POWER ACQUISITION PROGRAMME
(FY 2024 – FY 2030)

Compliance of Regulation 6 of NEPRA (Electric Power Procurement) Regulation, 2022

Regulation 6	Requirement	Coverage in Power Acquisition Programme ("PAP")	
		Section/ Annexure No.	Table No.
a)	Energy and peak demands during the preceding twelve months on actual basis.	S. 1.4	Table 2
	Projections for the subsequent five years Energy and peak demands.	Annexure I	Table 6 and Table 7
b)	Existing contracted energy and capacity	S. 1.2	Table 1
c)	Its capacity obligations as determined by the market operator in accordance with the Market Commercial Code;	S. 4.3	Table 5
d)	Proposed new and firm power procurement during the next three years Indicative procurement for the subsequent two years in accordance with these regulations	S. 4 and Annexure II & III	Table 4
e)	Mode of procurement against each proposed procurement and respective timelines including start and completion of the procurement process and start of operations of the respective projects;		
f)	Contracted energy and capacity that is expected to become available during next five years with respective timelines including indication of delay (if any);		

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K-ELECTRIC LIMITED

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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 (1,100MW), 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 ~9 c/kWh in FY 2030 from ~11.1 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.

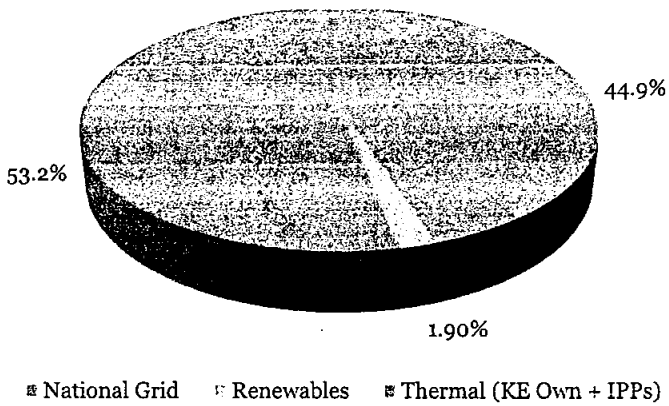
Table 1: Existing Generation Capacity in KE System

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

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.

Figure 1 : KE Fuel Mix 2022



[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

1.4 KE's Demand

During FY 2022, KE total demand was of 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)
Jul-21	2,078,126	1,963,624	3,524
Aug-21	1,918,825	1,804,129	3,149
Sep-21	2,041,709	1,924,140	3,619
Oct-21	1,868,308	1,775,507	3,246
Nov-21	1,486,434	1,405,857	2,723
Dec-21	1,221,661	1,168,611	2,200
Jan-22	1,143,037	1,088,530	2,081
Feb-22	1,208,320	1,141,352	2,357
Mar-22	1,735,003	1,629,084	3,138
Apr-22	2,059,064	1,936,358	3,361
May-22	2,191,181	2,007,198	3,670
Jun-22	2,231,711	1,957,817	3,646

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

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.

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

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

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 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

Base fuel prices for the indexed tariff have been taken as per the prevailing fuel prices in August 2022 and have been further indexed for future years in accordance with the indexation factors provided in the approved IGCEP 2022-31.

Whereas, for non-indexed tariffs, fuel prices prevalent in November 2022 have been considered while no indexation of fuel prices and macro-economic factors have been taken 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 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 in 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

[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, 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.

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 900MW and Wind 200MW 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 is expected to come online in FY 2026, followed by two additional units of 330MW coal power project in FY 2027 and 2029 respectively.

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	350
FY 26	Local Coal	330
FY 27	Local Coal	330
FY 27	Solar	200
FY 28	Wind	100
FY 29	Local Coal	330
FY 29	Solar	200
FY 29	Hydel	82
FY 30	Wind	100
Total		**2,172**

Detail of ongoing Projects (including 150 MW Winder and Bela Solar Projects, 350 MW Sindh Solar Energy Projects, 200 MW Site Neutral Hybrid Plant and 50MW Renewable Project by Ladies Fund) 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

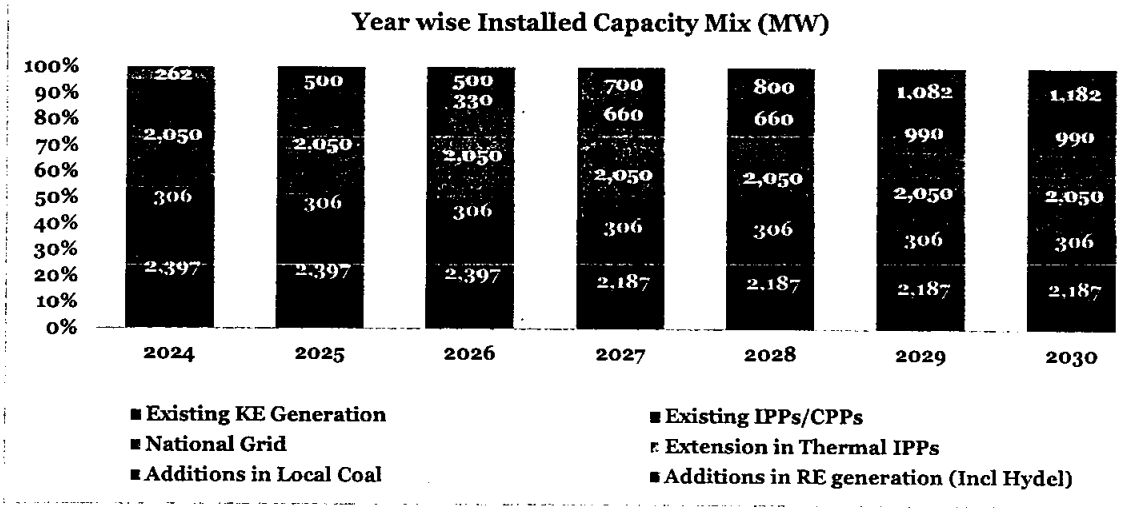
[10] These additions are planned through establishment of separate SPVs and as per the procurement mechanism defined under NEPP.

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)

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

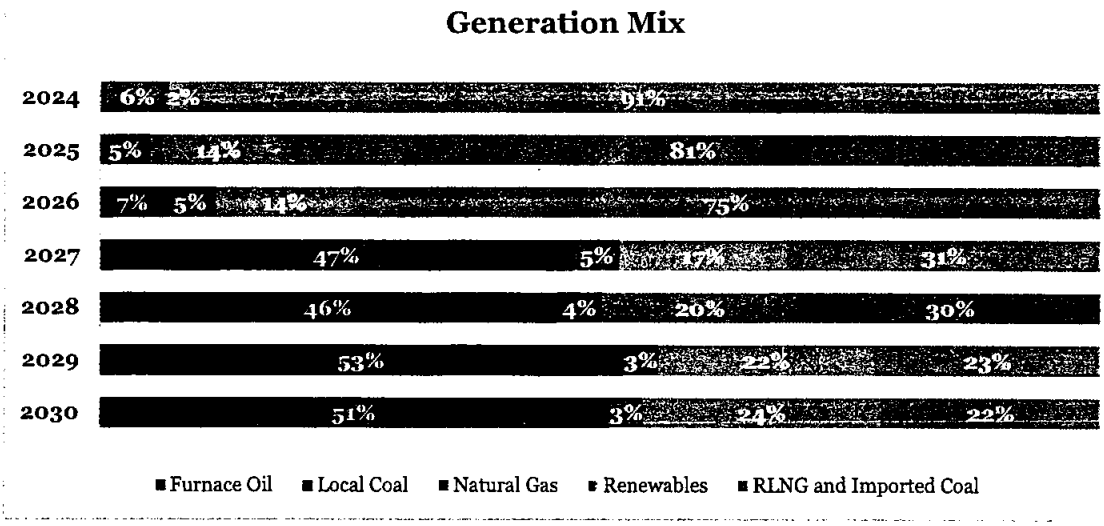
Figure 2 : Existing and Planned Additions in Installed Capacity (MW)



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 24% and 54% 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 **~11.1 cents/kWh** in year FY-2024 to **~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**).

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

Year	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027
Credited Capacity (MW)	4,076	4,470	4,466	4,770	4,929
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 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 is given below:

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

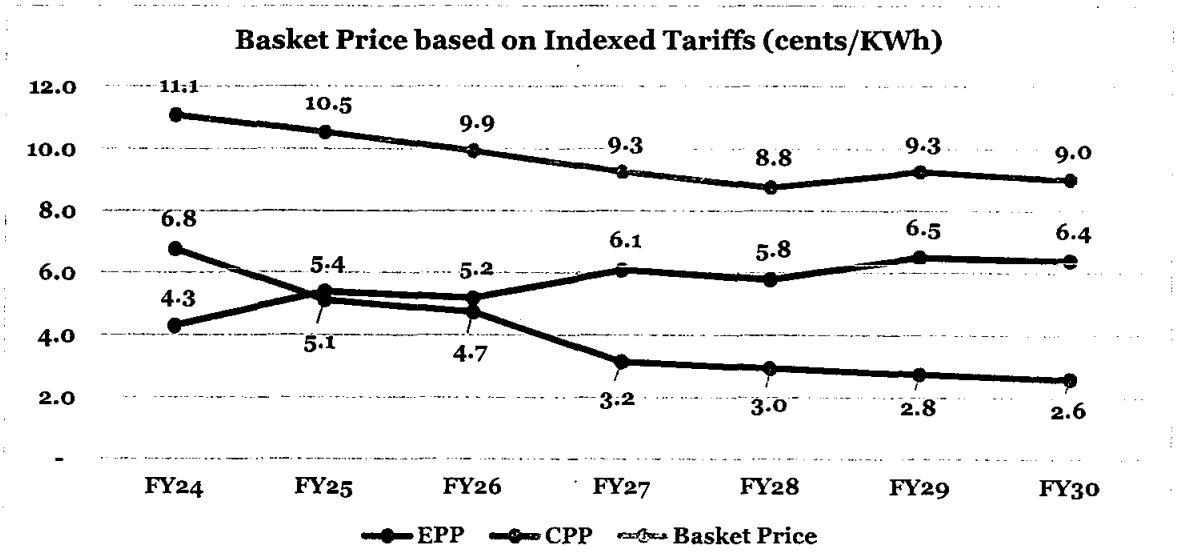
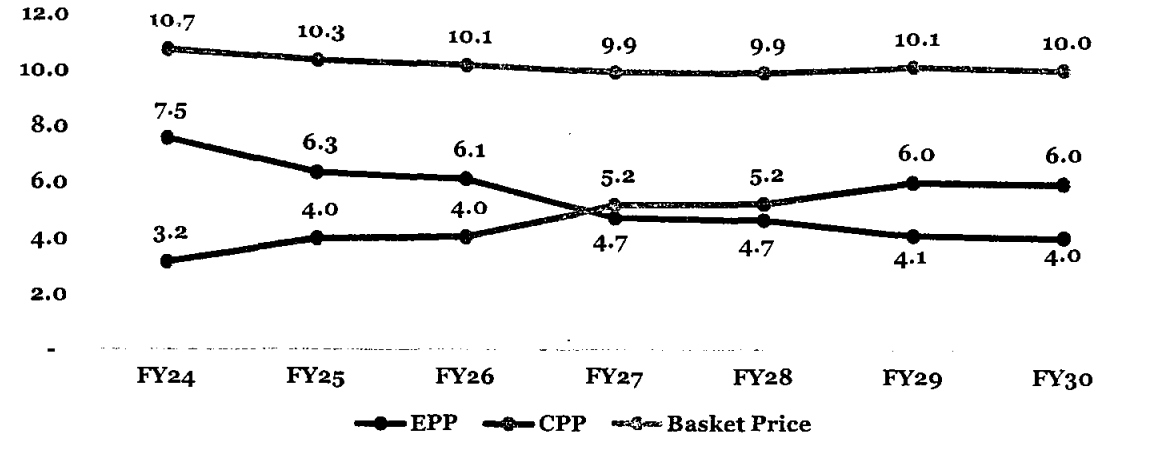


Figure 5 : Basket Price Non-Indexed Tariff (FY 2024-30)



5 Anticipated Challenges

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

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[11].

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 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 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.

[11] Source: State Bank of Pakistan

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

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	1,552	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	Installed Capacity (MW)	Distribution Voltage Level	Expiry of current Tariff
ISL	19	11 KV	28th January 2028
IIL	4	11 KV	17th April 2023
Lotte	14	220KV	29th July 2025
Lucky	5	11KV	8th April 2025
Total	**42**		

Annexure II - Details and status of Ongoing Projects

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 the 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 would 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 had 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 the 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, an 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) 350 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.

SED will be the Relevant Agent for the Project and will be responsible for carrying out the competitive bidding process including the RFP submission to NEPRA, bid evaluation and contract award to the Successful Bidder(s).

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, additional site is being identified for the remaining 80 MW Capacity.

c) 200 MW Site Neutral 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.

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) 50 MW Renewable Project by Ladies Fund

KE has expressed potential interest in power procurement from 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 advance 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 about 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 to procure 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.

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 to circulate 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 province of KPK, for KE's off-take. A working level joint development group has been constituted, comprising of the representative from both entities. The group has conducted several meetings during which PEDO has suggested the names of certain private hydel projects, that 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.