coal Power Generation Policy 2014 (Punjab Coal Initiatives)

MANAGER LEGAL (CONTRACTS) - FEBRUARY 2014 – JUNE 2015

Punjab Power Development Board

- Prepared and negotiated **Procurement Agreement for Chief Minister Ujala Programme**
- Prepared and negotiated Corporate and commercial Agreements
- Administer all contractual arrangements made by Energy Department
- Prepared bidding documents for Taunsa 135 MW HPP

ASSISTANT MANAGER LEGAL (CONTRACTS) - NOVEMBER 2011 – JANUARY 2014

Punjab Power Development Board

- Preparation and finalization of Power sector enactments (laws (Act / rules/ by-laws).
- Draft Agreements, Tender Documents, RFP, TORs /EOIs etc for power projects in Punjab IPP mode.
- Manage legal /commercial correspondence with all stake holders.
- Committee member for Land Allocation of valid LOI holders in Quaid –e-Azam solar power park.
- Committee Member for preparation and finalization of Pre-Qualification document for development of 120 MW Taunsa Hydro Power Project.
- Committee Member for preparation and finalization of Rules regarding the regulatory role of Electric Inspectors ,2014
- Litigation officer for high courts/ PST/FST and superior courts on behalf of Energy Department and all its Attached Departments
- Appellate member for provincial Advisory Board.
- Appellate Member for Special Advisory Board Punjab (SAB)
- Member for formulation, finalization and negotiations of Procurement Agreement (PA) for Chief Minister Punjab's Ujaala Program 2012
- Member for finalization draft Coal Supply Agreement 2012

SPECIAL ASSINGED TASK

Khawaja Harris, Advocate Supreme Court on following task assigned by GoPb:

- QASP Power Project (Litigation)
- (Agreements/Contracts)
- Sahiwal Coal Fired Power Project (Litigation)

SENIOR ASSOCIATE -JULY 2007- NOVEMBER 2011

Anwar Kamal Law Associates, Lahore

i. Rental Power Cases (Amicus Curiae)

ii. NEPRA's tariff determination (Petitions)

iii. Genco's (Litigation)
iv. KESC (Monthly & Quarterly Tariff Determinations)
v. Disco's Litigation & tariff determination
vi. Formulizations and finalization o **Value Added Tax ,2010 (VAT) Law**
vii. Appearing before the High Courts, Civil Courts, Banking Courts, Sales Tax Officers, Service Tribunals and Environmental Tribunals Etc
viii. Drafting pleading, Notices, Guarantees and other security documents.
ix. Writing Legal opinions
x. Legal Research

GOVERNMENT TO GOVERNMENT (G2G) AGREEMENT

i. **Facilitation Agreement with** PPIB & AEDB for Co-Facilitation regime under Federal Power Policy 2015
ii. **Coordination Agreement** with PPIB & AEDB for Co-Facilitation regime under Federal Power Policy 2015
iii. **Supplemental Agreements** between People's Republic of China and President of Pakistan
iv. **Tri-Partite Letter of Support (T-LOS)** with the Federal counterparts for post facilitation of Punjab initiated power projects

TRAINING & COURSES

- Director training course under **Corporate Governance Rules, 2013** (Public Sector Companies) Lahore University of Management Sciences **(LUMS), 2019**
- Project Management (Project Planning, Risk Analysis & Financial structure) Lahore University of Management Sciences **(LUMS), 2016.**
- Structuring of **"Power Purchase Agreement** (Legal, Technical and Financial Model) for development of Solar, Wind, Coal, LNG/Thermal and Waste to Energy based power projects - **South Africa, 2015.**

GOVERNMENT TRAINGS

- Capacity building session on **Public Private Partnership** organized by planning & development department, Government of Punjab,
- Special consultative session for power sector corporate/ commercial lawyers on commercial contracts under Energy Charter Treaty, Organized by the Office of Advocate General Punjab,
- Legal conference on Global Trends in legal Education on Experiential & Clinical learning conducted by Center School of Law & Policy with legal faculty of Harvard Law School & Boston Law School & US General Counsel Nina fite.

WOMEN IN ENERGY

- Founder member of member **Women in Energy (WIE) Group** in Pakistan by World Bank

BAR & PROFESSIONAL AFFILIATIONS

2020 Executive Member of Arbitration Panel of Lahore High Court
2013 Executive Member of Lahore High Court Bar Association
2012 Member of Central Law and Policy School, Lahore
2011 Member of the Federal Courts Lawyer Forum, Lahore
2008 Member of the Lahore High Court Bar Association

ACTIVITIES

Student Law Society, Part of University mooting team.

AHMAD SALMAN

735, F2 Wapda Town Lahore, Pakistan
0332 4184600 , 03000335083
ahmads993@gmail.com

PROFILE:-

Honest, committed and highly motivated professional with engineering and financial background along with the experience of working both in public and private sector power companies. He has result oriented aptitude and strong negotiation skills. Always develop a team to achieve goals. By receiving the award of facilitation through 1st flagship CPEC coal fired power project is the acknowledgement of his skills.

PROFESSIONAL SUMMARY:

- Presently working in **Punjab Power Development Board (PPDB)**, Energy Department, Government of Punjab, Pakistan
  PPDB has been established for the implementation of policies, programs and projects in the field of energy in the Province and to facilitate the private investors in power sector through one window facility, to harness the available sources of energy generation in the Province, and to provide for ancillary matters.

- **Designation**:- Director Technical Coordination with Additional Charge of Director Thermal
- **Duration**:- April 2015- till date
- **Designation**:- Deputy Project Manager Electrical
- **Duration**:- December2011 to April 2015

- Performed duties in **Nishat Power Limited i-e 200MW (11*18V46+STG) RFO based Fast Track IPP** (Independent Power Producers). It is developed through Wärtsilä Finland Oy which is a world-renowned global leader in power generation equipment supply and provide complete engineering of power plant. Generation of power plant is at 15kV and its distributing to National Grid at 132kV.
- **Designation**: Manager Electrical
- **Duration**: December-2007 to November 2011

- Performed duties in **Nishat Mills Ltd, Ferozwatwan** (Plant Capacity: 07MW) comprising Catterpillar Gas and Diesel Engines of 3516 series. Power generation of genesets is at 400V and their distributing is at 11kV.
- **Designation**: Deputy Manager – Responsible both for operation and maintenance
- **Duration**: July- 2003 to November- 2007

- Performed duties in **Nishat Mills Ltd, Bhikhi** (Plant Capacity: 13MW) comprising 03 Dihatsu RFO based Engines (02MW each unit), Gas Turbine of Solar (3.4 MW) and Caterpillar Gas & Diesel Engines of 3516 series. Power generation of genesets is at 11Kv and their distributing is also at 11kV.
- **Designation**: Electrical Engineer.
- **Duration**: June- 2002 to June- 2003

- Performed duties in **DG Khan Cement Company, Dera Ghazi Khan** (Plant Capacity: 24MW) comprising 04 Niigata RFO based Engines (5.96MW each unit) and 03 EG Boilers. Power Generation is at 6.3kV and its distributing is at 6.3kV.
- **Designation**: Assistant Manager Electrical.
- **Duration**: March- 1998 to June- 2002

Jobs performed /responsibilities in PPDB:

- Supervising complete project development cycle and operational activities, starting from evaluation of sponsors and issuance of Letter of Interest (LOI) to qualified sponsor till Commercial Operation Date and the operational issues where Government of Punjab involves
- Providing advice on policy matters to GoPb, relating to power sector
- Involved in development of CPEC flagship project of Sahiwal coal fired power plant (SCFP) of 1320MW
- Interacted with NTDC for the approval of load flow study of SCFP and interconnection with national grid on 500kv line
- Facilitate SCFP regarding availability of land from Board of Revenue, coal transportation through Pakistan Railways, in development of unloading fuel facility at Port Qasim, availability of water through Irrigation Department, receiving in NOC from environment department.
- Explore Thar Coal for 20% utilization in SCFP
- Represent PPDB at different provincial and federal departments
- Facilitating the department in establishing Punjab Grid Company
- Coordinating with NTDC, planning for inclusion of provincial power projects in IGCEP

Jobs performed /responsibilities in Nishat Power Limited:

- Review of Preliminary, Basic and Detail Electrical Design with respect to the scope of supply and standards given in Equipment Supply Contract and Construction Services Contract.
- Coordination with the site project team of CSC contractor for the installation of Electrical Equipment according to Electrical Installation drawings.
- Fulfilling the design requirements of Power Purchaser mentioned in schedules of **PPA.**
- Getting the approvals mentioned in Implementation Agreement **(IA).**
- Getting all necessary approvals from NTDC mentioned in Power Purchase agreement with the coordination of ESC & CSC Project Teams.
- **Coordinating with NTDC (WAPDA) to expedite the process of interconnection of complex with national grids.**
- **Coordinate with National Transmission and Dispatch Company to finalize SLD & Protection Scheme of 132kV switchyard of Power Plant.**
- **Facilitate LESCO in upgradation of 66Kv transmission line to 132Kv passing from plant site**
- **Facilitate NTDC in laying radial line of 132Kv from plant site to LESCO Chunian grid station of about 20km.**
- **Coordinate with NTDC in making In out arrangement at plant site of 132kv line joining LESCO grids of bhai pheru and pattoki**
- **Getting approval of 132Kv plant grid station from NTDC before its energization from national grid station**
- Preparing monthly and periodic project progress reports both for Power Purchaser and Private Power & Infrastructure board **(PPIB).**
- Coordinating CSC Contractor for preparing commissioning documents of about prior to synchronization and upon and after synchronization tests.

- Coordinating with CSC Contractor, its commissioning team and Independent Engineer to perform tests prior to synchronization and upon and after synchronization.
- Coordinate with Operation and Maintenance team to maintain the power plant trouble free.
- Fulfilling all obligations of Power Purchaser after running the power plant.
- Coordinated with National Power Control Center(**NPCC**) & Regional Control center (**RCC**) for the smooth operation of power plant in NTDC system
- Handled installation and commissioning issues of Primary and Backup Energy Meters (revenue meters) with the Metering Committee of NTDC (WAPDA).
- Coordinating with the Metering Committee to take monthly Energy Meters reading and resolve all metering issues which may delay process of Invoice.
- Preparing BOQs and Comparitive statements to assign the job to contractor.
- Discussing and resolving technical issues regarding EPP & CPP invoices with CPPA (Central Power Purchase Agency)

ACADEMIC PROFILE:

Master in Business Administration **(2018-20)**
IBA, University of Punjab Lahore

B.Sc. Electrical Engineering **(1992-*1998*)**
University of Engineering & Technology, Lahore

INTERESTS

To study social aspects of human lives
To remain in touch with the political position of Pakistan
To play different games

TRAININGS

1- A month long training at "**Wartsila Land and Sea Academy " in Finland** having the courses of Electrical, Mechanical and Power Plant.

2- One week training on" Off- Grid Solar PV Applications" organized by Renewable & Alternative Energy Assosiation of Pakistan(REAP) with the coordination of German institute **GIZ.**

3-Project Management Training from LUMS held in Karachi

4- One week training on " Project Management Course" organized by GIZ.

5- Training of Financial Modeling with PFAN

SKILLS

- Coordinating amongst different technical entities to achieve a single goal
- Negotiating with the parties to resolve the issues

AWARDS

- Facilitation Award by 1st Flagship CPEC coal fired power project developed by Huanang Shandong Ruyi Pakistan Energy Pvt. Ltd
- Acknowledgement by Alkhidmat Pakistan for serving the humanity during COVID-19

LANGUAGES

- URDU
- ENGLISH
- PUNJABI

MUHAMMAD ABU BAKAR

(B.Sc. ELECTRICAL ENGINEERING, LL.B.)

Father's Name:	Muhammad Yousaf
Date of Birth:	04-10-1991
CNIC #	35202-5212976-5
Address:	House # 20, Main Bazar, Old Anarkali, Lahore
Contact:	+92-0321-8020820 **Email:** ee.abubakar@gmail.com
PEC Registration #	ELECT/44322

VISION & OBJECTIVE:

To explore all horizons and secure a position in an organization that will fully employ my personal skills, experience and academic trainings in a rewarding career that affords both professional and personal growth.

My good academic background along with professional experience both in the field work as well as in the office / desk work combining with my commitment to personal & professional excellence and good written & oral communication skills makes me an excellent candidate for this position.

ACADEMIC PROFILE:

PROFESSIONAL QUALIFICATION			
QUALIFICATION	**INSTITUTION**	**ACADEMIC SESSION**	**%AGE / CGPA**
BSc. Electrical Engineering	University of the Punjab, Lahore	2009-2013	CGPA 3.0/4.0
LL.B.	University of the Punjab, Lahore	2016-18	49.8%

ACADEMIC QUALIFICATION			
QUALIFICATION	**INSTITUTION**	**ACADEMIC SESSION**	**%AGE**
FSc. (Pre-Engineering)	Govt. Islamia College Civil lines, Lahore	2007-2009	80.72%
Matriculation (Science)	Govt. Muslim Model High School, Lahore	2005-2007	89.29%

RESEARCH EXPERIENCE:

Conference: ICISDM '17 Proceedings of the 2017 International Conference on Information System and Data Mining

Paper Title: Cost Effective Solution for Minimization of Medical Errors and Acquisition of Vitals by using Autonomous Nursing Robot

Doi: 10.1145/3077584.3077598

PROFESSIONAL EXPERIENCE:

Organization	**Position Held**	**Period**	
		To	From
Punjab Power Development Board (PPDB), Government of the Punjab, Energy Department	Assistant Manager Thermal (BS-17)	July-2021	To Date
Punjab Power Development Board (PPDB), Government of the Punjab, Energy Department	Associate Thermal (BS-17)	Feb-2017	July-2021
Punjab Power Development Board (PPDB), Government of the Punjab, Energy Department	Additional charge of Monitoring & Coordination Officer (BS-17)	Mar-2018	Feb-2020

Punjab Power Development Board (PPDB), Government of the Punjab, Energy Department	Associate Thermal (BS-17)	Jul-2015	Jul-2016
Grand Electric Company	Electrical Engineer	Apr-2014	Apr-2015

➢ **PPDB, Government of Punjab, Energy Department:**

- Designation: Assistant Manager (Thermal)
- Duration: 12th July 2021 to Date

- Designation: Associate (Thermal)
- Duration: 15th July 2015 to 14th July 2016 and 02nd February 2017 to 11th July 2021

PPDB is working to exploit Thermal, Hydel and Renewable Power Generation through indigenous resources like coal, gas, oil, hydel, biomass, solar and wind of the province, keeping in view the International laws and governing electricity generation policies through Independent Power Producers (IPP) and Public Private Partnership (PPP).

Job Responsibilities include but not limited to the following:

- Assist Director Technical Coordination in carrying out responsibilities of Thermal Section of PPDB.
- Provide one-window facilitation to the private sponsors towards development of thermal power projects in accordance with the Punjab Power Generation Policy-2009, National Environmental Quality Standards (NEQS) provided by EPA Punjab, PPRA and NEPRA rules, regulations and relevant laws.
- Evaluation of technical feasibility and economic viability of thermal power projects in Punjab, in accordance with the Policy(ies).
- Assisted in design and review of electrical equipment of 1320 MW Sahiwal CFPP.
- Assisted in finalization of Water Use Agreement (WUA), Inland Coal Transportation Agreement (ICTA), Implementation Agreement (IA) and Power Purchase Agreement (PPA) for Sahiwal CFPP.
- Provide facilitation to the Project developers in acquiring land as per Land Acquisition Act for development of 1320 MW Sahiwal CFPP and sale of land to IPPs
- Provision of facilitation and witness of 8.2 & 8.3 Testing of Sahiwal CFPP for its commissioning.
- Under 8.2 of PPA the following tests were witnessed while facilitating the Sahiwal CFPP:
    1. Automatic voltage regulator setting and adjusting in stand still condition and with the generator running at no load
    2. Turbine governor control checks, including a steam governor over speed test
    3. Functional testing and timing of high voltage switchgear in the switchyard of the Complex
    4. Verification of the protection level settings for the following;
        i. Stator earth fault
        ii. Negative phase sequence
        iii. Generator transformer over-current and earth fault; and
        iv. High voltage bus-bar protection
    5. Voltage phasing checks carried out between the sub-station of the relevant Unit of the Complex and the Grid System.
    6. All inter-tripping circuits between the Complex and the Power Purchaser's equipment installed at the adjacent grid stations, as per Schedule 3of PPA

- Under 8.3 of PPA the following tests were witnessed while facilitating the Sahiwal CFPP:
    1. Coal Sampling and analysis (Section 8.3 (a)(vii)6.1)

2. Calibration of Coal feeders (PPA-Section 8.3 (a)(vii)6.2)
3. Automatic Voltage Regulator Operation Test (PPA-Section 8.3 (a)(iii))
4. Turbine Governor Operation Test (PPA-Section 8.3 (a)(iv) Part-I)
5. Minimum Load Capability Test (PPA-Section Section 8.3 (a)(vi))
6. Reactive Capability Test (PPA-Section Section 8.3 (a)(v))
7. Response of Complex to step load changes (PPA-Section Section 8.3 (a)(viii))
8. Turbine Over-speed Protection Test on both units (Section 8.3 (a)(iv) Part-II)
9. Load Rejection Test (PPA-Section 8.3 (a)(ix))
10. Reliability Run Test of the Complex (PPA-Section 8.3 (a)(ii))
11. Initial Tested Capacity Test (PPA-Section 8.3 (a)(i))
12. Heat Rate Test of the Complex (PPA-Section 8.3 (a)(vii))

- Preparation of Environmental Compliance Report on Sahiwal CFPP.
- Observation of annual maintenance of both units of Sahiwal CFPP.
- Facilitation of Sahiwal CFPP in matter of Technical Training School development, Internships of University students and Trust Fund as part of Sahiwal CFPP Corporate Social Responsibility (CSR).
- Worked as member Procurement Committee and provided assistance in procurement matters as per Punjab Power Regulatory Authority (PPRA) Rules.
- Assist in tariff computations and approval of CFPPs as per NEPRA's International Competitive Bidding Tariff Regulations-2014.
- Assist in supervision and coordination regarding implementation of CFPPs in Punjab under IPP mode.
- Prepared pre-feasibility report on utilization of Thar, Sindh coal for Sahiwal CFPP fuel mix and future thermal projects in Punjab.
- Coordination with relevant Agencies for implementation of power projects as well as liaison with stakeholders including government / private organizations.
- Monitoring of legal and policy compliance, project implementation monitoring in accordance with the applicable laws and policies, inter-alia, Punjab Power Generation Policy 2006 (Revised 2009), Punjab Procurement & Regulatory Authority (PPRA) Rules - 2014 and NEPRA's Rules and Regulations.
- Assisted in assessment of feasibility level designs and layout plans of:
  - ✓ 2x660 MW CFPP, District Rahim Yar Khan by M/s Huaneng Shandong Power Generation Company Limited
  - ✓ 1x660 MW CFPP, District Muzaffargarh by M/s KAPCO
  - ✓ 1x660 MW CFPP, District Muzaffargarh by M/s CMEC
  - ✓ 1x660 MW CFPP, District Rahim Yar Khan by M/s NISHAT Energy Limited
  - ✓ 1x660 MW CFPP, District Rahim Yar Khan by M/s NISHAT Chunian Group
  - ✓ 1x220 MW CFPP, District Sheikhupura by M/s NISHAT Chunian Group
- Facilitation to Sahiwal CFPP Company in matter of registration of Technical School at Sahiwal CFPP
- Assistance in matter of registration of Trust Fund under CSR agreement and conduction of its business
- Monitoring & Coordination between GoPb, GoP & Sponsors – Security, Progress & other matters
- Detail visit of Thar open pit mines and preparation of report for utilization of Thar coal for Sahiwal CFPP & future coal based power plants in Punjab
- Assisted Renewable Energy Section of PPDB for 04 months, during the tenure:
  - ✓ Prepared concept paper for setting up solar panel manifesting plant in Punjab

- ✓ Assisted in matter of Tri-Partite Letter of Support signing between PPDB, AEDB & Zhenfa New Energy (Pvt.) Ltd. For development of 100 MW SPP at Layyah
- ✓ Assisted in matter of Waste to Energy projects potential assessment and issuance of PQD to investor for development of 48 MW WtE project near Lahore
- ✓ Day to day communication with federal, provincial entities on ongoing projects & matters

- Preparation of Concept Paper & PC-I for establishment of Punjab Grid Company to secure the Punjab Government mandate
- Preparation of RFP document and hiring of Technical & Legal Consultants for the conduction of Feasibility, registration with SECP and filling of application to NEPRA for Grant of Transmission License
- Assistance in filing of MOA, AOA in SECP and registration of Punjab Grid Company Limited with SECP. Preparation of Transmission License Petition to file in NEPRA
- Assistance in preparation of comments /inputs on National Electricity policy, National Electricity Plan, IGCEP, CTBCM and others Rules & regulations by Ministry of Energy (power Division), NEPRA, CPPAG and other Federal entities
- Preparation of monthly progress reports of CFPPs under PPDB
- Preparation of Annual Procurement Plan, Annual Report, Tender Documents, Direct Procurements, Consultancy Contracts, Memorandums of Understanding (MoUs) in line with PPRA-2014, Policy 2009, etc.

➢ **Grand Electric Company:**

- Designation: Electrical Engineer
- Duration: April-2014 to April 2015

Job Responsibilities include but not limited to the following:

- Assistance in preparation of Bids for EPC Contracts for various projects.
- Performed detailed calculations to compute and establish manufacturing, construction, and installation standards and specifications.
- Operating computer-assisted engineering and design software and equipment to perform engineering tasks.
- Sub Station Works & over Head Line (11 kV)

TRAININGS & SEMINARS:

- One Day Workshop on Microgrids The Next Step Towards Democratization of Pakistan Power Sector
- One Day Live Webinar on External and Internal Factors that Impact Procurement Process
- One Day Live Webinar on Emergency Training and Exercising
- One Day Live Webinar on Planning and Design of Micro Hydropower Plant
- One Day Live Webinar on Personal Branding and Career choices for Engineers
- One Day Live Webinar on Introduction to Industry 4.0 Technologies
- One Day Live Webinar on Changing Dynamics of Supply Chain Management during Covid-19: A Case of Medical Supply Chains
- One Day Live Webinar on Elevate Your Leadership Skills to Take your Organization to the Next Level
- One Day Live Webinar on Risk Assessment and Management

ACHIEVEMENTS:

- Award for Extraordinary Facilitation received from M/s Huaneng Shandong Ruyi (Pakistan) Energy Limited in recognition of providing utmost facilitation for development of 1320 MW Sahiwal CFPP
- Certificate of Appreciation received from Managing Director, PPDB
- Got 2nd position in Pakistan Automotive Show 2014
- Secured 2nd position in Project Exhibition at Geek Week 2014
- Secured 1st position in GIKI All Pakistan Science Fair 2013
- Attained 1st position in IEEE Industrial Project Competition 2013
- Secured 1st position in Glow the LED Competition at UET TechnoFest 2012
- Got 3rd position in Component De Electrical Competition at Punjab Youth Festival 2012
- Got Laptop from Chief Minister Merit Program

ACADEMIC PROJECTS

- **Final Year Project**: Designed and Developed a Robotic Telepresence Platform for Autonomous Patient Monitoring and Medication along with Remote Interaction between Patients and Doctors.
- **Unmanned Ground Vehicle**: This UGV was designed for military usage; it had a gun mounting on it for target elimination.
- **Solar Charging Controller:** Its main purpose was to monitor the solar panel voltages, SLA battery voltages, battery temperature and then charge the battery efficiently to ensure long battery and solar panel life.

SOFTWARE SKILLS:

Computer Languages	C++, C, Assembly
Engineering Softwares	MatLab, Proteus, Multisim, ETAP, PWS, PCB Designing, Circuits Testing, Digital Circuits Design
Microsoft Office	MS Word, MS Excel, MS Power Point, MS Outlook, MS Access

INTERESTS:

- Active member of "Al-nazeer Blood Donation Society"
- Reading articles and forums related to latest technology and gadgets
- Studying social aspects of human lives
- Fund raising for "Green Souls"
- Traveling and Hoteling
- Being up to date with Pakistan and global current affairs
- Playing and watching Cricket, Snooker and Soccer

LANGUAGES:

LANGUAGE	SPEAKING	READING	WRITING
English	Excellent	Excellent	Excellent
Urdu	Excellent	Excellent	Excellent
Punjabi	Excellent	Excellent	Good
Chinese	Fair	-	-

REFERENCE:

Mr. Ahmad Salman
Director Technical Coordination, PPDB
Cell# : 0300-0335083
Email: ppdb.dtc@energy.punjab.gov.pk

Saqib Rasul

E 13/13, VI-B st # 7, Walton Road, Cavalary Ground, Lahore
Mobile: +92-300-0335053
E-Mail: cakib_423@hotmail.com

Work Experience: **Oct'07-to date**

Energy Department, GoPb **Oct'12 – to date**

As Manager Planning/ Transmission & Distribution in Punjab Power Development Board **Mar'15 – to date**

Core Responsibilities:

- To assist HOD in execution of Energy Private Sector Projects in Punjab.
- To prepare & evaluate Pre-qualification documents, Request for Proposal & Tender/Bidding documents and award of Projects to the EPC Contractor as per PPRA Rules & Punjab Power Generation Policy.
- To prepare Cost/Budget estimates for Development Projects.
- To prepare Financial/Business Models for different Energy Projects.
- To plan & facilitate in regulatory and implementing process of all Thermal Projects including 2x660MW coal fired projects at Sahiwal, Rahim Yar Khan and Muzaffargarh.
- To plan, monitor & evaluate project activities to ensure their timelines.
- To coordinate with and maintain constant liaison with all the local authorities & Project Company/EPC Contractor in order to execute the Project on a smooth path.

Energy Department, DOPP, as Asst. Director Projects **Oct'12 – Mar'15**

Core Responsibilities:

- To assist Director Projects in execution of Energy Public Sector Projects in Punjab.
- To prepare PC-I and other related documents for planning of such Projects.
- To prepare & evaluate Pre-qualification documents, Request for Proposal & Tender/Bidding documents and award of Projects to the EPC Contractor as per PPRA Rules.
- To prepare Cost/Budget estimates for Development Projects.
- To support in execution, monitoring & implementation of the awarded Projects.
- To prepare progress reports for awarded Projects periodically.
- To provide a liaison between project management & supply chain management.

PEL, as an Engineer QA System **Jan'09 – to Sep'12**

Core Responsibilities:

- To coordinate with the Production personnel for planning, executing & monitoring of production plan in order to ensure that targets are met efficiently & effectively.
- To conduct data analysis of Production department on monthly basis to enhance the productivity, straight pass & continual improvement in the system.
- To analyze the preventive and break down maintenance data of machinery & equipments required for production on weekly basis in order to analysis the man hour and production loss.
- To review & set Quality Objectives, Procedures, Work Instructions, Process quality control sheets, Quality plans & Production process flows of all related departments according to ISO requirement.

- To ensure the effective implementation of Quality Management System (ISO 9001:2008) and HSE Management System (ISO 14001:2004 & OHSAS 18001:2007) in the assigned departments.

Alkhair Group, (Five Star Foam, Spring Matrress Plant) Oct'**07** – **Jan'09**
as a Production Manager

- To plan, organize, coordinate, direct and control all the functions within the plant on a daily, weekly and monthly basis.
- To manage the budget, operations & capital expenditure and to train the plant members to further optimize performance.
- To initiate plans and processes which minimize manufacturing costs through effective utilization of manpower, equipment, facilities, materials, and capital.
- To overall manage the Maintenance activities of the Plant.

Education/Qualifications:

Degree	Institution	Highlights/Achievements
MBA Finance (2009-2011)	Lahore School of Economics	Acquired **3.77** GPA in exams/**Silver Medal**
BSc. Mechanical Engg (2003F to 2007)	University of Engineering and Technology, Lahore	Acquired **82**% in exams
Inter (Pre-Engg.)	Garrison Science College, Lahore	Acquired **78**% in exams
Matriculation	Garrison Boys High school	Acquired **80**% in exams

Personal Details

Date of Birth	May 13,1985
Nationality	Pakistani
Domicile	Lahore
PEC Reg. #	MECH/20223

Certifications

- Certified Internal Quality Auditor (ISO 9001, ISO 14001 & OHSAS 18001) by SGS Pakistan

7.10 Financial Plan

The Consultant has developed three (3) independent models using the cost-plus approach to establish a tariff for all three voltage types assumed. For this purpose, the largest transmission lines available in the plan for all three voltage types was chosen. This approach was adopted in order to provide an estimated tariff and the financial results that can be expected for projects of each voltage type.

7.10.1 Project Cost

Cost estimation is based on (i) the latest PC-1 available for the projects planned by NTDC and DISCOs and (ii) in-house data. Cost estimation classification system recommended by American Association of Cost Engineers (IR-97) has been adopted in which Class 5 is chosen as the benchmark for costing estimations. Class 5 indicates that the project is at a concept screening stage with an accuracy level of +/-20%-100%.

The total capital cost of the Project incorporates the cost of the main project packages:

- EPC Cost
- Non-EPC Cost
- Development Costs (Including Project Management, Engineering, Site Supervision, Topographical survey, Soil Investigation, Fees, Permits Insurance cost and Overhead Cost.
- Debt Service Reserve
- Insurance During Construction
- Financing Fees and Charges
- Contingencies
- Interest During Construction

Overhead Cost

In order to setup and commence the operations of PGC, an initial budget of **PKR. 400 million** is estimated. This includes office setup, rental for 2 years, utilities, vehicles purchase & associated running cost and salaries for the officials and staff for 2 years. This shall be considered as '**seed-money**' for initial operations and does not cover any sort of development costs for the actual construction of the transmission lines.

Project Cost Details

Table-25 below provides a breakdown of the total project cost for all three voltage types.

Table-25: Project Cost

PROJECT COST (PKR)	132kV	220kV	500kV
EPC Cost	4,314,556,278	20,362,656,788	70,152,404,691
Non-EPC Cost	479,395,142	2,262,517,421	7,794,711,632
Development Costs	183,690,280	198,846,787	317,462,932
Debt Service Reserve	-	-	-
Insurance During Construction	71,909,271	339,377,613	1,169,206,745
Financing Fees & Charges	-	-	-
Contingencies	100,991,019	463,267,972	1,588,675,720
Project Cost Before IDC	5,150,541,991	23,626,666,581	81,022,461,721
Interest During Construction	30,242,975	257,147,955	5,337,154,065
Total Project Cost	5,180,784,966	23,883,814,536	86,359,615,785

The total length of the lines chosen for calculations were as follows:

132 kV: 127 KM

220 kV: 150 KM

500 kV: 330 KM

Project Implementation Timeline

The total timeframe for implementation/ construction of the Project is estimated at 1 year for voltage type 132 kV, 2 years for 220 kV and 3 years for 500 kV projects during which the complete transmission line will be laid and energised.

Interest during Construction

Interest arising on loans during the construction period is projected to be accrued and rolled over into the debt principal and carried forward up to the completion of the Project. Accordingly, it is capitalized as part of Project Cost. Interest during construction is calculated on the basis of the total debt outstanding at each month end during the development period. The financing rate used for computation of this cost is as per the secured terms of financing, taken at 3-month KIBOR interest rate of 14.54% + 3.50% Spread. Interest during construction is given in **Table-26** below.

Table-26: Interest during Construction (IDC)

	132 kV	220 kV	500 kV
Interest During Construction	**PKR Mn**	**PKR Mn**	**PKR Mn**
	30.24	257.15	5,337.15

ANNEX-DD/1 -356-A-

No. SO(T&P) ED/28-9 /2020
GOVERNMENT OF THE PUNJAB
ENERGY DEPARTMENT

Dated Lahore the, 13th December, 2022

TO WHOM IT MAY CONCERN

GUARANTEE OF MINIMUM SOLVENCY REQUIREMENTS

WHEREAS, the Government of Punjab (GoPb) has incorporated Punjab Grid Company (Pvt.) Limited (PGC).

2. **WHEREAS,** the PGC require a license for the Provincial Grid Company under section 18-A of the Regulation of Generation, Transmission & Distribution of Electric Power Act (XL of 1997), as amended from time to time, (NEPRA Act), authorizing it to engage in transmission of electric power within the territorial limits of Province of Punjab.

3. **NOW THEREFORE,** the GoPb, being the sole owner of PGC:

i. Full supports the obtainment of license by the Punjab Grid Company for the Provincial Grid Company from the NEPRA; and

ii. Further, undertakes to provide and commit sufficient funds as are required from time to time towards compliance with and fulfillment of minimum solvency requirements of Punjab Grid Company, for grant of license as a Provincial Grid Company, within the Province of Punjab, under the NEPRA Act.

This Guarantee is issued with full faith and credit of Government of Punjab

ISSUED, STAMPED AND SEALED AT LAHORE ON THIS 13TH DAY OF DECEMBER, 2022.

FOR AND ON BEHALF OF THE GOVERNMENT OF PUNJAB.

13.12.2022

(MUHAMMAD AJMAL BHATTI)
SECRETARY ENERGY

Secretary
Govt. of the Punjab
Energy Department

7.12 Tariff Regime

Various tariff options were considered at the start of this feasibility. Amongst all, Cost-plus regime was selected to be the most preferred option. The typical Cost-plus tariff consists of actual cost and an agreed return to be paid to the investor. In Pakistan, this type of tariff is generally used in the Power sector where Independent Power Producers (IPPs) operate under this tariff regime.

In the Cost-plus tariff regime, the project revenues are primarily derived from the capacity charge and the energy cost which are the two main components of "Cost-Plus" regime. Such tariff is usually the multiple of fixed and variable cost factors combining the Capacity requirement aligning with fixed cost and the variable cost related to the injection and withdrawal aligning with the variable factor. Added to this is the allowed rate of return ("IRR") on investment which will be calculated to reflect the weighted cost of capital ("WACC"), i.e. the expected cost of capital relates to equity investors and cost of capital related to debt such as interest rate from the debt investors.

The cost-plus method requires that the cost is allocated to the specific user according to their related activity and the cost associated therewith. Therefore, a tariff is appropriately calculated for each type of user and hence the cost allocation depends on the user type of storage.

Table-32 below provides a brief overview of the tariff heads where the costs have been levelized over a period of 25 years. During the early years of operation, tariff will generally tend to be on the higher side based on factors such as Debt repayments which will end in year 10.

Table-32: Tariff Calculation

Levelized Tariff	132 kV	220 kV	500 kV
Capacity Charge			
Debt Principal Repayment - Foreign	0.2124	0.1836	0.1388
Debt Interest Payment - Foreign	0.1359	0.1175	0.0693
Debt Principal Repayment - Local	0.0018	0.0015	0.0011
Debt Interest Payment – Local	0.0076	0.0066	0.0046
Fixed O&M	0.1828	0.1448	0.0916
Insurance tariff	0.0547	0.0484	0.0334
ROE	0.1479	0.1278	0.0924
Total Capacity Charge (PKRs.)	0.7431	0.6302	0.4311

Total Capacity Charge (80% LF)	0.9288	0.7878	0.5389
Energy Charge			
Variable O&M	0.0000	0.0000	0.0000
Total Energy Charge	0.0000	0.0000	0.0000
Total Base Tariff (PKRs.)	0.9288	0.7878	0.5389

7.12.1 Transmission Line Loading Factor (%) and Applicable Levelized Tariff (Rs. /kW/Hr.) Relationship

This section provides an analysis of interrelation between load factor (LF) and levelized tariff. The financial models developed by the Consultant for all three-voltage level T/L projects (132 kV, 220 kV and 500 kV) of PGC reflect that any decrease in LF is inversely related to per unit levelized transmission tariff as illustrated in **Figure-21** below. At 100% LF, the transmission tariff is Rs. 0.74, per kW per hour in case of 132 kV T/L, Rs. 0.63 in case of 220 kV T/L and Rs. 0.43 in case of 500 kV circuit. To avoid any overloading of T/L, the base case has been considered at 80% LF for each voltage line and thus corresponding tariff, under base case scenario, stands at Rs. 0.93 in case of 132 kV circuit, Rs. 0.79 in case of 220 kV T/L and Rs. 0.54 for 500 kV circuit.

Under the circumstances of any underutilization of the line by the party availing the wheeling service of PGC would have to pay relatively higher tariff. The below graph shows that a decrease in LF of each line is associated with corresponding increase in levelized tariff. A decrease of 50% in the LF almost doubles the applicable tariff for each voltage level transmission line, as compare to applicable tariff at 100% LF of the line, and thus stands Rs. 1.49 in case of 132 kV T/L, Rs. 1.26 in case of 220 kV T/L and Rs. 0.86 in case of 500 kV T/L. By further decreasing LF of the line, the applicable tariff continues to rise a LF of 10% results in a tariff of Rs. 7.43 for 132 kV T/L, Rs. 6.30 for 220 kV T/L and Rs. 4.31 for 500 kV T/L is reflected which is almost 10 times higher of the tariff applicable at 100% LF of the respective line. Regarding thermal power projects like gas, oil and coal fired power plants, the LF of the T/L would be high i.e. 60-80% due to firm supply all the time while in case of Renewable Projects like wind and solar power plants the LF of the lines will comparatively low i.e., 20-30% due to less availability factors and intermittency issues of RE plants. Subsequently, the estimated levelized transmission tariff for thermal based power plants would be low in comparison of applicable tariff for RE plants.

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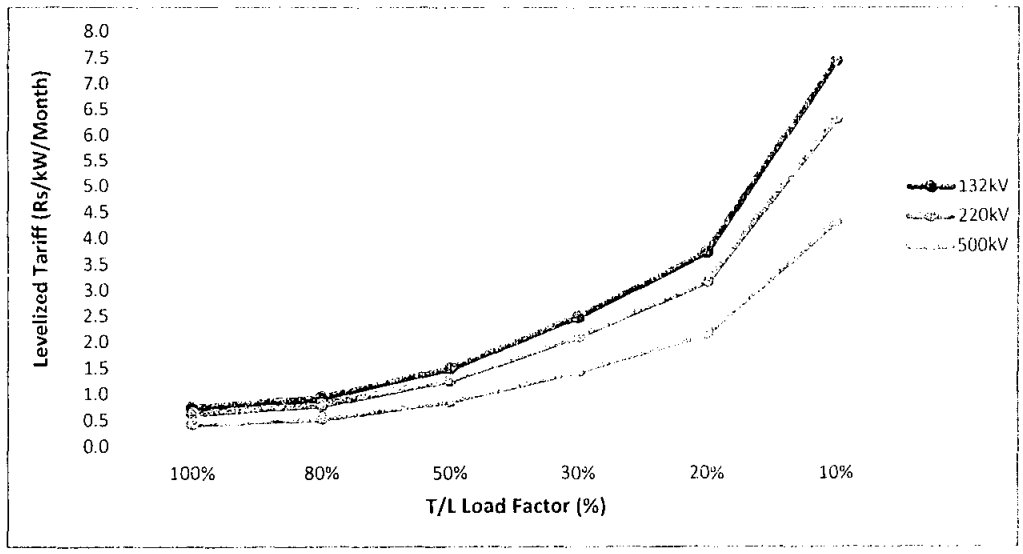
Figure-21: Loading Factor Impact on Levelized Tariff



7.12.2 Impact on Tariff

As a base case, Equity of 25%, Local Debt of 7.5% and Foreign Debt of 67.5% has been assumed. Any change in the ratio of local and foreign debt will have a direct impact on the tariff, IRR, NPV and Payback Period.

To present this, two scenarios have been assumed and results presented in the **Table-33** below.

Table-33: Impact on Tariff

Local & Foreign Financing Sensitivity	Total Project Cost	Tariff PKR/Kw	NPV (PKR)	IRR (%)	Payback (Years)
Local Debt 7.5%, Foreign Debt 67.5% (Base Case)	5,180,784,966	0.9288	1,396,132,153.44	5.5%	11.5
Local Debt 20%, Foreign Debt 55%	5,231,189,925	0.8762	235,252,763.18	4.40%	13.5
Local Debt 35%, Foreign Debt 40%	5,291,675,875	0.8145	(691,876,406.05)	6.40%	17.17
Local Debt 55%, Foreign Debt 20%	5,372,323,809	0.7347	(1,606,766,811.69)	2.80%	22
Local Debt 67.5%, Foreign Debt 7.5%	5,422,728,768	0.6863	(2,080,208,226.89)	1.00%	25.08

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Local Debt 67.5%, Foreign Debt 7.5%	5,422,728,768	0.6863	(2,080,208,226.89)	1.00%	25.08

7.13 Project Net Earnings

The Project net earnings are generated as a difference between income from its core operations and expenditures incurred to meet its operations and the other non-operating expenditures principally the Project financing cost. The results indicate a substantially viable Project as is demonstrated through the summary results of the income and expenditure flows in the periodical average results shown in **Table-34**.

Table-34: Projected Income Statement (25 year average)

PROJECTED INCOME STATEMENT (25 Years Average)	132 kV PKR Mn	220 kV PKR Mn	500 kV PKR Mn
REVENUE	699.77	3,160.36	10,748.74
OPERATING COSTS	319.34	1,406.57	4,541.70
O&M Costs	247.43	1,067.19	3,372.49
Insurance	71.91	339.38	1,169.21
EBITDA	**380.43**	**1,753.80**	**6,207.04**
Depreciation	234.60	886.72	2,933.57
Other Income	-	-	-
Financing Fees	-	-	-
EBIT	**145.83**	**867.08**	**3,273.47**
Interest on Long term Debt	44.93	207.12	614.54
Interest on Short term Debt	-	-	-
Profit Before Tax	100.90	659.96	2,658.93
Taxation	13.47	87.14	348.04
Net Profit	**87.43**	**572.81**	**2,310.89**

7.14 Financial Analysis

7.14.1 Quantitative Assessment of the Project

In this section, a comprehensive analysis has been carried out of the Project to assess its economic and financial viability and to determine its feasibility with reference to various risks present and mitigation of such risks thereof. Different basis has been used, relying primarily on the results of the financial model.

Base Case Parameters and Financial Profitability Analysis

Free Cash Flows (FCF) and free cash flow to equity (FCFE) of the Project have been used to determine the key financial indicators of the Project and of the equity holders respectively. The financial model based on free cash flows, both for the Project and the investor, is provided separately.

Using the free cash flow model, **Table-35** below shows the key financial indicators for the Project appraisal:

Table-35: Key Financial Indicators (Project)

Key Financial Indicators (Project)	132kV	220kV	500kV
Net Present Value (NPV – PKR)	1,396,132,153	3,797,225,441	18,758,412,236
Internal Rate of Return (IRR – %)	5.52	4.63	4.36
Project Payback Period (Years)	11.50	12.83	13.92

Net Present Value (NPV) of the Project is calculated without considering cash flows beyond project life if any in form of terminal value and are based on the net benefit arising from the Project after meeting all the liabilities and commitments as well as the cost of operations and other expenditures during the 25 years' life of the project.

Internal rate of return (IRR) is calculated at 5.52% for 132 kV, 4.63% for 220 kV and 4.36% for 500 kV.

Payback Period of the Project is estimated at 11.5 years for 132 kV voltage type, 12.83 years for 220 kV voltage type and 13.92 years for 500 kV from COD.

Project Start	July 1, 2022
Months	12
Time Till Company Setup and Construction Start	July 1, 2023
Months	12
Construction End Date	July 1, 2024
Planned COD	July 1, 2024

Please Note:
- Model is calculated using the lengthiest line from the 132KV Transmission Lines data available
- No indexations assumed in model and tariff calculated on straight line basis
- 132 KV transmission line gestation period assumed 1+1 years (1 year for project development and company setup) plus 1 year of actual construction period
- Tariff period has been assumed to be 25 years

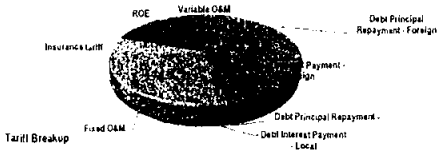
- This dashboard includes all assumptions used in the model
- Only change hard coded figures in this sheet
- No other changes should be made where numbers are calculated, otherwise model will not work efficiently

Line Selected as Reference	
	127

Key Model Inputs	
Assumed Upfront ROE (Subject to PPDB Discretion)	15%
Discount Rate for Levelized Tariff (WACC)	7%
Net Enterprise Value	1,396,132,153
Project Payback Year	11.50
Project IRR	5.5%
Net Equity Value	1,176,039,287
Equity Payback Year	9.75
Project IRR	12.6%

Technical Assumptions	
Gross Capacity	150
Capacity after Load Factor	120
Gross Capacity KWh	1,314,000,000
Monthly Capacity KWh	109,500,000
Capacity after Load Factor KWh	1,051,200,000
Actual Energy Transmitted MW	999,271
Actual Energy Transmitted KWh	8,753,611,507,200
Total Hours	8,760
T/L Loading factor	80%
Project Operational Life	25.00

Levelized Tariff - PKR/KwH	
Capacity Charge	
Debt Principal Repayment - Foreign	0.2124
Debt Interest Payment - Foreign	0.1359
Debt Principal Repayment - Local	0.0018
Debt Interest Payment - Local	0.0076
Fixed O&M	0.1828
Insurance tariff	0.0547
ROE	0.1479
Total Capacity Charge (100%)	**0.7431**
Total Capacity Charge (Utilisation)	**0.9288**
Energy Charge	
Variable O&M	0.0000
Total Energy Charge	**0.0000**
Total Base Tariff	**0.9288**

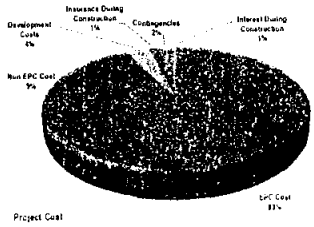


O&M Assumptions	
132KV Line - Cost Basis	3.0%
Fixed Management Fee (%age of PC)	1.0%

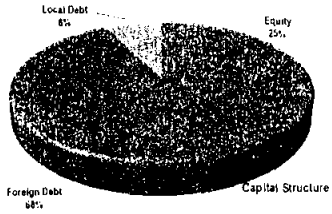
O&M Assumptions	
132KV Line - Cost Basis	143,818,543

Project Cost Assumptions	PKR
EPC Cost Percentage	90%
Total EPC Cost USD	4,314,556,278
Onshore EPC Cost USD	4,314,556,278
Offshore EPC Cost USD	0
Taxes on EPC (% of EPC)	0.00%
Taxes on EPC USD	0
Non-EPC Costs USD	479,395,142
Non EPC Costs USD	479,395,142
Residential Civil Works USD	0
Development Costs USD	183,690,280
Financing Fees & Charges USD	0
Consultant's Fees	50,000,000
Company Registration Charges	40,000,000
NEPRA Licensing Fee	10,000,000
Insurance During Construction (% of EPC)	1.50%
Insurance During Construction USD	71,909,271
Contingencies	2.00%

General Assumptions	
Annual Increase in O&M Tariff	0.00%
PKR USD Rate	200.00
Annual PKR Devaluation	5.00%



Financing Assumptions (USD)	
Project Cost	5,180,784,966
Equity	25.0%
Equity	1,295,196,242
Foreign Debt	
Foreign Debt % of Project Cost	67.5%
Foreign Debt	3,497,029,852
Base rate: 3 Month LIBOR	1.610%
Spread	4.000%
Total Cost of Foreign Debt	5.61%
Tenor (Years)	10.00
Payments per Annum	12.00
Monthly Installment	58,142,854
Local Debt	
Local Debt % of Total Debt	7.5%
Local Debt	388,558,872
Base Rate	14.540%
Spread	3.500%
Total Local Debt Cost	18.04%
Three Months' KIBOR	14.54%
Spread	3.50%
Total Local Debt Cost linked to KIBOR	18.04%
Tenor (Years)	10.00
Payments per Annum	12.00
Monthly Installment	7,011,265

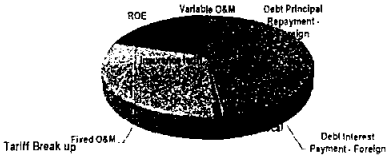


Debt Service Reserve	
Months	
Funding	Cash Flow
DSRA Amount USD	
L/C Cost Per Annum	1.00%
Annual Profit on Cash (3 month KIBOR less 3%)	11.54%

Key Model Inputs	
Assumed Upfront ROE (Subject to PPD	15%
Discount Rate for Levelized Tariff (WA	7%
Net Enterpise Value	3,797,225,441
Project Payback Year	12.83
Project IRR	4.6%
Net Equity Value	1,771,320,432
Equity Payback Year	11.83
Project IRR	10.6%

Technical Assumptions	
Gross Capacity	800
Capacity after Load Factor	400
Gross Capacity KWh	**7,008,000,000**
Monthly Capacity KWh	**584,000,000**
Capacity after Load Factor Kwh	3,504,000,000
Actual Energy Transmitted MW	3,382.411
Actual Energy Transmitted KWh	**29,629,922,112,000**
Total Hours	8,760
T/L Loading Factor	50.00%
Project Operational Life	**25.00**

Levelized Tariff - PKR/kWh	
Capacity Charge	
Debt Principal Repayment - Foreign	0.1836
Debt Interest Payment - Foreign	0.1175
Debt Principal Repayment - Local	0.0015
Debt Interest Payment - Local	0.0066
Fixed O&M	0.1448
Insurance tariff	0.0484
ROE	0.1278
Total Capacity Charge (100%)	**0.6302**
Total Capacity Charge (Utilisation)	**1.2604**
Energy Charge	
Variable O&M	0.0000
Total Energy Charge	**0.0000**
Total Base Tariff	**1.2604**



O&M Assumptions	
200Kv Line - Cost Basis	2.5%
Fixed Management Fee (%age of PC)	2.0%

O&M Assumptions	
200Kv Line - Cost Basis	565,629,355
Management Fee	477,676,291

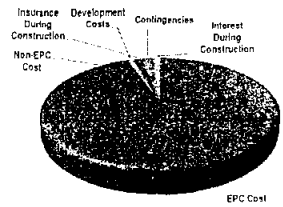
Project Cost Assumptions	PKR
EPC Cost Percentage	90%
Total EPC Cost USD	20,362,656,788
Onshore EPC Cost USD	20,362,656,788
Offshore EPC Cost USD	0
Taxes on EPC (% of EPC)	0.00%
Taxes on EPC USD	
Non-EPC Costs USD	2,262,517,421
Non-EPC Costs USD	2,262,517,421
Residential Civil Works USD	0
Development Costs USD	198,846,787
Financing Fees & Charges USD	0
Consultant's Fees	50,000,000
Company Registration Charges	40,000,000
NEPRA Licensing Fee	10,000,000
Insurance During Construction (% of EPC)	1.50%
Insurance During Construction USD	339,377,613
Contingencies	2.00%

Financing Assumptions (PKR)	
Project Cost	23,883,814,536
Equity	25.0%
Equity	5,970,953,634
Foreign Debt	67.5%
Foreign Debt % of Project Cost	16,121,574,812
Foreign Debt	1.610%
Base rate: 3 Month LIBOR	4.000%
Spread	5.61%
Total Cost of Foreign Debt	10.00
Tenor (Years)	12.00
Payments per Annum	175,841,472
Monthly Installment	7.5%
Local Debt	1,791,286,090
Local Debt % of Total Debt	14.540%
Local Debt	3.500%
Base Rate	18.04%
Spread	14.54%
Total Local Debt Cost	3.50%
Three Months' KIBOR	18.04%
Spread	10.00
Total Local Debt Cost linked to KIBOR	12.00
Tenor (Years)	32,322,467
Payments per Annum	
Monthly Installment	

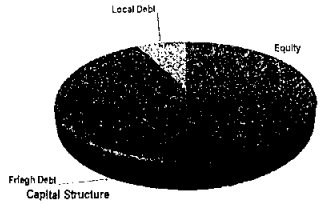
Debt Service Reserve	
Months	
Funding	Cash Flow
DSRA Amount USD	
L/C Cost Per Annum	1.00%
Annual Profit on Cash (3 month KIBOR less 3%)	11.54%

Sensitivity Triggers	
Project Cost	0.0%
Interest Rate	

General Assumptions	
Annual Increase in O&M	0.00%
PKR USD Rate	200.00
Annual PKR Devaluation	5.00%



Project Cost

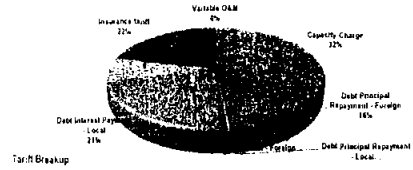


Capital Structure

Key Model Inputs	
Assumed Upfront ROE (subject to PP	15%
Discount Rate for Levelized Tariff (%)	12%
Net Enterprise Value	**18,758,412,236**
Project Payback Year	**13.92**
Project IRR	**4.4%**
Net Equity Value	**5,814,054,621**
Equity Payback Year	**13.00**
Project IRR	**9.3%**

Technical Assumptions	
Gross Capacity	1,000
Capacity after Load Factor	3,200
Gross Capacity KWh	**35,040,000,000**
Monthly Capacity KWh	**2,920,000,000**
Capacity after Load Factor Kwh	28,032,000,000
Actual Energy Transmitted MW	13,529,645
Actual Energy Transmitted KWh	**118,519,688,448,000**
Total Hours	8,760
T/L Loading factor	80%
Project Operational Life	**25.00**

Levelized Tariff - PKR/KwH	
Capacity Charge	
Debt Principal Repayment - Foreign	0.1368
Debt Interest Payment - Foreign	0.0693
Debt Principal Repayment - Local	0.0011
Debt Interest Payment - Local	0.0046
Fixed O&M	0.0916
Insurance tariff	0.0334
ROE	0.0924
Total Capacity Charge (100%)	**0.4311**
Total Capacity Charge (utilization)	**0.5389**
Energy Charge	
Variable O&M	0.0000
Total Energy Charge	**0.0000**
Total Base Tariff	**0.5389**



Tariff Breakup

O&M Assumptions	
Fixed Management Fee (%age of PC)	2.0%
500KV Line - Cost Basis	2.0%

O&M Assumptions	
Management Fee	1,727,192,316

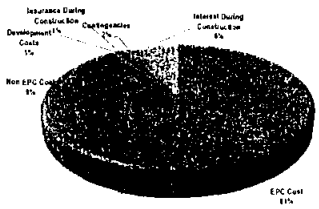
Project Cost Assumptions	USD	PKR
EPC Cost Percentage	90%	90%
Total EPC Cost USD	307,799,546	70,152,404,691
Onshore EPC Cost USD	307,799,546	70,152,404,691
Offshore EPC Cost USD	0	0
Taxes on EPC (% of EPC)	0.00%	0.00%
Taxes on EPC USD	0	0
Non-EPC Costs USD	34,199,950	7,794,711,632
Non-EPC Costs USD	34,199,950	7,794,711,632
Residential Civil Works USD	0	0
Development Costs USD	487,021	317,462,932
Financing Fees & Charges USD	0	0
Consultant's Fees	248,240	50,000,000
Company Realstration Charges	188,926	40,000,000
NEPRA Licensing Fee	49,855	10,000,000
Insurance During Construction (% of EP	1.50%	1.50%
Insurance During Construction USD	0	1,169,206,745
Contingencies	2.00%	2.00%

Financing Assumptions (PKR)	
Project Cost USD	86,359,615,785
Equity	25%
Equity USD	21,589,903,946
Foreign Debt	
Foreign Debt % of Project Cost	67%
Foreign Debt USD	58,292,740,655
Base rate: 3 Month LIBOR	0.131%
Spread	4.500%
Total Cost of Foreign Debt	4.63%
Tenor (Years)	10.00
Payments per Annum	12.00
Monthly Installment USD	607,817,456
Local Debt	
Local Debt % of Total Debt	7.5%
Local Debt USD	6,476,971,184
Base Rate	14.540%
Spread	3.500%
Total Local Debt Cost	18.04%
Three Months' KIBOR	14.54%
Spread	3.50%
Total Local Debt Cost linked to KIB	18.04%
Tenor (Years)	10.00
Payments per Annum	12.00
Monthly Installment USD	116,872,279
Cost of Equity	15%
WACC	6.93%

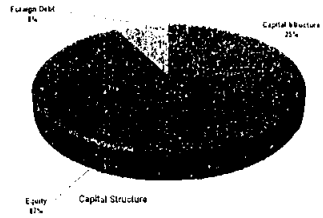
Debt Service Reserve		
Months		
Funding	Cash Flow	Cash Flow
DSRA Amount USD	0	
L/C Cost Per Annum	1.00%	1.00%
Annual Profit on Cash (3 month KIBOR	11.54%	11.54%

Sensitivity Triggers

General Assumptions	
Annual Increase in O&M Tariff	0.00%
PKR USD Rate	200.45
Annual PKR Devaluation	5.00%



Project Cost



No. PGC/ 08/2023
PUNJAB GRID COMPANY
ENERGY DEPARTMENT
1st Floor, Irrigation Secretariat,
Old Anarkali, Lahore
(Ph: 042-99213877 Fax: 99213875)

Dated: 20/ 01 / 2023

RESOLUTION PASSED BY THE BOARD OF DIRECTORS OF M/S PUNJAB GRID COMPANY (PGC) (THE "COMPANY") ON JANUARY 17, 2023.

That the Board of Directors of the M/s Punjab Grid Company was convened on 17th January, 2023 at the Energy Department, Government of Punjab, Lahore.

That the Board of Directors in its 1st meeting resolved as under:

"RESOLVED, that the Miss Saniya Awais, the Chief Executive Officer of the Company, be and is hereby authorized to file petition, sign all necessary documents, pay necessary fee, appear and file petitions, responses, applications and plead before the NEPRA Authority and do all necessary and incidental acts for processing, filing and completion of petition / application for the grant of PGC license and make such other representations which are required for grant of PGC license to the Company as Provincial Grid Company (the "**Petition**") including all supporting documents;

FURTHER RESOLVED, that Barrister Asghar Khan, of Lincolns Law Chamber, be and is hereby authorized ("**Duly Authorized Representative**") for and on behalf of the Company to file petition, sign all necessary documents, pay necessary fee, appear and file petitions, responses, applications and plead before the NEPRA Authority and do all necessary and incidental acts for processing, filing and completion of petition / application for the grant of PGC license and make such other representations which are required for grant of PGC license to the Company as Provincial Grid Company".

Given under my hand on 20th day of January 2023 at Lahore.

PUNJAB GRID COMPANY
Government of the Punjab

Raja Mahmood Subhani
Company Secretary
Punjab Grid Company

BEFORE THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ISLAMABAD

Petition No. _____ / 2023

PUNJAB GRID COMPANY LIMITED

APPLICANT / PETITIONER.....

PETITION FOR TRANSMISSION LICENCE FOR PROVINCIAL GRID COMPANY PURSUANT TO SECTION 18A OF THE NEPRA ACT

AFFIDAVIT

I, **Ms. Saniya Awais duly authorized representative of Punjab Grid Company Limited,** do hereby solemnly affirm and declare that the contents of the accompanying Petition along with all annexed documents are true and correct to the best of my knowledge and belief and nothing has been concealed therefrom.

PUNJAB GRID COMPANY ★ Government of the Punjab ★

DEPONENT

VERIFICATION

Verified on oath at Islamabad on 19th January, 2023 that the contents of the above affidavit are true to the best of my knowledge and belief nothing has been concealed or suppressed.

PUNJAB GRID COMPANY ★ Government of the Punjab ★

DEPONENT

Lincoln's Law Chamber™
Corporate Office: 22nd F-Floor, Beverley Center, Blue Area, Islamabad
Business Center : 22nd M-Floor, Beverley Center, Blue Area, Islamabad

No. LLC/2023/NEPRA-PGC/01

17th February, 2023

Mr. Iftikhar Ali Khan
Additional Director General
NEPRA
NEPRA Tower, Ataturk Avenue
G-5/1, Islamabad

Subject: **APPLICATION FILED BY PUNJAB GRID COMPANY FOR GRANT OF PROVINCIAL GRID COMPANY**

Dear Sir,

1. We refer to the NEPRA Authority Letter No. NEPRA/R/LAT-100/PGC/1354 dated 31st January, 2023 wherein NEPRA has informed that certain additional information / documents are required under Regulation 3 of NEPRA (Application, Modification, Extension and Cancellation) Procedure Regulations, 2021 (the **Regulations**).

2. While the detailed para-wise response is set-out as below, it informed that the requirements for the Provincial Grid Company are different to the existing transmission companies with established infrastructure as Provincial Grid Company is a newly established entity to which requirements of operational transmission companies cannot be made applicable and the projects to be undertaken by a Provincial Grid Company will be reflected in its investment plan and tariff requirements etc:

S/N	NEPRA COMMENTS	PGC RESPONSE
1.	Certified copies of Annual Reports of the Company as required pursuant to Regulation 3(4)(c)(i)(C) of the Regulations.	The Punjab Grid Company (**PGC**) is newly established and incorporated with effect from 3rd January, 2023 before SECP and hence requirement of certified copies of annual reports is not applicable.
2.	The last annual return of the Company submitted in compliance of Section 130 of the Companies Act 2017 as required pursuant to Regulation 3(4)(c)(ii) of the Regulations.	The PGC is newly established and incorporated with effect from 3rd January, 2023 before SECP and hence requirement of last annual return is not applicable.

3.	Evidence of cash balances held in reserve by the applicant along with bank certificates required pursuant to Regulation 3(4)(d)(i) of the Regulations.	The PGC is wholly owned by the Government of Punjab (**GoPb**) which has undertaken, guaranteed and committed to provide and commit sufficient funds as required from time to time in order to fulfill the minimum solvency requirements for grant of license as a Provincial Grid Company, within the Province of Punjab, under the NEPRA Act. (Guarantee of Minimum Solvency Requirements by GoPb is attached with the Petition as Annex – DD-1)
4.	Details of charges or encumbrances attached to the applicant's assets, if any as required pursuant to Regulation 3(4)(d)(ii) of the Regulations.	Presently the PGC has applied, through the Petition, for grant of license in respect of Provincial Grid Company within the Province of Punjab and there are no charges and encumbrances attached to the applicant assets. The assets of the PGC will be developed in the differing modes, as suggested in the Feasibility Study Report (Ref: PGC-FRT22-V01) (**Feasibility Study Report**), upon grant of the license.
5.	Latest audited financial statements of the applicant as required pursuant to Regulation 3(4)(d)(iii) of the Regulations.	The PGC is newly established and incorporated with effect from 3rd January, 2023 before SECP and hence requirement of last audited financial statements is not applicable.
6.	Expressions of interest to provide credit or financing along with sources and details thereof as required pursuant to Regulation 3(4)(d)(iv) of the Regulations.	There is no Expression of Interest to provide credit or financing and hence this provision is not applicable.
7.	Documents describing the net worth and the equity and debt ratios of the applicant, as on the date of the audited balance sheet accompanying the application, as required pursuant to Regulation 3(4)(d)(v) of the Regulations	The PGC is newly established and incorporated with effect from 3rd January, 2023 before SECP and hence requirement of last annual return is not applicable. Furthermore, the PGC is wholly owned by the GoPb which has undertaken, guaranteed and committed to provide and commit sufficient funds as required from time to time in order to fulfill the minimum solvency requirements for grant of license as a Provincial Grid

		Company, within the Province of Punjab, under the NEPRA Act.
8.	Profile of sub-contractors, if any, along with expressions of interest of such sub-contractors, as required pursuant to Regulation 3(4)(d)(viii) of the Regulations	Not Applicable at this stage of grant of license to PGC as a Provincial Grid Company under the NEPRA Act.
9.	Verifiable references in respect of the experience of the applicant and its proposed sub-contractors, as required pursuant to Regulation 3(4)(d)(ix) of the Regulations	Roles and responsibilities of key functionaries / competencies and Staffing / HR plan is described in the Feasibility Study Report and attached with the Petition as Annex – CC.
10.	Technical and financial proposals in reasonable detail for the operation, maintenance, planning and development of the facility or system in respect of which the license is being sought, as required pursuant to Regulation 3(e) of the Regulations	The technical and financial proposals for operation, maintenance, planning and development of the Provincial Grid as required by the NEPRA is submitted through Feasibility Study Report and attached with the Petition as Annex – E. Furthermore, information sought under Regulation 3(e) of the Regulations, it may be noted that technical proposal of setting up of PGC includes the following: (a) Analysis of existing and future power supply and demand scenarios (b) Role and ability of National Transmission and Dispatch Company (NTDC) and distribution companies, specifically in the Punjab province to efficiently provide transmission services for reliable power supply from generation sources to ultimate delivery points. (c) Pursuant to Section 18 of NEPRA Act, opportunities for the PGC to provide a robust and reliable transmission grid through its independent efforts and by complementing the efforts of NTDC and distribution companies. (d) Identification of opportunities in view of the NEPRA Amendment Act 2018 and plans to introduce competitive trading bilateral contract market in the power sector. Based on the anticipated potential projects as explained above, the phasing of projects for PGC is given in Table below.

Table: Phasing of Potential Projects for PGC

Phase-I –Short Term (1-3 years)				
Sr.	Project name	Voltage Level	Distance (Km)	Source
1	Reshma Power Plant to Sundar Industrial Estate	132 kV	4.5	96.96 MW
2	Reshma Power Plant to Orange Line Authority Lahore	132 kV	40	96.96 MW
3	Chishtian Solar Plant to Bahawalpur Industrial Estate	132 kV	149	250 MW
4	Chishtian Solar Plant to Multan Industrial Estate	132 kV	165	250 MW
5	Chishtian Solar Plant to Muzaffargarh Industrial Estate	132 kV	187	250 MW
6	Chishtian Solar Plant to Vehari Industrial Estate	132 kV	83	250 MW
7	Chishtian Solar Plant to Okara Industrial Estate	132 kV	129	250 MW
8	Chishtian Solar Plant to Chunnian Aqua Business Park	132 kV	166	250 MW

Phase-II –Medium Term (3-5 years)				
1	Taunsa to Multan Industrial State	132 kV	80	135 MW
2	Multan Industrial State to Vehari Industrial State	132 kV	80	135 MW
3	Taunsa to DGK Industrial State	132 kV	65	135 MW
4	Rojhan to RYK Industrial State	132 kV	40	300 MW
5	Rojhan to No Grid Areas	132 kV	10	300 MW
Phase-III –Long Term (5 years & above)				
1	H.Faqirian – Ludewala	220 kV	88	-
2	500 kV Nokhar – Gujranwala-II	220 kV	80	-
3	Chishtian – Vehari S/C at Lal Sohanra	220 kV	80	-
4	Sialkot New – Sialkot (Sahuwala)	220 kV	12	-
5	Sialkot New – Gujranwala-II	220 kV	36	-

		6	Qasimpur – Multan	220 kV	12	-
		10	Maira – Islamabad West	500 kV	130	-
		11	Sialkot New – Lahore North	500 kV	55	-
		12	Ludewala – Faisalabad West	500 kV	100	-
		13	T/L from Chakri to required load center from solar plant in future	-	-	100 MW
		14	T/L from Kalar Kahar to required load center from solar plant in future	-	-	100 MW
		15	T/L from Darya Khan to required load center from solar plant in future	-	-	100 MW
		16	T/L from Ali Pur to required load center from solar plant in future	-	-	100 MW
		17	T/L from Pindi Gheb to required	-	-	100 MW

		solar plant in future The financial proposal discusses that PGC in addition to constructing projects on its own may also involve private sector for expeditious development of transmission grid in the province. The feasibility report included three scenarios if the projects involve different transmission voltage levels i.e. 500kV, 220kV and 132 kV and worked out standard financial indicators and resulting tariffs.
11.	An affidavit stating whether the applicant has been granted any other license under the Act, as required pursuant to Regulation 3(g) of the Regulations.	The Punjab Grid Company (**PGC**) is newly established and incorporated with effect from 3rd January, 2023 before SECP and hence requirement of certified copies of annual reports is not applicable. Hence, the requirement of affidavit in this regard is not applicable.
12.	A duly authorized statement stating whether the applicant has been refused grant of license under the Act and, if so, the particulars of the refused application, including date of making the application and decision on the application, as required pursuant to Regulation 3(h) of the Regulations	The Punjab Grid Company (**PGC**) is newly established and incorporated with effect from 3rd January, 2023 before SECP and hence requirement of certified copies of annual reports is not applicable. Hence, the requirement of statement by the authorized in this regard is not applicable.
13.	Information required under Schedule-III (Regulation 3(4)(a)(A)(B)(c) in respect of Provincial Grid: i. System studies ii. Environmental and Social Soundness Assessment (ESSA) studies/reports iii. Information relating to: (i) Line lengths, starting point, termination point, year of completion (ii) Structures (type, number/km)	The technical information in respect of projects envisaged to be undertaken by the PGC including environmental and social impact assessment in studies / reports are set-out in detail in the Feasibility Study Report as attached with the Petition as Annex -E. Furthermore, it may be noted that the information under Schedule III of the Regulation will be available once PGC undertakes specific project(s). Presently a rather broad set of potential projects have been identified as part of the Feasibility Study Report which analyses various technical and financial aspects of overall working and viability of establishing PGC. It is foreseen that a number of steps will be involved before the PGC initiates construction of projects as follows:

			load center from solar plant in future			
		18	T/L from Hasil Pur to required load center from solar plant in future	-	-	100 MW
		19	T/L from Athram Hazrai to required load center from solar plant in future	-	-	100 MW
		20	T/L from Muzaffargarh to required load center from solar plant in future	-	-	100 MW
		21	T/L from Rangpur to required load center from solar plant in future	-	-	50 MW
		22	T/L from Fort Abbas to required load center from solar plant in future	-	-	50 MW
		23	T/L from QA Solar Park to required load center from	-	-	300 MW

	(iii) Line characteristics (iv) Insulators (v) Shield-wire (number, size) (vi) Compensation employed (series, Shunt, SVC) (vii) Communication systems (PLC, fiber optics, microwave) (viii) Conductor, type, current carrying capacity, circuit power transfer (ix) Grid station(s) involved: number, existing/new and details of the following: a. Scope, size, number of transmission circuits, in and out b. Type: indoor/outdoor, transformation/switching c. Arrangement scheme: breaker and a half, double bus d. Basic insulation level: kV e. Control and protection system f. Specification of equipment (breakers-type, re-closing mechanism, duty cycle etc. isolators, transformers-type, size, cooling system, tap-changer, and protection) g. Lightening arresters, shunt reactors, metering and instrumentation	(a) preparation of list of identified transmission lines projects, their categorization (projects to be developed in public mode and in PPP/BOOT mode) and obtaining approval thereof from BoD. (b) selection of transmission project(s), which are to be developed in public mode, conducting feasibility study to ascertain the technical and economic viability before development / implementation. (c) issuance of LoI to concessionaire to conduct feasibility study by itself in case of BOOT project(s) (d) obtaining approval from BoD for each feasible project. Therefore, project specific feasibility study will be done for every project and all the technical details including system studies, environmental and social soundness assessment studies, route surveys, tower design, transmission and grid systems will be evaluated. It is also highlighted that the Grid Code requires that detailed system studies will be conducted for every interconnection to be made with NTDC grid and it will be mandatory to share all technical characteristics by relevant parties; NTDC/Discos and PGC in the instant discussion. The most important stakeholder for setting up PGC and during its functioning will be regulator/ NEPRA. The requirement under the Act to be satisfied for its eligibility as a licensee and subsequent responsibilities during operations requires that PGC will maintain continuous interaction with NEPRA. In this respect the following minimum areas are identified; (a) petition for obtaining license from NEPRA and requirement to meet obligations contained in license; (b) filing of tariff petition including short to medium term plans for its operation and management (use-of-service charges) as a PGC where integration to the national grid is involved;

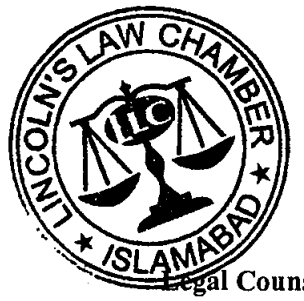
		h. SCADA and communication i. Information relating to metering, installation and testing facilities	(c) submission of regular operational performance reports to NEPRA; (d) submission of progress reports on its ongoing projects; (e) submission of its future plans before NEPRA; (f) providing inputs on NEPRA concept papers for developing regulatory regime and participation in conferences, hearings for promoting its position on key issues; (g) information sharing as desired by regulator; and (h) sharing of its rates and charges and other terms and conditions approved by NEPRA with public. It is further submitted that in order to streamline PGC's interaction with various stakeholder's specific frameworks have also been defined as discussed here: **Framework for Coordination between PGC and NTDC** 1. A Protocol/Agreement will be entered between PGC and NTDC for streamlining coordination for expansion of transmission network in the province. 2. Both parties will cooperate with each other by providing relevant information in respect of planning, design and implementation of transmission projects, which will include but not limited to the following: **Obligations of NTDC** NTDC shall be obliged to provide the following details to PGC:

		Projects under Construction (a) name and details of all Projects including technical specifications, length of the projects, starting and termination points in the national network and allied additions or alterations in network (b) scheduled and actual start dates. (c) if actual start dates are different than the scheduled dates, then reasons for delays by identifying any procedural constraints like delays in tendering process, non-availability of funds, etc. (d) scheduled and expected completion dates (e) if expected completion dates are different than the scheduled dates, then reasons for such delays. For instance, Right of Way issues, Force majeure events, other construction and implementation bottlenecks. (f) progress reports (g) progress reports will be shared with PGC for all relevant under construction projects. (h) project completion delays (time graded) (i) provide list of projects which have been delayed for more than 1 year **Existing System Details** (a) details about overloading of transmission lines and grid stations and other quality issues will be included. Similarly planning and design standards will be shared. **Projects Planning (future projects)** (a) NTDC while preparing transmission system expansion plans under the Transmission System Expansion Plan (TSEP), will share details with PGC of projects planned in the Punjab Province.

		The information will be prepared for short, medium and long terms and also required to include funding requirements and details of fund availability. **Obligations of PGC** PGC will provide the following details about its transmission projects: (a) technical information about Projects, location, scheduled completion, interconnection points if proposed to be connected with national grid or otherwise. (b) in case of single corridor where PGC intends to construct its transmission line prior to NTDC construction of transmission line, PGC shall share complete transmission line route survey details along with profiles to NTDC, so that both entities agree to optimized solution for the existing and future infrastructure. (c) PGC shall share its planning and construction information with NTDC and in case of reservations of NTDC, parties will work together to devise a workable solution acceptable to both. (d) in a corridor where PGC has already constructed transmission line and where NTDC also requires its transmission line PGC shall extend its support for a hybrid design so that multiple transmission circuits are accommodated. (e) PGC shall extend right-of-way support to NTDC. Similar coordination protocol will be followed with relevant DISCOS so as to have standardized construction and operation practices.

3. The aforesaid information is submitted for the consideration and perusal of the NEPRA Authority.

Yours Sincerely,



Barrister Asghar Khan
Legal Counsel / Authorized Representative
Punjab Grid Company