National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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Registrar

No. NEPRA/R/Advisor (CTBCM)/LAS-22/PAP(K.E)/ 7271-75 May 17, 2024

Chief Executive Officer,
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Subject: **Determination of the Authority in the matter of Power Acquisition Programme for FY 2024 - FY 2030 Submitted by K-Electric Limited (KEL)**

Enclosed please find herewith the Subject Determination of the Authority along with **Annex-I** (total 56 pages) in the matter of Power Acquisition Programme for FY 2024 - FY 2030 Submitted by K-Electric Limited.

Enclosure: As above

(Engr. Mazhar Iqbal Ranjha)

Copy to:

1. Secretary, Ministry of Energy (Power Division), 'A' Block, Pak Secretariat, Islamabad
2. Secretary, Cabinet Division, Cabinet Secretariat, Islamabad
3. Secretary, Ministry of Finance, 'Q' Block, Pak Secretariat, Islamabad.
4. Chief Executive Officer, Central Power Purchasing Agency Guarantee Limited (CPPA-G), Shaheen Plaza, 73-West, Fazl-e-Haq Road, Islamabad.

National Electric Power Regulatory Authority

Determination of the Authority in the matter of Power Acquisition Programme for FY 2024 – FY 2030 Submitted by the K-Electric Limited (KEL)

May 17, 2024

(A). Background

In compliance with section 32 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (XL of 1997) (the "NEPRA Act") read with regulation 12 of the NEPRA (Electric Power Supplier) Regulations, 2022 (the "Supplier Regulations") and regulation 6 & 7(3) of the NEPRA (Electric Power Procurement) Regulations, 2022, (the "Procurement Regulations"), KEL in its role as Supplier of Last Resort (SoLR) submitted an application on March 20, 2023 for the approval of its Power Acquisition Programme (the "PAP") for the period FY 2024 – FY 2030 before the Authority.

(B). Admission by the Authority

The Authority considered the PAP in its regulatory meeting and admitted the same on April 26, 2023, and further decided to seek comments from the general public and stakeholders. In this regard, notices were published in one (01) English and one (01) Urdu newspapers on May 18, 2023, to seek comments from the general public, interested/affected parties, and other stakeholders. Further, individual letters were also sent to relevant stakeholders soliciting comments on the matter for the assistance of the Authority.

(C). Comments of Stakeholders

In response to the above, the Authority received comments from only one (01) stakeholder i.e., Pakhtunkhwa Energy Development Organization (PEDO). The comments offered by PEDO are summarized in the following paragraphs.

(i). **PEDO** commented that the preparation of the PAP by KEL is in compliance with the requirements of the Procurement Regulations and is highly appreciated. It is a long-term plan of KEL to ensure the security of power supply with a minimum cost strategy and for long-range expansion of power generation, which is adequate for supplying the forecasted load within a set of prevailing policies and technical and socio-economic considerations. PEDO acknowledged that the PAP has considered the directives of the Government of Pakistan (GoP), as also iterated through the National Electricity Policy 2021 (NE Policy 2021), encouraging the development of power projects based on indigenous and renewable energy (RE) resources. It is of vital importance that new RE sources are procured with a focus on reducing the carbon footprint to address global warming and climate change.

In addition to the above, PEDO submitted that KEL is in active discussions with major hydro developers in Khyber Pakhtunkhwa and AJ&K to explore power

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acquisition through wheeling/CTBCM as a fallback option if the development of indigenous coal projects does not materialize. Furthermore, KEL is collaborating with PEDO to establish hydro projects in the Khyber Pakhtunkhwa province specifically for KEL's power procurement. A joint development group comprising representatives from both organizations has been formed to facilitate this collaboration. Several meetings have taken place where PEDO has proposed specific public and private hydel projects included in the Indicative Generation Capacity Expansion Plan 2022-23 (the "IGCEP 2022-31") that could be considered for power off-take by KEL. The PAP prioritizes providing affordable energy and places significant emphasis on integrating RE sources, thereby contributing to sustainable power generation. Additionally, by leveraging local fuel resources, distribution companies can enhance energy security and reduce dependency on external sources.

(D). Consultative Session with KEL

The Authority examined the PAP in detail and identified several issues that required discussion/deliberation. A professional-level discussion session was held with KEL on June 9, 2023, to deliberate upon these issues. The discussion issues included the PAP's compliance with the Procurement Regulations and the Market Commercial Code (MCC), alignment of the PAP's output with the approved IGCEP 2022-31, power and energy demand forecasts methodology considering seasonal variations, intermittency, and distributed generation, consideration of demand-side management measures, extension of projects with expired PPAs versus proposing new replacements, evaluation of transmission and evacuation arrangements, the rationale behind proposing certain projects through a cost-plus regime rather than competitive auctions, and the need to incorporate long-gestation hydro projects in the PAP. Additionally, issues pertaining to project cost evaluation, the tariff impact of the proposed PAP, and the need for revision or approval of the PAP by the Authority were also discussed. Furthermore, several clarifications and information were sought from KEL on the submitted PAP, along with a set of assumptions used for the tariff impact calculations and requisite information on transmission evacuation arrangements in specific formats for ease of processing the PAP. Based on this consultative session, the Issues of Public Hearing were framed.

(E). Proceedings of Public Hearing:

The notice of Public Hearing was published in the press on October 12, 2023, as well as on the official website of NEPRA. Further, letters were also sent to various government ministries, attached departments and other relevant stakeholders soliciting their comments on the Issues of the Public Hearing.

(2). The Public Hearing in the matter was held on October 19, 2022 at the head office of NEPRA in Islamabad in person as well as through video link wherein representatives of KEL, Industrial Associations and Chambers of Commerce, Central Power Purchasing Agency (Guarantee) Limited (CPPA-G)/Market Operator, National Power Control Centre (NPCC) of National Transmission & Despatch Company (NTDC)/System Operator, other interested stakeholders, and the general public participated and presented their point of view.

(3). The following paragraphs contain issue-wise discussions covering KEL's response and stakeholder comments, followed by an analysis by the Authority.

(i) Whether the PAP has been prepared in accordance with the NEPRA (Electric Power Procurement) Regulations, 2022 (the "Procurement Regulations") and market commercial code (the MCC)?

KEL submitted that its PAP is compliant with the Procurement Regulations and the MCC. Furthermore, as per the MCC, the Capacity Obligations (CO) for the preparation of the PAP are to be determined by the Market Operator. Accordingly, the CO for KEL included in the PAP are as determined by the MO.

CPPA-G as Market Operator submitted that the PAP has to be prepared as required under section 32 of the NEPRA Act, regulation 12 of the Supplier Regulations and in line with regulation 6 (2) of the Procurement Regulations which stipulates the following: "*The power acquisition programme shall be prepared by the supplier of last resort in line with the IGCEP, TSEP, network expansion plan(s) and approved investment programme of the concerned distribution licensee, demonstrating compliance with its capacity obligations determined in accordance with the Market Commercial Code.*"

However, KEL submitted the PAP in the absence of the Transmission System Expansion Plan (the "TSEP") and its investment plan. The evacuation of power from upcoming generation projects is of paramount importance. Prior to approving any future generation project, its power evacuation should be guaranteed, and system constraints should be removed to ensure the economic dispatch of the existing generation fleet. In addition, clause 5.8.4 of the NE Policy 2021 states that: "*Future procurement of electricity will be in accordance with the IGCEP and TSEP, pursuant to applicable policy / framework and regulatory stipulations*".

Moreover, KEL has proposed adding 2 x 330 MW local coal plants in FY-2027 and another 330 MW local coal plant in FY-2029. This amounts to a total capacity addition of 990 MW on the NTDC side of the network. Simultaneously, KEL has also initiated an agreement with the CPPA-G for up to 2,050 MW from the National Grid. Therefore, the total power to be evacuated from NTDC-KEL interconnections will be over 3,000 MW. However, no evacuation plan for this has been provided in the PAP. It is important to ascertain the evacuation plan for such projects along with the approval of the PAP.

Further, the CPPA-G submitted that the quantum of capacity in the PAP fulfills the COs determined by the Market Operator in accordance with the MCC.

Rejoinder of KEL: In response, KEL reaffirmed the alignment of the PAP with the approved IGCEP 2022-31 and explained that KEL's Investment Plan (KIP) submitted to the Authority for approval incorporates evacuation arrangements for proposed PAP projects and considers potential transmission augmentation needs in collaboration with NTDC. Additionally, KEL has assessed its interconnection requirements and included relevant investments in the KIP. Notably, regarding

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additions on the NTDC side of the network, no coal plants are currently included in the firm period (FY 2024 to FY 2026). However, KEL is currently under discussions with the GoP for power purchase from power plants in the NTDC system entailing the conversion of imported fuel-based units to local fuel, including Unit -1 of Jamshoro (660 MW). NTDC and CPPA-G have remained involved in all such discussions and meetings. The targeted capacity is already planned, and no additional investment will be required in this regard in the NTDC network, as also confirmed by NTDC in official meetings, and will be evacuated via enhancement of KEL's interconnection capacity, which is under construction. KEL's interconnection capacity, linked to overall transmission capacity as per agreement with NTDC and CPPA-G, is currently estimated at 2,600 MW and is planned to reach ~3,000 MW with proposed investment in the KIP. KEL submitted that its PAP fulfills key objectives, including CO under MCC, cost reduction through lower-cost plants, and system stability.

Observations/Findings of the Authority:

The Authority has noted that KEL has submitted a seven-year PAP spanning from FY 2024 to FY 2030, despite the requirement for a five-year plan as per Regulation 6 (1) of the Procurement Regulations, which states: *"a supplier of last resort shall prepare a rolling five-year power acquisition programme on an annual basis."* The Authority has thus considered the PAP submitted by KEL for the specified five-year period until FY 2028.

Regarding alignment with the IGCEP, a comparison between the IGCEP 2022-31 and the proposed capacity additions in the PAP has been made. While there are variations between individual years' capacity and timelines, the overall proposed capacity additions based on the CO in the PAP are aligned with the IGCEP 2022-31 for the planning horizon of FY 2024 – FY 2030. This issue is further discussed in the following paragraphs.

Concerning compliance with the CO, KEL is compliant for the period FY 2023 – FY 2027, as confirmed by the MO. However, due to the CO report's horizon not extending to FY 2028, compliance for that year cannot be confirmed. Notably, compliance status is not mandatory for FY 2028 as it falls within the indicative period.

Regarding the preparation of the PAP in line with the TSEP and other relevant plans, it is noted that TSEP is yet to be formally submitted by the NTDC. However, KEL's electric power evacuation arrangements for projects have been finalized, and investment plans for interconnection/evacuation arrangements have been approved by the Authority.

KEL is directed to coordinate with NTDC for the timely preparation and submission of TSEP to ensure evacuation arrangements for proposed projects are duly integrated with the NTDC power system and any strengthening with regards to the stability, flexibility and ancillary services are accounted for. The timely implementation of the

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KIP will ensure that evacuation arrangements for projects during the first three years are in place.

In view of the above, the Authority considers the PAP submitted by KEL to be in substantial compliance with the Supplier Regulations, the Procurement Regulations, and the MCC. Alignment with the TSEP requirement is relaxed in this instance due to the reasons detailed above. Further, KEL is directed to incorporate the evacuation arrangements for the proposed projects in the PAP in the upcoming TSEP.

(ii) **Whether the output of the PAP i.e., the firm and indicative procurement for the control period (FYs 2024-30) is in line with the generation capacity addition in the latest approved Indicative Generation Capacity Expansion Plan (IGCEP 2022-31) on year-on-year basis? In case of any deviations, what are the justifications and which document should take precedence to ensure least-cost procurement by the SoLRs?**

KEL submitted that IGCEP 2022-31 optimized the addition of 1,282 MW of renewables and 990 MW of baseload plants for the control period (FY 2024-30) in KEL's system, and this has been aligned in its PAP. Accordingly, there is no deviation in the capacity addition considered during the submitted period (FY 2024-30) between the PAP and IGCEP 2022-31. The breakdown of capacity addition during firm and indicative periods under IGCEP 2022-31 and PAP is given below:

Period	Renewables (MW)		Base Load – Local Coal (MW)	
	IGCEP	PAP	IGCEP	PAP
Firm Period (FY 24-26)	400	673	-	-
Indicative Period	882	609	990	990
Total	1,282	1,282	990	990

The variance in capacity addition during the firm period is mainly due to the optimization methodology of IGCEP, which considered the annual addition of a fixed block size of 200 MW of renewables in the KEL system. Considering that RFPs for projects with a cumulative capacity of 640 MW have been submitted for NEPRA approval, while 33 MW are proposed to be included under negotiated procurement, KEL has considered the addition of 673 MW of renewable energy (RE) projects during the firm period.

The timing change for the induction of RE plants from IGCEP facilitates the early displacement of expensive fuel in the KEL system through the aggressive addition of renewables, which would directly benefit consumers and ensure alignment with KEL's development plan for RE projects.

Moreover, KEL is also actively engaged with the Ministry of Energy (Power Division) for approval to purchase power from the 660 MW Jamshoro Power Company Limited (JPCL) Unit-1 after its conversion to local coal. This will not only reduce KEL's generation cost but will also cater to its future requirement for baseload capacity. KEL will submit its request for the Authority's approval once the GoP's

competent forum grants principal approval for the conversion of said power plant to local coal and the change in power off-taker to KEL.

Observations/Findings of the Authority:

The Authority observed that the proposed capacity addition in the PAP is overall in line with that of IGCEP 2022-31 for the planning horizon, i.e., FY 2024–FY 2030. However, since the Authority has been considering the PAP for five years in line with the requirements of the Procurement Regulations, there is a difference of around 230 MW between IGCEP 2022-31 and the PAP, as shown in the table below.

Fiscal Year	Local Coal	HPP	Solar	Wind	Total Capacity Addition	Cumulative Capacity Addition
IGCEP						
FY 24	-	-	-	-	-	-
FY 25	-	-	150	50	200	**200**
FY 26	-	-	150	50	200	**400**
FY 27	990	-	150	50	1,190	**1,590**
FY 28	-	-	150	50	200	**1,790**
PAP						
FY 24	-	-	-	-	-	-
FY 25	-	-	453	-	420	**420**
FY 26	-	-	88	132	220	**640**
FY 27	660	-	127	-	820	**1,460**
FY 28	-	-	-	100	100	**1,560**

As evident from the above data, the planned procurement for the firm years (FY 2024–FY 2026) appears relatively high, while it shows a lower figure for the subsequent indicative period (FY 2027–FY 2028). The Authority believes that the primary goal of the PAP is to ensure timely capacity enhancement during the firm period and lay the groundwork for the future procurement of generation plants in the indicative period, which will be further refined and firmed up in subsequent iterations of the PAP.

In view of the above, the Authority directs KEL to adjust the proposed capacity for the indicative period to align it with the IGCEP during future iterations of the PAP. Moreover, KEL is also directed to expedite the necessary approval from the GoP regarding the JPCL Unit-1 conversion to local coal and indicate the firm procurement and timelines of the said project in the upcoming PAP. For the current PAP, the Authority has decided to approve the procurement as proposed by KEL until FY 2028.

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(iii) **Whether the demand forecast used in the combined PAP is aligned with the forecasting methodology of KEL and Distribution Code, demand forecast used in the IGCEP 2022-31 as well as its network investment programmes? Also explain the basis for choosing the base case scenario of the IGCEP 2022-31 for preparation of PAP.**

KEL submitted that the demand forecast considered in its PAP is aligned with its network investment programme and considers an average annual growth rate of 2.4% in annual demand. This demand growth is based on a historical analysis of load growth and its relationship with GDP growth. The demand forecasting methodology adopted by KEL is in accordance with section 5.1 of the Distribution Planning Code (DPC 5.1).

Furthermore, it is understood that this is also aligned with the approach adopted by the XW-DISCOs, where demand forecasts are developed based on historical growth observed at the grid level. Additionally, the generation capacity optimized for KEL in the IGCEP 2022-31 is the same in all three scenarios (i.e., normal, low, and high demand).

Observations/Findings of the Authority:

The Authority has noted that KEL's demand forecast methodology relies on historical load growth projections while also considering macroeconomic factors like GDP growth. This differs from the Power Market Survey (PMS) methodology utilized by XW-DISCOs. In this regard, it is relevant to mention that, according to DPC 5.1 of the Distribution Code, distribution companies can employ any reasonable and justifiable method, supported by reliable data and relevant indices.

Upon examination, it is evident that KEL's methodology is pragmatic and closely resembles the approach used by NTDC for IGCEP preparation. Additionally, the demand forecast in the PAP aligns with KEL's network investment program. Consequently, the Authority believes that the demand forecast methodology and its use in the PAP are aligned and consistent with Distribution Code requirements, IGCEP 2022-31, and network investment program. Furthermore, since the generation capacity optimized in IGCEP 2022-31 for KEL remains consistent across all scenarios, utilizing the base case is justified.

(iv) **Whether the impact of rooftop solar and captive generation has been considered during preparation of the PAP and what is the expected impact of the same on the proposed PAP?**

KEL submitted that it has considered the impact of solar photovoltaic (PV) penetration in its projections of base energy demand. Furthermore, as submitted during the Public Hearing, KEL has also taken into account the impact of captive generation on their demand forecasts, with around 344 GWh of captive demand forecasted to be coming onto the grid by FY 2030.

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Market Operator submitted that for KEL, the net-metering/rooftop solar quantum has been subtracted from the overall demand forecast, and the rest of the generation is planned based on the residual demand. Therefore, no net-metering generation has been selected for KEL in IGCEP 2022-31. However, IGCEP 2022-31 selects net-metering generation differently for XW-DISCOs. The demand forecast of the XW-DISCOs is taken as is, and the net-metering quantum is added as generation. This is why we see net metering being selected separately for XW-DISCOs in IGCEP 2022-31.

Market Operator added that the same technique should be used for both KEL and XW-DISCOs, preferably using the method adopted for the XW-DISCOs in IGCEP 2022-31. This is because modeling net metering generation in the IGCEP would capture its generation behavior more accurately and improve the overall process.

Rejoinder of KEL: In response to the observations of the Market Operator, KEL submitted that while the approach for adjusting rooftop solar has already been considered and approved by the Authority in IGCEP 2022-31, it is believed that both methods for demand adjustment can be used interchangeably for generation planning, and the results will not significantly impact the optimization, specifically in the KEL system. Furthermore, the performance of rooftop solar is not the same as that of utility-scale solar projects, and hence, the rooftop solar addition must be viewed in conjunction with the overall historical impact on demand. Therefore, the adjustment approach adopted by KEL is more suitable for generation planning as it accurately reflects the demand trends of SoLR and adjusts the supply requirement for better planning and compliance with the provisions of the MCC and Procurement Regulations.

Observations/Findings of the Authority:

The Authority notes that KEL has duly considered the impact of rooftop solar generation, net metering, and captive generation in its PAP. Consequently, the demand was adjusted accordingly from a base demand growth of 2.4% to a growth

DEMAND & SENT-OUT GROWTH	FY-23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	CAGR
Base Demand (GWh) A	**21,490**	**22,015**	**22,554**	**23,105**	**23,670**	**24,249**	**24,842**	**25,450**	2.4%
Captive Induction (GWh) B	119	297	305	312	320	328	326	344	
Demand including Captive (GWh) C=A+B	**21,609**	**22,313**	**22,859**	**23,417**	**23,990**	**24,577**	**25,178**	**25,793**	2.6%
Solar Disruption (GWh) D	(247)	(477)	(700)	(931)	(1,175)	(1,445)	(1,733)	(2,050)	
Demand after Disruptions (GWh) E = C+D	**21,361**	**21,836**	**22,158**	**22,487**	**22,815**	**23,132**	**23,445**	**23,744**	1.5%
Technical Loss Savings (GWh) F	-	(9)	(50)	(90)	(135)	(179)	(227)	(275)	
Demand (GWh) G = E + F	**21,361**	**22,827**	**22,110**	**22,400**	**22,687**	**22,964**	**23,234**	**23,491**	1.4%
Load Shed %	12.0%	8.7%	7.0%	6.0%	5.3%	4.9%	4.4%	4.1%	
Load Shed (GWh) H	2,554	1,895	1,552	1,348	1,210	1,116	1,026	951	
Total Sent-Out (GWh) I = G + H	**18,807**	**19,932**	**20,558**	**21,052**	**21,487**	**21,848**	**22,208**	**22,539**	2.6%

rate of 1.4% by FY 2030. It is, however, important to note that KEL plans to reduce load shedding (as a percentage of demand) to 4.1% by FY 2030 and bring load-shedding-exempt feeders to 95% by FY 2030, which will increase the total sent outs to a compound annual growth rate (CAGR) of 2.6%, as depicted in the following table.

Regarding the observations of CPPA-G about using a similar methodology for XW-DISCOs and KEL, the Authority considers that both approaches have their advantages and disadvantages. As such, no preference can be given to one approach over the other unless a significant advantage of one method is clearly established. Therefore, the Authority believes that both approaches can be employed unless one demonstrates clear superiority over the other.

However, KEL is directed to provide the demand forecast based on a time-series/bottom-up approach, as adopted by XW-DISCOs, for comparative analysis in the upcoming PAP.

(v) **Whether the capacity obligations prepared by the CPPA-G as market operator during the test-run period should be considered for approval of the PAP or otherwise?**

KEL submitted that the PAP has been prepared in accordance with the CO determined by the Market Operator and is therefore in compliance with regulatory requirements. Furthermore, it may be noted that the total capacity additions assumed by KEL in its PAP are consistent with the generation capacity additions outlined in the approved IGCEP 2022-31.

Given that the difference between the contracted capacity and the CO identified by the Market Operator is not material, the additional contracted capacity will account for contingent events. These include, but are not limited to, a shortfall in supply from the National Grid, delays in commissioning timelines of planned projects, unforeseen outages of generation units, and fuel supply constraints (if any).

Market Operator submitted that considering the CTBCM is under trial run and the Authority's decision is pending on the recommendations in the final test run report which proposes some changes in the MCC, therefore, the proposed changes, if approved, will affect the determination of CO.

Rejoinder of KEL: It was responded that, as per Regulation 6 of the Procurement Regulations, the SoLR is required to submit a PAP on an annual basis, which shall include the CO as determined by the MO. The CO report enclosed with KEL's PAP for FY 2024-2030 was in compliance with the requirements of the said regulations. Accordingly, the PAP is based on the CO as determined by the Market Operator in accordance with the requirements of the Procurement Regulations.

Observations/Findings of the Authority:

The Authority has noted that during the test-run period, the Market Operator identified several amendments to the MCC, including changes in the mechanism for

preparing the capacity obligations report, which serves as a key input for the proposed PAP as mandated under Regulation 6(2) of the Procurement Regulations. Consequently, the proposed amendments to the MCC, submitted to the Authority along with the final test-run report of the CTBCM, may alter the output of the PAP, a fact also corroborated by CPPA-G in their aforementioned comments.

However, compared to XW-DISCOs, the impact of these changes may not be as significant for KEL, given that the quantity being proposed by KEL is considerably lower than that of XW-DISCOs. In this regard, the capacity obligations, as determined by the Market Operator based on the proposed amendments to the MCC, are likely to have an impact of less than fifty (50) megawatts on KEL's PAP, according to discussions with the Market Operator team. Therefore, the Authority has considered the PAP based on the test-run capacity obligations and further directs KEL to adjust and update the forthcoming PAP as necessary, in accordance with the approved CO methodology.

(vi) Whether it is prudent to allow the extension of contracts of projects whose PPAs have already expired as proposed by KEL in the PAP or new projects be proposed to replace such projects? Has there been any financial and technical assessment study conducted to justify the same?

KEL submitted that it expects an increase in supply from the National Grid after the commissioning of the KKI Grid. The KKI Grid is currently expected to be commissioned by the end of June 2024 to meet the peak summer demand. To cover any generation shortfall until the energization of the KKI Grid, it is essential to arrange a reliable supply and meet the projected power demand in the KE system before the increase in supply from the National Grid. Considering this contingency requirement, KE has proposed extensions in the following plants:

(i) Extension in PPA with Tapal having 123 MW capacity.

(ii) Extension in PPA with Gul having 128 MW capacity.

(iii) Extension in retirement dates of BQPS-1 Unit 1 and 2

Given the above, KEL requested that the PPA/useful life of these plants be extended until the completion and energization of the KKI Grid. KE further highlighted that these are the only available options until the commissioning of the KKI Grid and do not require any further technical assessment as they are already connected to its network. Additionally, these plants will be operated as per the Economic Merit Order.

Market Operator submitted that as per regulation 33 (2) of the Procurement Regulations, any extension of a legacy contract PPA is subject to optimization under IGCEP. Therefore, if the IGCEP suggests the extension of a particular power plant on a least-cost basis, then the extension be granted.

Rejoinder of KEL: The comment aligns with the Procurement Regulations. Accordingly, KE has followed the regulations for the extension, inclusion, and optimization of legacy contracts.

Observations/Findings of the Authority:

The Authority is of the view that considering fuel availability constraints, KEL foresees that the Tapal and Gul Ahmed Independent Power Producers will be required to meet consumer demand in the summer seasons until FY 2024. Therefore, KEL requested positive consideration for the extension of these plants, which would operate at peak times in accordance with the Economic Merit Order (EMO) and on a take-and-pay basis. It is noted that the requested extension for Tapal and Gul Ahmed is on a take-and-pay tariff basis and the operation of these plants may be necessary to avoid load shedding. Therefore, the proposal is accepted/approved, as the Authority has already determined the tariff for their operation. Furthermore, KEL is directed to ensure fuel arrangements for its efficient plants to avoid relying on such costly options.

In its post Public Hearing submissions, KEL has also requested an extension in the retirement dates of Unit 1 and Unit 2 of BQPS-1. In this regard, the Authority has observed that the proposed extension was neither part of the original submissions in the PAP nor raised by KEL during the Public Hearing. In view of the said, the subject submission requires proper petition and due diligence regarding the merits/demerits of extension and its justification through CO and optimization in IGCEP. Therefore, the Authority has decided that any extension of BQPS-1, if required, shall be justified in the upcoming PAP or a separate request by KEL.

(vii) Whether the availability of transmission/evacuation arrangements for all projects envisaged in the PAP have been considered during preparation of PAP and are part of network investment programmes of the KEL under approval at NEPRA?

KEL submitted that the availability of transmission/evacuation schemes for all projects proposed in the PAP has been accounted for, as detailed below:

Project	Transmission Scheme
150MW UBB	Evacuation is considered through a 132 kV transmission line from Hub and Bela sites.
270 MW GoS	Evacuation through 220 kV transmission line connected to Surjani Grid Station; is part of approved KIP.
330MW Thar Coal Plant	Evacuation has been considered as a wheeling arrangement through NTDC system.
Uzghor 82MW	
Candidate Renewables (427MW)	Evacuation through proposed Gharo/Wind corridor grid

Candidate Local coal (660MW)	Option for a coal plant to be finalized – in case this capacity would be outside Karachi, it will be managed through wheeling from NTDC system via KEL-NTDC Interconnections.
Negotiated Solar – 33 MW	Evacuation through 11kV line
Dhabeji Site Neutral (220 MW)	Evacuation through 220kV line connected to Dhabeji Grid Station – Arrangement to be finalized upon award of Project.

In addition, a detailed transmission plan, which is part of KE's Investment Plan and includes the aforementioned transmission schemes, along with the required technical and transmission studies performed by the Consultant, has been submitted to the Authority for approval. Based on this, it is evident that the reliable evacuation of power from the planned projects will be available, subject to timely approvals by the Authority.

NTDC as System Operator submitted that the interconnected national power system has a fundamental mismatch between baseload demand and baseload generation capacity. Baseload demand is approximately nine (9) GW, whereas baseload supply from just coal and nuclear power stations exceeds ten (10) GW. Additionally, there are must-run hydroelectric, solar, wind, and local gas-based power plants that need to be considered. In order to reduce the Power Purchase Price (PPP), the single most important action that should be taken is to increase baseload demand.

Furthermore, it was stated that KEL, which is currently drawing 1,100 MW from the NTDC network as baseload, can potentially increase its draw to 2,600 MW once the Dhabeji and KKI grid stations are commissioned. Therefore, it is in the national interest that KEL fully avails the increased interconnection capacity, thereby increasing the NTDC baseload by 1.6 GW, rather than wheeling electric power from new power plants. Increased consumption of southern generation will also enhance network stability.

Additionally, KEL is required to provide operating reserves from its generating units in compliance with the Grid Code. As per the Operating Reserves Policy submitted by the System Operator on October 31, 2023, KEL would need to contribute its share of operating reserves in proportion to its demand. If KEL is unable to contribute the requisite operating reserve from its generators, the System Operator will provide the reserve from other generating units and charge KEL accordingly.

Moreover, KEL has stated in its PAP that it intends to wheel power from the 82 MW Turtonas-Uzghor Hydropower Project (TUHPP) and 330 MW Siddiqsons Energy Limited (SEL) through the NTDC network. With respect to TUHPP, the available transmission network capacity in Chitral is already fully allocated to 108 MW Golan Gol HPP, 68 MW Lavi HPP, and 40 MW Koto HPP. Therefore, in order to wheel power from TUHPP, KEL will have to arrange transmission interconnection from

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TUHPP to the nearest point in the NTDC network, which is the Chakdara 220 kV grid station.

Rejoinder of KEL: KEL in its response submitted that the interconnection capacity and drawl have been covered in the initialed Interconnection Agreement (ICA)/Power Purchase Agency Agreement (PPAA) signed between KEL and NTDC/CPPA-G. As per the initialed ICA/PPAA, NTDC/CPPA-G are obliged to supply KEL power up to the capacity of KEL's interconnections with NTDC and wherein, supply up to 1,000 MW will be supplied on a firm basis which shall not be curtailed due to any reason other than force majeure events and emergencies, while supply over and above the firm 1,000 MW will be on a pro-rata basis at par with XW-DISCOs. Therefore, KEL has considered 2050 MW from National Gird in its PAP.

Regarding operating reserves, KEL responded that it has not yet received the Operating Reserves Policy and requested the System Operator to share the draft policy for review and comments. Moreover, relevant requirements regarding operating reserves should be shared with KEL and also incorporated into the SOP for central dispatch, which is currently under discussion between the parties. In addition, it was replied that KEL is coordinating with relevant stakeholders including but not limited to Private Power and Infrastructure Board (PPIB) to determine the possible power evacuation option for TUHPP. Additionally, the project is scheduled for commissioning by FY-2029. Therefore, KEL and the relevant stakeholders (including WAPDA and NTDC) will mutually devise the most effective evacuation scheme in a timely manner.

Observations/Findings of the Authority:

The Authority has observed that in terms of regulation 6(2) of the Procurement Regulations, PAP is required to be prepared, inter-alia, in line with the TSEP, network expansion plans and approved investment programmes of the concerned distribution licensee. In this regard, it has been noted that the availability / evaluation of evacuation schemes for projects in the three-year firm period has been accounted for while proposing the projects in the PAP. Furthermore, KEL does not currently foresee any delay in the evacuation arrangements and the project costs for evacuation arrangements have already been approved by the Authority in the KIP. Further, KEL has submitted a performa confirming the availability of evacuation arrangements for the proposed projects of PAP. Therefore, the Authority is of the opinion that the evacuation arrangements for the projects during the first three years, i.e., firm commitment projects, will be in place.

Regarding the TSEP, the System Operator highlighted during the Public Hearing that its preparation is in progress and the earliest submission of the same may not be possible before the end of the 3rd quarter of FY 2024. In this regard, KEL is directed to coordinate with the relevant licensees especially NTDC as the System Operator and transmission network operators, for timely preparation of TSEP to ensure that evacuation arrangements for the proposed projects requiring interconnection and

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evacuation arrangements from the NTDC are planned and implemented in a timely manner aligned with projects timelines of PAP.

It is also important to highlight that KEL has informed that currently a study is being conducted to ascertain the interconnection capacity of the NTDC-KEL network. After completion, the actual interconnection/transfer capacity will be ascertained. In this regard, KEL is directed to expedite the said study in coordination with NTDC and conclude the requirements of reserves and ancillary services required by the KEL system.

Regarding the comments of the NTDC as System Operator, the Authority directs NTDC to ensure that the issues it raised are duly addressed during preparation of the TSEP and recommendations are accordingly submitted for consideration of the Authority. Further, the Authority directs KEL to ensure the submission of evacuation arrangements for proposed projects in the future iterations of the PAP on the Authority's reporting format already shared with the KEL during the processing of the current PAP and enclosed as part of this determination.

Additionally, KEL is directed to conduct a detailed technical study through a firm of international repute, proposing the redressal and treatment of any potential impact and investments arising due to the induction of RE and baseload plants with regards to the provision of system reserves, flexibility, stability, and ancillary services. The study and redressal proposals shall be submitted to the Authority as part of the upcoming PAP.

(viii) What is the rationale behind proposing certain projects through the cost-plus and negotiated regime rather than competitive auctions? Further, Whether the proposal of 18 MW solar project from K-Solar, which is a wholly owned subsidiary of KEL, through negotiated procurement justified and in accordance with the Procurement Regulations?

KEL submitted that for the firm period, all proposed projects are to be procured under the competitive bidding regime except for two projects connecting at 11 kV with individual capacities below 20 MW (15 MW GNL and 18 MW K-Solar). These projects have been considered under negotiated procurement in compliance with regulation 30 of the Procurement Regulations that allows negotiated procurement from small-scale generation connected directly to the distribution system at the distribution voltage. The land for these projects is already available and hence projects can be commissioned on a fast-track basis with the targeted COD by early FY 2025. The tariffs of these projects are competitive and will reduce KEL's basket price.

KEL submitted that it has proposed two new projects under negotiated procurement, which constitute only 33 MW out of the total 1,282 MW RE projects proposed under the PAP. This is a very small quantum of total additions submitted and will be inducted after necessary to ensure the least cost.

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The proposal for the 18 MW solar project from K-Solar is considered under negotiated procurement for the following reasons, (i). regulation 30 of the Procurement Regulations does not restrict KEL from making such a transaction; (ii). availability of multiple small land parcels within existing KEL grids, therefore K-Solar has offered to install a solar plant within the available area and connect at 11 kV voltage level; (iii). this facility will be established on a fast-track basis that will provide economic benefit to the consumers; (iv). all the terms of the contract and tariff will be subject to the Authority's approval and all the transactions will be in accordance with the relevant regulations.

Market Operator submitted that according to regulation 30 of the Procurement Regulations, negotiated tariff is allowed only in the cases where the generation plant is connected at distribution voltage level subject to the following conditions, (i). proposed project does not result in over contracting; (ii). the distribution system is adequate to receive the energy; (iii). the project reduces the overall power purchase price; (iv). impact of proposed power procurement results in a reduction in overall basket price. Moreover, regulation 9(a) of the Procurement Regulation states that where KEL is interested to participate as a generator over and above distribution voltage then such procurement should be subject to competitive auction which shall be conducted by the Independent Auction Administrator (IAA).

Rejoinder of KEL: The proposed projects under negotiated procurement do not fall under regulation 9 of the Procurement Regulations and have been submitted under regulation 30 of the said regulations and are in compliance with the criteria specified in the same.

Observations/Findings of the Authority:

The Authority is of the considered opinion that negotiated mode of tariff is allowed under regulation 30 of the Procurement Regulations subject to approval of the rates and terms and conditions for such procurement at the time of approval of the power purchase agreement for the said projects. Regulation 30 of the Procurement Regulations stipulates: "*where a supplier of last resort intends to procure electric power from a project connected or to be connected with distribution system at the distribution voltage on negotiated rates and where competitive auction is not feasible, such a project shall be separately identified in the power acquisition programme...*"

In addition, section 2.9 of the ARE Policy 2019 states that: "..T*o the maximum extent permitted by law and the licensing instruments, NEPRA will require that all procurements of AREPs by K Electric and the public utilities that may be privatized in the future will be done through competitive bidding, except only where a demonstrable case is made out to the satisfaction of NEPRA that competitive bidding will yield higher than directly negotiated or cost-plus tariffs set by NEPRA.*"

KEL has submitted that for the 15 MW GNL project, the land is available with the sponsor, the feasibility study has already been conducted, and the proposed location

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is near (around 6 km) the vicinity of the 11 kV Gharo grid, which will directly feed the load at reduced losses with improved voltage profile and grid stability. Therefore, the project can be commissioned on a fast-track basis. Further, the proposed tariff of 4.2 cents/kWh will lower KE's basket price.

Similarly, for the 18 MW K-Solar project, KEL has submitted that multiple small land parcels are available within existing grids. Therefore, K-Solar has offered to install a solar plant within the available area and connect at the 11 kV voltage level. Furthermore, this facility will be established on a fast-track basis, which will reduce the tariff and ensure overall economic benefit to the consumers.

It is also worth mentioning that during the public hearing, the Authority questioned KEL about its conflict of interest in negotiating the tariff with K-Solar, as it is an associated company of KEL. In this regard, KEL conveyed its consent that the tariff for K-Solar project may be negotiated directly by the Private Power and Infrastructure Board (PPIB) as the Independent Auction Administrator (IAA).

Considering there is not any reference of price discovery through competitive auctions due to the lack of successful competitive bidding for utility-scale solar projects in the country, it is challenging to determine if competitive bidding would result in lower tariffs than negotiated ones. However, it is worth noting that the proposed tariff of 4.2 cents/kWh is slightly higher than the reference tariff optimized in IGCEP 2022-31, set at 4 cents/kWh, which is subject to prudence checks by the Authority. It is also important to mention here that any project approved in PAP affirms its specifics like location, size and procurement mode, etc. and not the tariff. Therefore, there shall be separate submissions by KEL/GNL, and subsequent regulatory proceedings shall determine the prudent tariff for this project, pursuant to the applicable documents and negotiated tariff proposal submitted by KEL in the case of GNL.

Furthermore, the Authority directs KEL to evaluate the prudency of negotiated tariff proposal submitted by GNL based on prevailing equipment cost, combined with the cost of funds.

Moreover, given the submissions of KEL, the Authority has decided that KEL shall conduct a comprehensive evaluation and assessment of the negotiated tariff, considering the prevailing macroeconomic and market conditions. This shall include assessing the tariff proposal of the GNL, while considering the prevailing cost of modules and other equipment, the cost of funds and other parameters, as considered appropriate. Additionally, the assessment and analysis of displacement of expensive electricity shall also be carried out, to essentially check and confirm the basis on which this capacity was optimized in the IGCEP and included in the PAP.

KEL may use the lowest number obtained from any of the mentioned criteria as a benchmark for negotiation and prudency checks of the tariff. KEL has the authority to reject any tariff proposal found imprudent based on these criteria. If KEL accepts a negotiated tariff with the project company, the above assessments will be included

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in the tariff petition/application submitted to the Authority for approval. In case of K-Solar, tariff negotiations will be conducted jointly by KEL and PPIB as IAA, and the final negotiated proposal duly acknowledged by KEL and IAA shall be submitted to the Authority for approval.

In view of the above, the Authority has decided to allow procurement from above two projects through negotiated mode, with the condition that the negotiated tariff will undergo due diligence and prudency checks by the Authority at the time of regulatory approval, in accordance with the relevant regulations and applicable documents. The tariff negotiated with GNL by KEL, and K-Solar by KEL and IAA, will be subject to prudence checks for potential downward adjustment or rejection by the Authority.

(ix) Whether it is prudent to procure electric power over and above the capacity obligations compliance report as calculated by the market operator to ensure security of supply and alignment with the IGCEP for least-cost addition of electric power in the system?

KEL reiterated its submission as detailed in issue no. (v) above.

Market Operator submitted that the overall scheme of PAP is primarily prepared for 3 reasons, (i). fulfillment of CO under the MCC, (ii). cost reduction through the induction of lower variable cost plants, (iii). to ensure system stability and reliability. Therefore, it is understood that PAP can procure over and above the requirements of the CO.

Observations/Findings of the Authority:

The Authority considers that the CO report calculates the minimum capacity that an SoLR must have in contracts to meet its forecasted demand during the planning horizon. However, it does not consider the aspect of the least-cost addition of generation capacity. The Authority believes that the most effective method to determine the quantity of generation capacity needed to meet system demand at the least-cost principles is through the IGCEP. Therefore, if IGCEP proposes a generation mix at least-cost and it exceeds the number given in the CO report and any tariff impact analysis determines and proves that such additions shall ensure the consumer demand is served on a least-cost basis, affordable, and sustainable tariff on a long-term basis, then it shall be given preference.

Consequently, the Authority deems it prudent to allow the procurement of additional generation capacity beyond what is calculated in the CO report, provided that it is optimized at least-cost in the IGCEP, as the KEL has made the case and proved that the addition of such capacity has a positive impact on the basket price and consumer end tariff as demonstrated in Issue No. (x) of this determination.

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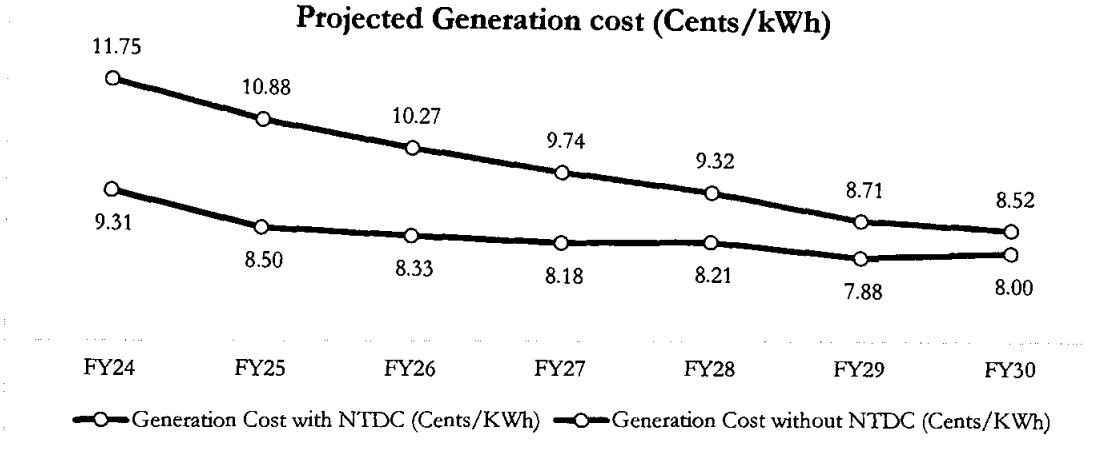
(x) **If the PAP approved as proposed, what is the forecasted financial/tariff analysis and impact of the proposed PAP on the end-consumer tariff as well as basket price of KEL? Are the projected costs of the power acquisition programme reasonable and consistent with industry benchmarks and best practices?**

KEL submitted that it forecasted basket price based on the recent fuel prices and macro-economic assumptions, and considering the expected energy and capacity mix after the addition of new projects as per the proposed timeline as depicted below:



As evident from the above, through planned capacity additions, KEL anticipates a reduction of around USD 1.3 cents/kWh (generation cost with NTDC) in its generation cost by FY-2030. However, it may be noted that the forecasted generation cost has been calculated based on certain assumptions as provided above and is subject to additions of projects as per their planned timelines, which are dependent on multiple factors including, but not limited to, timely approvals related to project development. Furthermore, the following assumptions have been considered for new projects, which are consistent with industry benchmarks.:

Name of Project/Technology	Total tariff assumed	Basis
Candidate solar projects	4 cents/kWh (levelized tariff)	In line with the approved IGCEP 2022-31
Candidate wind projects	4 cents/kWh (levelized tariff)	In line with the approved IGCEP 2022-31
Coal plant – 330MW (at mine mouth)	8.3 cents/kWh (first year tariff)	CAPEX cost aligned with the IGCEP 2022-31; assumption is $1,419/KW. Whereas coal price of $25 as per TCEB approved tariff has been used.
Candidate coal plants (other than mine mouth)	7.5 cents/kWh (first year tariff)	CAPEX cost of $1,244/KW has been taken and coal price of $25 as per TCEB approved tariff and transportation cost of $4.5 has been used.
UHPP Hydel	6.74 cents/kWh (first year tariff)	In line with the IGCEP 2022-31 (levelized tariff of 5.14 cents/kWh).

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Observations/Findings of the Authority:

The Authority is of the view that while KEL has projected potential benefits in the consumer end tariff, these are based on certain cost assumptions and macroeconomic conditions that may change over time. There is no proper tool available to ascertain the actual impact on consumer end tariffs, as the assumptions may vary. Further, the proposed tariff numbers are yet to be discovered and approved by the Authority and will be subject to regulatory proceedings. Therefore, they may be considered indicative at this stage for having an idea of the decreasing impact on consumer end tariffs.

Furthermore, the Authority considers that the proposed projects align with the IGCEP 2022-31, which has already been approved by the Authority and is based on least-cost generation optimization and capacity addition. In view of this, it can be considered that, prima facie, the proposed PAP will result in lower consumer end tariffs. However, it is crucial to note that approval of a project in the PAP must not be considered approval of its tariff. The tariff for each project shall be determined either through competitive auctions or negotiated modes of procurement, with the due regulatory process followed upon submission of bidding documents or tariff petitions by KEL as a SoLR or IAA, as the case may be.

The Authority considers it important to discuss KEL's proposal for procurement from local coal power projects under a cost-plus regime. In this regard, KEL submitted that due to issues relating to the development of new coal plants in Pakistan and limitations on securing financing for new projects, given the embargo imposed by Western lenders and the Chinese state government on financing coal power projects built outside of their countries, KEL is currently exploring several options for the addition of local coal capacity in its system. Its preferred option is to induct plants already under development. Resultantly, KEL has included SEL's project in its PAP, as it has already conducted all relevant studies, obtained a generation license and tariff from NEPRA, and is currently only waiting for the consent of NTDC and CPPA-G on the change in Power Purchaser to proceed further. Moreover, options for adding remaining local coal capacity are also being explored by KEL and will be brought for the Authority's approval once finalized.

Additionally, KEL has also shown its interest in procuring power from Unit-1 of the JPCL, by facilitating its conversion to 100% local coal after having the GoP approval. Unit-1 of JPCL already has an approved pre-feasibility tariff from NEPRA while its request for EPC stage tariff is currently with NEPRA. In case KEL's proposal for the purchase of power and facilitation with respect to the conversion of 100% local coal is accepted, the Authority will be requested for tariff modification based on local coal. This will be the first of its kind project, and if successful it can create a precedence template that can be followed for other imported coal projects having a capacity of 3,600MW, for their conversion to local coal. Since these projects are already at an advanced stage of project development with licence and tariff already granted by the Authority or in construction phase, these can be allowed

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for the cost-plus tariff, however the case shall be demonstrated by the KEL firming up projects' approval status of the GOP and their requirement established in the firm period through upcoming iteration of the PAP.

Regarding the above tariff assumptions provided by KEL for the projects proposed in the PAP, the Authority is of the considered opinion that since the scope of the PAP approval scope is limited to CO-based power acquisition and the process does not include a detailed tariff assessment for the proposed projects, therefore, the provided tariff assumptions have been considered as only indicative without any impact of the said assumptions on the detailed evaluation, assessment, prudency and reasonability checks to be made by the Authority at the time of the approval of tariff for each project through separate regulatory proceedings, in accordance with the applicable documents.

(xi) Whether interconnection connection agreement and power procurement agency agreement (PPAA) have been signed between KEL, NTDC/CPPAG regarding 2050 MW capacity considered in PAP by KEL from June 2024? For how many years PPAA terms is negotiated and firmed up? What is an alternative plan of the procurements for long-term horizon, in case the capacity contracted from the national grid is reduced or withdrawn?

KEL submitted that as per the initialed ICA/PPAA, NTDC/CPPA-G are obliged to supply power to KEL up to the capacity of KEL's interconnections with NTDC and wherein, supply up to 1,000 MW will be supplied on a firm basis which shall not be curtailed due to any reason other than force majeure events and emergencies, while supply over and above the firm 1,000 MW will be on a pro-rata basis at par with XW-DISCOs.

Furthermore, in line with the Ministry of Energy (Power Division)'s directives through letter dated September 01, 2023, KEL has also submitted an Indicative Generation Plan to the same, aiming to reduce reliance on the National Grid and lower KEL's basket price. Ongoing deliberations with relevant stakeholders on KEL's Indicative Generation Plan are in progress and will be subsequently submitted to the relevant forum for further directions and approvals.

Observations/Findings of the Authority:

The Authority has noted that the provisions of the NEPRA Act, NE Policy 2021, National Electricity Plan (the "NE Plan 2023"), Grid Code 2023, CTBCM regime, and other applicable documents obligate for one grid and one system operator for the central economic dispatch of the generators in the country and approval of the interconnection agreement(s) by the Authority. NTDC, CPPA-G, and KEL are directed to conduct a joint technical, dispatch, and financial study to justify the cost and efficiency-based expansion of NTDC and KEL systems for the unconstrained power flow between the two systems.

It is noted that KEL's cumulative future planned interconnection capacity is 2,850 MW as per the approved investment plan. The recent system assessment report by

the NPCC and their comments given in the matter also recommend that the increased tie-lines capacity with KEL would increase the capacity factor for some of the cheaper (baseload) generation located in the south to serve KEL demand instead of being constrained-off due to insufficient transfer capacity from south to north, so it is recommended that either an independent study may be conducted or earlier study commissioned for integration of KEL into CTBCM by CPPA-G, along with KEL and NTDC, may be built upon to ascertain the impact of removing the bottleneck by modeling an unconstrained flow of power between the two networks and associated savings. Also, the NPCC report and the PAP of KEL requires interconnection capacity enhancement to evacuate power from the 82 MW TUHPP, 330 MW Thar coal power plant, and 600 MW from JPCL.

In light of the foregoing, KEL is directed to conduct an unconstrained power flow study between the NTDC and KEL systems to definitively determine the economic, technical, and financial advantages for the national power system. It is generally believed that reinforcing the corridors may yield several benefits, including lowering the overall cost of the generation mix, reducing future generation capacity expansion requirements, mitigating borrowing costs and risks, decreasing dollar outflow, improving the balance of payments, and enabling the system operator to conduct central economic dispatch more effectively. This would result in financial and economic gains, alleviate the burden of subsidies on the GoP, and unlock opportunities for utilizing low-cost idle/available generation from the NTDC/CPPA-G system/pool. Importantly, quantification of these benefits is crucial, as they may positively impact system reliability and stability. Increased active (MW) and reactive power (MVAr) flow through the corridors could enhance frequency and voltage profiles, thereby reducing the occurrence of brownouts and blackouts nationwide.

The Authority has also approved the ICA between KEL and NTDC/CPPA-G, wherein the interconnection capacity of the two systems has to be determined and ascertained with a technical study to be conducted by NTDC. It is also pertinent to mention that in this PAP, KEL has considered 2050 MW electric power supply from the National Grid/NTDC system, and XW-DISCOs have excluded the same quantum from their PAP. KEL is hereby directed to consider in future 2050 MW supply from National Grid as considered in the current PAP to reflect the same in the future iterations of the PAP. In addition, KEL, NTDC and CPPA-G are directed to conduct dispatch and financial studies for unconstrained power flow between the two systems to visualize the benefits and savings. They are also directed to expedite the completion of the augmentation of the grid interconnection and conclude power system studies to ascertain the new interconnection capacity of the NTDC and KEL systems. Subsequently, the future capacity obligations should be determined for upcoming PAPs up to the determined interconnection capacity of the two power systems.

Regarding the long-term plan in case the supply from the National Grid is reduced, the Authority is of the considered opinion that the initialed ICA/PPAA covers the horizon of PAP. Therefore, based on current proceedings/record, there is no such

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proposal underway to reduce supply during the horizon of PAP, and therefore, the same does not merit any deliberation at this stage.

(xii) Is there any action plan developed to be shared to improve the fuel availability on KEL's own plants? Has the same been considered while working out capacity obligations?

KEL submitted that it has considered the foreseeable impact of fuel constraints on a prudent basis in the expected utilization of KEL power plants and does not foresee any unserved demand due to the impact of fuel constraints.

Moreover, KEL submitted that it is actively engaged in finalizing the long-term availability of fuel supply for its fleet, including but not limited to BQPS-III and BQPS-II, and has also requested approval from the Authority for HSD commissioning at BQPS-II. However, approval of the 'Take or Pay' fuel arrangement from the Authority will be critical, as firm purchase commitments for gas supply with fuel suppliers can only be made based on 'Take or Pay' fuel arrangements.

The following options are being actively considered by KEL for the security of fuel supply:

Gas Supply to BQPS Complex (including BQPS III and BQPS II):

- Extension of RLNG supply contract with PLL beyond December 2025
- Private Procurement through international RLNG tender (Enactment of TPA rules is a prerequisite)
- SSGC confirmation for supply of RLNG via CTS (on transmission tariff)

Gas Supply to:

SGTPS: Advanced evaluation for a project via virtual pipeline option due to the infeasibility or unavailability of pipeline gas despite multiple attempts. Final proposals have been assessed and negotiations are in progress for the scheme of agreement.

KGTPS and KPC: Commencing another round of discussions with SSGC regarding a dedicated pipeline by SSGC or the enhancement of its existing network to supply gas to KPC and KGTPS. Proposals for the virtual pipeline have been received and will be pursued depending on the outcome of discussions with SSGC. Assessment for the best possible and available solution out of the above options will be timely finalized to manage the fuel constraints accordingly.

Observations/Findings of the Authority:

The Authority has observed that lately KEL has been informing the Authority about efforts to arrange and manage its fuel availability issues; however, it has failed to ameliorate the situation to date. Even in the current PAP, it proposed an extension of power plants (Tapal, Gul Ahmed, etc.) due to fuel availability constraints.

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Nonetheless, the Authority considers that as the supply from the National Grid increases and the addition of new power plants as proposed above is materialized, the issue may not remain that significant. However, keeping in view the impact of the fuel availability issues on the end consumer tariff, the Authority directs KEL to submit periodic updates about its fuel availability issues and take measures to ameliorate the same while fast-tracking the construction of interconnection grid projects between the NTDC and KEL systems.

Regarding the commissioning of BQPS-II on HSD fuel, the Authority has observed that while KEL has proposed the commissioning of the BQPS-II plant on HSD fuel in a separate request, the PAP indicated that the operation of the plant is on Natural Gas/RLNG. To clarify, KEL explained that BQPS-II is currently operational on RLNG/Gas. However, its CAPEX and commissioning on HSD (as a back-up fuel) has been proposed by KEL as a separate request which is under NEPRA regulatory proceedings for approval.

The Authority is of the considered view that this matter falls within the scope of the tariff petition and is not related to the PAP but rather it is the operational issue of a power plant requiring approval on an alternate fuel. Therefore, the Authority has decided not to approve alternative fuel as part of the PAP. Rather, it is deemed appropriate to address this issue as part of the relevant tariff determination.

(F). General Comments of Stakeholders during the Public Hearing

In addition to the issue-specific written submissions made by the stakeholders as summarized above, the Authority considers it important to address the following comments made by the stakeholders during the Public Hearing:

(i) **Mr. Abid Lodhi** expressed his concerns about the potential impact of incorporating base load and RE plants into the system and highlighted its impact on peak load shifting and the provision of ancillary services within the system. In addition, he highlighted the issue regarding provision of ramping and ancillary services in the KEL system, as expect HFO based power plants there are no such plants that could contribute to ramping in the KEL system. Mr. Lodhi inquired whether National Grid would step in to provide these services and, if so, what the associated costs would be. Notably, he highlighted that, in the current system, the entire power pool collectively covers these costs.

Expanding the conversation to the context of a uniform tariff, Mr. Lodhi emphasized that any relocation of power plants and the development of transmission and distribution lines would be funded either by the consumers of Pakistan or through the GoP subsidies. He underscored the potential commercial implications of firm commitments and stressed the importance of evaluating the entire plan within the framework of integrated planning and uniform tariff, aligning the same with the relevant provisions of the NE Plan 2023 and NE Policy 2021.

Moreover, Mr. Lodhi drew attention to the recent drastic reduction in demand at the National Grid and highlighted the challenges related to evacuation arrangements for

power plants when demand decreases, and new generation requirement is reduced. He emphasized the need to review the plan comprehensively, considering elements from the TSEP, the IGCEP, and the XW-DISCOs' PAP. He proposed limiting procurements to urgent and important cases, with an allowance for seeking clarity in case delays occur in the approval of PAP.

(ii) **Mr. Tanveer Bari** questioned the rationale behind KEL insisting on expensive fuel based plants, especially when the 900 MW BQPS-III has already been commissioned. He further inquired about the retirement plans for other inefficient plants within the KEL system and raised concerns about Karachi residents paying for power from costly plants, along with the additional burden of the FCA. Additionally, he questioned why KEL had not signed a GSA with SSGC for power generation from cheap gas and suggested a shift in load shedding from the feeder level to the PMT level.

(iii) **Mr. Arif Bilwani** pointed out that similar proposals had been submitted during previous MYTs and tariff determinations, urging a thorough assessment of whether these plans had been successfully implemented in the past. Mr. Bilwani referred to the 2016 MYT, where KEL justified improved efficiency and a transition from supply deficit to surplus, which did not materialize, resulting in consumer hardships. Mr. Bilwani emphasized the need for rigorous monitoring of KEL's PAP.

(iv) **Mr. Hamad Ali** from RE First provided an alternative perspective by presenting the difference between KEL's and RE First's modelling results using PLEXOs. He emphasized that, according to RE First's model, coal was not optimized, and wind and solar power plants were more cost-effective. Mr. Ali highlighted the potential for a higher share of renewables, up to 70%, based on their model, compared to the 24% projected by PAP. He recommended that KEL prioritize additional RE projects to reduce overall costs.

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(2). The Authority has reviewed stakeholder comments. Regarding Mr. Abid Lodhi's concerns, particularly on ancillary services, development of interconnection arrangements, and evaluation of the PAP within the integrated planning and uniform tariff framework aligned with the NE Plan 2023 and NE Policy 2021, relevant directions are provided in this determination's preceding paragraphs. These will be presented to the Authority for consideration in the upcoming PAP, while other concerns fall under the TSEP's scope and will be addressed there. Additionally, a significant decrease in demand for XW-DISCOs compared to the previous base year has been observed. However, KEL's demand forecast, already low, is not expected to change as drastically. As the PAP is an annually updated document, future iterations will be adjusted based on new demand forecasts with valid base years and capacity obligations.

(3). Concerning the comments of Mr. Tanveer Bari and Mr. Arif Bilwani, it is considered the whole purpose of the PAP is to streamline the power procurement process of the KEL through the implementation of integrated system planning and ensure that least-cost, reliable and competitive electric power procurement is made in a timely manner to lower down the cost

for the provision of electricity to the end consumers on an affordable, reliable and sustainable basis.

(4). On the comments of Mr. Hamad Ali, the Authority is of the opinion that the submitted PAP is based on the approved IGCEP 2022-31 and any change in the future iterations of the IGCEP will also be reflected in PAP. Therefore, the Authority considers that the comments of Mr. Hamad Ali are not relevant to the PAP and are related to IGCEP and will be considered during the proceedings of the upcoming IGCEP.

(G). Decision of the Authority

In view of the above, the Authority hereby decides to approve the PAP with the following conditions and directions:

(i) The PAP is approved for the period of five (05) years i.e. from FY 2023-24 — FY 2027-28.

(ii) The projects for the three (03) years i.e. from FY 2023-24 — FYs 2024-26 shall be considered as firm projects whereas the projects for the subsequent two (02) years i.e. from FY 2026-27 — FY 2027-28 shall be considered indicative.

(iii) The requirement of TSEP for the current PAP is relaxed with the direction to KEL to coordinate with NTDC for timely preparation of TSEP and addressal of evacuation arrangements, flexibility and stability issues as indicated in the preceding paragraphs. Further, KEL shall be responsible to ensure timely evacuation arrangements for the projects coming in firm years and any delay therein may attract penal proceedings.

(iv) The proposed tariff numbers in the PAP by KEL are indicative, which shall be subject to separate regulatory proceedings and approval by the Authority, and tariffs shall be determined either through the competitive auctions, negotiated or cost-plus mode followed with submission of bidding documents or negotiated proposal or tariff petitions by the KEL, as the case may be. Therefore, the proposed PAP is approved to the extent of quantity of acquisition (MW) and procurement mode for firmed up projects.

(v) The base case of IGCEP has been considered for the current PAP. Further, the demand forecast, and sent-out growth numbers as submitted are approved being consistent with the approved investment programme of KEL.

(vi) The approach used by KEL for adjustment of rooftop solar is considered and approved. However, KEL shall ensure that necessary due diligence and consultation is carried out with the relevant agencies including NTDC, XW-DISCOs, CPPA-G for improvement of the current methodology and reflect any improvements/changes in the future iterations of the PAP.

(vii) The capacity obligations as calculated during the test-run period are considered for the current PAP with the direction to KEL to adjust and update the results and impact on future procurement in the forthcoming PAP.

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(viii) The extension in PPA of Tapal and Gul Ahmed is allowed for the requested period with the condition that the tariff determined and approved by the Authority for these projects in its tariff relevant determination shall be applicable.

(ix) The extension in retirement dates of BQPS-1 Unit I and 2 is not approved at this stage, any extension of BQPS-1, if required, shall be justified in the upcoming PAP or through separate request by KEL and shall be decided in separate regulatory proceedings by the Authority.

(x) Procurement from 15 MW Solar PV of GNL project and 18 MW Solar PV project of K-Solar under negotiated mode, based on the prudency check and right of rejection given to KEL if the proposal by GNL and K-Solar are imprudent, is approved with the condition that the negotiated tariff will also undergo due diligence and prudency checks at the time of regulatory proceedings and approval of tariff in accordance applicable documents. The tariff negotiated by the parties shall be subject to downward adjustment or rejection by the Authority if deemed prudent.

(xi) For the projects falling in the indicative period, KEL is directed to firm up relevant approvals for such projects including size, location, interconnection and evacuation arrangements and submit the same in the next iteration of the PAP. The approval of the project, size and mode of procurement for the said projects shall be firmed up in the upcoming PAP.

(xii) The quantum of 2050 MW supply from National Grid to KEL has been considered in the current PAP KEL is directed to reflect the quantum as approved in the ICA between KEL and NTDC in the future iteration of the PAP. Furthermore, KEL, NTDC and CPPA-G are directed to update and conclude the earlier technical and dispatch study to determine interconnection capacity and unconstrained power flow between two systems to determine the associated financial savings and economic benefits. KEL is also directed to expedite completion of the interconnection grid stations and related technical studies to ascertain the interconnection capacity of the NTDC & KEL networks for subsequent determination of future capacity obligations for upcoming PAP. The study shall be submitted to the Authority as part of the upcoming PAP for information of the Authority.

(xiii) KEL is directed to conduct a detailed technical study through firm of international repute proposing the redressal and treatment of any potential impact and investments arising due to induction of variable RE resources and base load plants with regards to the provision of system reserves, flexibility, stability and ancillary services. The study and redressal proposal shall be submitted to the Authority as part of upcoming PAP

(xiv) KEL is directed to submit periodic quarterly updates about its fuel availability issues and take necessary measures to ameliorate the same.

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(xv) KEL is directed to submit the status of the evacuation arrangements for the proposed projects as per the Performa attached (Annexure-I) with the determination as part of the upcoming PAP.

Engr. Maqsood Anwar
(Member)

Rafique Ahmed Shaikh
(Member)

Mathar Niaz Rana (nsc)
(Member)

Amina Ahmed
(Member)

Waseem Mukhtar
(Chairman)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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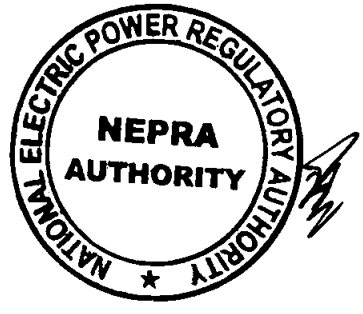
17/05/24

POWER ACQUISITION PROGRAMME
(FY 2024 – FY 2030)

APPROVED FOR THE PERIOD FY 2024 – FY 2028



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PREAMBLE

The Power Acquisition Programme is developed in compliance with the requirements stipulated under NEPRA (Electric Power Procurement) Regulations, 2022 ("NEPP").

The Power Acquisition Programme envisages KE's long-term planning to ensure security of power supply with an objective to determine a minimum cost strategy for long-range expansion of power generation, which is adequate to supply the load forecasted within a set of prevailing policies and technical and socio-economic considerations. The Power Acquisition Programme pertains to the period from FY 2024 till FY 2030 duly considering the future electricity demand forecast, KE's generating fleet (including external sources of supply) and energy mix, as well as most suitable possible options for power procurement.

The Power Acquisition Programme will serve as a roadmap for KE's power augmentation with a focus on leveraging indigenous fuel resources followed by meaningful inclusion of renewable sources of power generation.

EXECUTIVE SUMMARY

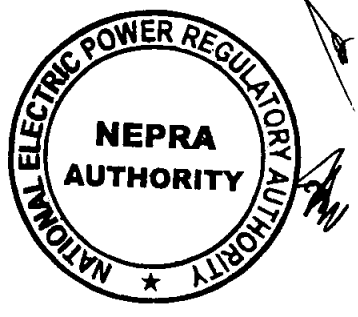
The provision of reliable, adequate, and affordable electricity is a pre-requisite for socio- economic growth and development of any country. In this context, KE has formulated this Power Acquisition Programme spanning on a horizon from FY 2024 till FY 2030, aptly identifying KE's long-term power needs through addition of new power generation and power supply sources with a focus on reduction of KE's basket price keeping in view the reliability of the system through induction of renewables and indigenous power sources.

This Power Acquisition Programme is being formulated at the crucial juncture of time, when both the local and global power markets are going through unprecedent challenges such as growing emphasis on induction of renewable energy power sources to reduce the carbon footprint and address the global warming and climate changes followed by change on political landscape globally. Additionally, the world is still recovering from the aftermath of COVID-19 pandemic, which posed challenges including but not limited to the pent-up demand scenario, supply chain bottlenecks due to global disruption of supply chain, rising inflation levels and alarming increase in commodity and fuel price(s). In addition to aforementioned, formulation of this Power Acquisition Programme has also considered the directives pronounced by the Government of Pakistan (GoP), as also iterated through the National Electricity Policy 2021, encouraging development of power projects on indigenous and renewable resources.

In order to effectively respond to these impeding challenges, KE remains committed towards adding sustainable and cheaper power generation in its fleet. To achieve this, KE has devised this Power Acquisition Programme as part of its long-term planning in line with the best international practices, assisting it to achieve not just the future financial success, but also to provide cheaper and reliable power to its customers, along with meeting its regulatory obligations whilst navigating the constraints as elaborated in preceding para.

It may be noted that the Power Acquisition Programme has been modeled on the assumption of power availability from National Grid up to 2,050 MW throughout the planning horizon from the time of commissioning of KKI Grid in FY 2024 as approved under IGCEP 2022-2031 along with new capacity additions of Renewables (1,200MW), Hydro (82MW) and Thermal Baseload (990MW). The data utilized for the purpose of this Power Acquisition Programme has been sourced internally or has been referenced from the assumptions taken by NTDC during the development of IGCEP 2022-2031, approved by NEPRA vide its determination dated February 01, 2023. Based on these data and assumptions, the results achieved clearly depict a positive impact in terms of reduction of KE's basket price based on indexed tariff to ~7.9 c/kWh in FY 2030 from ~8.7 c/kWh in FY 2024.

Going forward, KE will be re-evaluating its assumptions and long-term forecast on annual basis, as required under NEPP, which will be submitted to the Authority for its consideration and approval.



1 Introduction

The provision of reliable, adequate, and affordable electricity is a pre-requisite for growth and development of economy and as an emerging economy, a country's demand for electricity correlates with the GDP of the country. Accordingly, certain electricity indices such as per capita consumption of electricity and access to electricity are used to express the socio-economic strength of a country. The per capita consumption of Pakistan is 644[1] kWh compared to 1,218[2] kWh in India. Considering the consequential high-capacity costs in the National Grid as well as given the volatility of electricity demand, it is imperative to conduct planning in such a manner that reliable supply is ensured, which is crucial for the economy and socio-economic development of Pakistan.

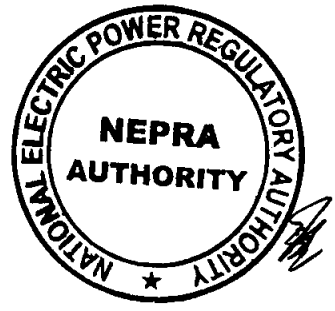
1.1 Company Overview

KE is a vertically integrated power utility providing utility services to the city of Karachi and adjoining parts of Sindh and Baluchistan. KE was incorporated in the year 1913 and subsequently privatized in November 2005. As a vertically integrated utility, KE is engaged in generation, transmission, distribution, and supply of electricity by virtue of its licenses granted by NEPRA. KE is a public limited company duly listed on the Pakistan Stock Exchange and serving a consumer base of over 3.4 million consumers.

1.2 KE's Existing Generation Capacity

Since privatization and up to FY 2022, KE has invested an amount of **~PKR 474 billion** across the power value chain through fresh equity injection, debt, and reinvestment of all profits in the business, resulting in significant improvements across the power value chain. Out of the PKR 474 billion invested across the power value chain, **~PKR 204 billion** have been invested in the Generation function. As a result of investments made in the Generation function, KE since privatization has added 1,977 MW[3] of installed capacity in its generation fleet including BQPS-III[4]. KE's licensed installed capacity including BQPS III is 2,817 MW.

The total net generation capacity in KE system (after considering auxiliary consumption) including procurement from IPPs and import from National Grid at present stands at around 4,061 MW (including BQPS III) which will further increase upon enhancement in interconnection capacity enabling off-take of 2,050 MW from National Grid.



[1] NEPRA State of Industry Report 2022
[2] Statista.com
[3] Excluding 50 MW derated capacity recouped at BQPS 1 units
[4] BQPS-III (Unit 2) has declared COD on 9th March 2023 while BQPS-III (Unit 1) is currently under testing and commissioning.

Table 1: Existing Generation Capacity in KE System

Plants	Fuel	Installed Capacity as per License (MW)	Net Capacity after Aux. consumption (MW)	Initial Firm capacity as per Capacity Obligation report (MW)
BQPS-I	Natural Gas/RFO/RLNG	840	693	713.93
BQPS-II	Natural Gas/RLNG	573	494.5	509.59
BQPS-III	RLNG/HSD	942	899.6[5]	867.008
SGTPS	Natural Gas/RLNG	107	93	93.93
Korangi CCPP	Natural Gas/HSD/RLNG	248	220.8	271.53
KGTPS	Natural Gas/RLNG	107	92	89.88
Total KE Fleet		**2,817**	**2,493**	**2578.46**
Gul Ahmed	Furnace Oil	136	128	113.46
Tapal Energy	Furnace Oil	126	124	109.92
SNPC-I	Natural Gas	52	51	42.81
SNPC-II	Natural Gas	52	51	42.81
FPCL	Imported Coal	60	52	48.34
Oursun	Solar	50	9	12.87
Gharo	Solar	50	11	13.70
Total IPPs		**526**	**426**	**383.91**
Total CPPs		**42**	**42**	**42***
National Grid Supply		**1,100**	**1,100**	**2050****
Total Existing Capacity		**4,485**	**4,061**	**5054.37**

*Captives were not included in the Capacity Obligation Report hence their capacity is considered as per their contract capacity

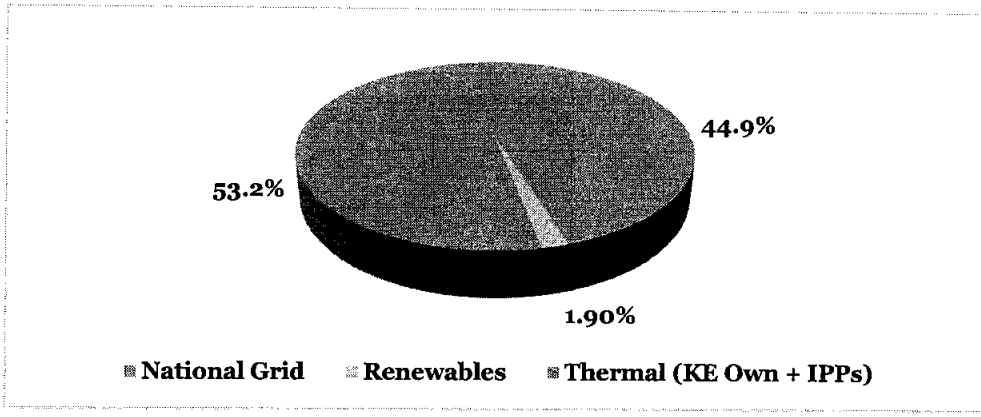
**Supply from the National Grid of 2050MW as mentioned in the Capacity Obligation report will be available after commissioning of the KKI Grid.

1.3 KE's Fuel Mix

During FY 2022, KE served a total energy of 19,802 GWh, which was generated by 1.9%[6] renewables, 53.2% thermal (KE's own and IPPs), and 44.9% from National Grid.

[5] Actual dependable capacity of BQPS III will be determined post commissioning of both units
[6] Includes 44GWh of power import from net metering consumers

Figure 1 : KE Fuel Mix 2022



1.4 KE's Demand

During FY 2022, KE total demand was 21,104 GWh, with Peak demand of 3,670 MW recorded in the month of May 2022.

Table 2: Historic Energy Demand and Served Demand

Month	Energy Demand (MWh)	Served Demand (MWh)	Peak Demand (MW)	Actual Supply against Peak Demand (MW)
Jul-21	2,078,050	1,963,624	3,524	3,022
Aug-21	1,918,794	1,804,129	3,149	2,749
Sep-21	2,041,706	1,924,140	3,619	3,084
Oct-21	1,868,308	1,775,507	3,246	2,817
Nov-21	1,486,434	1,405,857	2,723	2,437
Dec-21	1,221,665	1,168,611	2,200	2,043
Jan-22	1,143,033	1,088,530	2,081	1,903
Feb-22	1,208,317	1,141,352	2,357	2,098
Mar-22	1,735,026	1,629,084	3,138	2,695
Apr-22	2,059,064	1,936,358	3,361	2,943
May-22	2,191,170	2,007,198	3,670	3,050
Jun-22	2,231,712	1,957,817	3,646	2,774

2 Objective

The key objective of the Power Acquisition Programme is to develop a long term capacity expansion plan for KE's service territory to meet the load and energy demand in a reliable and sustainable manner, while maximizing use of indigenous resources. Accordingly, this Power Acquisition Programme has been prepared with the following objectives:

a) Identification of KE's requirements

Envisages identification of generation requirements by capacity, fuel, technology, type and planned commissioning dates on year-by-year basis.

b) Creation of a long-term plan

Identification of KE's requirements is followed by formulation of a long-term plan to ensure that the projected demand in the system is adequately met by adding most optimal and reliable generation capacity, which would not only diversify KE's generation fleet mix, but also reduce its generation cost. However, the Power Acquisition Programme is based on certain estimates/ projections that involve various economic and business uncertainties and is therefore subject to changes upon its future iterations.

c) Reduction in generation costs

The Power Acquisition Programme also focuses on reduction of KE's generation costs through induction of indigenous and renewable resources to meet the future load growth in KE's service area. Considering the challenges and restrictions in procuring power from indigenous resources such as hydel and local coal from outside KE's system via wheeling, the Power Acquisition Programme has been conceived keeping a balance between procurement within and outside KE's territory, to ensure reliability of project commissioning and evacuation timelines. It is pertinent to mention that wheeling is a critical element for KE to procure power based on indigenous sources and hence, now with the enactment of Open Access Regulations, 2022, KE humbly requests the Honorable Authority for resolution of other issues critical for a sustainable roll-out of wheeling regime in the country.

d) Ensure reliability of the system

Another key consideration accounted for in this Power Acquisition Programme is availability of reliable sources of generation to meet the future load demand with maintenance of contingency and spinning reserve along with other requirements and due compliance with the provisions of the applicable documents.

3 Assumptions / Inputs of Power Acquisition Programme

The Power Acquisition Programme takes into account several assumptions including but not limited to technical, commercial and economic factors, as detailed below.

3.1 Technical Assumptions

The following technical assumptions have been accounted for in this Power Acquisition Programme.

1) Renewable Energy Generation

Actual data of wind and solar, collected from the vicinity of KE's renewable corridors has been used to predict the future energy generation and the annual generation pattern. For the sake of this Power Acquisition Programme, the capacity utilization factor of 23.1%[7] and 40.3%[8] has been taken for Solar and Wind generation plant(s) respectively.

2) System Reserve Requirement

Reserve of a generating system is a measure of the system's ability to respond to a rapid increase in load or loss of the generating unit(s). For the purpose of this Power Acquisition Programme, two types of reserves have been modelled as per provisions of the Grid Code, i.e., contingency and secondary reserve.

a) Contingency Reserve

The contingency reserve is the level of generation over the forecasted demand, which is required on the basis of real time plus 24 hours to cover for uncertainties. This reserve is provided by the generators, which are not required to be synchronized but they can be synchronized within 30 minutes of the initiation of the contingency and the corresponding fall in frequency. As per best industry practices, this is equal to the capacity of the largest generator in the system.

b) Secondary Reserve

The secondary reserve is a type of spinning reserve, and it is the increase in power output of the online generators following the falling frequency and is fully sustainable for 30 minutes after achieving its maximum value. It is equal to the one third of the largest unit in the system.

3) Scheduled Maintenance / Availability of power plants

Scheduled maintenance plays an important role in retaining the desired efficiency and reliability while at the same time preserving the useful life of a generating unit. Scheduled maintenance of available plants has also been considered while formulating this Power Acquisition Programme.

4) Variable Renewable Integration Study

KE is in the process of conducting a VRE study, which shall evaluate the extent to which renewables can be incorporated into KE's network, without making a compromise to the reliability of the network. The current Power Acquisition Programme assumes that all the proposed renewable projects, as delineated in this Programme, shall be incorporated subject to the outcome of VRE study being conducted, and with no additional cost of development of spinning/contingency reserve and transmission augmentation which could differ from the Transmission System Investment Plan.

5) Transmission System Investment Plan of KE

[7] Based on Actual capacity factor of Gharo Solar
[8] Based on latest NEPRA benchmark for wind plants

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The long-term transmission investment plan (FY 24 – FY 30) has been developed and submitted for NEPRA's approval and the generation selected under this Power Acquisition Programme is in accordance with the availability of the grid and transmission capacities envisaged under the investment plan.

3.2 Commercial and Economic Assumptions

Following commercial and economic assumptions have been accounted for in this Power Acquisition Programme:

1) Forecasted Energy Demand

Energy and power demand forecast provides the basis for all planning activities in the power sector, and it is one of the decisive inputs for generation planning. In line with this, KE foresees the following demand projections, based on historical demand and macroeconomic environment *(Refer **Annexure I** for forecasted energy demand).*

2) Forecasted Served Demand

Sent-out growth per annum has been taken at ~1.77%. Following aspects are considered while calculating sent-out growth:

a) Data sources (GDP, Historic Demand etc.)
b) Demand side considerations (Impact of equipment efficiency)
c) Net metering/Solar disruptions
d) AT&C loss-based load-shed has been considered in the projected sent-out
e) Non-AT&C loss-based load management.

*(Refer **Annexure I** for forecasted served demand)*

3) Fuel price Forecast

Fuel prices and macro-economic factors prevalent in June 2023 have been considered with no indexation of fuel prices and macro-economic factors during the planning horizon.

4) Contractual Assumptions:

Following contractual commitments have been assumed under this Power Acquisition Programme:

a) Up to 2,050 MW power drawl from National Grid throughout the year for the entire planning horizon starting from June 2024, subsequent to commissioning of KKI grid station as approved in IGCEP 2022-31.

b) Take or Pay obligations of existing fuel contracts and IPPs.

3.3 Other Assumptions

In addition to the aforementioned, retirement of KE's own power plants and IPPs has also been considered based on completion of their useful lives and/or expiry of PPA (shown

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Table 3 below). KE will further evaluate their retirement before their expiry date as per its business needs and keeping in view the expected demand-supply situation. Therefore, KE, keeping in view the safety and operational viability, may request the Honorable NEPRA Authority for extension in their useful lives, if required.

Table 3 : Retirement Schedule of Existing Power Projects in KE's System

S No.	Name of Project	Fuel Type	Installed Capacity (MW)	Retirement[9] /PPA Expiry
1	Tapal	RFO	126	FY 24
2	BQPS 1 – Unit 1	NG/RLNG/RFO	210	FY 24
3	BQPS 1 – Unit 2	NG/RLNG/RFO	210	FY 24
4	Gul Ahmed	RFO	136	FY 25
5	BQPS 1 – Unit 5	NG/RLNG/RFO	210	FY 27

4 KE Proposed Power Acquisition Programme

In accordance with Regulation 6 of NEPP, a Supplier of Last Resort shall prepare Power Acquisition Programme on annual basis. In adherence to it, KE has prepared this Power Acquisition Programme, and it focuses on reduction in future generation cost by maximizing induction of renewables and use of indigenous coal for base load generation. The proposed Power Acquisition Programme provides the most prudent scenario of KE's long-term procurement planning with addition of generation planned from different generation technologies, with majority of the power coming from renewables i.e., Solar 868MW and Wind 332MW till FY 2030. In addition to this, 82MW hydel is also proposed to be added in the generation mix in year FY 2029. Additionally, KE has also considered that the import of power from National Grid up to 2,050 MW will be available throughout the year, for the entire planning horizon i.e., FY 2024 till FY 2030. With respect to baseload power, 330MW Siddiqsons Energy Limited and 330MW coal power project is expected to come online in FY 2027, followed by 330 MW coal power project in FY 2029.

Table 4 - Year Wise Addition of New Capacity FY 2024 – FY 2030

Expected COD	Technology Type	Installed Capacity (MW)[10]
FY 25	Solar	150
FY 25	Solar	270

[9] PPA of Tapal and Gul Ahmed have expired in June 2022 and November 2022 respectively and NEPRA has till date extended their Tariff till 30 April 2023. However, considering the fuel availability constraints and decision of Appellate tribunal in this regard, KE foresees that both IPPs will be required to meet its consumer demand in the summer seasons till FY 24. Hence, Tapal and Gul Ahmed have requested for review of NEPRA's decision and requested for further extension, which is under consideration of NEPRA, and KE also requests for positive consideration in lieu of requirement of these plants at peak times in accordance with EMO and on Take and Pay basis.

[10] These additions are planned through establishment of separate SPVs and as per the procurement mechanism defined under NEPP.

FY 25	Solar	33
FY 26	Solar+Wind	220
FY 27	Local Coal	330
FY 27	Local Coal	330
FY 27	Solar	127
FY 28	Wind	100
FY 29	Local Coal	330
FY 29	Solar	200
FY 29	Hydel	82
FY 30	Wind	100
Total		**2,272**

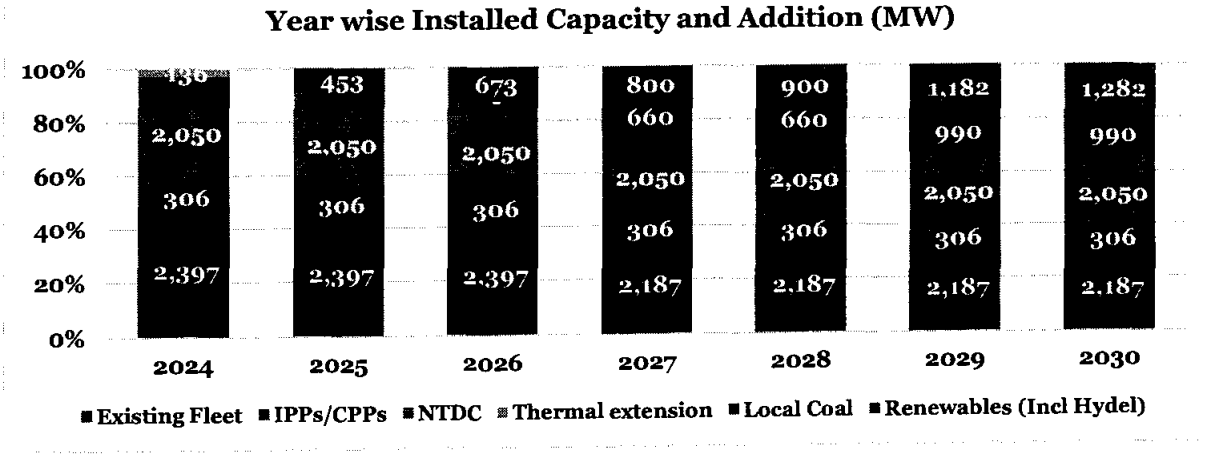
Detail of ongoing Projects (including 150 MW Winder and Bela Solar Projects, 270 MW Sindh Solar Energy Projects, 200 MW (AC Peak) Dhabeji Site Neutral Hybrid Plant, 33 MW through negotiated procurement) are enclosed as **Annexure II** of this Power Acquisition Programme. KE had also submitted a detailed plan for renewable energy additions to the Honorable NEPRA Authority in September 2022.

In addition to the ongoing projects, KE is also pursuing other projects which have been detailed in **Annexure III**. Moreover, KE is also actively evaluating the possibility of direct offtake from larger hydel projects, however they have not been included in the planning horizon of this Power Acquisition Programme due to later commissioning of the projects being targeted (i.e., post FY 2030).

4.1 Capacity Additions | Installed Capacity Mix (MW)[11]

KE's year-wise Installed capacity (including additions planned from FY 2024-2030) is depicted below:

Figure 2 : Existing and Planned Additions in Installed Capacity (MW)'

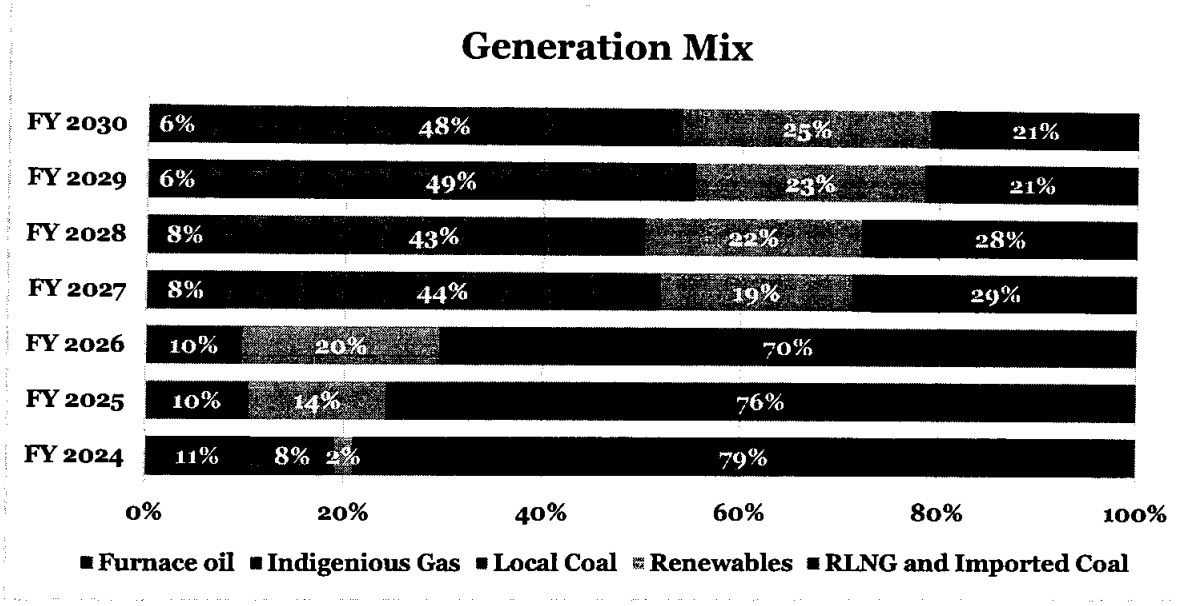


[11] Installed Capacity have been updated based on recent submissions by KE of their Renewable RFPs with NEPRA.

4.2 Generation Fuel Mix (GWh)

The energy contribution by FY 2030 in KE's system (excluding supply from National Grid) will primarily be dominated by indigenous fuels and renewables. The percentage of renewables and indigenous fuel penetration in KE's network will be 25% and 48% respectively by FY 2030, wherein the percentage increment of indigenous fuel utilization and renewables will by ~ 70%.

Figure 3 : Generation Fuel Mix (FY 2024-2030)



This significant shift towards renewables and indigenized fuel resources along with additional off-take from National Grid will help reduce KE's cost of generation, and accordingly, the basket price is expected to reduce from **~8.7 cents/kWh** in year FY-2024 to **~7.9 cents/kWh** in year FY-2030.

4.3 Capacity Obligation under Market Commercial Code

As per Regulation 6 (1)(c) of NEPP, a Supplier of Last Resort in preparing its Power Acquisition Programme shall include capacity obligations as determined by the Market Operator in accordance with the Market Commercial Code.

In this regard, CPPA-G, in its role as Market Operator, has worked out the following Capacity Obligations for KE in accordance with the Commercial Code and has determined that KE is 100% compliant with the requirements for Capacity Obligation as stated in Table 17 under Step 3.4 of the report (enclosed as **Annexure IV**).

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Table 5 : Capacity Obligation as per CPPA G Report (FY 2023-27)[12]

Year	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027
Credited Capacity (MW)	4,076	4,470	4,456	4,515	4,961
Capacity Obligation (MW)	3,548	3,956	4,220	3,539	2,764

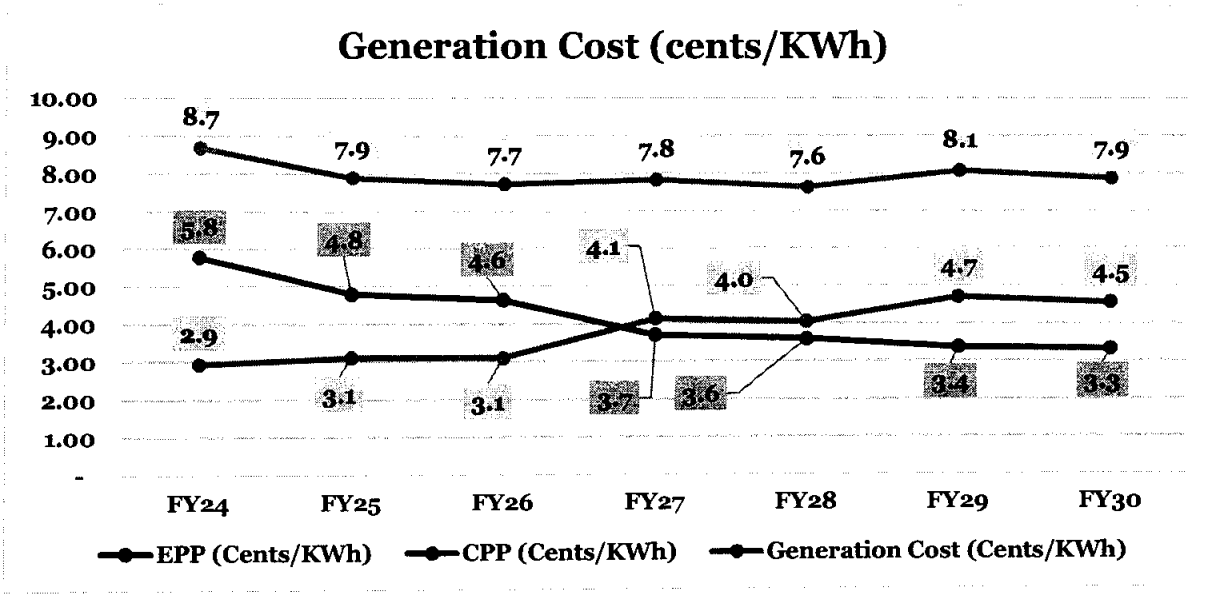
4.4 Impact on Basket Price

Paradigm shift towards indigenous fuel and renewable power sources over the years will result in reduction in KE's basket price. However, as highlighted earlier, the development of coal power generation is subject to the support of international technology providers and financiers. KE is currently engaging with all the relevant stakeholders to assess the viability of development of a coal-based project and to acquire further clarity in this regard.

In parallel, KE is also actively engaged with Hydel developers of KPK and AJK, to create a fallback option in case the development of indigenous coal project does not materialize.

Movement of Basket price on both indexed and non-indexed tariff (calculated on the basis of Sent outs) is given below:

Figure 4: Basket Price Non-Indexed Tariff (FY 2024-30)



5 Anticipated Challenges

KE anticipates the following challenges, which may be faced in the implementation/execution of this Power Acquisition Programme.

[12] Adjusted as per the plan being submitted by KE

a) Local Coal:

Other than SEL, for which there is a signed EPC contract and signed term sheet based on mainly local financing, future development on local coal remains to be seen due to the moratorium on coal projects in consideration of global carbon targets.

KE is actively pursuing a multifaceted strategy, to create a fallback option in case the current plan of developing indigenous coal power projects doesn't materialize due to the challenges narrated in preceding paras. To mitigate the impact of coal projects, KE is actively working with the private developers of KPK and AJK and is also in close contact with the Federal and Provincial Hydel power development agencies like PPIB and PEDO to ensure that the required capacity of hydel power is developed and contracted in a timely manner, to displace the power, which, has been planned to be generated from indigenous coal assets.

b) National Grid:

KE in collaboration with National Transmission & Distribution Company (NTDC), had successfully implemented the cross-trip scheme along with rehabilitation of KDA-Jamshoro lines, enabling KE to draw additional power of 450-600 MW from the National Grid through existing interconnections. At present, KE is also in the process of constructing grids at KKI and Dhabeji, which will enable KE to increase its power evacuation from the National Grid.

Moreover, with respect to supply from National Grid as envisaged under this Programme, timely development of large hydel power projects will be pivotal, especially the projects supported by public sector like Dasu (2,160MW), Mohmand (800MW), Tarbela Ext. 5 (1,630MW) and Thakot (1,490MW), which are significantly dependent upon availability of funds and land for construction. Considering that historically there have been significant delays in commissioning of large-scale hydel power projects from their stipulated timelines, there is a material risk that the proposed generation and its timelines assumed in the approved IGCEP 2022-31 would turn out to be drastically different from the actual commissioning dates. This would certainly have a consequential impact on the execution of this Power Acquisition Programme.

c) Induction of Renewables:

Renewables induction in KE's network, up to its maximum technical capability will always remain a top priority for KE. The fact remains that the development timelines of renewables are also shorter as compared to other generation options, and ample appetite is available amongst international and local lenders to finance such projects. In this context, KE is in the process of conducting a VRE study with the assistance of international consultant, which would assist KE in determination of the most optimum capacity of

renewables that could be inducted into KE's network, in line with the international best practices with due regards to the inherent technical limitations. Further, in case of any changes to the proposed Power Acquisition Programme in light of the results of the VRE Study, the same shall be duly shared with NEPRA.

d) Implementation of CTBCM:

While KE has already incorporated an impact of net metering and solar penetration on its expected demand, the possible impact of defections of KE's Bulk Power Consumers (i.e., over 1 MW of load) towards the bilateral mode contracts post implementation of CTBCM cannot be ascertained at this stage. However, KE anticipates that this may alter KE's demand forecast, which will also affect this Power Acquisition Programme in future years.

6 Conclusion

KE is committed to adding cheaper power to its system and humbly requests the NEPRA Authority to consider and approve this Power Acquisition Programme to enable KE to continue working upon the avenues as highlighted under this Power Acquisition Programme.

Further, KE humbly submits that this Power Acquisition Programme is conceived with limited foresight of future dynamics of the power market and the current geopolitical environment, based on the factors listed below:

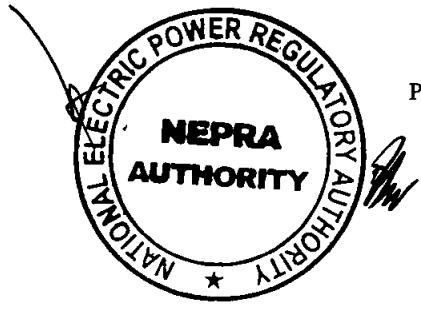
- **Geo-political conditions:** Have added to global fuel constraints and has led to fluctuating fuel prices that are depressing the global economy. This in turn has increased the need for self-sufficiency to ensure fuel supply security for Pakistan.

- **Rupee devaluation:** Rupee has lost over 38 per cent of its value during FY 2023[13].

The above factors have necessitated the requirement for development in indigenous projects to ensure economic security. Keeping this in perspective, KE has planned to add indigenous coal-based projects for its baseload requirements and renewable projects to limit the dependency on imported fuels, which is also in accordance with the principles of National Electricity Policy 2021.

KE humbly requests NEPRA for approval of this Power Acquisition Programme and shall keep NEPRA Authority apprised of any changes in the Power Acquisition Programme on an annual basis as required under the NEPP. Further, it is humbly submitted that the implementation and timely execution of this Power Acquisition Programme is also dependent upon a sustainable tariff for the next tariff control period as well as timely investment approvals such that required network infrastructure is in place for smooth and reliable evacuation of power from the sources envisaged under this Power Acquisition Programme. Furthermore, it is

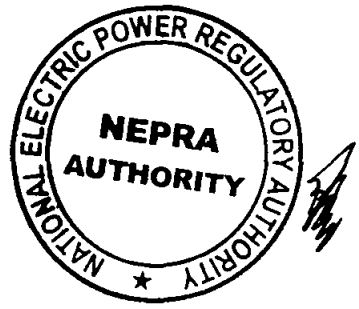
[13] Source: State Bank of Pakistan



important that a level playing field is provided to the IPPs to be contracted with by KE, as envisaged under this Power Acquisition Programme, and the IPPs to be contracted by CPPA through PPIB or AEDB in order to ensure that the investors are provided similar attraction for investments.

7 Disclaimer

The Power Acquisition Programme has been prepared for the period from FY 2024 to FY 2030 and does not contain or determine targets or ascertain liabilities pertaining to power purchase or procurement, commissioning of future power projects assumed within the Power Acquisition Programme, regulation or determination of electricity tariff(s), performance or ascertainment of economic despatch etc. The Power Acquisition Programme has been prepared in compliance with regulatory requirements and is based on proprietary input data as received from various entities and best estimates/assumptions. Use or reliance on this Power Acquisition Programme or any portion or variation thereof by any third party shall be at their sole discretion and risk. KE shall not be held responsible/liable in any manner whatsoever for the integrity, accuracy, authenticity, correctness or representation of such data or consequences resulting from dependency on the Power Acquisition Programme therefrom.



8 Glossary

Abbreviation	Definition
BQPS	Bin Qasim Power Station
CCPP	Combined Cycle Power Plant
CPPA-G	Central Power Purchase Agency (Guarantee) Limited
CPP	Captive Power Producers
FPCL	FFBL Power Company Limited
GENCO	Generation Company
GoP	Government of Pakistan
ICA	Interconnection Agreement
IGCEP	Indicative Generation Capacity Expansion Plan
IPPs	Independent Power Producers
KGTPS	Korangi Gas Turbine Power Station
KE	K-Electric Limited
KKI	KANUPP Karachi Interconnection
kWh	Kilowatt hours
NEPRA	National Electric Power Regulatory Authority
NEPP	NEPRA (Electric Power Procurement) Regulations, 2022
NTDC	National Transmission and Despatch Company
PAEC	Pakistan Atomic Energy Commission
PPA	Power Purchase Agreement
SGTPS	Site Gas Turbine Power Station
SNPC	Sindh Nooriabad Power Company (Private) Limited and Sindh Nooriabad Power Company Phase II (Private) Limited
TSEP	Transmission System Expansion Plan
USD	United States Dollar
WAPDA	Water and Power Development Authority
VRE Study	Variable Renewable Energy Integration study

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Annexure I - Forecasted data for FY 24 till FY 30

Table 6 : Forecasted Energy Demand (in GWh)

Month	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
July	2,150	2,178	2,206	2,235	2,262	2,289	2,314
August	1,883	1,907	1,932	1,957	1,981	2,004	2,026
September	2,110	2,137	2,165	2,193	2,220	2,246	2,271
October	1,882	1,907	1,932	1,957	1,980	2,004	2,026
November	1,550	1,570	1,591	1,611	1,631	1,650	1,668
December	1,273	1,289	1,306	1,323	1,339	1,355	1,370
January	1,176	1,192	1,207	1,223	1,238	1,252	1,266
February	1,226	1,242	1,258	1,275	1,290	1,305	1,320
March	1,816	1,839	1,864	1,887	1,910	1,933	1,954
April	2,148	2,175	2,204	2,232	2,260	2,286	2,311
May	2,236	2,265	2,295	2,324	2,352	2,380	2,406
June	2,377	2,408	2,440	2,471	2,501	2,530	2,558

Table 7 : Forecasted Peak Demand (in MW)

Month	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
July	3,484	3,529	3,575	3,621	3,665	3,708	3,749
August	3,297	3,339	3,383	3,427	3,468	3509	3,548
September	3,536	3,581	3,628	3,675	3,720	3,763	3,805
October	3,424	3,468	3,514	3,559	3,602	3,645	3,685
November	3,154	3,195	3,237	3,279	3,319	3,357	3,395
December	2,385	2,415	2,447	2,479	2,509	2,538	2,566
January	2,353	2,384	2,415	2,446	2,476	2,505	2,533
February	2,628	2,662	2,697	2,731	2,765	2,797	2,828
March	3,432	3,476	3,522	3,567	3,610	3,653	3,693
April	3,785	3,834	3,884	3,934	3,982	4,029	4,073
May	3,733	3,782	3,831	3,880	3,928	3,974	4,018
June	4,168	4,290	4,404	4,522	4,631	4,768	4,896

Table 8 : Forecasted Served Demand (in GWh)

Month	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
July	1,960	2,023	2,072	2,11,4	2,150	2,186	2,219
August	1,745	1,795	1,835	1,869	1,900	1,930	1,957
September	1,935	1,994	2,041	2,082	2,117	2,151	2,183
October	1,734	1,785	1,826	1,862	1,893	1,923	1,951
November	1,417	1,461	1,496	1,526	[illegible]	1,578	1,601

December	1,173	1,207	1,235	1,259	1,280	1,301	1,319
January	1,075	1,108	1,135	1,158	1,178	1,197	1,215
February	1,125	1,159	1,186	1,210	1,230	1,250	1,269
March	1,651	1,704	1,746	1,782	1,813	1,844	1,871
April	1,969	2,029	2,077	2,118	2,154	2,189	2,222
May	2,010	2,080	2,134	2,180	2,219	2,258	2,293
June	2,139	2,213	2,270	2,319	2,361	2,401	2,439

Table 9 : Captive Power Plant

Name of Captive	Contracted Capacity (MW)	Voltage Level	Expiry of current Tariff
ISL	19	11 KV	28th January 2028
IIL	4	11 KV	17th April 2023[14]
Lotte	14	220KV	29th July 2025
Lucky	5	11KV	8th April 2025
Total	**42**		

Annexure II - Details and status of Ongoing Projects

[14] Request for approval of provisional tariff submitted with NEPRA

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a) 150 MW Winder and Bela Solar Projects ("Solar Projects")

KE is undertaking solar project in the Lasbela region of Balochistan (50 MW at Winder and 100 MW at Bela), via competitive bidding mechanism as stipulated under the NEPRA Competitive Bidding Tariff Regulations, 2017, whereby KE is the Relevant Agent and the Power Purchaser.

These are strategic projects for KE to improve the reliability of power supply for these regions as KE is also planning to install new 132 kV lines / grids from Hub to Bela. These initiatives are expected to improve service delivery, pave way for industrial growth, increase employment in the region and socially uplift the adjoining areas.

Tremendous interest was shown for these Solar Projects by local and international investors, in the form of 56 Expression of Interests (EOIs) that were submitted, which were finally brought down to 22 pre-qualified applicants. Once the bidding process for the generation projects is concluded, the successful Bidder will have majority shareholding and management control in the SPV, while KE may participate as a non-controlling shareholder with the successful bidder. Such discussion will only be initiated upon culmination of the bidding process in a clear and transparent manner. The Bidding process will be overseen by an independent consultant, who will be part of the Bid Evaluation Committee and the Bid Evaluation report will be submitted to NEPRA prior to the Letter of Interest (LOI) being issued to the Successful Bidder.

Moreover, the land for the Solar Projects will be provided by GoB. Successful Bidder will be responsible for development and financial close of the projects with KE providing the necessary support required.

In June 2021, KE completed all requisite technical studies and submitted them as part of the Request for Proposal (RFP) package to NEPRA and the prospective bidders for the projects in Lasbela. RFP was submitted in April 2021 and was approved by NEPRA in October 2022.

Since March 2020, KE has continuously been engaged with the GOB for land allocation of the three projects. The Projects were initially conceived in equal parcels of 50 MW each at Winder, Uthal and Bela and feasibility studies were conducted on these shortlisted sites. However, it was later informed by the Energy Department GOB that the land at Uthal is under the Forest Department and not available for the project. Hence, alternate land was provided by GoB parallel to the existing Bela site thereby increasing the project size of the Bela project to 100 MW from 50 MW (as recommended by NEPRA).

For the final allocation of land, LEC meeting was held on 24 August 2022, whereby GOB directed to route the projects under Public Private Partnership (PPP) mode.

While the parties were under discussion on the suitable way forward, GOB, on 30 November 2022, issued the Lease Order for Bela site 1 and Winder under PPP mode. Upon extensive deliberations and discussions, it was concluded that the Solar Projects cannot be undertaken

via the proposed route. Hence, the lease order for the alternate site at Bela (Bela 2) was issued without the PPP mode on 14 February 2023, while the corrigendum to the Lease Order for Winder and Bela site 1 is under process with GOB for removal of PPP mode.

Once the lease orders for the sites are provided, the same would be provided to NEPRA for adjustment of benchmark tariff, in accordance with NEPRA's earlier approval of the RFP, for the initiation of the competitive bidding process.

Milestones achieved since inception include the following:

Milestones	**Date**
Advertisement seeking EOIs	07-Aug-2020
EOIs received from 56 parties	21-Aug-2020
Issuance of Prequalification Document	05-Nov-2020
Submission of Prequalification Applications from the Applicants	21-Dec -2020
Submission of RFP to NEPRA and issuance to Prequalified Applicants	28-Apr-2021
Submission of Feasibility Studies to NEPRA for the three sites	30-Jun-2021
NEPRA hearing on RFP	22-Sep-2021
NEPRA approval on RFP	14-Oct-2022
KE Review Petition filed on NEPRA RFP decision	14-Nov-2022
Lease Order Bela site 2	14-Feb-2023

b) 270 MW Sindh Solar Energy Projects

To increase solar power generation and access to electricity in the province of Sindh, Sindh Energy Department (SED) in collaboration with the World Bank Group (WB) will undertake as one of the components of the Sindh Solar Energy Project (SSEP), a 400 MW of Utility-Scale Solar Park to be developed by the private sector under a competitive bidding model, bifurcated into:

- Single or multiple solar projects with cumulative capacity of 350 MW to be set up in KE's service territory
- Remaining 50 MW Project in Jamshoro district, with Central Power Purchasing Agency (CPPA-G) as the power off-taker

KE, WB and SED signed a Memorandum of Understanding (MoU) on December 10, 2021, for the development of 350 MW solar projects.

The GOS has allocated 612 acres of land at Deh Metha Ghar and 600 acres at Deh Halkani for the development of the projects. The feasibility study and Grid Interconnection Study for both the sites is being finalized. The advertisement for prequalification applications was widely

published in national and international newspapers on 26th January 2023. The RFP for the projects was submitted to NEPRA on 20 February 2023.

Presently, 270 MW are being developed at two sites on single axis technology and tracking is the part of the minimum technical requirement in the Request for Proposal (RFP) to enhance the reliability and availability of electricity from the Projects.

The details of the Projects are as follows:

1. Karachi Site 01 – Deh Halkani, District West, Karachi, Sindh, Pakistan (Approx. 120 MW solar PV potential- on single axis technology).
2. Karachi Site 02 - Deh Meth Ghar, District Malir, Karachi, Sindh, Pakistan (Approx. 150 MW solar PV potential - on single axis technology)

The Deh Metha Ghar and Deh Halkani sites would accommodate a capacity of c. 270 MW, an additional site is being identified for the remaining 80 MW Capacity.

c) 200 MW (AC Peak) Site Neutral Dhabeji Hybrid Plant

KE has submitted the RFP for the Site Neutral Hybrid Plant to NEPRA on 28 November 2022. The Project will be within a 50km radius from KE's Dhabeji Grid Station. KE has invited developers to bid for the capacity for delivery at the interconnection point, and the developers would be responsible for all the activities including procurement of land and conducting the feasibility studies. The advertisement for prequalification was published on 6th February 2023.

The capacity for this RFP is 200 MW (AC Peak) and will be developed under the NEPRA's NCBT 2017 regulations. KE will enter into an Energy Purchase Agreement with the successful bidder upon securing relevant approvals. This capacity is envisioned for commissioning beyond FY-25.

d) 82 MW Uzghor Hydel Power Plant

The proposed 82.25 MW, Turtonas-Uzghor Hydropower Project (TUHPP) is in Chitral district of KPK, located at a distance of 390 km from Islamabad, spanning over an area of 52.7 acres. It is a run of the river project, located on River Golen Gol, upstream of existing WAPDA HPP.

On December 21, 2021, KE issued a letter to indicate KE's potential interest in power procurement to the project. The project already has a generation license granted in December 2020 and has completed environmental and feasibility studies. The feasibility stage tariff was determined by NEPRA in April 2021 for which a review petition was filed by the project. NEPRA in its review determination on July 29, 2021, has directed the Project to supply power under CTCBM. TUHPP is further reviewing the decision since TUHPP will be supplying power to KE, an SoLR, for the regulated consumers, and hence will require a tariff from NEPRA.

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TUHPP has further submitted the Licensee Proposed Modification (LPM) to NEPRA for change in power purchaser to KE. In this regard, KE requests NEPRA to consider their request. TUHPP has been optimized in the NEPRA approved IGCEP 2022 for KE with the targeted COD of 2029.

It is pertinent to mention that the addition of low-cost hydro power to KE system will benefit the electricity consumers through reduction of KE basket price and will help diversify KE's generation fuel mix. The project will further match the seasonal demand requirement by catering to serve during peak summer months.

e) Siddiqsons Energy Limited 330 MW Thar Mine Mouth Power Plant

The project was initially conceived to sell power to CPPA-G and has completed various project milestones including signed project agreements, completion of feasibility studies, upfront tariff and Generation License award by NEPRA. SEL approached KE for power off-take and has been in active discussions with lenders and are confident of securing financing for the Project. KE has completed its due diligence. SEL has approached the Government to sort out the pending issues for the Project so that they may move forward. SEL has also approached NTDC at the working level for discussions on wheeling and initiate the requisite studies. The development of the wheeling structure would be the most critical element for the success of this project with KE, opening the doors for future evacuation of power by KE from projects not located in or around its service territory. In parallel, SEL is pursuing SECMC and GoS for consents and extensions of already executed contracts including Coal Supply Agreement and Water Use Agreement.

NEPRA conducted a meeting on 3 October 2022 with relevant stakeholders including CPPA-G, PPIB, SEL, SECMC and KE on the matter of change of purchaser from CPPA-G to KE. NEPRA principally supported this change and the Project, however directed SEL to resolve outstanding issues with PPIB and CPPA-G before formally making any filings to NEPRA. The Authority further directed SEL to conduct EPC bidding, which is currently under evaluation.

f) 15 MW GNL Solar Project

KE has received a proposal for a 15 MWp Solar project from GNL. The project is planned to be evacuated via 11KV through KE's Gharo grid station for which a new 11 kv line of around 7-8 km will also be required.

The developer has recently conducted the pre-feasibility study and proposed an indicative levelized tariff of 4.2 cents. The proposal will fall under negotiated procurement as per Section 30 of NEPPR. Subsequent to PAP approval, GNL will submit the tariff petition to the Authority and will get the final tariff after determination from the Authority. KE has evaluated that the tariff proposed by GNL is below KE's average purchase price and will reduce the KE's basket price (based on sentout) which was PKR 23.91 / Kwh and PKR 21.52 / Kwh for FY-23 and FY-22.

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It is pertinent to mention that land for the project is already available with the developer, therefore, the project can be commissioned on a fast-track basis with targeted COD in 24-25. Moreover, this will be in the interest of KE consumers considering the overall level of solar generation in KE mix, this procurement will immediately reduce KE's reliance on expensive fuels and will bring cheaper renewable energy to the KE system.

g) 18 MW Solar Project

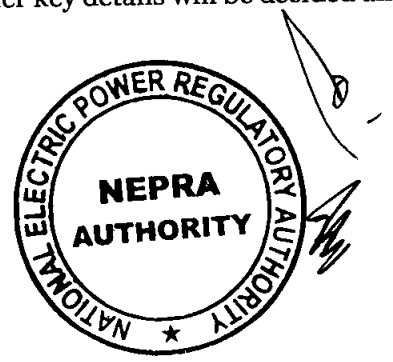
18 MWp Solar project from K-Solar has been considered on negotiated procurement. The project will be located at KE's existing sites with cumulative capacity of 18 MWp and is planned to be evacuated via KE's existing 11KV system.

The developer has proposed an indicative levelized tariff of 4.2 cents and falls under negotiated procurement as per Section 30 of NEPPR. Subsequent to PAP approval, K solar will submit the tariff petition to the Authority for final tariff determination. KE has evaluated that the tariff proposed by K solar is below KE's average purchase price and will reduce the KE's basket price (based on sentout) which was PKR 23.91 /KWh and PKR 21.52 /KWh for FY-23 and FY-22.

It is pertinent to mention that land for the project is already available with KE, therefore, the project can be commissioned on fast track basis in the quickest possible time with targeted COD in 24-25. Moreover, this will be in the interest of KE consumers considering the overall level of solar generation in KE mix, this procurement will immediately reduce KE's reliance on expensive fuels and will bring cheaper renewable energy to the KE system.

h) 50 MW Renewable Project by Ladies Fund

KE has expressed potential interest in power procurement from a 50 MW solar power project to be developed by Ladies Fund. KE engagement is conditional to the results of relevant technical studies including the Bankable Feasibility Study, load flow, short circuit and stability, and necessary regulatory approvals, The project has recently completed the pre-feasibility which has been shared with international lenders and are now in the process of preparing bankable feasibility study. The developer has communicated that the bankable feasibility study of the project will be completed by 31st March and based upon which the tariff of the project along with other key details will be decided and communicated to the Authority.



Annexure III - Other Indicative Projects

a) 330 MW X 2 on Local Coal

KE intends to develop the project on Thar Coal at Port Qasim using advanced coal technologies. The land is already available with KE. The reason for developing the project at Port Qasim is availability of water due to the vicinity of the location with the seashore, availability of interconnection and transmission facilities and expected availability of rail link prior to the start of project construction (feasibility study with Crimson Engineering under the supervision of Pakistan Railway Freight Transportation Company is underway. KE has envisioned this project to come online by FY-27/29 in the base case. In order to conduct the fast-track development of the project, KE is also in contact with the various stakeholders like technology providers, contractors, developers, and lenders to create a viable structure keeping into perspective the challenges related to financing of coal projects, due to embargos by Western countries and even China to support offshore coal projects. Being a feasible and least cost baseload option based on indigenous resources inline of Government of Pakistan's policy, it is top priority of the utility to ensure the timely development of the coal base power projects. However, given the changing international focus towards sustainable development and dwindling support available amongst the international lenders and technology pertaining to support such development, it would remain a steep challenge to timely convince all the stakeholders. KE intends to keep the Honorable Authority apprised of the progress regarding the coal power plant development.

b) Letter of Intent (LOI) Issued by KE

i) 500 MW GO Energy Floating Solar Project

KE is considering procuring upto ~ 500 MW from floating solar at Keenjhar Lake, under the ambit of new technology. The project has also been provided an LOI by GoS for the use of water body and develop this Project at Keenjhar Lake. The project is undergoing pre-feasibility, and the Grid Interconnection Studies will commence shortly. KE is keen to support this Project since it is a novel and new technological approach towards solar which has been recently gaining ground globally.

ii) 500 MW Hybrid Power Project

The novel idea for developing solar PV and wind hybrid project has been pursued by an independent company and the project has completed and the feasibility study, while Grid Interconnection Study is currently underway.

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c) Request for Proposal (RFP) for RE Project on Land procured by KE

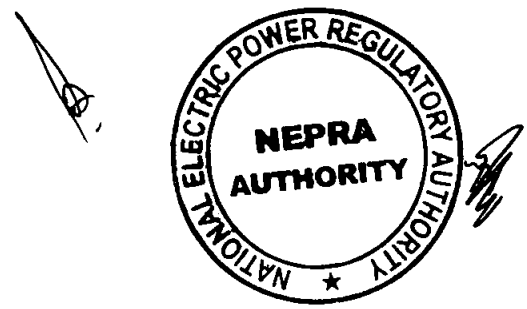
Considering that Government land availability and allocation remains one of the most critical items in project development which takes substantial amount of time with the provincial government authorities for its identification, pricing, and allocation, and delays the overall project timeline significantly, KE is considering circulating RFPs for Solar projects on land procured by KE.

KE is currently in the process of identifying suitable private land for procurement in order to initiate a competitive bidding process for a new renewable project having capacity of 250 – 300 MW.

d) Discussion with Hydel Projects

KE has also initiated discussions with large hydro developers for power off take by KE via wheeling.

KE has been engaged with PEDO for the development of hydro projects in the province of KPK, for KE's off-take. A working level joint development group has been constituted, comprising of the representatives from both entities. The group has conducted several meetings during which PEDO has suggested the names of certain private hydel projects, which can be considered for KE's power off-take. KE is currently evaluating the projects based upon their tariffs and development status, and plans to further engage with the project developers, to select the most optimal project for meeting KE's demand needs. KE has also executed a Memorandum of Understanding (MoU) with China Three Gorges South Asia Limited (CSAIL), to carry out the joint development of hydel power projects.



PAP's PROPOSED PROJECTS & EVACUATIONS INFORMATION PERFORMA (ANNEXURE-I)

(1) Generation Type		(1) Generation										(2) Transmission related Information									(3) Other Comments / Remarks
		Capacity MW	Technology	Fuel	Is part of IGCEP (Committed/Optimised)		Rationale of procurement	Firm Capacity MW	Year of Commissioning as per IGCEP/ Original COD	Year of Commissioning if delayed/ Actual COD	Location	Is GIS Conducted and Aproved	Proposed Grid for Interconnection	Augmentation required in Grid	Augmentation required in Transmission Network	Is Grid & Transmission Network Augmention included in investment plans?	Responsible entity or entities for grid and transmission expansion	Year of Commissioning of Grid & Transmission Network	Year of Commissioning if Grid & Transmisson Network is Delayed	Procurment entities concluding remarks on Evacuation	
(a) Firm Project	Generator 1						Capacity needs / Constraint removal / legacy commitment / Fuel displacement														
	Generator 2																				
	.....																				
	Generator n																				
(b) Indicative Project	Generator 1																				
	Generator 2																				
	::::																				
	Generator n																				

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