



Integrated Investment Plan

From FY 2024 to FY 2030



- KE's existing Multi Year Tariff (MYT) is set to expire in June 2023. Accordingly, KE has initiated the process for renewal of its tariff for the period post June 30, 2023.
- Further, keeping in view the learnings of Current MYT and upcoming market changes including separation of Distribution and Supply businesses, implementation of CTBCM model and proposed country wide central economic dispatch and for better transparency KE is pursuing separate Tariff Petitions for Generation, Transmission, Distribution & Supply Businesses
- In view of above, KE has filed Generation Tariff Petition on December 01, 2022, and the same has been admitted by NEPRA on February 03, 2023.
- For Transmission & Distribution segment, KE as per direction of NEPRA has submitted the Investment Plan for the next control period FY 2024 – 2030 on January 30, 2023, which will form basis for Tariff petition.
- Investment plan is prepared with an aim to ensure improve safety, efficiency, reliability, availability and capacity of network

Following slides highlight the key features of the investment plan submitted along with KE's response on the issues framed by the Authority:

Description	PKR Mn							
	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Total
Transmission	46,628	48,986	51,786	49,654	41,623	22,416	19,822	280,915
Distribution	24,881	30,062	29,541	29,082	24,161	24,158	22,765	184,650
Support	3,597	2,394	2,583	2,223	2,736	2,831	2,150	18,514
Total CAPEX	75,106	81,442	83,910	80,959	68,520	49,405	44,737	484,079*

Assumptions (as at June 30, 2022):

Exchange rate – PKR / USD 206

PAK CPI (avg.) - 158.48

US CPI (avg.) – 282.03

**Note: The above CAPEX is exclusive of Dedicated Consumer Funded CAPEX as explained in the Investment Plan.*



KE has proposed its investment plan on the following reference macro-economic assumptions:


- **Exchange Rate of PKR 206 per USD.**
- **Pak CPI of 158.48.**
- **US CPI of 282.03.**

By requesting indexation, K-Electric is seeking to ensure that **its allowed costs keep pace with its actual costs** and that it can continue to invest in infrastructure, upgrade its facilities, and provide reliable electricity to its customers. **Indexation is a common practice in the power sector** and is used to **maintain the financial viability of power utilities**.

Furthermore, in addition to the indexation for the above reference macro-economic assumptions, KE has also requested to consider other uncontrollable factors including but not limited to change in **demand growth assumptions, changes in technology, Government policies including Import/ LC ban and change in power procurement plan and projects**.

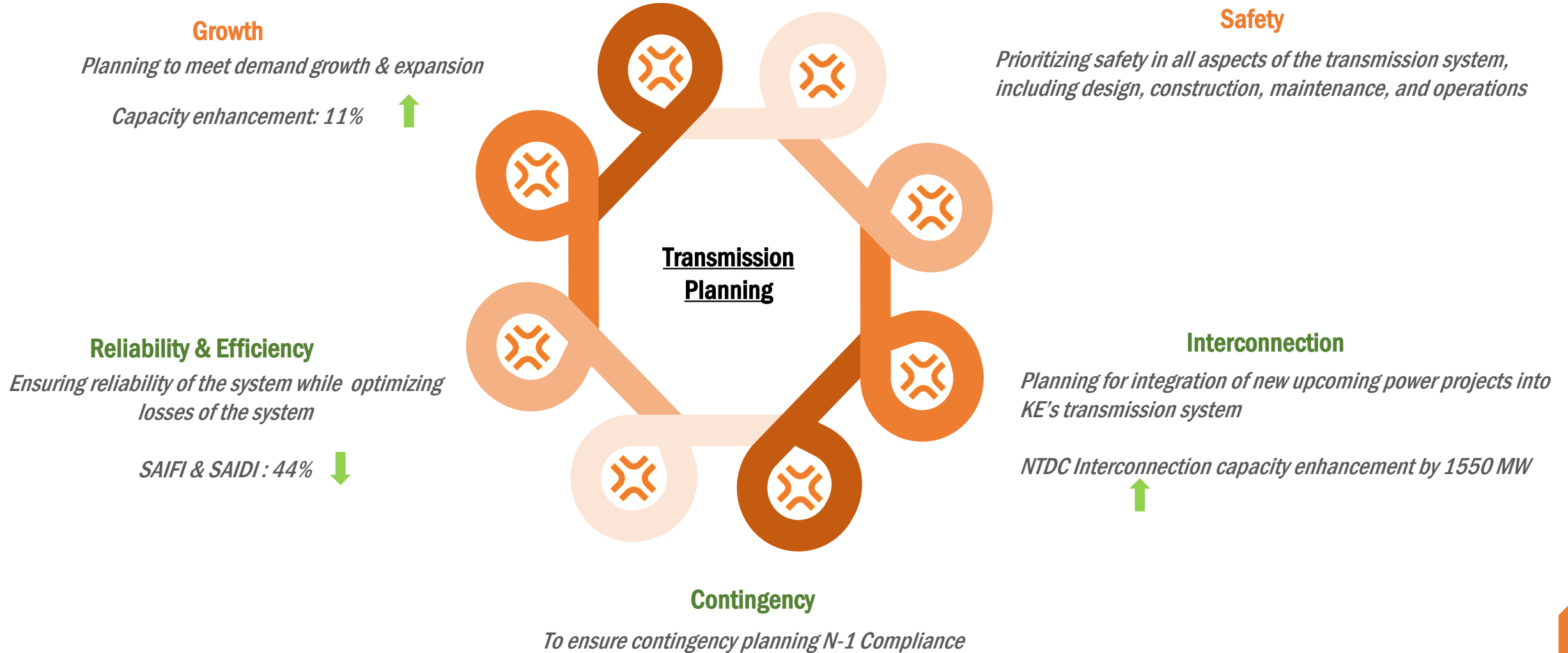
Accordingly, KE has requested an Indexation Mechanism in the following two parts:

1. **Annual Investment Update (After every year)** – Account for changes due to macro factors and adjust for delays in investment plan and actualization of deferred revenue additions from Grid Sharing Charges. Furthermore, to rebase future CAPEX at the prevailing macro-economic assumptions for CAPEX given for the remaining years.
2. **Complete Investment Review (After every two years)** – Account for changes in uncontrollable factors as explained above.
3. **Specific Approval for any Additional CAPEX from NEPRA.**



Investment Plan – Transmission FY 24 - 30

Transmission Planning – Key Considerations

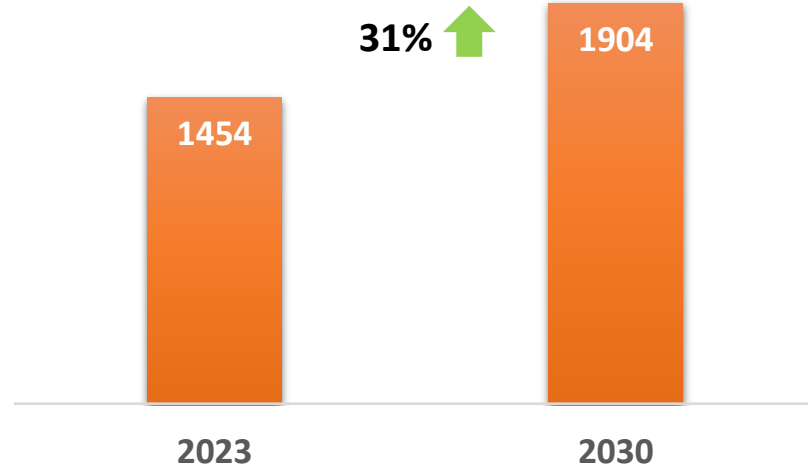


Transmission Planning – Key Parameters

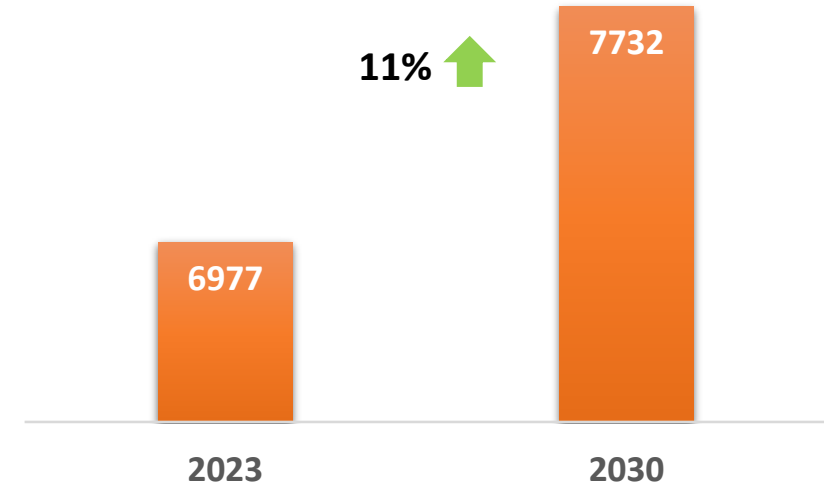
Transmission planning is being done based on the following key parameters:

- Grid wise forecasted demand;
- Minimum N-1 contingency for critical 220 kV and 132 kV Transmission Lines and Auto Transformers;
- Power Transformers are designed on optimized load of 93%
- Rehabilitation of existing assets (including GIS, AIS, transmission lines hardware, conductor ampacity, buildings)
- Augmentation of extended load on existing grid stations where technically possible;
- Installation of reactor for managing short circuit limit breach owing to addition of new generators on the shorter distances from load center.
- Interconnections required for upcoming New Power Projects
- Optimization of asset utilization

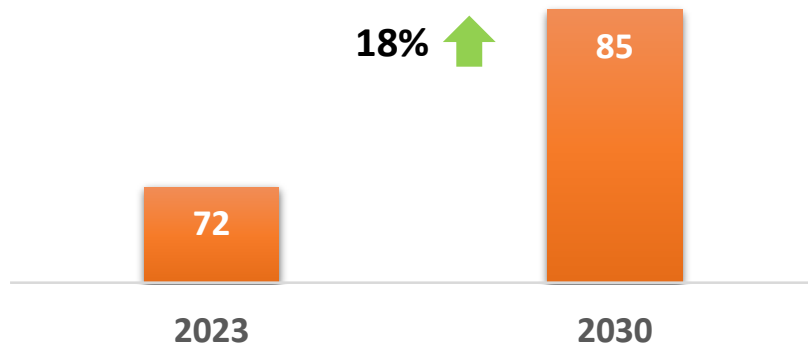
Addition of 450 km of Transmission Lines



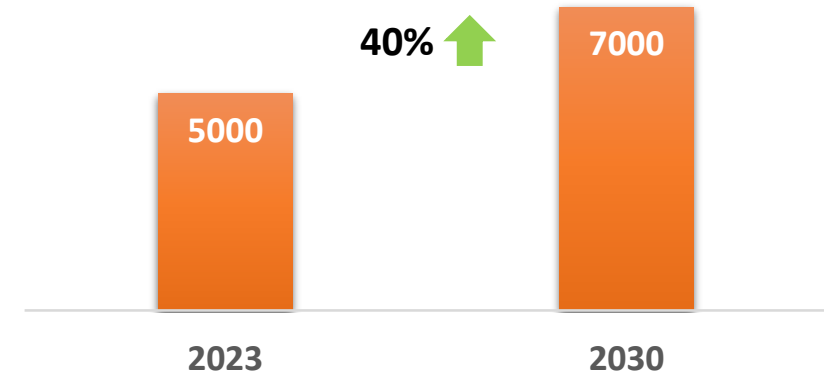
Capacity Enhancement by 755 MVAs – Power Transformers



Addition of 13 Grid Stations



Capacity Enhancement by 2,000 MVAs – Auto Transformers *



* In addition to 2000MVA addition in 220kV Grids, 1800MVA will also be added in KKI Grid station.

PKR in Mn

CAPEX Category	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Total
Growth Projects	14,965	30,661	31,899	20,082	28,732	10,357	4,054	140,751
NTDC Interconnection	22,202	3,042	4,562	-	-	-	-	29,806
IPPs- Interconnection	2,305	5,943	5,776	8,778	122	129	-	23,054
System Improvement / Reliability	6,731	8,704	8,871	20,337	12,211	11,762	15,516	84,133
Reactive Power management & Loss Reduction	424	636	677	457	558	167	251	3,171
Total Capex	46,628	48,986	51,786	49,654	41,623	22,416	19,821	280,915

A nighttime photograph of a cityscape. In the background, a large port area is visible with several large gantry cranes and industrial buildings, all illuminated by bright lights. In the foreground, a city street is shown with light trails from cars, indicating long-exposure photography. A prominent church with a tall, ornate steeple and a clock face is visible on the right side of the foreground. The sky is a deep blue, suggesting dusk or dawn. An orange banner with white text is overlaid in the center of the image.

Investment Plan – Distribution FY 24 - 30



KEY OBJECTIVES OF DISTIRBUTION INVESTMENT PLAN 2024-30

01



SAFETY

Provide a safe environment both for own employees and general public

02



RELIABILITY

Provide uninterrupted power supply to customers that is resilient to climatic impacts

03



QUALITY

Provide quality power to customers that is free from sags, swells, jerks and fluctuations

04



LOSS REDUCTION

Identify and eliminate sources of technical & commercial losses using technology insights

05



TECHNOLOGY

Make intelligent use of technology to achieve operational excellency

Categories	Gross Investment	*Inflows	Net Investment
Growth	120,439	(83,335)	37,104
Loss Reduction	71,662	(7,000)	64,662
Maintenance	44,789	(4,293)	40,496
Safety	25,858	-	25,858
Technology	16,529	-	16,529
Total (Inc IDC)	279,277	(94,628)	184,649

DISTRIBUTION INVESTMENT PLAN INITIATIVES FY'24-30

FOCUS	Growth	Loss Reduction	Maintenance (Outage Reduction & Spread containment)		Safety	Technology
INITIATIVES / MEASURES IN MYT 24-30	<ul style="list-style-type: none"> ○ New feeders (Growth & Overloading) ○ Grid Balancing (Grid – Grid) ○ Grid Balancing (PT – PT) ○ New links ○ Overloading elimination of DTs (SIP OL) 	<ul style="list-style-type: none"> ○ Loop Splitting ○ Power Factor Improvement Plants ○ OH Network Rehabilitation: <ul style="list-style-type: none"> ○ Covered OH conductor ○ Covering of exposed conducting parts ○ LT Aerial Bundle Cable on High Loss PMTs 	<ul style="list-style-type: none"> ○ OCB replacement with VCB (primary substation) ○ Deteriorated UG Cable replacement ○ Deteriorated Knife switch replacement with LBS 	<ul style="list-style-type: none"> ○ Protection Upkeeping & Enhancement at Primary Loops ○ Missing Relays Installation ○ Timely activation of relays through Aux power backup (CTU) 	<ul style="list-style-type: none"> ○ Public Accident Prevention Plan (PAPP) ○ No Mains ○ Earthing of Service Bracket ○ Encroached Overhead to Underground ○ Stay Unit Insulators ○ Installation of DBs ○ Pad Mounted Unit on Wheels ○ Special Equipment & Tools 	<ul style="list-style-type: none"> ○ SCADA & ADMS pilot for real time monitoring and control ○ Sustainability of GIS and MDMS ○ Shift of Focus from Reactive to Periodic Maintenance ○ Power Quality Analyzers ○ Change Management ○ Mobility Devices (MR /MIO/RCDC) ○ AMR Meters ○ Customer Service Digitization

Benefits

*FY23 **FY30

3,251 MW Growth
3.3% per Annum (Sys. Peak)

*13.8% → **11.5%
Distribution Loss

*168k → **114k
32% Outage Reduction



Issues Framed (Transmission)

Issue (i)

Whether claimed cost of Rs. 140,751 Million for growth projects in Transmission Segment is justified? K-Electric is required to provide detailed cost breakup for each transmission project.

S. No.	Project Name	MVA	Amount Mn PKR	Energization Year	Justification/Scope of Work	Relieving Grid
1	220kV Landhi – New Grid	250	19,653	2026	<p>Justification/Benefit: The project will enable to cater the upcoming load growth in Landhi and adjoining areas. This will enable maintaining adequate load profile on existing Auto transformers of this island whilst having N-1 contingency provision. and provide relief to Pipri West Island. In case where the 220kV Landhi grid does not materialize then rehabilitation of 220kV BQPS2 – KCR circuits will be required for evacuation of power from BQPS2 & BQPS3 power plants</p> <p>Scope of Work: 01 x 250 MVA 220/132kV Auto Transformer, 10x 220kV & 5x 132kV Bays and allied paraphernalia. 220kV D/C T/Line from existing 220kV BQPS – 3 Grid Station. (30 KM).</p>	Pipri Dhabeji
2	220kV Ziauddin – New Grid	500	37,353	2028	<p>Justification/Benefits: The project will enable to cater the upcoming load growth in KDA & Surjani area. This will enable maintaining adequate load profile on existing Auto transformers of this island whilst having N-1 contingency provision.</p> <p>Scope of Work: 02 x 250 MVA 220/132kV Auto Transformer, 7x 220kV & 5x 132kV Bays and allied paraphernalia. 220kV D/C U/G T/Line from existing 220kV Surjani Grid Station. (20 KM). 132kV Valika - Nazimabad T/Line in/out at 132kV Ziauddin Grid Station. (4 KM)</p>	KDA Surjani



S. No.	Project Name	MVA	Amount Mn PKR	Energization Year	Justification/Scope of Work	Relieving Grid
3	220kV DHA4 – New Grid	250	9,053	2030	<p>Justification/Benefits: The project will enable to cater the upcoming load growth in DHA area. This will enable maintaining adequate load profile on existing Auto transformers of this island whilst having N-1 contingency provision</p> <p>Scope of Work: 01 x 250 MVA 220/132kV Auto Transformer, 4x 220kV & 2 132kV bays and allied paraphernalia. 220kV K. Creek – CCP Transmission line in/out at 220KV DHA – 4 Grid Station of 5km length</p>	KCR Lalazar
4	132kV SITE - 2	80	7,186	2026	<p>Justification/Benefits: The new grid station will enable to serve the upcoming industrial & residential load growth relieving the existing feeding grids.</p> <p>Scope of Work: 01 x 40 MVA 132/11kV Power Transformer, 4x 132kV Bays and allied paraphernalia (FY 2026) 01 x 40 MVA 132/11kV Power Transformer along with 132kV Bays and allied paraphernalia (FY 2030) 132kV Valika - Nazimabad T/Line in/out at 132kV Site – 2 Grid Station (3 KM).</p>	Haronabad / SITE



S. No.	Description	MVA	Amount Mn PKR	Year	Justification/Scope of Work	Relieving Grid
5	132kV MALIR - 2	40	5,160	2029	Justification/Benefits: The new grid station will enable to serve the upcoming load growth relieving the existing feeding grids. Scope of Work: 01 x 40 MVA 132/11kV Power Transformer, 4x 132kV Bays and allied paraphernalia 132kV Landhi – Johar T/Line in/out at 132kV Malir – 2 Grid Station (3KM).	KDA
6	132kV K. CENTRAL	80	8,068	2026	Justification/Benefits: The new grid station will enable to serve the upcoming industrial load growth relieving the existing feeding grids. Scope of Work: 02 x 40 MVA 132/11kV Power Transformer, 7x 132kV Bays and allied paraphernalia 132kV Qayyumabad - K. East T/Line & 132kV Qayummabad – K. South T/Line in/out at new 132KV K-Central Grid Station (8 KM).	K.East / Town
7	132kV MAYMAR - 2	40	4,572	2030	Justification/Benefits: The new grid station will enable to serve the upcoming load growth relieving the existing feeding grids. Scope of Work: 01 x 40 MVA 132/11kV Power Transformer, 4x 132kV Bays and allied paraphernalia 132kV Maymar – Surjani T/Line in/out at 132kV Maymar – 2 Grid Station(3 KM).	Maymar



S. No.	Description	MVA	Amount Mn PKR	Year	Justification/Scope of Works	Relieving Grid
8	132kV KKI	250	8,441	2027	Justification/Benefits: The project will enable to cater the upcoming load growth in Baldia and adjoining areas. This will enable maintaining adequate load profile on existing Auto transformers of this island whilst having N-1 contingency provision Scope of Work: 01 x 250 MVA 220/132kV Auto Transformer. 1x 220kV & 6x 132kV Bays and allied paraphernalia 132kV D/C T/Line from existing 132KV HUB Chowki Grid Station.(18 KM).	Baldia
9	132kV HOSPITAL - 2	40	7,681	2029	Justification/Benefits: The new grid station will enable to serve the upcoming load growth in Johar area. Scope of Work: 01 x 40 MVA 132/11kV Power Transformer, 6x 132kV Bays and allied paraphernalia 132kV S/C T/Line from Existing 132kV Hospital Grid Station. (3KM) 132kV S/C T/Line from Existing 132kV KDA Grid Station. (10 KM)	Hospital





S. No.	Description	Rs. million	Year	Justification/Scope of Work
10	Auto Transformers	5,245		Justification/Benefit The addition of Auto Transformer will enable to cater new load growth near respective load centers alongside increasing reliability of power system. This will also help in optimal management of network, loss reduction and voltage regulation.
				Scope 3 x 250MVA ATRs along with 220kV Bays and allied paraphernalia at:
			2025	- Surjani (from 100% to 60%)
			2026	- Gulshan (from 94% to 67%)
			2027	- Mauripur (from 101% to 77%)
11	Power Transformers	4,743		Justification/Benefit The addition & enhancement of power transformer will enable to cater new industrial & residential load growth in respective areas alongside increasing the capacity of grids. This will provide relieve to existing feeding grids thereby enhancing overall system efficiency.
				Scope 3 x 67MVA PTRs along with 132kV Bays and allied paraphernalia at:
			2024	- Jail Road (from 101% to 58%)
			2024	- Hospital (from 104% to 66%)
			2030	- KEPZ (from 98% to 93%)
			2028	1 x 40MVA PTR at Port Qasim (from 100% to 74%)





S. No.	Description	Rs. million	Year	Justification/Scope of Work
12	HVUB	21,734	2025	<p>The addition of construction of new 3x Grids includes up-gradation of 66 kV to 132 kV level along with construction of new 132kV Transmission line of 150KM.</p> <p>It will improve the power quality and reduce losses alongside enhancing capacity of grids.</p> <p>Further, this will also enable evacuation of 150MW power from Solar projects at Vinder and Bela.</p>
13	GSMO/ TRN Special Projects	1,268	2024	<p>Rehabilitation of 3x 132kV Transmission Lines</p> <ul style="list-style-type: none"> o 132kV Surjani- Valika o 132kV KDA – Memon Goth o 132kV Pipri- KEPZ <p>Addition of Switchgears at Port Qasim and North Nazimabad.</p> <p>RTV Coating and Tower rehabilitations (88% reduction in trips of RTV coated circuits)</p> <p>Line Diversion of 132kV Pipri - Port Qasim - Landhi.</p> <p>Details are provided in issue frame iii</p>
14	LILo STDC Interconnection	594	2024	<p>132kV KDA – SNPC Transmission Line in/out at 132KV Gadap Grid Station</p> <p>This will enable energization of Gadap grid (load grid)</p>
TOTAL		140,751		



Auto Transformer Loading profile

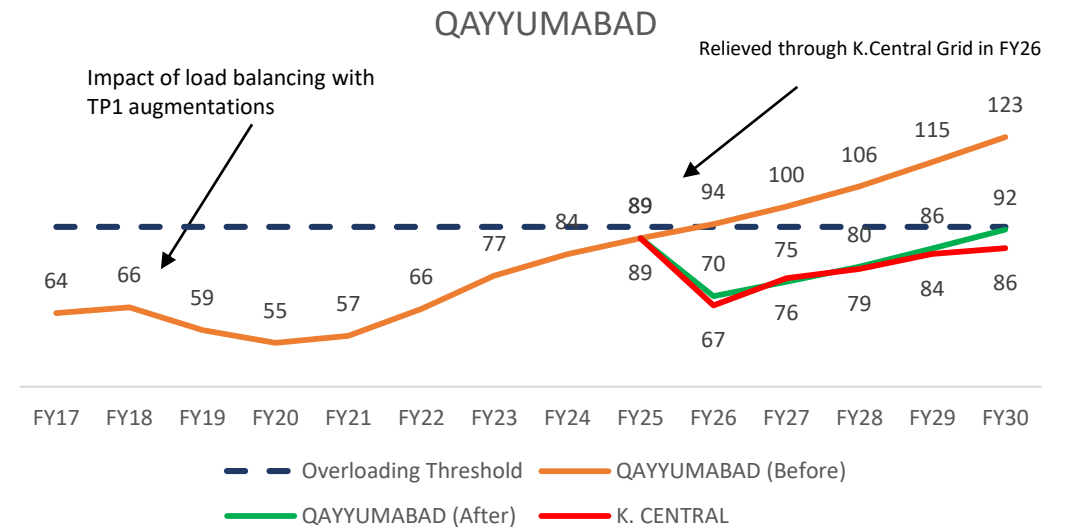
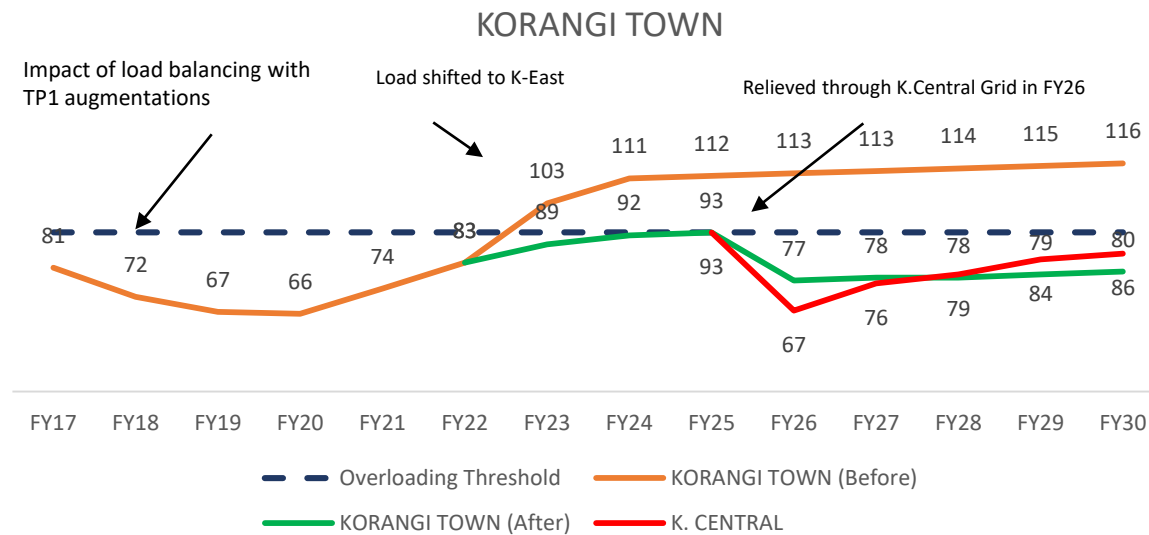
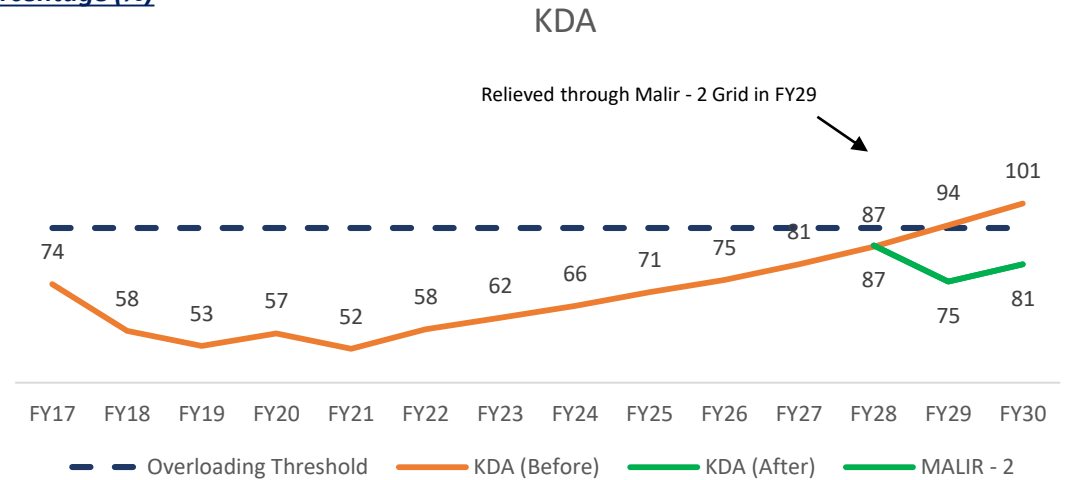
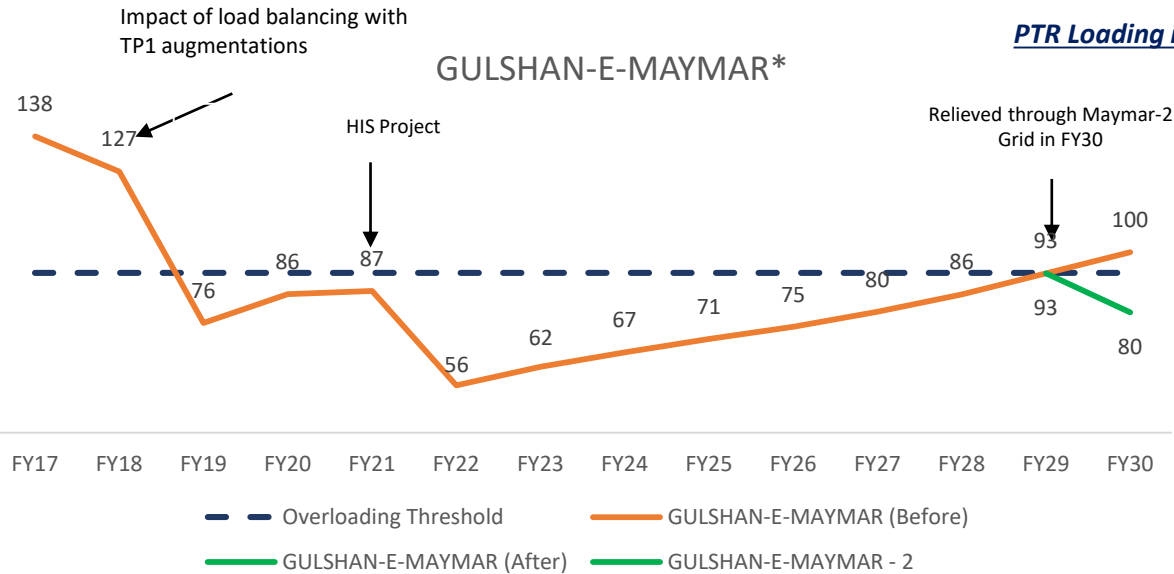
ATR Additions in Existing Grids								
Islands		FY 2025		FY 2027		FY 2030		
		MVA		MVA		MVA		
Mauripur (Island 1)		-		250		-		
Baldia (Island 2)		-		-		-		
KDA + Surjani (Island 3)		250		-		-		
Pipri + Dhabeji (Island 4)		-		-		-		
KCR + Lalazar (Island 5)		-		-		-		
Gulshan (Island 6)		-		250		-		
Requirement of New Grid								
Islands		New Grids	FY 2025		FY 2027		FY 2030	
			MVA		MVA		MVA	
Mauripur (Island 1)		-	-		-		-	
Baldia (Island 2)		KKI	-		250		-	
KDA + Surjani (Island 3)		Ziauddin	-		-		500	
Pipri + Dhabeji (Island 4)		Landhi	-		250		-	
KCR + Lalazar (Island 5)		DHA-4	-		-		250	
Gulshan (Island 6)		-	-		-		-	
KE Island Percentage Loading under N-1 condition								
Islands		FY25		FY27		FY30		
		Before	After	Before	After	Before	After	
Mauripur (Island 1)		89%	89%	154%	82%	88%	88%	
Baldia (Island 2)		115%	115%	130%	90%	105%	105%	
KDA + Surjani (Island 3)		125%	89%	100%	100%	130%	85%	
Pipri + Dhabeji (Island 4)		120%	120%	130%	95%	100%	100%	
KCR + Lalazar (Island 5)		98%	98%	111%	111%	122%	90%	
Gulshan (Island 6)		91%	91%	135%	88%	100%	100%	



Transmission Business – Issue i (8/10)

Synopsis of New Grid Requirement

PTR Loading in Percentage (%)

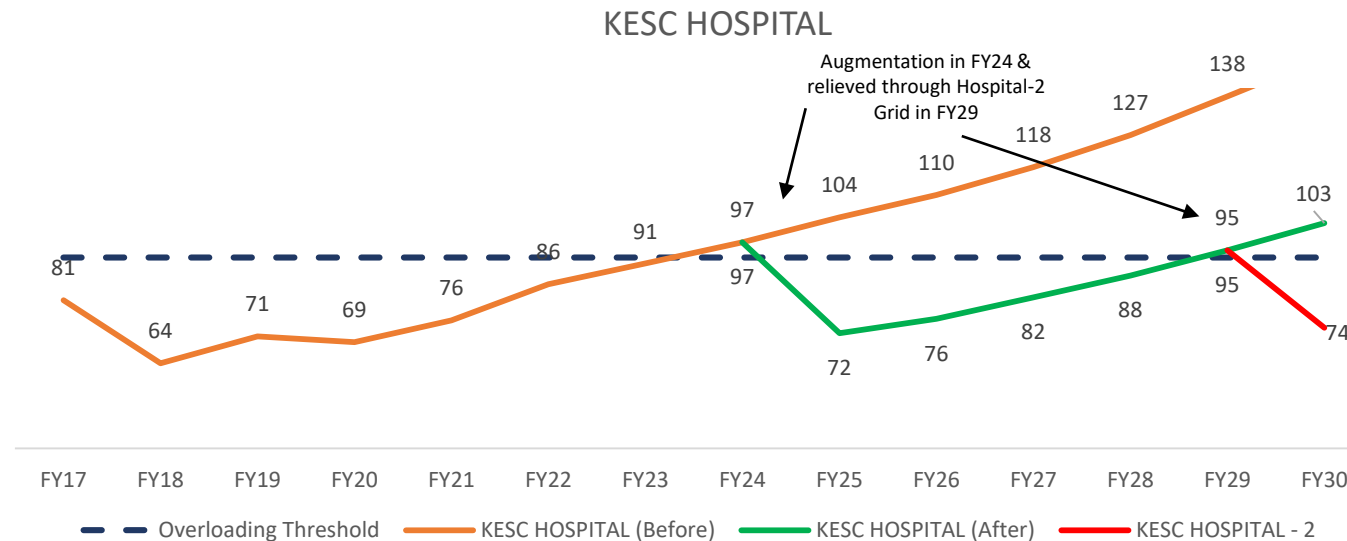
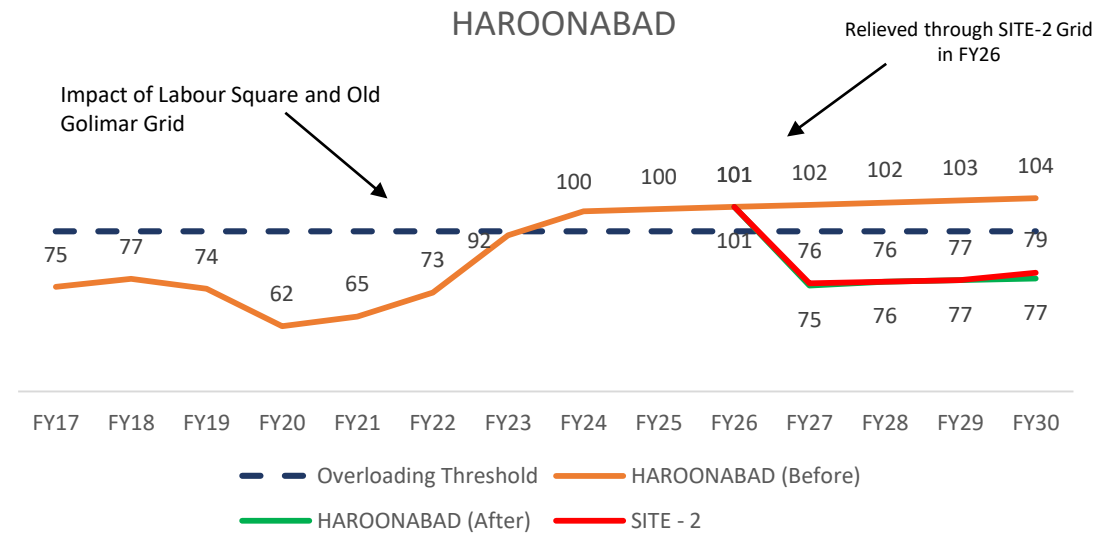
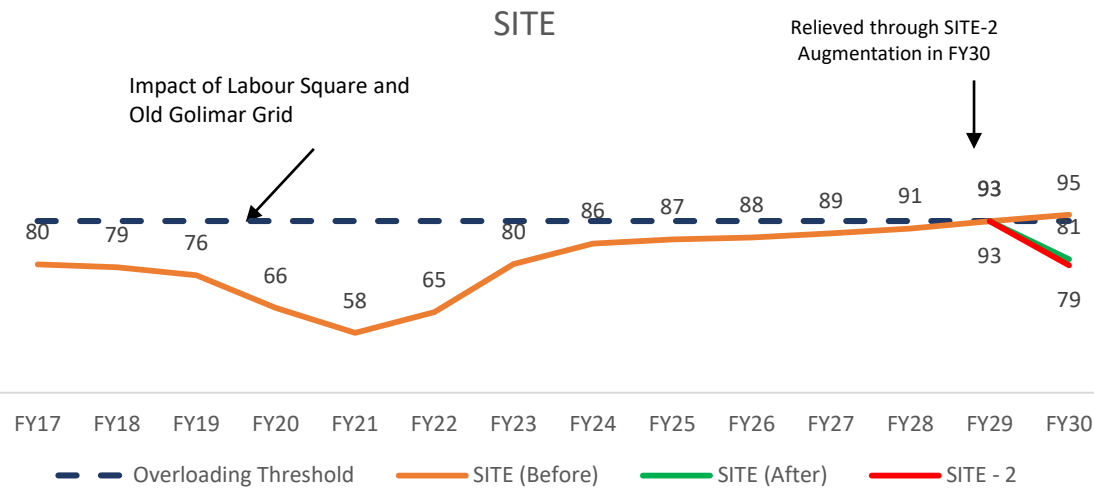




Transmission Business – Issue i (9/10)

Synopsis of New Grid Requirement

PTR Loading in Percentage (%)



** Further augmentation at Site and Haroonabad is not possible due to technical constraints. Refer slide

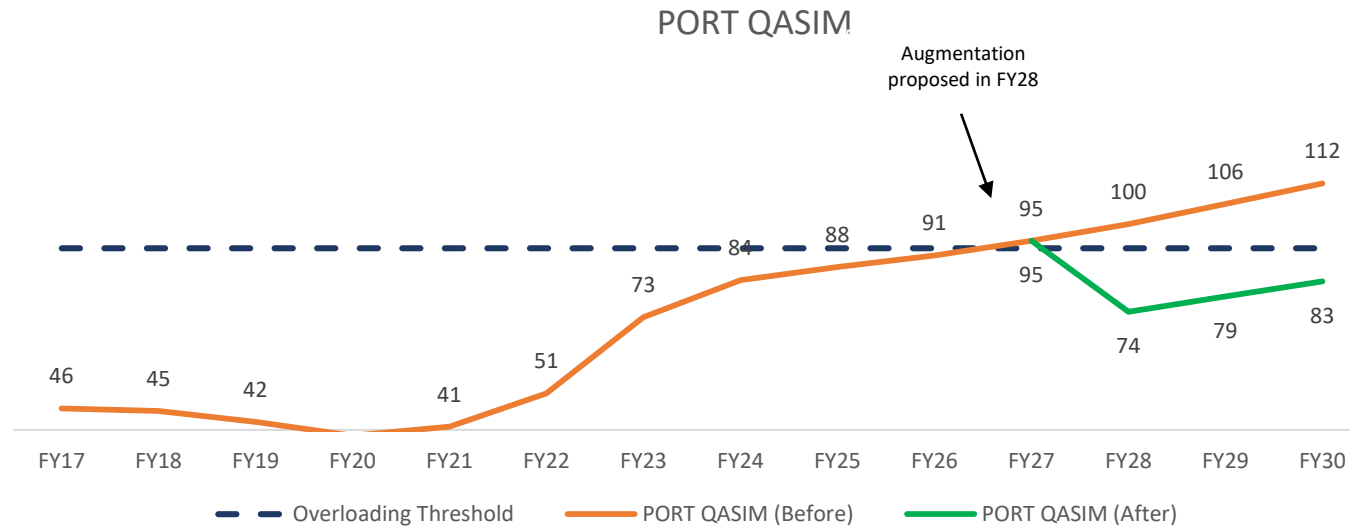
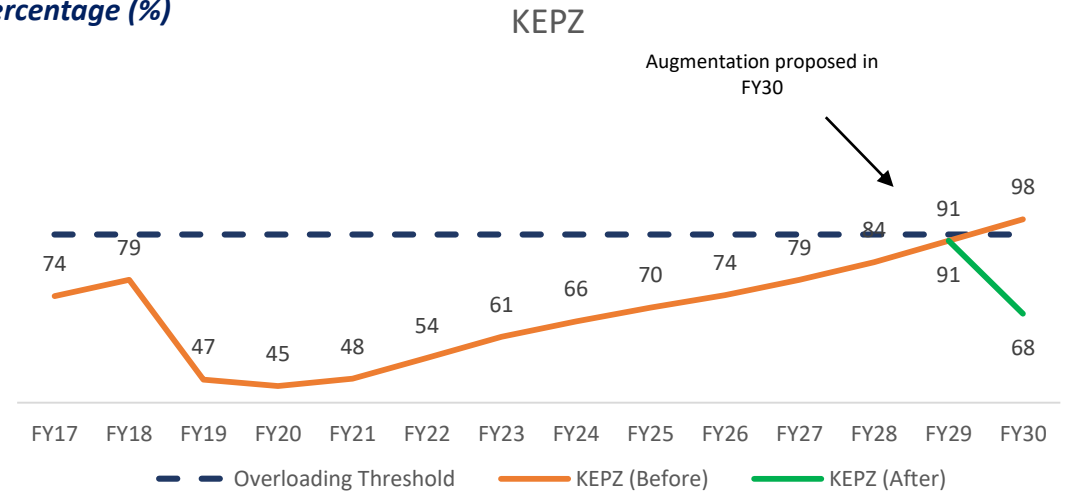
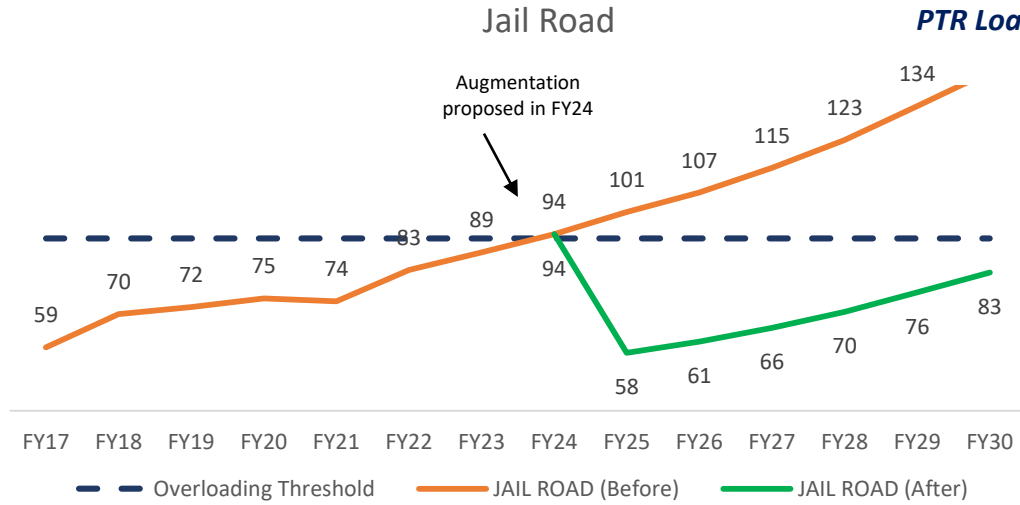
MVA Addition

----- 93% Loading Threshold



Transmission Business – Issue i (10/10)

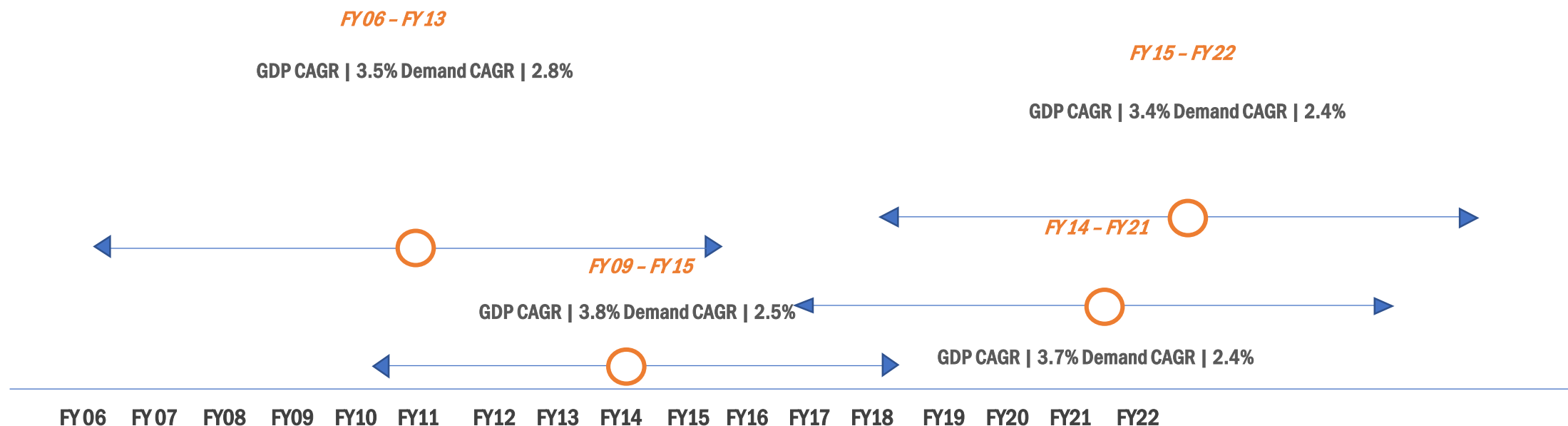
Synopsis of Augmentation at Existing Grids



Issue (ii)

What is the rationale of the 1.4% Energy (GWh) growth projections after catering captive and solar generation during next seven years of MYT?

DEMAND AND GDP



The graph covers different periods of Macro-economic growth compared with the demand growth of KE., KE has opted for historical CAGR of 2.4% as a prudent approach for the next 7 years.

KE Transmission Business – Issue ii (2/4)

Peak Demand (MW)		FY-23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	CAGR
Gross Demand (Gwh)	A	21,490	22,015	22,554	23,105	23,670	24,249	24,842	25,450	2.4%
Average Demand (MW)	B = A/8760	2,453	2,506	2,575	2,638	2,702	2,761	2,836	2,905	2.4%
Peak Demand (MW)	C = B * D	3,760	3,858	3,980	4,094	4,213	4,322	4,459	4,588	2.9%
Peak to average demand ratio	D	1.53	1.54	1.55	1.55	1.56	1.57	1.57	1.58	0.4%
Captive Induction (MW)	E	249	333	333	333	333	333	333	333	
Heatwave (MW)	F	156	160	165	170	175	179	185	190	
Base Peak Demand (Day) (MW)	G = C+ E+ F	4,165	4,350	4,478	4,597	4,720	4,834	4,977	5,111	3.0%
Solar Disruption on Day Peak (MW)	H	154	359	473	589	716	855	1,007	1,171	
Day Peak (with all impacts) (MW)	I = G-H	4,010	3,992	4,004	4,008	4,004	3,979	3,970	3,939	-0.2%
Night Peak (with all impacts) MW)	*	3,990	4,168	4,290	4,404	4,522	4,631	4,768	4,896	3.0%

Peak Demand Growth

- Base Peak to average demand ratio (FY 22: 1.51) is projected to grow by 0.4% per year based on CAGR of last seven years from FY 15 - FY 22
- Heat wave impact is assumed at 4.1% of base peak demand based on Sep - 2021 whereas 4.6% of base peak demand was witnessed on May - 2015
- * Current trend of day to night peak demand ratio (based on latest recorded peak demand 3,670 MW on 18th May, 2022).
- Captive Influx of 555 MW load is assumed to contribute 60% in peak Demand i.e. MDI: Sanctioned load of B3 and above consumers
- Solar projections at 1,464 MW by FY30 with a 32% CAGR is comparable with other regions. This disruption will affect day peak demand at efficiency factor of 80%. For Solar GWh projection, Solar efficiency factor taken at 18%.

KE Transmission Business – Issue ii (3/4)

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%

GDP Growth

Based on historic trend, Pakistan has not experienced a consistent GDP growth of 5% or above except for FY17 and FY18 in last 10 years.

Demand Growth

Considering current economic slowdown and political instability, a prudent approach for demand growth has been used which will also prevent creation of idle assets

Approach

Base Demand growth is based on a hybrid model of top-down and bottom-up approach

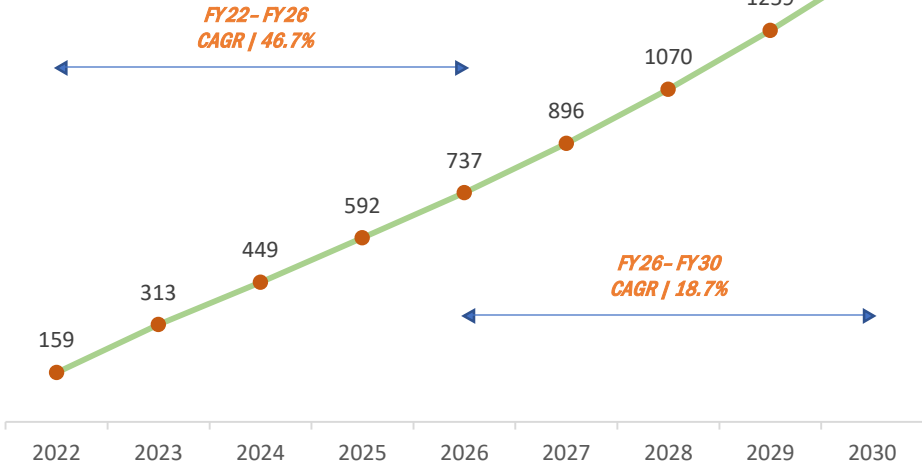
Load Shed

KE Plans to reduce the Load shed (as a % of Demand) at 4,1% by FY2030 and bring the LS Exempt feeders at 95% by FY2030

SOLAR ASSUMPTION

Solar Penetration (MW) | Karachi

32% CAGR

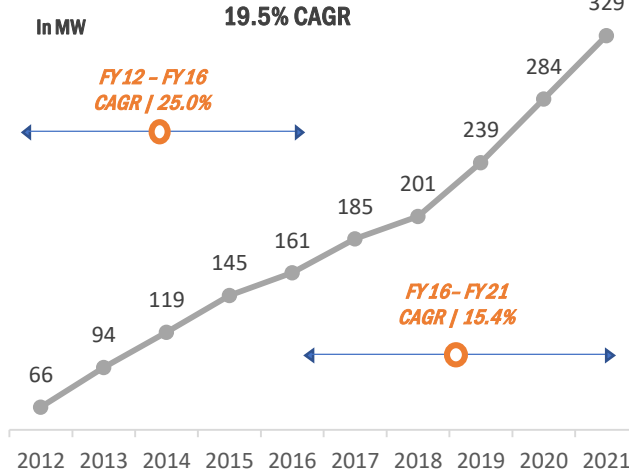


Large scale solar panels operate at 21% to 23% efficiency (also taken by IGCEP) depending on factors like placement, orientation, weather conditions, and panel size. Solar panels used for Residential/Commercial/Industrial premises (PV) operate at a lower efficiency of 18%.

Solar Efficiency References: [IGS](#) and [GreenMatch](#)(UK)

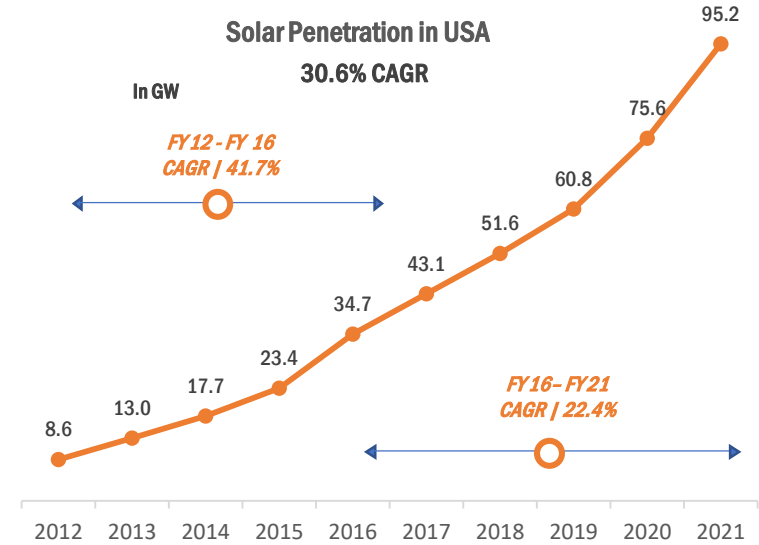
Solar Penetration in Bangladesh

19.5% CAGR



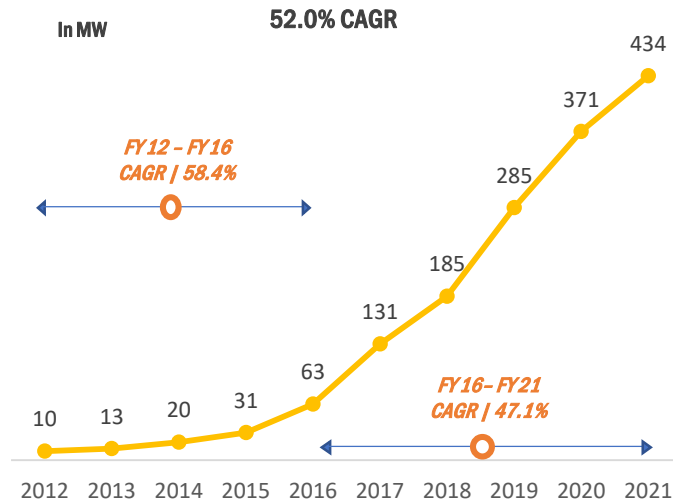
Solar Penetration in USA

30.6% CAGR



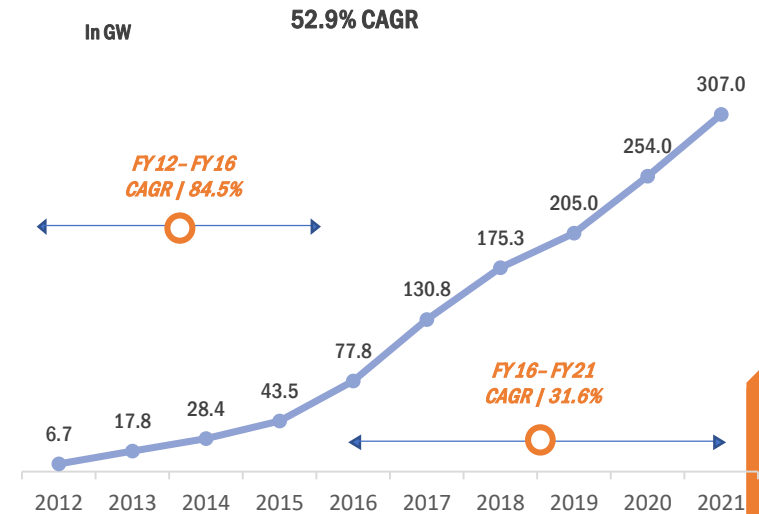
Solar Penetration in Sri Lanka

52.0% CAGR



Solar Penetration in China

52.9% CAGR



Issue (iii)

Whether the cost for rehabilitation projects which include Rs. 1,268 Million (Growth Projects) and 24,039 Million (System Reliability) are justified?

Transmission Special Projects – PKR 1,268Mn

Projects	Rs. Mn	Justification
Rehabilitation of 3x 132kV Transmission Lines o 132kV Surjani- Valika o 132kV KDA – Memon Goth o 132kV Pipri- KEPZ	510	All these lines are currently running at an average loading of 90-100% and are required to be reconducted with a higher capacity STACIR conductor in order to maintain a reliable flow of power through them.
Addition of Switchgears at Port Qasim and North Nazimabad.	200	These projects are required based on the load forecasted at these grid stations and comprise of 2 Power Transformers along with allied Switchgears and accessories.
RTV Coating and Tower rehabilitations	246	RTV coating of insulators will: <ul style="list-style-type: none"> • Reduce Flashovers/tripping of OHTL during humid/rainy weather. • Minimal need of maintenance on Tx lines. • Tower rehabilitation is for ensuring mechanical strength
Line Diversion of 132kV Pipri - Port Qasim - Landhi.	312	Relocation of Transmission lines from encroached areas is for safety perspective. Less maintenance owing to encroachment has noticeably deteriorated the infrastructure that pose safety risk for maintenance staff and common masses.
Total	1,268	

Transmission Routine Capex – PKR 24,039Mn

This investment is required for routine corrective and preventive maintenance activities on existing system. Major activities of routine maintenance is segregated in following categories:

Transmission Departments	Rs. Mn	Justification
▶ GSMPO	14,253	Includes replacement of several aged equipment which includes; 11kV Switchgears, Overhauling of GIS bays, Power Transformers, Relays equipment, battery charger, current & voltage transformers, control panels, breakers, capacitors and civil works.
▶ Overhead	4,754	Includes RTV coating, replacement of cable/conductor/insulators, replacement of composite insulators and installation of damper spacers.
▶ SCADA	2,951	To maintain SCADA system. Main equipment includes; cards, switches, gateway, marshalling system, Barco wall, modules, DRC servers application, server UPS and others.
▶ Telecom	1,434	It includes upgradation of SDH/PDH System Installation/Services/Spares, OPGW Cable / Services / CRO, Cell / Battery / Charger and PABX System/Services/Spares
▶ Underground	646	It includes Cable / Termination / Joint & Accessories, Cable Replacement Project, Solid / Cross Link and Other Material and services
Total	24,039	

Issue (iv)

Whether the cost of Rs. 21,952 Million for rehabilitation of transmissions lines is justified?

Justification

Based on load flow study, rehabilitation works have been planned on overhead and underground network for ensuring power evacuation capability to serve increase in demand. Major scope of works includes:

1. Replacement of old aged and deteriorated conductor
2. Replacement of deteriorated insulators
3. Strengthening of towers/poles foundations
4. Replacement of underground cables

Transmission line wise details are given in next slides.

Sr. No.	Planned Year	Commissioned since	Name & Description	Voltage Level	Circuit Type	Loading before rehab (N-1 condition)	Loading after rehab (N-1 condition)	OH	UG	Length (KM) Total	Total PKR Mn
1	2025	1969	Baldia – Orangi	132kV	SC	112%	55%	6.50	0.00	6.5	321
2	2025	1984	Valika – Surjani	132kV	SC	124%	62%	7.28	0.27	7.55	454
3	2025	1992	Johar – KDA	132kV	SC	138%	60%	6.72	0.00	6.72	332
4	2025	1981	K-Town – Landhi	132kV	SC	140%	60%	0.00	0.50	0.5	175
5	2025	1981	K.Town - Gul Ahmed	132kV	SC	140%	72%	0.00	0.07	0.07	25
6	2025	1981	Pipri – KEPZ	132kV	SC	128%	66%	12.22	0.00	12.22	603
7	2026	1979	Site – SGT	132kV	DC	139%	68%	1.34	0.00	1.34	44
8	2026	1972	KDA - Memon Goth	132kV	SC	139%	57%	14.20	0.00	14.2	701
9	2026	1992	Gulshan – KDA	132kV	SC	138%	54%	11.36	0.00	11.36	561
10	2026	1972	Valika to Federal-B (T-Federal-A)	132kV	SC	148%	68%	11.76	0.00	11.76	581
11	2026	1981	Gizri - K-West (T-Baloch)	132kV	SC	123%	70%	8.40	0.00	8.4	415
12	2027	2005	Baldia - Site-GT	132kV	DC	125%	69%	8.60	0.00	8.6	283
13	2027	1972	Maymar – Surjani	132kV	SC	140%	91%	5.20	0.00	5.2	257
14	2027	2009	K. East - Korangi South	132kV	SC	101%	64%	4.50	0.00	4.5	222
15	2027	2003	Labour Square – Maripur	132kV	SC	129%	84%	4.80	0.00	4.8	237
16	2027	1992	Civic – Liaquatabad	132kV	SC	Replacement of OFC due to obsolescence		0.00	5.00	5	1,754
17	2027	1995	Port Qasim – Landhi	132kV	SC	160%	93%	10.46	0.00	10.46	516
18	2027	2002	Valika - N.Nazimabad	132kV	SC	111%	78%	6.43	0.00	6.43	318
19	2027	2003	Mauripur – KKI	220kV	DC	133%	79%	15.80	0.48	16.28	1,216

Sr. No.	Planned Year	Commissioned since	Name & Description	Voltage Level	Circuit Type	Loading before rehab (N-1 condition)	Loading after rehab (N-1 condition)	OH	UG	Length (KM) Total	Total PKR Mn
20	2028	2011	Johar – Hospital	132kV	SC	125%	62%	6.20	0.12	6.32	348
21	2028	1995	Qayyumabad - K. East	132kV	SC	105%	56%	10.80	0.00	10.8	533
22	2028	2003	Old Golimar – Maripur	132kV	SC	130%	85%	4.89	0.00	4.89	241
23	2028	2010	KTPS – Qayyumabad	132kV	SC	139%	62%	0.00	7.11	7.11	2,494
24	2028	1985	PRL – KTPS	132kV	SC	123%	97%	1.47	0.00	1.47	73
25	2029	1995	Landhi - Pipri West	132kV	SC	110%	62%	14.40	0.00	14.4	711
26	2029	1995	Qayyumabad - K-South	132kV	SC	110%	67%	4.00	0.00	4	198
27	2027	1995	CCPP – Landhi (conversion from 132kV to 220kV) *	132kV	DC	N/A	N/A	16.00	16.00	32	8,339
			Total							222.88	21,952

* Existing 132kV Landhi – KTPS & 132kV Landhi – K. South will be converted to 220kV CCPP – Landhi circuits for connection of 220kV Landhi grid with CCPP

Issue (v)

Whether the cost of Rs. 7,604 Million claimed for augmentation at NKL grid station is justified?

Whether the cost of Rs. 7,604 Million claimed for augmentation at NKI grid station is justified?

Justification

- Enhancement in NTDC's NKI Grid is necessary to evacuate power from following planned IPPs:
 - 330 MW Thar Based Coal Plant
 - 82 MW Hydel Plant
- Scope includes addition of 600MVA Auto Transformer, 500kV GIS bay, 220kV GIS bays and Loop-in/out of 5KM at NKI between Baldia – Surjani will help to ensure to N-1 contingency on the interconnection.
- KE's interconnection capacity will be 2,850 MW from below mentioned interconnection points.

Grid Station	Power Dispatch Capacity
KKI	900 MW
NKI*	1100 MW
Jhimpir-2	500 MW
Dhabeji	350 MW

*Currently 2x 600MVA ATRs are installed at NKI, to ensure reliable power evacuation, augmentation will be required at NKI.

Issue (vi)

Whether the cost of Rs. 568 Million claimed for IPPs metering is justified?

Whether the cost of Rs. 568 Million claimed for IPPs metering is justified?

Justification

- Under the PPAs, KE is required to install the Main metering system (including metering devices, relays and other switchyard equipment) at Interconnection with IPPs
- IPPs are required to install the Backup metering equipment along with switchyard Gantry and the same is included in their Project Cost
- KE has included IPP metering and related cost for induction of power from thermal and renewable plants. PKR 106 million kept for 2 thermal IPPs and PKR 468 million kept for 15 new Renewable IPPs
- Average cost for each Metering and allied equipment is expected to be around PKR 30 Mn for a 50MW renewable power plant and PKR 53 Mn for a Thermal based plant.

Issue (vii)

Whether the transmission losses of 1.3% claimed to be maintained during the MYT control period is justified?

Justification

Looking at the dynamics of the network , Transmission loss is expected to get impacted by following factors:

- Future load growth
- Reduced embedded generation on 132 KV; and
- Import of additional power from 500kv network

In view of above, It is expected to have an increasing impact on transmission loss profile which has been optimized w.r.t cost / benefit analysis. Consultant has also performed validation on transmission loss profile in its report.


High level summary of TL % breakup is appended below:

Head		Calculation	% Loss
Grid Station Loss	Fixed losses ¹	0.575 kW / MVA (fixed loss of Power Transformer) × X MVA × 24 hours × 365 days / 1000	0.18%
		0.25 kW / MVA (fixed loss of Auto Transformer) × X MVA × 24 hours × 365 days / 1000	0.07%
	Variable losses ²	Power loss against I ² R loss at 50% to 90% average loading	0.39% ~ 0.79%
Transmission Line Loss	Variable losses	Power loss against I ² R loss at 50% to 90% average loading	0.18% ~ 0.40%
Total			0.8 % ~ 1.4%

Notes

[1] This is based on average fixed loss of Transformer, as per nameplate data, which is subject to change/ increase due to aging of Transformer.

[2] Variable losses are dependent on loading profile of Transformer(s) which is optimized at around 70-75% loading.



Issues Framed (Distribution)

Issue (i)

Whether claimed cost of Rs. 37,105 Million for growth projects in distribution Segment is justified?

Investment during MYT Period FY24 – FY30			
Projects	UOM	Qty	Rs in Mn
New Feeders CDS	Feeders	268	21,251
System Improvement Plan – Over Loaded PMTs	PMTs	1,962	7,065
New Connection (Network Expansion & Metering Project)	MW	-	4,217
Grid Balancing (Grid to Grid)	Schemes	40	2,227
New Links	Links	70	1,544
Grid Balancing (PT to PT)	Schemes	174	802
Total			37,105

CDS Network Enhancement / Projected Peak Demand of 5,111 MW from FY-24-30

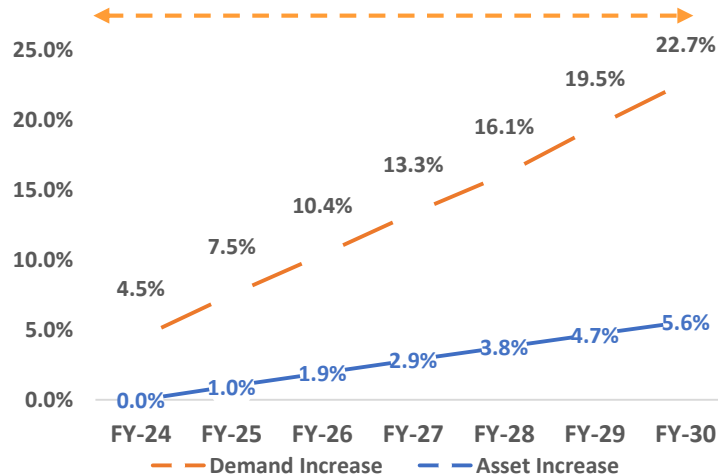
Cater projected demand through efficient utilization of Distribution Network

Common Distribution Transformers

7,065 Million PKR

Demand on LT network will result in addition of **1,962** Distribution Transformers after exhausting LT circuit shifting and DT swapping options

Peak Demand VS New DT Addition

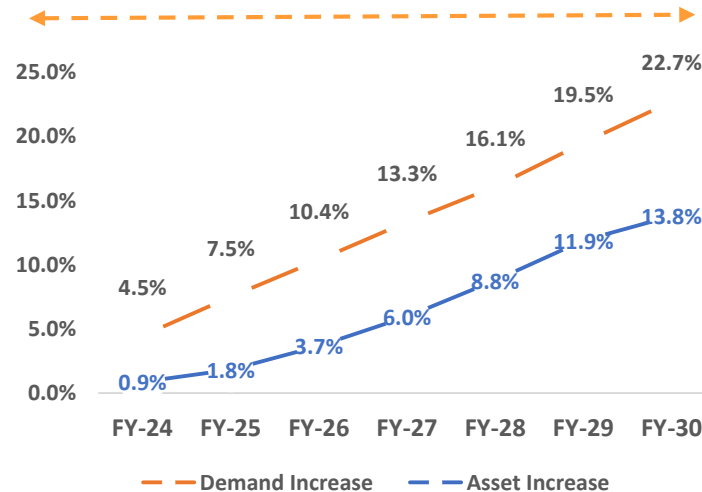


MV Common Distribution Feeder

22,795 Million PKR

70 new MV links will be added and **268** new MV CDS feeder will be laid if switching operation is not possible with adjacent ring feeder

Peak Demand VS New Feeder Addition



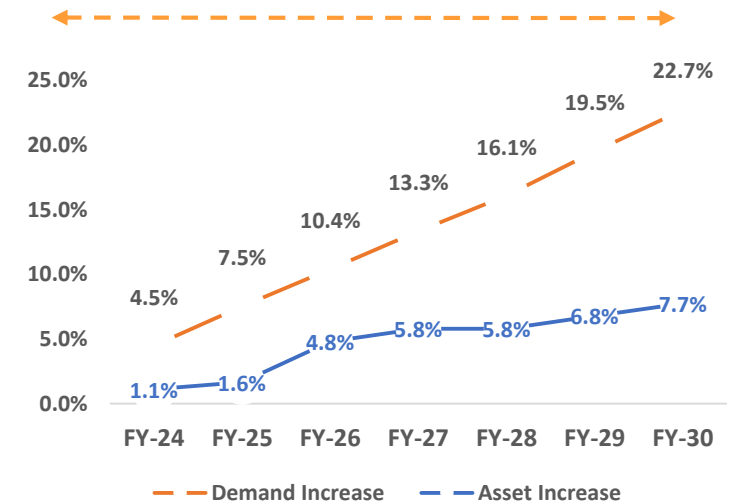
Grid Power Transformer

3,059 Million PKR

The subsequent effect of demand on PT is catered by **174** PT-to-PT and **40** Grid to Grid feeder balancing will be carried out

Grid to Grid & PT to PT feeder balancing can be among 179 existing PTs and with **15** new Power Transformer installed on **61** existing grids as well as **8** new grids.

Peak Demand VS New PT Addition



Issue (ii, iii, iv & vii)

Issue ii: Whether the claimed cost of Rs. 64,622 Million for energy loss reduction program is justified?

Issue iii: Whether the claimed cost of Rs. 19,933 Million for rehabilitation of existing LT ABC Rehabilitation is justified? What is the criteria and rationale of rehabilitation /replacement of existing LT ABC? What is the useful life of ABC cables which are being replaced/rehabilitated?

Issue iv: Whether the cost of Rs. 15,279 Million claimed for network rehabilitation program is justified?

Issue vii: Whether the distribution loss reduction of 2.3% during MYT control period i.e. from 13.8% in FY24 to 11.5% in FY30 is justified?

Investment during MYT Period FY24 – FY30				
Projects	UOM	Qty	Rs in Mn	
Low Tension – ABC	PMTs	1,770	11,389	Commercial Loss Reduction PKR 45.74 Bn
Low Tension – ABC Rehabilitation	PMTs	3,032	16,079	
Low Tension – ABC Replacement	PMTs	7,833	3,854	
Meter Replacement	Each	1,622,301	14,418	Technical Loss Reduction PKR 18.92 Bn
Deteriorated Overhead Rehabilitation	Feeder	1,132	15,279	
Loop Splitting	Schemes	420	3,505	
Power Factor Improvement Plant	Each	95	138	
Total			64,662	

1) Distribution loss reduction primarily driven by conversion onto ABC, network improvement plan and increased governance activities along with technological interventions

Loss Reduction

Loss reduction plan for the next MYT period

Commercial Loss Reduction

CLR | 2.1 % ↓

New ABC

1,770 PMTs

Non - ABC
Losses >20%

ML
659

HL
407

VHL
704

KEL converted c.12,500 PMTs on Aerial Bundle Cable as a flagship Loss Reduction Project (Sarbulandi). As a result, KEL anticipates over-achieving its regulatory T&D Loss target of 15.4% by FY-23.

In the upcoming MYT control period, KEL targets to invest **PKR 31.3 Bn** in LT ABC project (including PKR 16 bn and PKR 3.8 bn Rehan and replacement). KEL has converted 90% of its High Loss areas and remaining 10% (translating into 1,770 PMTs) is planned to be converted in the upcoming control period. These areas primarily belong to outskirts areas of the city and represent High Loss pockets where low propensity of the consumers to pay leads to illegal means to consume electricity. Such measures also impact network health.

In addition, scope of Loss Reduction Project also includes 1.6 million meter replacements in the upcoming tariff control period worth **14.4 Bn** due to natural wear and tear, corrosive weather conditions and meter tampering. The average meter replacement cycle is 17-20 years and is essential to maintain Distribution Loss and improve quality of metered billing.

Rehabilitation

3,032 PMTs

ABC completed
Losses >20%

ML
1,216

HL
840

VHL
976

Replacement

20% Circuits/Spans of 7,833 PMTs

Rehabilitation of ABC entails replacement of ABC spans that have become deteriorated, primarily due to network tampering by consumers in congested and poor neighborhoods. Moreover, it also includes conversion of non-static to static meters to further prevent electricity theft. As a result, since there is further potential of commercial loss reduction on these PMTs, the investment of **PKR 16 Bn** is justified. This loss reduction investment will also be augmented by increased theft governance.

Replacement of ABC entails partial spans replacement where effectiveness of ABC cable has been compromised due to excessive wear & tear and corrosive coastal environment. This has caused ingress of moisture thereby weakening the insulation and resulted in reduced capacity of the cable.

The benchmark life of ABC is 15-20 years, which becomes increasingly diluted earlier in coastal conditions due to excessive corrosion and wear & tear. Accordingly, KEL estimates 20% spans of 7,833 ABC PMTs installed before 2019 will be deteriorated during the next tariff control period that may result in increased theft. Hence, replacement ABC worth capex of **PKR 3.8 Bn** is justified.

Network Rehabilitation, Loop Splitting & PFIP

Reason

- Aged/deteriorated overhead lines and leakages
- Power loss due to oxidized joints and connections
- Overloading, load unbalancing and low power factor
- Deteriorated conductor also result in high contribution of overhead faults

Actions / Initiative

Network Rehabilitation: (1,132 feeders)

To improve efficiency of overhead network by selected upgradation/replacement of deteriorated and aged lines, joints and connections.

- Replacement of deteriorated/aged overhead lines
- Improving joints and connections quality to mitigate environmental impact
- Covering of exposed conducting components and connections

Loop Splitting: (420 schemes)

To ensure distribution of load on loop level and shifting of DTs on load center, resulting in loss reduction.

Power Factor Improvement Plant: (95 Nos)

Installation of PFIP at load end to relief loading of upstream assets resulting in reduced technical losses and improved voltage profile.

Benefits

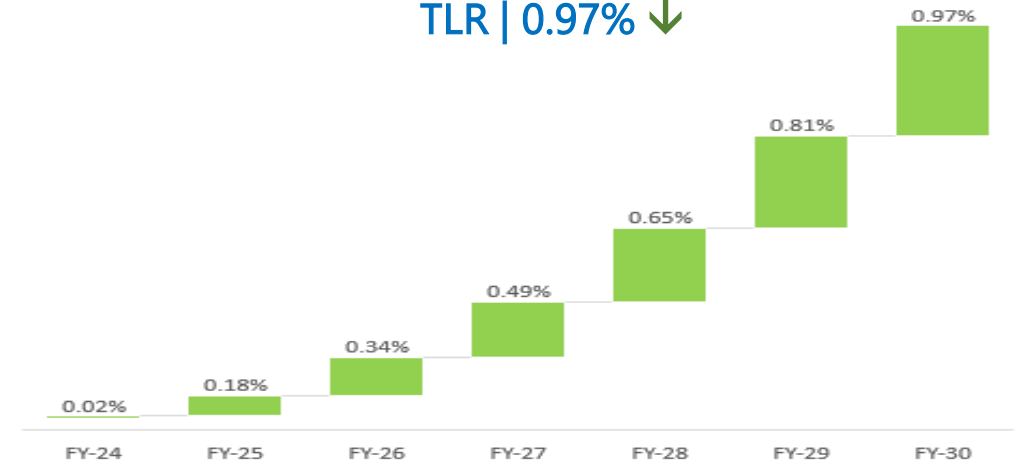
- **Technical loss reduction** on account of reconductoring, proper joints and connections.
- **Significant reduction in outages of overhead network**, by elimination of below challenges, resulting in **improved reliability**.

- Bird-grounding
- Partial Discharge
- Vegetation,
- Accidental touch

• **Transient Faults**
These initiatives will drive significant improvement in technical loss and outage reduction journey.

Technical Loss Reduction Journey

TLR | 0.97% ↓



FY17-23

Commercial Loss Reduction

- Converted 12k PMTs on ABC under Project Sarbulandi
- Replaced c.1mn Meters for theft prevention
- No-Mains Scheme for theft prevention
- Theft Governance in Sarbulandi IBCs

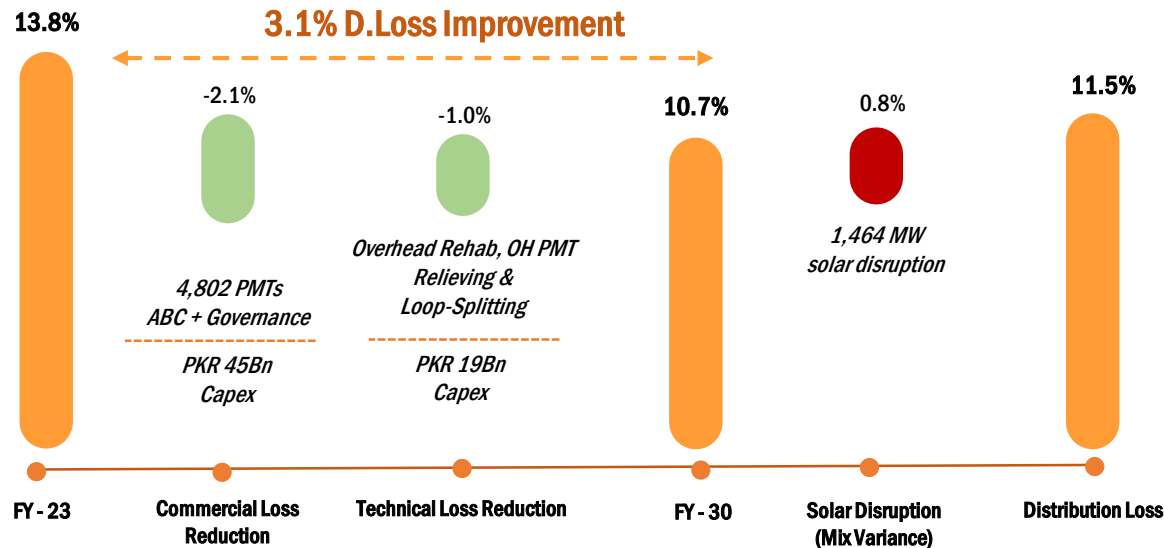
FY24-30

Commercial & Technical Loss Reduction

- Converted 4,802 PMTs on ABC | 100% HL PMTs on ABC
- Approx 750 No-Mains Schemes | Ring-fence ABC Areas for theft prevention
- Theft Governance across the city + c. 1.6mn Meter Replacement for theft prevention
- Technical Loss Reduction | Overhead Rehab + Relieving of OH PMTs + Loop-splitting

T&D Loss: 22.2% to 14.7% | 7.5% Improvement
Capex : PKR 34Bn

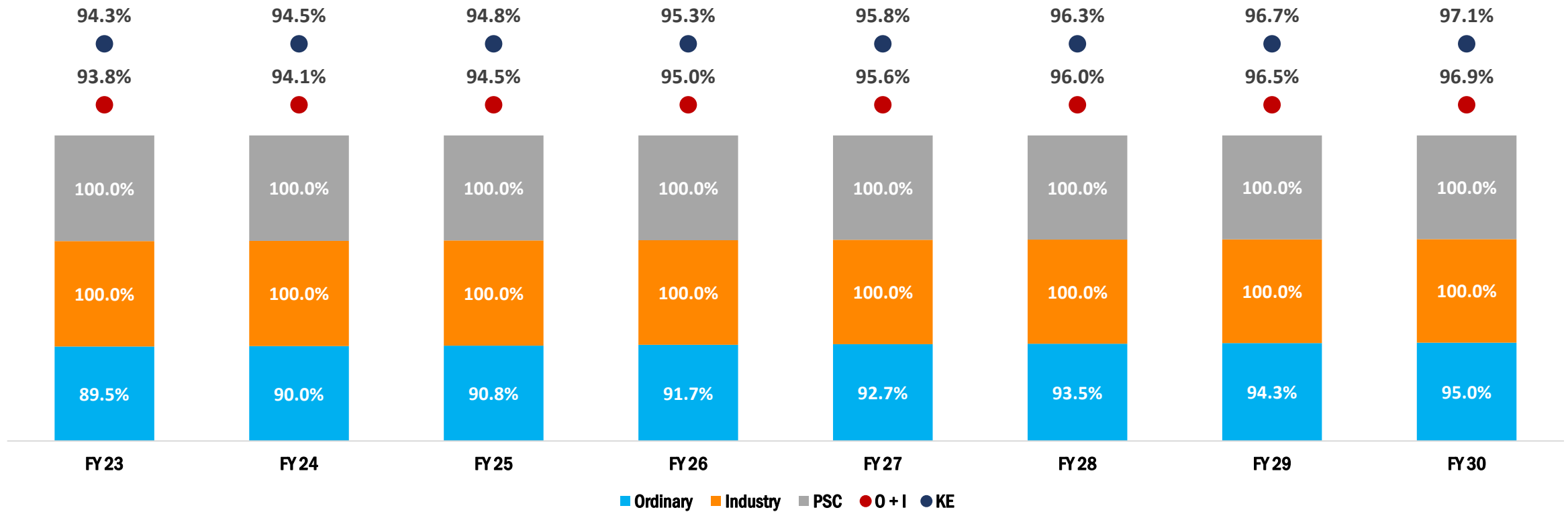
Distribution Loss: 13.8% to 11.5% | 2.3% Improvement
Capex : PKR 69.0Bn (with PKR 5.0Bn Technology)



Capex required for Distribution loss improvement is increasing overtime as commercial loss potential is decreasing + impact of inflation, LME and exchange rate.

Distribution Loss improvement beyond 11.5% would be commercially **unviable** as the payback period would extend beyond 7 years (incremental 1% D loss reduction requires PKR 50Bn capex)

Recovery Ratio – Future Outlook



Recovery Ratio

- **Solar impact on KE RR:** 2 GWh is assumed to move out from system by FY 30 impact KE RR
- **ABC Conversion:** All ordinary feeders to be converted are assumed at 90.0%.

AI Based Recovery

- AI based historical data analysis to learn consumer behavior. Consumer level analytics to redefine dunning strategy and conduct targeted recovery efforts.
- Prediction of payment trends to adopt proactive approach towards recovery, augmenting efficiency of efforts employed.
- Enhanced consumer experience via personalized interactions through preferred channels.
- System to be developed for rationalizing resources required.

Instant Payment/Service Visibility

Real Time Payment System for 3.4 Mn+ bills contributing towards improved customers' experience and operational efficiency across the value chain. Payment reflection time reduced drastically, improving efficiency of recovery efforts and saving on.

Promotion of Digital Payment

- Onboarding e-Payment partners, Digital Banking Partners & Incentivizing Customers to promote digital payment (E.g.: Cashback, vouchers, points, BNPL)
- Savyour, Faysal Bank, Bank Alfalah

Introduction of Alternate Payment Channels

- Multiple ePay Gateways, Acquiring Solution for Website & App, QR Code, POS Machines and RTGS especially for corporate clients and CBM customers



RO/BPO Model

- Deploy Recovery Officers to door-knock recent defaulting consumers as first line of on-prem recovery efforts
- BPO Model to capture chronic defaulting consumers and enhance disconnection efforts
- Success-based payment mechanism to debt collection agencies

Increase Outreach

Banking facilities through IOWs, Bank Booths and CFCs for 1.2 Mn+ consumers in outskirts and empowering Recovery officers to collect KE bill payment at doorstep

Dues Specific Schemes

- Area-wise schemes to recover overdue receivable from chronic defaulting consumers
- General recovery schemes to capture forgetful payers and sustain their current billing along with collaboration with Saylani Welfare to support chronic defaulters settle their dues

Recovery Camps

- Area-specific camps with provision of easy instalments and one-time dues settlement

Issue v

Whether the claimed cost of Rs. 40,496 Million for maintenance of distribution network is justified?

Investment during MYT Period FY24 – FY30					
Projects	UOM	Qty	Rs in Mn		
Corrective Maintenance	-	-	13,243	Maintenance PKR 26.8 Bn	
Periodic Maintenance			2,194		
Transformer & Switchgear Workshop	-	-	8,110		
Civil & Customer Services	-	-	3,326		
System Improvement Plan – Others	-	-	2,721	Network Rehabilitation PKR 13.6 Bn	
System Improvement Plan (Public Sector)	-	-	1,198		
HT Cable Replacement	KM	329	4,797		
Load Break Switch (LBS)	EACH	2,100	781		
Protection Upkeeping and Enhancement	Each	2,254	384		
OCB to VCB conversion	Each	2,275	3,743		
Total			40,496		

Reason

- *Aged and **deteriorated** asset base in substation, overhead and underground network*
- ***Obsolete** and **unprotected** Oil Circuit Breakers (OCB)*
- *Aged underground cables and deteriorated joints*
- ***Exposed** & deteriorated knife switches*
- *Change in approach from **reactive** maintenance towards **periodic** maintenance*

Benefits

***168k → **114k**
32% Outage Reduction

*FY23 **FY30

Actions / Initiative

Deteriorated HT Cable Replacement: (329km out of 1,049km)

Deteriorated and aged cables are planned to be replaced, based on planned asset health index

Load Break Switch: (2,100 out of 7,684)

Replacement of deteriorated/ obsolete knife switches with LBS for on-load operation

Protection Enhancement & OCB Replacement: (2,275 out of 7,440 OCBs)

To enable distribution protection layers on 11kV outgoing loops at primary substation level

Periodic Maintenance:

Adoption of OEM recommended maintenance regime to ensure longevity of asset

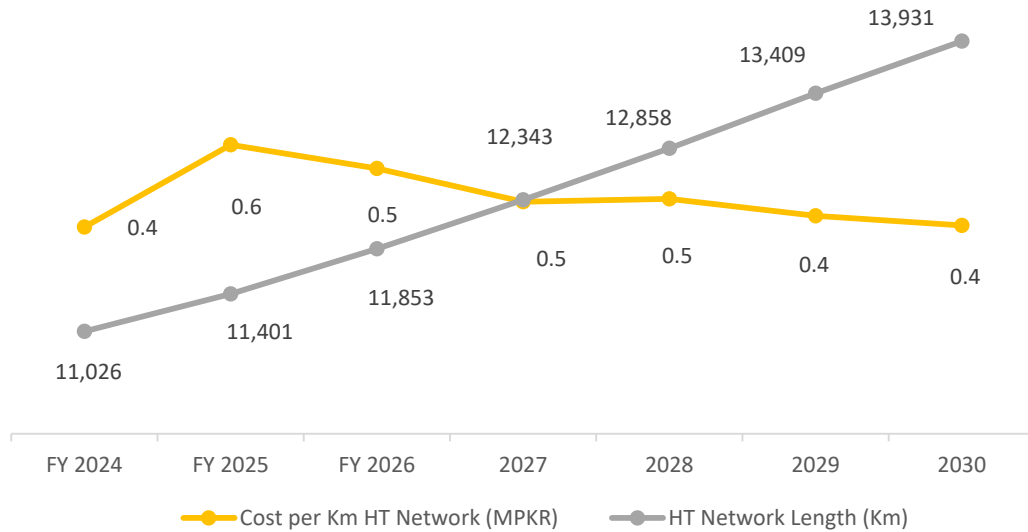
Corrective Maintenance:

To ensure continuity of supply during this period until planned initiatives take their course by 2030 and keeping in view aged/obsolete asset base not covered during this MYT

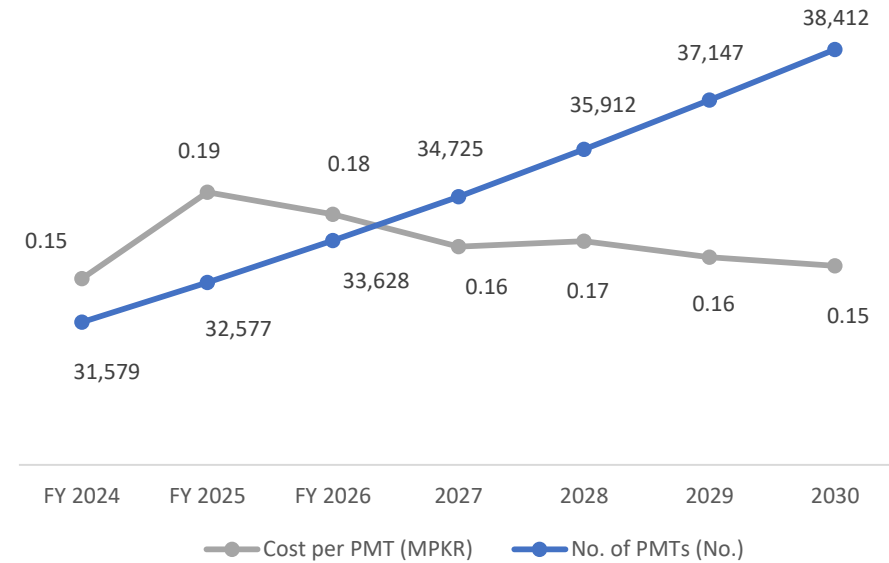
Damaged Transformer & Switchgear Repairing:

To repair the faulty transformer and switchgears of distribution network

Cost per HT (Km) Length vs Total HT Network Length (Km)



Cost per DT vs Total No. of DTs



It is pertinent to note that the KE's asset will be increasing every year but the maintenance cost is being optimized for maximum utilization.

Issue vi

Whether the investment of Rs. 25,858 Million (distribution) and 3,859 Million (transmission) for Safety is justified?

Investment during MYT Period FY24 – FY30			
Projects	UOM	Qty	Rs in Mn
Public Accident Prevention Plan (PAPP)	-	-	9,858
No Mains	Schemes	750	9,450
Earthing of Service Bracket	PMTs	6,800	2,142
Encroached Overhead to Underground	Km	112	1,385
Stay Unit Insulators	Each	34,000	679
Installation of DBs	Each	4,250	521
Pad Mounted Unit on Wheels	Each	25	555
Special Equipment & Tools	-	-	1,268
Total			25,858

PAPP Projects



Dilapidated pole & Conductors

Due to aged KE infrastructure, most of the poles have become rusted from the base which may cause a safety incident if not addressed



Multi story Busbar

Large no of Multistorey Busbars (MSBBs) have become a safety risk due to deterioration and may cause a safety incident if not addressed



PMT Shifting

This project aims to replace the dilapidated PMT poles in KE infrastructure by replacing the pole and PMT structure

PAPP - Dilapidated Poles & Conductors

Due to aging factors and nearness to the coast, steel poles become quite rusty, dilapidated, and may pose hazard itself and may cause a safety incident if not properly mitigated.

It is essential need for distribution network to replace such hazardous poles to mitigate the risk thus significantly enhancing the overall safety of the network.

For last three years around 6,000+ Poles have been replaced by KE in different area of Karachi to avoid any predicted mishap in addition to fallen poles under CM and proactive replacement under APM Head.

However, KE team is around the clock striving to identify dilapidated infrastructure that may become hazardous for public. Since it is incessant process, to replace necessary LT / HT Poles, an additional investment of **PKR 6,069 Million** has been envisaged, under a dedicated head.

KE network comprises around 245k+ Poles, and with these necessary investments around **7,000 Poles per year** (which is 3% of Total Count) are envisaged to be replaced every year.

PAPP - Multi Storey Bus Bar

Installation of Static Meters along with Bus-Bar arrangement is known as MSBBs (Multi-Storey Busbars). It is being installed for building having multi-storeys or apartments in Karachi.

Over time as building age the bus bar have become deteriorated due to their aging and may become hazardous so far, therefore replacement with proper bus-bar arrangement is required to mitigate the hazard timely.

The aging and pilferage of bus-bars doors causes serious hazard of open electrical connection for residence and KE staff (Meter Reader and Lineman) as well.

Around 2,000+ Multi-Storey Bus-Bars have been replaced to prevent public accidents in last three years. This learning has developed a need for pro-active replacement of existing MSBB across Karachi, which is growing vertically at a much faster rate than before.

For installation / replacement of the MSBBs on the distribution network, KE has planned additional Capex of **PKR 1,780 Million**. Under which **2,900 Unit MSBB** per year will be replaced against a total count of around 100k MSBB in KE system (which is around 3% of total count per year).

PAPP – PMT Shifting

Timely shifting of CDS PMTs from hazardous dilapidated structure to healthy structure will ultimately prevent the public accidents and reliability of network will also be enhanced.

PMT Shifting (For dilapidated poles and structure), includes replacement of PMT Poles, Structures, and related hardware to mitigate safety risk. The new poles and hardware are installed adjacent to dilapidated PMT structure and has to be shifted the same day, since area outage cannot be prolonged.

210 PMTs per year have been targeted against a total count of around 20k CDS PMTs in KE system (which is around 1% of total count per year).

For such shifting of PMTs, KE has planned additional Capex of **PKR 2,008 Million**.

Stay Unit Insulators

Stay wire is tied with straining screw at the bottom of the wire and adjusted to achieve maximum tension on stay wire, the other end of the stay wire is connected on pole using stay clamp. This arrangement provides strengthened and support to LT/HT Poles.

In KE network the stay wires is conductive in nature and are directly connected with the pole bracket, which can become a probable path of conduction in case of wire broken.

Hence stay wire insulators have been developed to isolate the upper part of the stay wire from the lower part which is accessible to general public at ground level, to mitigate any untoward safety incident.

34,000 Stay Insulator have been planned for replacement during the next MYT period. For aforesaid installations, KE has planned additional Capex of **PKR 679 Million**.



New Scheme (PMT) Installed along with HT/LT Network

The informal settlements, known as Katchi Abadis are in areas that lack basic utilities including but not limited to energy infrastructure. It is pertinent to note that, the population that resides in such areas obtains access to electricity through illegal means (carrying nonstandard electrical wires from nearest PMTs) which makes the unwarranted system prone to accidents, safety hazards and underperformance of loss reduction. Such population in the outskirts has increased in the recent years and the trend is continuing

In such a case, it is of paramount importance to lay down the infrastructure that eliminates the chances of any accident through the illegal abstraction of electricity and to provide safe and reliable power to consumers. Further, the use of substandard material by locals due to no mains also results in deterioration to the existing KE system. In this regard, KE is continuously working on electrifying no mains areas through various schemes which are designed for consumers in far flung areas where power is being used through illegal infrastructure. In this process, LT mains and network infrastructure is being laid out to regularize around 800 schemes requiring 1,000 additional PMTs and other allied material which includes but is not limited to LT ABC Spans, LT poles, protection equipment, meters and service cables. .

To further accelerate the installation of necessary distribution infrastructure in such potentially hazardous areas, under the revised Capex plan, an additional investment of **PKR 9,450 Million** has been envisaged.



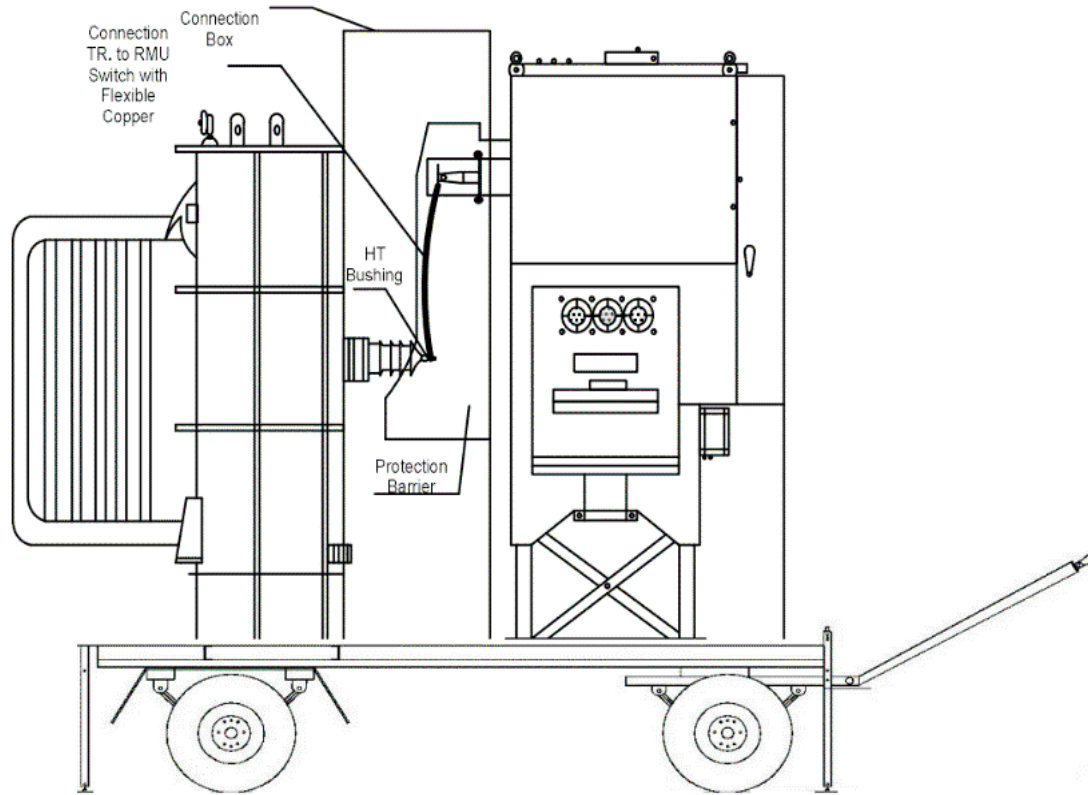
HT/LT Infrastructure surrounded by Encroached Illegal Houses.

Karachi's rapid growth and massive migration mean nearly 5 million people, or 50% of the population, in 2000 lived in slums, a number that is believed to have grown.

Karachi is growing at a rate of around 5% per year, in large part due to rural to urban migration in the area and the 45,000 migrant workers who come to Karachi every month from around Pakistan.

This results in New Construction & Horizontal as well as Vertical Growth. Considering the expansions and lack of support from civil authorities , it is difficult for KE to make aware every citizen about safe construction parameters, which is the basic duty of civic authorities and not KE.

Hence, to maintain safe clearance distance from Overhead Lines to consumer premises around **112,000** meters encroached overhead network is planned to be converted into Underground Cable, and for aforesaid execution, **PKR 1,385 Million** has been envisaged.



It's a Mobile Trolley Sub-Station comes with a carrier equipped with four wheels and a hook so that the trolley can be linked with any vehicle for movement from one place to other place easily. It is strong enough to sustain the weight of the equipment like PMU etc.

The design of Trolley shall be such that it can accommodate different designs & make of approved 500 kVA PMU's both PMU with RMU's and PMU with Arc strangles.

In addition to the wheels, carrier should also be equipped with jacks which can be engaged and locked (to prevent accidental rolling of trolley) when trolley is parked in a place for a long duration.

PMU ON WHEELS is a project initiated to facilitate network with provision of a compact, transportable & cost-effective mobile power supply solution for providing temporary energization to consumers during breakdown or maintenance.

It is kept in budget for providing temporary arrangement solution, till Reconstruction and Permanent arrangement of those Sub-Station which are under rehabilitation or break-down due to maintenance.

Reconstruction of 600 Sub-Station is planned across MYT, and for this initiative an investment of **PKR 555 Million** has been envisaged for around 25 Trolleys, and same will be rolled over across substations as they are re-constructed in phases.

PMU is an SF6 insulated 11kV/50Hz RMU installed with distribution transformer. PMU is an, on load switching device used to make and break 11 KV circuit without feeder switching from Grid station or substation/RMU. These transformers are designed for installation on three-phase distribution systems.

Earthing of Metallic structures are an important part of any Distribution and Transmission Network.

The planned initiatives would enable KE to ensure safe and reliable supply of electricity up to consumers premises. The potential benefits of the project include:

- Protection against unfortunate incidents
- Avoid risk of fire due to leakage current through unwanted path; and
- Avoid electric shock to persons who may be in contact with the network

Earthing of Service Bracket would enable KE to ensure safe and reliable supply of electricity up to consumers premises.

In parallel with execution of phase-II, KE has also planned to secure its consumers up to consumer facility, which is being done through inter-connection of 1x16mm Insulated Conductor from nearest earthed pole to consumer service bracket.

For aforesaid Bracket Earthing an additional investment of **PKR 2,142 Million** has been envisaged for around **6,800 CDS PMTs**.

Installation of DBs

At present, Pole Mounted Transformer's allied protection and distribution equipment is divided into multiple individual boxes made of MS steel enclosures. This causes complexity in design, operations and issues relating to environmental conditions causing corrosion which eventually affects reliability and longevity. In order to address this issue a proof of concept for unifying all these segments including circuit breakers and energy meter into one Polymer box to bring simplification in design and also rule out corrosion issues. Development for Proof of concept is underway. All new pole mounted transformers envisioned to be added in the next control period will be replaced with one unified box instead of multiple boxes. Accordingly, an investment of **PKR 521 million** is planned for this purpose.

Whether the investment of 3,859 Million (transmission) for Safety is justified?

Justification

S. No.	Description	Amount Mn PKR	Justification
1	132kV CAA – Landhi / Landhi – Johar	827	Keeping in view the existing network configuration of KE and the topographical dynamics of metropolis, the uncontrolled encroachment within transmission line corridors has made it impossible to maintain infrastructure in encroached areas. Consequently, the structures, conductors, insulators and hardware on these lines have deteriorated noticeably and posed safety risk for maintenance staff and common masses. The encroached area infrastructure is planned to be either re- located or diverted through a more accessible route or be converted from overhead to underground.
2	132kV KDA – Gulshan / KDA-Johar	768	
3	132kV KDA – Gulshan / Hospital – Gulshan	1,613	
4	Rehabilitation works	650	Works are planned on following grids for 11kV yard extension and infrastructure strengthening: SITE North Karachi KEPZ KDA 33 Johar
Total		3,859	



Issues Framed (Others)

Other Issues (i)

SCADA and other Automation equipment: whether the claimed cost Rs. 9,682 Million for SCADA upgradation is justified?

Justification

KE state-of-the-art SCADA system is operational since December 2009 for controlling, monitoring and acquisition of real time events critical to power systems. At present, the entire KE network including all grid stations and generation plants are adopted and are being monitored / controlled through Supervisory Control and Data Acquisition (SCADA).

As part of TP-1000 project in 2019, KE has upgraded the SCADA SINUAT spectrum from 4.5 to 4.7. Timely upgradation of SCADA (material, application & software) is critical for effective monitoring and control of the system while adhering to the standards. Following are the key benefits that are yielded at present from utilization of SCADA.

- Effective monitoring and control of the system
- Efficient Management of Real Time Operations through utilization of different applications
- Digitalization of Conventional Processes
- Utilization of SCADA applications for achieving operational excellence

System will be required to be upgraded in 2028 due to change in technology.

Without the upgrade, operators will not be able to use supervisory control features, EMS technology, reporting and archiving functionalities. Overall performance and availability of SCADA services will be at risk due to obsolete operating system, database and other third-party software dependencies along with frequent downtime/ interruption may impact business continuity.

The cost of PKR 9,682 will be incurred on SCADA Upgrade, Oracle Servers Upgrade and DRC Redundancy.

Issue (ii & iii)

Issue ii: AMR Coverage and Digitization of services: Whether the claimed cost of Rs. 5,701 Million for AMR coverage and digitization of customer's services is justified? Whether the AMR coverage on distribution transformer (PMT) level is only for monitoring the consumption or it has control/ remote connection and disconnection features as well at PMT level?

Issue iii: Smart Networks: Whether the cost of Rs. 10,828 Million for Advanced Distribution Management System (ADMS) and Meter Data Management System (MDMS) pilot project is justified?

Investment during MYT Period FY24 – FY30			
Projects	UOM	Qty	Rs in Mn
Smart Network	-	-	10,828
Automated Meter Reading (AMR) Coverage	-	-	4,736
Customer Services Digitization	-	-	523
Commercial Digitization	-	-	301
Power Quality Analyzers	Each	100	129
PQ Work Bench	Each	1	13
AMR Coverage and Digitization of services			5,702
Total			16,529

Major new technology initiatives only include the implementation of OMS & DMS/SCADA (Pilot)

Roll Out of Outage Management System | KE Wide

OMS is used to manage outages and restore power to customers as quickly and safely as possible. It improves outage response time & minimizes the impact of outages on customers. OMS rollouts generally reduce outage durations by ~20% through efficient crew & outage management, & communication with customers

Benefits:

- **Outage reporting & analysis:** Analyzes power outages and its extent by analyzing the parent child hierarchy of assets and consumers
- **Crew dispatch and management:** Helps in crews dispatch to the affected areas and manage their activities.
- **Work order management:** This includes assigning work orders, tracking crew locations & progress, and tracking of new and resolved outages
- **Improved communication:** Provide more accurate and timely information to customers during outages, improving communication and customer engagement.
- **Reporting and analytics:** Provides data and insights on outage frequency, duration, and other metrics, which can be used to optimize operations and plan for future operations

Advanced Distribution Management System (DMS+SCADA) | 200 Feeders

ADMS provides real-time visibility of distribution network, fault localization & automates routine tasks to reduce costs & optimize operations. It helps to improve reliability, asset management, & integrates with other systems for improved communication. ADMS rollouts generally improve service levels by ~35%

Benefits:

Operational Efficiency:

- **Real time network visibility and control:** Allows engineers to quickly identify and respond to outages and other issues that could impact service reliability.
- **Fault location identification and isolation:** Identifies and isolate faults quickly, reducing the duration and extent of outages.

Advanced Analytics and Asset Management:

- **Better asset management:** Increased asset life & reduced cost through condition-based planning of asset maintenance & replacement activities
- **Data integration:** Integrates SCADA, AMI, GIS, and historical data, to create a comprehensive view of the distribution network.
- **Predictive analysis:** Utilizes machine learning algorithms to predict potential asset failures & take proactive actions to prevent or minimize outages' impact

Sustenance:

Hardware enhancements to cater data growth, end-of-life product replacements and license renewals to ensure continuity of existing operational (AMI & GIS) and analytical solutions (MDMS Analytics)

R&D:

Enhanced system efficiency & cost optimization through R&D to ensure readiness for futuristic technologies

Total Technology (PKR 10.8 Bn*) = New Initiatives (PKR 5.1 Bn) + Sustenance (4.5 Bn) + R&D (0.35 Bn)

AMR

KE has placed AMRs on its Distribution Transformers to regulating energy accounting from Feeder to DT and DT to consumers. AMRs will be required for installation on additional PMTs and feeders. KE has currently c. 30k Distribution Transformers installed and all of them have AMRs installed as Check-Meter. Further, KE also has a significant consumers with AMRs meters installed, for which the same investment will be used to replace Meters in case of faults.

AMR Features

AMR installed at PMT level are used for monitoring following power parameters which help in driving improvement initiatives;

- *Energy Consumption*
- *Outage analysis*
- *Voltage profiles*
- *Loading profile*
- *Power factor profile*
- *Simulation studies*
- *Load curve analysis*

Smart meters which have a built in mechanism for remote connection and disconnection are connected direct online and are supplied up to a maximum 160A . These meters can be installed on PMTs having 50kVA rating or less. The meter manufacturers do not recommend it for frequent switching cycles though.

70-80% of the meters installed in KE network are 250-500kVA and direct online smart meters with built-in disconnection/ connection mechanism cannot serve at such high ratings. For higher ratings, CT operated meters are used but they do not have a built-in mechanism for remote operation.

Customer Services Projects | 523 Mn

GENESYS UPGRADE | 118 Mn

Contact center telephony solution which includes IVR services also to be upgraded. Support continuation along with enablement of new features to be part of this upgrade

KE LIVE APP REVAMP | 94 Mn

Feature enhancement on KE Live mobile Application for customer facilitation along with AI based customization of the App.

ROUTINE REPLACEMENT OF FRONT-END LAPTOPS | 59 Mn

Replacement of old and depreciated laptops for front end staff to serve the customers effectively

CHATBOT | 59 Mn

Conversational Chatbot solution which will be integrated with current customer facing channels where customer will chat with an automated solution

QMS REVAMP | 35 Mn

Queue Management system used for service centers. Upgrade of QMS is planned which will enable new features and help to improve Customer Service

CONVERSATIONAL IVR | 35 MN

Conversational based IVR which will allow customers to speak to IVR in a human like interaction way and help in deflection of calls towards digital & also increase digital adoption

AVAYA E-LEARNING MODULE | 24 Mn

Learning management system which will help to cascade information amongst frontend staff and ensure e-learning based training facility for customer facilitation

ROBOTIC PROCESS AUTOMATION | 24 Mn

Workflow Automation with RPA solution which will help to complete tasks which are repeated in nature and static in process

OTHERS | 76 Mn

Other Projects include Artificial Intelligence based call routing, VR based customer care, analysis of interactions and highlighting keywords and sentiments and a complete self care menu for non-smart phone users

Commercial Digitization Projects | 301 Mn

RCDC Digitization

This project involves assignment of hand-held devices to DCRC teams to ensure disconnection and reconnection is maintained real-time in system (SAP) and is auto synchronized with the activity on site. It will enable digital record-keeping of recovery efforts and disconnection evidence, permitting pictorial evidence to be recorded for each disconnection with ease

PKR. 41 Mn

SIR Digitization

The hand-held units (HHU) are critical in the process of meter reading process and provision of new hand-held devices to Meter Readers is needed in place of stolen, damaged, and faulty devices (460 devices replaced in the last 2 years). This is critical for ensuring operational business continuity is maintained and meter reading process remains reliable and accurate through use of Handheld units

PKR. 70 Mn

HHU Devices

Digitization of this process will allow paperless real-time survey report punching, significantly reducing time taken to punch and process survey report in the system, also ensuring a near real-time availability of evidence on discrepant meters. The benefits will extend to elimination of the need for extensive day-to-day printing of proforma and notices, as well as prevent issues caused by misplacement of documents and repetition of work

PKR. 190 Mn

Other Issues (iv)

IT, Cyber Security & Other Improvements: Whether the cost of Rs. 18,514 Million for IT and Other improvement Plan is justified ?

Below is the proposed investment plan for IT & Other improvement CAPEX divided into three categories:

Description	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	Total
IT – ERP & Infrastructure	3,103	1,809	1,967	1,558	2,033	2,087	1,499	14,056
Cyber Security	250	300	340	390	430	450	495	2,655
Real Estate & Civil Works	244	285	276	275	273	295	156	1,803
Total	3,596	2,394	2,583	2,223	2,736	2,833	2,150	18,514

The details of investment in these projects are presented in the following slides:

Information Technology – ERP and Infrastructure (Proposed)

Details of investment in ERP and infrastructure is as follows:

Description	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	Total
End of life / System Upgrade	1,678	1,788	1,905	1,435	1,878	1,995	1,434	12,113
Specialized Projects	1,425	21	62	124	155	93	65	1,943
Total IT	3,103	1,809	1,967	1,558	2,033	2,087	1,499	14,056

S#	Key Cybersecurity Solutions	Description
1	SAP ERP, Billing, CRM and Data warehouse Upgrade Projects	This will benefit to use modern and innovative technologies for upcoming critical business projects and day-to-day operations across KE.
2	Infrastructure Modernization	Including Cloud Adoption, Data Center Upgrades, Disaster Recovery capabilities enhancements, High end Routers/Switches for Critical Campuses, etc. – With the vision of software-defined infrastructure and cloud technologies, overall IT infrastructure will become more flexible, lean and resilient for business changes and demands in less turn-around-time and hassle-free deployments.
3	Adoption of Cloud Native Architecture for Enterprise applications modernization	Critical business projects and regulatory requirements will be developed on Cloud Native Architecture that provides benefits related to cost efficient enhanced customer experiences, adaptability, enhanced security and real time analytics and compliance with regulatory requirements.
4	Supporting Technology Infrastructure for Distribution OT Projects	related to ADMS, NMS, MDMS, Smart Grids & AMI , Field Force Automation etc. – Alignment and convergence with OT technologies will provide coherence and ease of doing management for the standards, policies, tools, processes.
5	IT Equipment / System upgrade	Continuous Technology Refresh & Upgrade for Legacy and Old Servers, Storages, Network Equipment, Notebooks/Laptops etc. – This will improve employee productivity, enhance the workplace experience, strengthen devices security and imperative for overall business continuity of KE.

Cyber Security (Existing)

Cybersecurity function is accountable and responsible to protect and defend KE's critical business data in addition to Infrastructure and Business Systems.

Information Security and Access Controls are the most important pillars of Cybersecurity which have been implemented by the KE Cybersecurity department, such as **Web-Application Firewalls, SIEM**, Access Controls and provisioning system, **Antivirus/Antimalware solutions, DNS Security, File Integrity Monitoring, Threat & Vulnerability Management**, Data exfiltration & prevention control systems and **logging/monitoring systems**.

Furthermore, additional level of threat assessment is also carried out to ensure the best level of protection is applied on KE's digital landscape. Below are the major Cybersecurity solutions in place:

S#	Key Cybersecurity Solutions	Description
1	IT/OT Risk Consultancy	3rd party Cybersecurity risk assessment and maturity review on IT and OT landscapes
2	Security Information & Event Management (SIEM)	Core security element which helps in collection of alerts, detection and triage of developing threats
3	Web Application Firewall (WAF)	Protects KE's web applications from various cyber attacks
4	File Integrity Monitoring (FIM)	Provides integrity assurance on critical systems, data files and modifications. It also protects and reports unauthorized changes on KE's digital landscape
5	Domain Name System Security (DNS)	Protects IT infrastructure from cyberattacks in order to keep it performing quickly and reliably by monitoring and blocking malicious and suspicious Internet domains.
6	Network Detection and Response (NDR)	Monitors, detects, reports and responds to known and unknown malicious traffic, anomalous behavior and protocols within KE networks by using non-signature-based tools or techniques
7	Privileged Access Management (PAM)	Protects, controls and monitors logical accesses to KE's digital systems
8	Advance Malware Protection (AMP)	Expands the malware protection on all KE network segments.

Cyber Security (Proposed)

KE has successfully established a robust and dynamic IT Security function in the recent years by deploying globally reputed solutions. Following this success (also acknowledged by NEPRA recently), KE is now embarking on the journey to establish a similar Cybersecurity posture in KE's OT environments as well to cover the entire organization. According to Allianz Risk Barometer for 2022, Cybersecurity Risk is on the top, specially for energy companies and hence adequate level of cybersecurity maturity and preparedness/readiness is critically required to ensure supply of power to the consumers.

Accordingly, Cybersecurity proposed investment planning covers following key domains:

Description	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	Total
Defense & Security	100	120	136	156	172	180	198	1,062
Risk Assessment & Compliance	151	180	204	235	258	270	297	1,593
Total Cyber Security	250	300	340	390	430	450	495	2,655

S#	Key Cybersecurity Domain	Solution Benefits
1	Cyber Defense & Security operation	Provides 24x7 coverage to monitor, report and protect against live threats on KE's infrastructure
2	Identity & Access Management	Protects, controls and monitors logical accesses to KE's digital systems
3	End User & Network Defense	Monitors, detects, reports and responds to known and unknown malicious traffic, anomalous behavior and protocols within KE networks by using non-signature-based tools or techniques
4	Threat Risk and Vulnerability Assessments	Provides regular updated reports on vulnerabilities and their remediation plans, in order to keep KE's infrastructure and systems proactively protected throughout.
5	Application Security	Protects KE's applications from various cyber attacks and helps to improve KE's secure coding practices
6	Incident Management	Leverage Cybersecurity incident management services through global reputed organizations in case of any Cyber-attack on KE
7	Security Awareness, Governance & Compliance	Enhance Risk-based Cybersecurity awareness amongst employees and contractors. Retain global certifications like ISO27001 to enhance Cybersecurity posture in KE

Real Estate & Civil

K-Electric owns several properties in various locations of Karachi to meets its operational needs. Investment planning in civil works is mainly based on rehabilitation and replacement, to maintain the existing civil structure for smooth and safe operations as well as payment of provincial and federal government taxes and duties etc.

Description	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	Total
Real Estate & Civil	244	285	276	275	273	295	156	1,803

THANK YOU



A nighttime photograph of a cityscape. In the background, a large port area is visible with several large gantry cranes and industrial buildings, all illuminated by bright lights. A body of water is in front of the port. In the middle ground, a tall, dark building with a clock tower is prominent, featuring a glowing blue circular logo. The foreground shows a city street with long-exposure light trails from cars, creating streaks of red and white. A large, ornate church with a clock tower is visible on the right side of the foreground. The sky is a deep blue, indicating twilight. An orange banner with white text is overlaid across the center of the image.

Back – up (Transmission)

Transmission Investment Plan is divided into five categories: (i) Growth Projects, (ii) Interconnection for off take from NTDC (iii) Interconnection for off take from IPPs (iv) System Improvement / Reliability; and (v) Reactive Power Management and Loss Reduction Projects, which are discussed in detail in the subsequent sections:

► **i) Growth Projects – PKR 140,751 million**

These are mainly demand driven projects for which KE has planned following additions to its network:

- Transformation Grid Stations – 2,000 MVA *
 - 3 new 220kV Grid Stations
 - Installation of 3 new Auto Transformers on existing 220kV Grid Stations
- Load Grid Stations – 555 MVA **
 - 6 new 132kV Grid Stations *
 - Installation of 4 new Power Transformers on existing 132kV Grid Stations
 - Upgradation of Hub, Vinder, Uthal and Bela grids from 66kV to 132kV, along with addition of new 150km 132kV TL
- Transmission Lines
 - 450 km (circuit length) new transmission lines

* 220kV/132kV KKI Grid station is included in load grid where KE will add transformation capacity of 250MVA which is included in 2000MVA

** Additionally, 200 MVA will be added through 3 new 132kV grids and a Power Transformer, which are consumer-funded

► **ii) Interconnection Projects – NTDC – PKR 29,806 Million**

These projects are required to draw additional power from national grid. Main projects includes following:

- Addition of 500kV KKI Grid station and 220kV Transmission Line
- Loop-in / loop-out of transmission lines for Dhabeji and KKI for connectivity with NTDC network
- Installation of additional 600 MVA Auto Transformer at NKI to enable power evacuation of 400MW IPPs

► **iii) Interconnection Projects – IPPs – PKR 23,054 Million**

These projects are required for connectivity with new Independent Power Producers (IPPs), mainly including:

- Step-up grid and related transmission line of 20 km – planned at Gharo corridor for inducting additional 600 MW renewable power plants in KE system
- TL having estimated length of 20 km – planned for evacuation of power from 350 MW GoS renewable power plants through Surjani Grid. These projects are being developed under the umbrella of Government of Sindh with support of World Bank.

► iv) System Improvement / Reliability – PKR 84,133 Million

These projects are required to upkeep and reinforce the existing network for system reliability and stability. While adhering to technical limits as per Grid Code, measures are planned to improve efficiency and achieve operational excellence. These include network augmentation for maintaining N-1 contingency, system security and safety standards. Major projects include:

S. No.	Description	Amount Mn PKR	Justification
1	Short Circuit Control	1,373	The proposed Current limiting reactor between the 220 kV Bus Bars of New Port Qasim Grid Station will help in mitigating the fault level. Furthermore, this shall also reduce the risk of equipment damage and used as shunt to manage the voltage at 220kV, where necessary. It is important to limit short circuit value within permissible range to ensure the safety of grid and working staff.
2	SCADA & Other Automation equipment	<u>9,682</u>	Refer issues frame - Others (i)
3	Safety	<u>3,859</u>	Mainly includes relocation of transmission lines from encroached areas is for safety perspective
4	Rehabilitation and replacement projects	45,180	Refer next Slide
5	Maintenance/ Improvement	24,039	Refer issues frame no (iii)
Total		84,133	

► v) Reactive Power Management and Loss Reduction Projects – PKR 3,171 Million

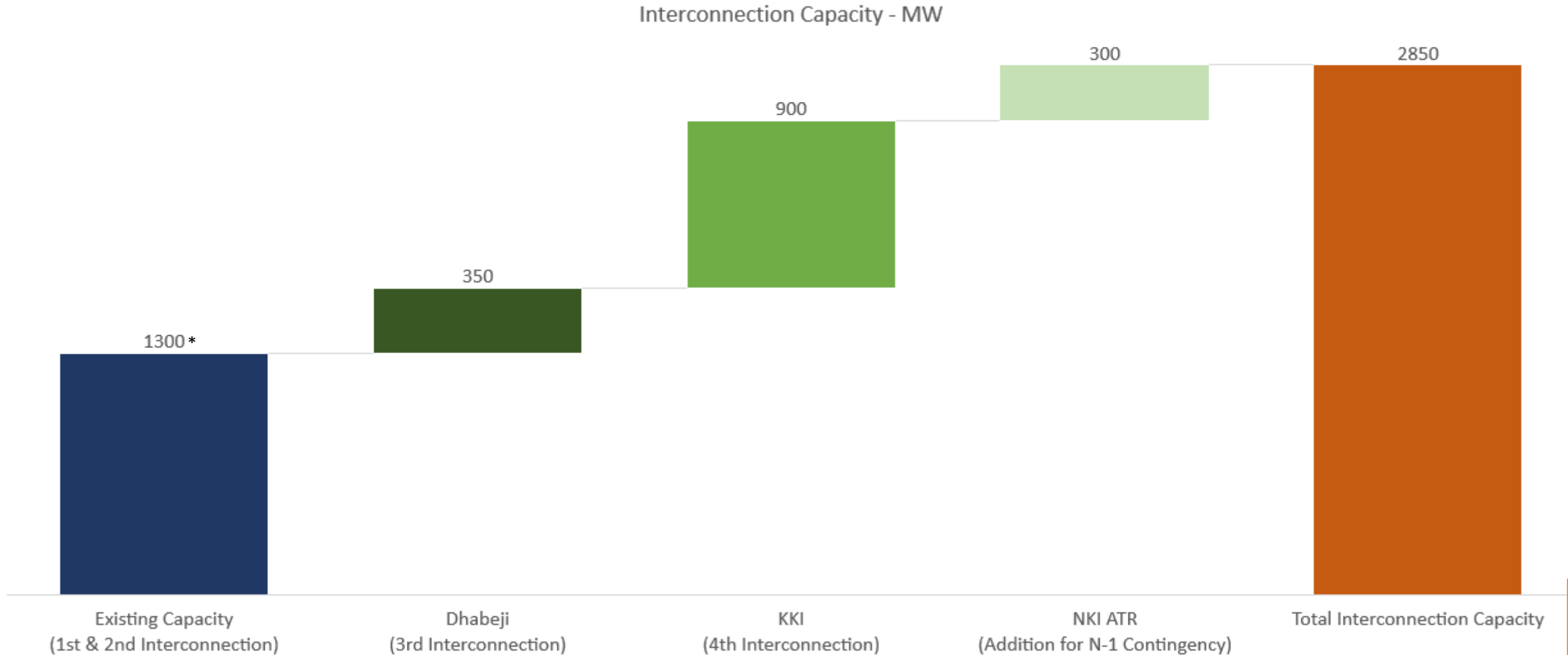
- With increase in demand, the total MVAR requirement of KE system increases & the supply of MVAR from NTDC interconnection and generation by KE own power plant is insufficient as shown in table below.
- The deficiency of MVAR in the system impacts the voltage profile, power quality and inhibit compliance of grid code, performance standards and other applicable documents.
- To maintain 0.95 power factor at interconnection points between KE and NTDC, additional capacitor banks are required.
- Thus, installation of capacitor at 11kV level, along with MV panels, is planned to meet the MVAR demand (452 MVAR) of the system.

DESCRIPTION		2025	2027	2030
System Requirement (A)		3052	3119	3738
Generator Supply (B)		1636	1558	2073
Total Deficit C = A-B		1416	1561	1665
Compensated by Existing Shunt (D)		1076	1417	1561
Net Deficit E = C – D		340	144	104
New Proposed Shunt Compensation	At Existing Grid	308	88	56
	At New Grid	32	56	48



S. No.	Description	MVA	Amount Mn PKR	Year	Justification
1	500 kV KKI Grid station & TL	1800	17,618	2024	<ul style="list-style-type: none"> - Investment already approved by NEPRA and project is under execution. - The Grid is key to evacuate up to 800MW from National Grid.
2	NTDC Interconnection TL KKI	NA	2,667	2024	<ul style="list-style-type: none"> - NEPRA principally agreed to consider the cost of these interconnection projects vide its Oct 2021 letter, addressed to the Ministry of Energy (Power Division) - These are critical for evacuation of power from National grid alongside enhancing the network capacity, reliability of power system, optimal management of network, loss reduction and voltage regulation. • Enhancement in NTDC's NKI Grid is necessary to evacuate power from following planned IPPs: <ul style="list-style-type: none"> • 330 MW Thar Based Coal Plant • 82 MW Hydel Plant
3	NTDC Interconnection TL Dhabeji	NA	1,916	2024	
4	Addition of 600MVA ATR at NKI	600	7,604	2026	
Total			29,806		

With investment in interconnection projects the existing interconnection capacity of KE system with NTDC will increase as shown below:



S. No.	Description	MVA	Amount Mn PKR	Year	Justification
1	Step up Grid for 600MW at Gharo	750	14,962	2027	<ul style="list-style-type: none"> - Evacuation of power from upcoming renewable plants to manage demand / supply gap - Improvising the load flow of 220kV network and increase quantum of clean and cheaper energy in KE fleet in line with National Environmental Policy guidelines - Reducing KE's reliance on imported fuel and decrease electricity generation cost
2	Addition of Transmission Line for 350MW renewable plants	NA	7,523	2025	
3	Other Costs (Metering cost for IPPs)	NA	568	Multiple	To measure use of energy for billing and load at new proposed IPPs.
Total			23,054		

S. No.	Description	Amount Mn PKR	Year	Justification
1	Short Circuit Control	1,373	2025	The proposed Current limiting reactor between the 220 kV Bus Bars of New Port Qasim Grid Station will help in mitigating the fault level. Furthermore, this shall also reduce the risk of equipment damage and used as shunt to manage the voltage at 220kV, where necessary. It is important to limit short circuit value within permissible range to ensure the safety of grid and working staff.
2	SCADA & Other Automation equipment	9,682	2030	Refer issues frame - Others (i)
3	Safety – Relocation of TLs and Grid works	3,859	Multiple	Relocation of Transmission lines from encroached areas is for safety perspective. Civil work is planned at grid stations for 11 kV yard extension and strengthening the infrastructure
4	Rehabilitation and replacement projects	45,180	Multiple	Refer Slide
5	Maintenance/ Improvement	24,039	Multiple	Refer Slide
Total		84,133		

Rehabilitation and replacement projects

S. No.	Description	Rs. Mn	Justification
1	Rehabilitation of Transmission Lines	21,952	Details are given in issues frame iv
2	132kV Bays replacement	2,490	Replacement of 7 aged/ deteriorated equipment will improve system reliability.
3	132kV KTPS-Qayyumabad T/L	1,500	The line is currently in use by KE for evacuation of 200MW power from KTPS while ensuring increased efficiency and provision of N-1 contingency. NTDC has submitted a request to KE to purchase the line for which verification of cost is currently being done by KE. Current amount taken as per NTDC letter, which is tentative and subject to cost verification by KE
4	ATRs Replacement	2,336	Replacement of 3 aged/ deteriorated Auto Transformers to increase the reliability of power system
5	D/C NPQ/ DHABEJI – New	4,162	Evacuation of power from upcoming power plants – 25km circuit length
6	Fire Sprinkle system for 130 PTRs	3,600	For safety and security of grid equipment and surrounding.
7	Replacement of OFC Cable (UG)	5,301	Replacement of 19 km old, deteriorated and technologically obsolete circuits
8	S/C KTPS-K – South – New	798	To reduce congestion on existing alternate serving 6km transmission lines.
9	S/C Landhi from K. South G/S – New	2,882	To reduce congestion on existing alternate serving 8km transmission lines.
10	132k Jacob to Baloch	158	For activation of tele-protection.
Total		45,180	

Transmission Routine Capex – PKR 24,039Mn

This investment is required for routine corrective and preventive maintenance activities on existing system. Total amount of PKR 24,039 Million is based on annual forecast of PKR 3.42 Bn. Historically KE has incurred similar annually between FY 2017-22. Major activities of routine maintenance is segregated in following categories:

Transmission Departments	Rs. Mn	Justification
▶ GSMPO	14,253	Investment includes replacement of several aged material which includes; 11kV Switchgears, Overhauling of GIS bays, Power Transformers, Relays equipment, battery charger, current & voltage transformers, control panels, breakers, capacitors and civil works.
▶ Overhead	4,754	Investment includes RTV coating, replacement of cable/conductor/insulators, replacement of composite insulators and installation of damper spacers.
▶ SCADA	2,951	To maintain SCADA system. Main equipment includes; cards, switches, gateway, marshalling system, Barco wall, modules, DRC servers application, server UPS and others.
▶ Telecom	1,434	It includes upgradation of SDH/PDH System Installation/Services/Spares, OPGW Cable / Services / CRO, Cell / Battery / Charger and PABX System/Services/Spares
▶ Underground	646	It includes Cable / Termination / Joint & Accessories, Cable Replacement Project, Solid / Cross Link and Other Material and services
Total	24,039	



Growth Detail Breakup – FY 2024 - 30

PKR in Mn

Description	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Total
DHA-4	-	-	-	-	2,751	4,502	1,801	9,053
Landhi	2,948	4,913	11,792	-	-	-	-	19,653
New 220kV Grid/TL	2,948	4,913	11,792	-	2,751	4,502	1,801	28,706
Ziauddin	-	-	10,184	12,870	14,300	-	-	37,353
New 220/ 132 kV Grid/TL	-	-	10,184	12,870	14,300	-	-	37,353
Auto Transformers	-	1,745	1,745	1,755	-	-	-	5,245
GSMO/TRN Special Projects	1,268	-	-	-	-	-	-	1,268
Power Transformers	3,074	-	-	-	1,063	-	605	4,743
Augmentation	4,342	1,745	1,745	1,755	1,063	-	605	11,256
HOSPITAL - 2	-	-	-	241	4,595	2,845	-	7,681
K. CENTRAL - 1	-	4,864	3,204	-	-	-	-	8,068
KKI	-	-	3,360	5,081	-	-	-	8,441
LILO STDC Interconnection	594	-	-	-	-	-	-	594
MALIR - 2	-	-	-	135	3,421	1,604	-	5,160
MAYMAR - 2	-	-	-	-	2,603	1,407	563	4,572
SITE - 2	-	4,486	1,615	-	-	-	1,085	7,186
New 132 kV Grid/TL	594	9,349	8,179	5,458	10,618	5,856	1,648	41,701
HVUB	7,081	14,653	-	-	-	-	-	21,734
HVUB	7,081	14,653	-	-	-	-	-	21,734
Total Growth Projects	14,965	30,661	31,899	20,082	28,732	10,357	4,054	140,751

220kV MVA addition

132kV MVA addition

Component wise breakup

Cost per Unit



S. No.	Description	FY-24	FY-25	FY-26	FY-27	FY-28	FY-29	FY-30	Total
Auto Transformer - 220/ 132 kV									
1	MVA Additions in Existing Grids – A	-	250	250	250	-	-	-	750
I	Gulshan	-	-	250	-	-	-	-	250
ii	Mauripur	-	-	-	250	-	-	-	250
iii	Surjani	-	250	-	-	-	-	-	250
2	New Grids MVA - B	-	-	250	250	500	-	250	1,250
I	KKI	-	-	-	250	-	-	-	250
ii	Landhi	-	-	250	-	-	-	-	250
iii	Ziauddin	-	-	-	-	500	-	-	500
iv	DHA-4	-	-	-	-	-	-	250	250
Auto Transformer - 500/ 220 kV									
3	KKI - C	1800	-	-	-	-	-	-	1800
Total MVA Addition per Year (A + B + C)		1800	250	500	500	500	-	250	3800

S. No.	Description	FY-24	FY-25	FY-26	FY-27	FY-28	FY-29	FY-30	Total
Existing Grid		Power Transformer - 132/11 kV							
i	JAIL	67							67
ii	KESC HOSPITAL	67							67
iii	Port Qasim					40			40
iv	KEPZ							41	41
v	Hub(Consumer Funded) Note					-	40		40
vi	HVUB		60						60
New Grids		Power Transformer - 132/ 11 kV							
	EAST INDUSTRIAL ZONE (BOC - 2) ^{Note}	-	40	-	-	-	-	-	40
	K. CENTRAL	-	-	80	-	-	-	-	80
	SITE - 2	-	-	40	-	-	-	40	80
	Memon Industrial Park ^{Note}	-	-	40	-	-	-	-	40
1	Ittehad Town Grid ^{Note}	-	-	80	-	-	-	-	80
I	HOSPITAL - 2	-	-	-	-	-	40	-	40
ii	MAYMAR - 2	-	-	-	-	-	-	40	40
iii	MALIR - 2	-	-	-	-	-	40	-	40
Total MVA Addition per Year		134	100	240	-	40	120	121	755

NO

YES

PT
Count
till
FY-24

Fdr.
Count
till
FY-24

Balancing of
existing PTs
possible?

Switch space
in existing
yard
available?

New power
transformer
addition
possible?

Excavation
within grid
boundary
Possible?

Feeder RoW
from outside
grid boundary
Possible?

KORANGI TOWN

4

67

QAYUMABAD

3

39

HAROONABAD

3

50

SITE

6

79

MAYMAR

4

46

KDA-33

4

54

HOSPITAL

3

40

BOC

2

24

Malir Nadi

Nala

Reasons for loading percentages being low still capex planned.?

Justification

- The present loading profile of system represents the served quantum of load which does not include the impact of policy load shed otherwise, the number of circuits operated above 80% loading would have increased.
- For planning of network in next control period, system demand is referenced according to which rehabilitation / upgradation is required on proposed circuits / transformers as per the load flow studies to ensure constraint free power evacuation and N-1 contingency.
- Also, the construction of new grids/ augmentation in existing grids is for the purpose of serving new upcoming loads that cannot be technically fed through existing grids either due to constraints in expansion of existing facility / evacuation in 11kV network or due to distant location of new load centers. It is ensured that existing grid station / network is duly optimized before going for new augmentation.

Material Category	FY24	FY25	FY26	FY27	FY28	FY29	FY30	Total
Switchgear	33	384	434	313	120	229	189	1,702
Overhauling of GIS bays	-	194	279	633	350	-	-	1,456
Power Transformer	-	174	177	397	97	101	-	946
Relays and allied equipment's and services	163	146	97	121	92	78	79	776
Block Transformer	-	-	108	110	-	261	-	479
Repair and maintenance of transformers	46	50	54	53	63	67	73	406
Charger / Battery	-	78	33	74	41	56	70	352
Current Transformer	20	67	44	23	36	37	39	266
Voltage Transformer	40	31	20	31	16	34	82	254
Control Panels	25	63	28	14	56	16	19	221
Cable / Conductors	2	28	24	29	39	43	34	199
Relay over current	58	29	29	10	29	37	3	195
Breaker and allied equipment's	8	22	52	22	33	19	32	188
Lock Out Tag Out	-	10	48	52	70	-	-	180
Capacitor	19	22	36	19	29	24	25	174
Analyzer	-	48	21	9	24	-	65	167
Double Cable to single cable	31	35	80	-	-	-	-	146
Switchgear Spares	27	2	14	1	61	-	23	128
Fault Recorder	3	57	65	-	-	-	-	125
Cards / Switches / Boards / RTU Racks / Gateway / Modules	4	34	23	14	7	11	10	103
Disconnecter	5	10	32	10	19	7	17	100
LIBB + BFR	-	-	-	28	-	56	-	84
Sergi for Pipri west	-	-	-	-	81	-	-	81
Other Material and services	1243	750	347	86	117	2	53	2,598
Grid Station Rehabilitation	323	352	318	374	514	547	499	2,927
Total	2,050	2,586	2,363	2,423	1,894	1,625	1,312	14,253

Material Category	FY24	FY25	FY26	FY27	FY28	FY29	FY30	Total
RTV coating Supply and Services	404	364	303	106	13	0	16	1,206
Cable / Conductor / Isolators / Insulators	204	112	118	164	126	101	229	1,054
Strengthening of Tower Structure & HT Poles	20	149	145	145	144	84	20	707
Replacement/Installation by Composite Insulators on 132KV	-	-	46	-	-	207	-	253
Damper Spacer / Vibration	16	57	57	-	61	34	-	225
CRO - Installation / Refurbishments of Insulators, Stubs, Crash Barriers, Spacer Damper	43	47	40	6	7	7	7	157
Overhead Dept offices at KDA and Baldia	-	48	-	-	-	-	-	48
FAT and Training for Tx Lines Material and Equipment	3	3	4	4	4	5	6	29
Safety and Innovation	5	-	6	-	7	-	8	26
Insulator	11	0	-	5	1	-	3	20
Li-Dar Survey 220kv & 132	-	-	38	-	-	-	-	38
Others Material and services	310	420	93	57	42	3	66	991
Total Overhead	1,016	1,200	850	487	405	441	355	4,754



Material Category	FY24	FY25	FY26	FY27	FY28	FY29	FY30	Total
Cards / Switches / Boards / RTU Racks / Gateway / Modules	32	46	58	72	68	65	110	451
Marshalling system	66	51	22	47	37	25	101	349
Rehab of Grid Automation System	-	-	33	36	79	-	93	241
Barco Wall for LDC & DRC with Spares	-	-	4	-	-	156	-	160
Module	5	17	19	21	23	26	29	140
Servers with Applications for DRC	-	124	-	-	-	-	-	124
Long Term Load Forecast - application	-	96	-	-	-	-	-	96
AGC - JROS	90	-	-	-	-	-	-	90
RTU System / Tools / Functionality	9	-	51	2	24	-	4	90
Analog Module	2	9	9	16	6	12	12	66
Store and Spares / Equipment / Services	5	6	12	7	9	9	17	65
GPS	-	7	5	9	5	11	17	54
Application Enhancements	-	8	9	11	-	-	23	51
Complete Station Data monitoring and EHT & HT Bays Control	-	-	10	13	-	18	-	41
RTU Module/AK/Cards/Power Supply	0	0	12	0	12	-	15	39
Battery for DRC	-	-	-	10	29	-	-	39
EHT Bay Integration Unit	-	-	12	-	23	-	-	35
UPS Service / Equipment/ Maintenance	-	-	2	-	3	10	19	34
LDC Renovation	33	-	-	-	-	-	-	33
Automation Health Monitoring System for 132 KV Stations	-	-	-	-	33	-	-	33
Others Material and services	369	143	84	54	60	5	5	720
SCADA	611	507	342	298	411	337	445	2951

Material Category	FY24	FY25	FY26	FY27	FY28	FY29	FY30	Total
SDH/PDH System Installation/Services/Spares	69	81	77	92	73	83	82	557
OPGW Cable / Services / CRO	29	23	31	11	27	38	31	190
Cell / Battery / Charger	23	32	26	29	23	28	26	187
PABX System/Services/Spares	26	32	24	25	20	16	18	161
Line Trap Current Circuit enhancement	11	11	-	6	-	8	-	36
Cards / Switches / Boards / RTU Racks / Gateway / Modules	13	8	7	3	1	0	0	32
Others Material and services	101	90	49	19	5	4	3	271
Telecom Total	272	277	214	185	149	177	160	1,434

Material Category	FY24	FY25	FY26	FY27	FY28	FY29	FY30	Total
Cable / Termination / Joint & Accessories	122	38	20	9	1	108	17	315
Cable Replacement Project	-	7	11	15	12	19	23	87
Solid / Cross Link	-	-	16	-	-	23	-	39
Other Material and services	87	74	11	9	12	6	6	205
Underground Total	209	119	58	33	25	156	46	646

EHT Cable Replacement Project

Justification

Equipment failure may occur due to aging of old oil filled cable circuits. Moreover, there is an environmental hazard of cable oil which will be eliminated with XLPE Cable circuits in addition to better load carrying capacity with addition of higher size of EHT Cable in Replacement Project

Circuits Name with Consumption Yr placed are as follows

- KDA ATR 2 EHT – FY25
- KDA ATR 1 EHT – FY26
- Valika-North Karachi II EHT – FY26
- Pipri ATR 1 EHT – FY 27
- Jacobline PTR 3 – FY27
- Baldia ATR 1 EHT – FY28
- Pipri ATR 2 EHT – FY29
- Pipri ATR 3 EHT – FY30

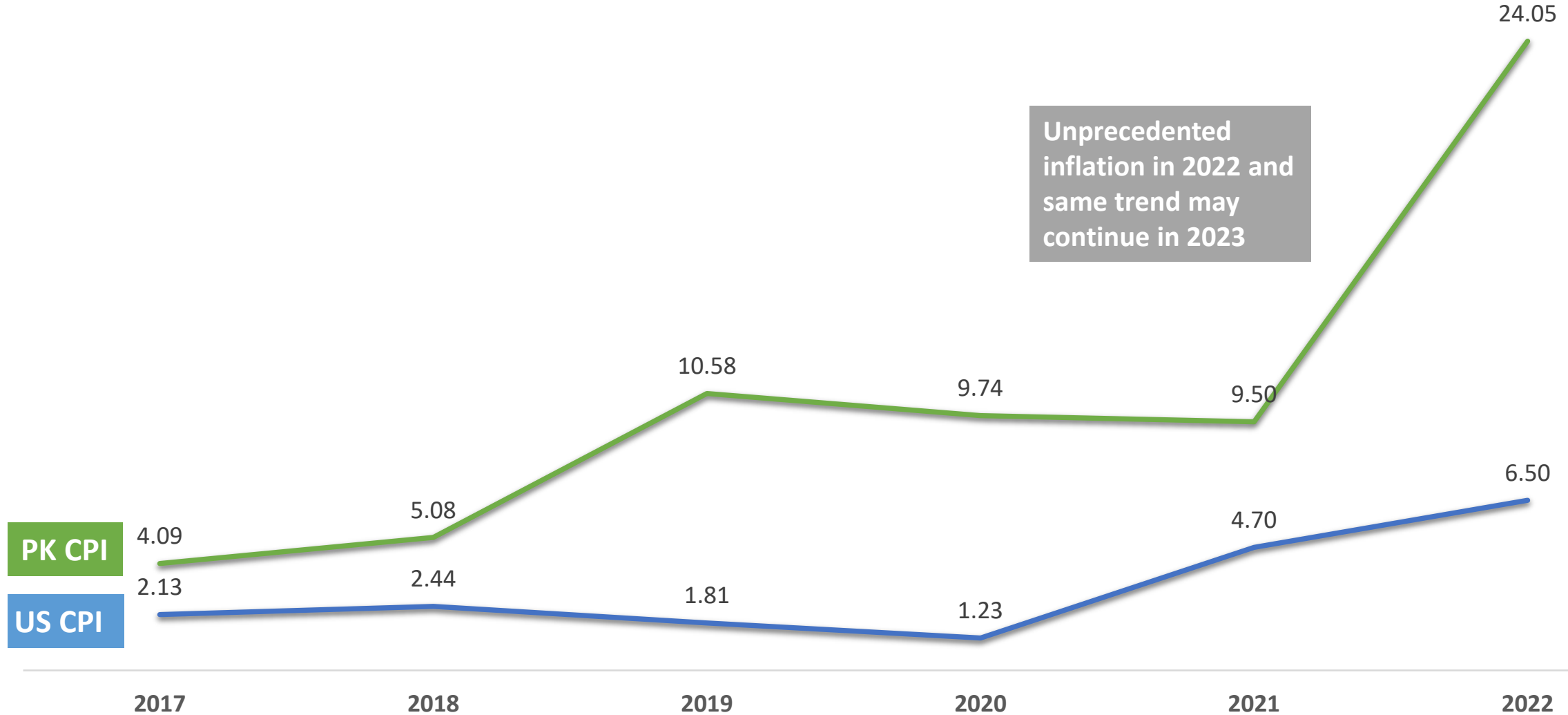
KPI	Definition	Calculation	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
System Reliability	System Average interruption Frequency Index (SAIFI)	SAIFI= No of interruptions during one year / No of consumers	3.52	3.17	2.85	2.57	2.31	2.19	2.08	1.98
	System Average Interruption Duration Index (SAIDI)	SAIDI = \sum Duration of interruptions / No of consumers (Hours)	4.83	4.35	3.91	3.52	3.17	3.01	2.86	2.72
Transmission Loss	The technical losses in the Transmission network	FY T. Loss= $1 - \frac{\sum \text{Units available for distribution}}{\text{Total Sentout}}$	1.1%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%

The year-on-year SAIFI and SAIDI numbers vary due to specific circumstances prevalent at that point in time. The target of FY23 onwards is set considering the impact of outages owing to the following projects, which has also been vetted by Consultant (refer Section 9):

- a) Augmentation of new grids at:
 - i) Landhi
 - ii) Korangi West / Qayyumabad
 - iii) ICI
 - iv) BQPS
- b) Reconductoring projects on three transmission 132kV lines:
 - i) KDA-Federal-B
 - ii) Pipri / K.Town
 - iii) Landhi/ Gul Ahmed

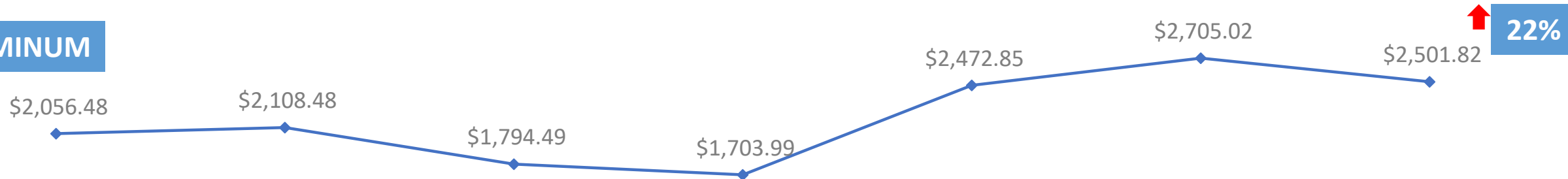
KPI	Definition	Calculation	FY17	FY18	FY19	FY20	FY21	FY22	FY23
System Reliability	System Average interruption Frequency Index (SAIFI)	SAIFI= No of interruptions during one year / No of consumers	8.59	8.07	10.07	6.12	4.58	2.46	3.52
	System Average Interruption Duration Index (SAIDI)	SAIDI = \sum Duration of interruptions / No of consumers (Hours)	12.1	11.55	16.56	11.77	6.93	2.73	4.83
Transmission Loss	The technical losses in the Transmission network	FY T. Loss= $1 - \sum$ Units available for distribution / Total Sentout	1.50%	0.90%	1.20%	1.11%	1.07%	0.83%	1.10%

Historical Trend – Change in CPI

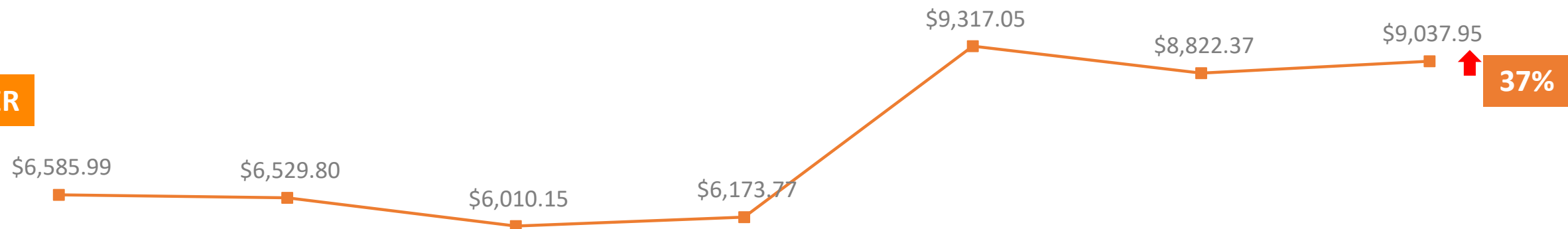


Historical Trend – Commodity Prices and Inflation

ALUMINUM



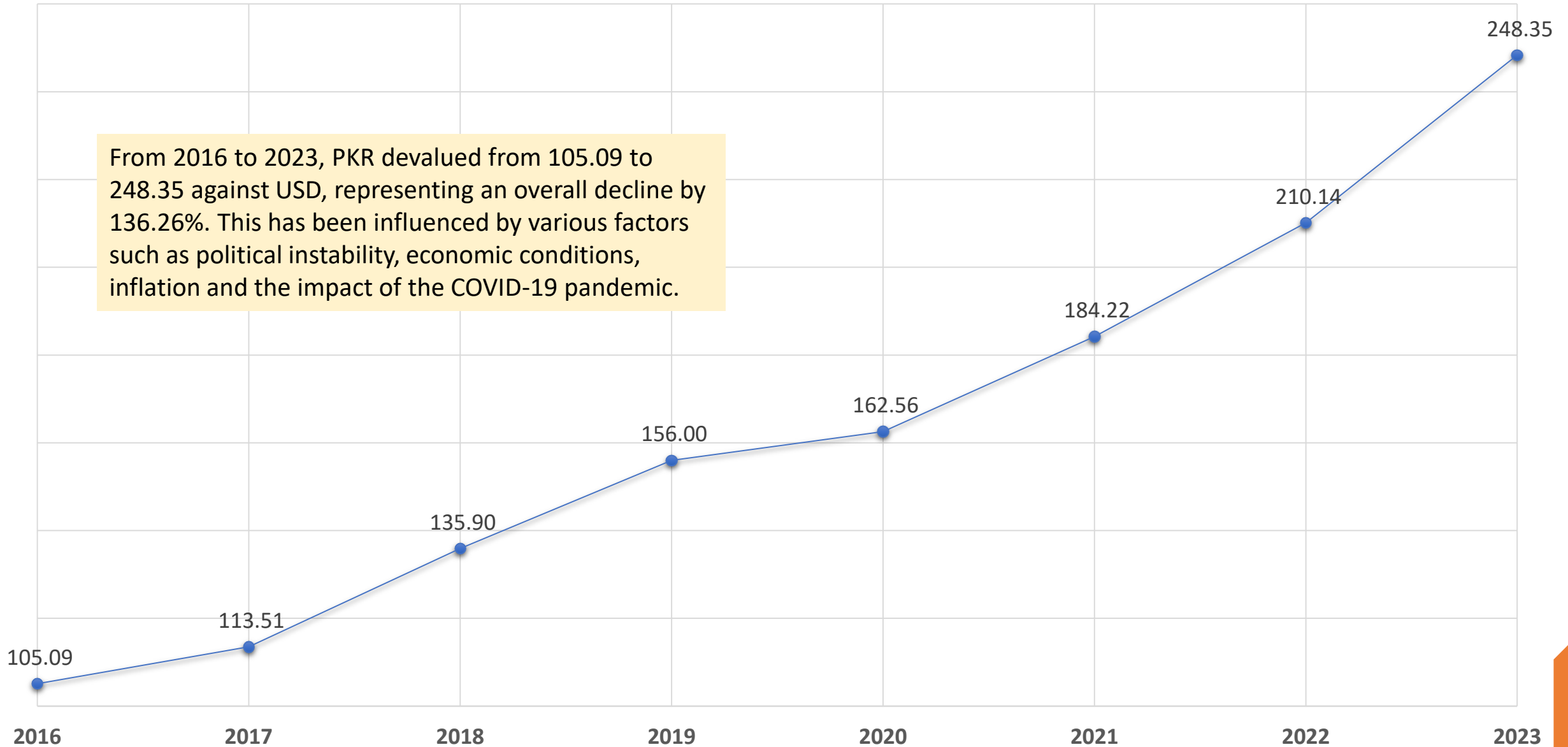
COPPER



IRON



Historical Trend – Exchange Rate



Particulars (MW)	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30
KE Own Plants	1,253	1,253	1,253	1,077	1,077	1,077	1,077
BQPS 3 - 900 MW RLNG Plant	900	900	900	900	900	900	900
Existing IPPs / CPPs - Solar IPPs not considered	173	173	173	173	173	173	173
Supply from National Grid	2,050	2,050	2,050	2,050	2,050	2,050	2,050
Supply before Proposed Additions	4,376	4,376	4,376	4,200	4,200	4,200	4,200
Proposed Additions							
Thermal IPP Extensions	251	-	-	-	-	-	-
Additions in Local Coal Plants	-	-	305	610	610	915	915
Wind Additions - 200 MW	-	-	-	-	40	40	81
Solar 900 MW Additions - not considered in night peak	-	-	-	-	-	-	-
Hydel Additions	-	-	-	-	-	80	80
Total Supply	4,627	4,376	4,681	4,810	4,850	5,235	5,276
Peak Demand (Night Peak)	4,168	4,290	4,404	4,522	4,631	4,768	4,896
Surplus / (deficit)	459	86	277	288	219	467	380

Supply Outlook

Fuel	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	Total
Planned Additions (MW)								
Solar	-	500	-	200	-	200	-	900
Wind	-	-	-	-	100	-	100	200
Hydel	-	-	-	-	-	82	-	82
Coal (Local)	-	-	330	330	-	330	-	990
Thermal	-	-	-	-	-	-	-	-
National Grid	1,050	-	-	-	-	-	-	1,050
Total Additions	1,050	500	330	530	100	612	100	3,222
Decommissioning of Thermal Plants (MW)								
Tapal / Gul Ahmed	(126)	(136)	-	-	-	-	-	(262)
BQPS 1 (Units)	(420)	-	-	(210)	-	-	-	(630)
Total Decommissioning	(546)	(136)	-	(210)	-	-	-	(892)
Net Additions	504	364	330	320	100	612	100	2,330

Transmission Routine – GSMP0 – Switch gear



Material Category	FY24	FY25	FY26	FY27	FY28	FY29	FY30	Total
Korangi East	-	67	51	63	-	-	-	181
Garden East	-	65	57	-	-	43	-	165
Azizabad	3	-	65	65	27	-	-	160
Elander Road	-	-	-	-	58	8	81	147
West Wharf	-	56	7	-	-	71	8	142
Jail Road Grid	-	7	60	54	-	-	-	121
Haroonabad	-	-	48	51	-	-	-	99
North Nazimabad	-	-	51	-	-	40	-	91
Old Town	-	-	68	17	-	-	-	85
Maripur 132 KV	-	-	-	-	-	-	76	76
PRL	-	51	8	1	-	-	7	67
Civic Center	-	-	-	50	8	10	-	68
Korangi South	-	59	-	-	-	-	-	59
CAA	-	53	-	-	3	-	-	56
North Karachi	-	-	-	-	8	45	-	53
Others	-	13	-	-	-	-	-	13
Gadap	-	-	-	-	6	5	-	11
Johar	-	-	4	-	-	-	7	11
132kV GIS Shadman Town	4	-	-	-	-	7	-	11
Federal A	6	-	-	-	-	-	5	11
Valika	1	10	-	-	-	-	-	11
Balouch Colony	7	3	-	-	-	-	-	10
KDA Scheme 33	3	-	-	-	-	-	5	8
Surjani Town	9	-	-	-	-	-	-	9
Jail Road Grid	-	-	9	-	-	-	-	9
Maymar	-	-	-	7	-	-	-	7
Malir	-	-	-	-	5	-	-	5
Federal B	-	-	-	-	5	-	-	5
Korangi West	-	-	-	5	-	-	-	5
Qayyumabad	-	-	6	-	-	-	-	6
Total	33	384	434	313	120	229	189	1,702



Overhauling of GIS Bays:

The activity is planned for the bays based on the completion of the service life. The price estimates are taken based on last PO price. GIS Overhauling based on OEM recommendations. Following overhauling have been planned.

- 132KV GIS Bays at KDA (Make: BBC ; Installation year: 1982-83).
- 220KV KCR & Lalazar GIS Bays (Make: Siemens 8DP3 ; Installation year: 1996).

Material Category	FY24	FY25	FY26	FY27	FY28	FY29	FY30	Total
KDA Scheme 33 – 10 Bays -132KV	-	194 (3)	279 (4)	212 (3)	-	-	-	685 (10)
KCR – 7 Bays – 220KV	-	-	-	421 (4)	350 (3)	-	-	771 (7)
Overhauling of GIS bays	-	194	279	633	350	-	-	1,456

Relays and allied Equipment:

Various turnkey projects of relay installation and replacement.

- LD relays on 22 No 132KV Circuits (2024 – 2029)
- Old obsoleted ABB IEDs installed at HIS Grids (2024 – 2028)
- HIBB relay replacement at Lalazar, Queen’s Road, Jacobline, Gulshan, Clifton, Jauhar, North Karachi, Grids. (2025 – 2028)

Repair Maintenance of Transformers:

From 2018 - 2021 a total of 6 trafos were sent for overhauling. Each region of GSMP has kept the contingency of PTR repair in each year.

Power Transformer:

- Power Trafo. are planned for the replacement in the network with the following details. The useful life of Power trafo is of 30 Years.

Grid Name	Consumption Period	PKR in Mn	Commissioning Date
Azizabad*	FY 27	227	2010*
Balouch Colony	FY 26	88	1988
Balouch Colony	FY 27	88	1989
Gizri	FY 25	90	1989
North Karachi	FY 28	97	1987
North Nazimabad	FY 27	92	1986
Orangi Town	FY 25	85	1996
Pipri East	FY 26	89	1980
S.I.T.E	FY 29	90	1986
Total		946	

* Azizabad: Replacement of the old 40 MVA PTR with 50/67 MVA PTR.

FY	Grid Name	FY 24 – 30 Rs Mn	FY	Grid Name	FY 24 – 30 Rs Mn
FY 24	K.Town	323	FY 28	Jacobline	514
	Malir			Clifton	
	SITE			Defence	
	Old Landhi			Civic centre	
	Dhabeji			Orangi	
	Queens Road			CAA	
FY 25	West Wharf	352	FY 29	Liaquatabad	547
	Pipri East			KCR	
	Federal B			Lyari	
	Hub			Garden	
	Gulshan 132kV			KEPZ Grid	
	Valika			BOC Grid	
FY 26	Vinder	318	FY 30	RECP	499
	Nazimabad			ICI	
	Bela			Elander Road	
	Uthal			Johar	
	Gizri			Lalazar	
FY 27	Baldia	374	FY 30	Qayyumabad	499
	Airport 1			Haroonabad	
	Pipri West			Korangi East Grid	
	North Khi				
	Baloch		Total		2,927
	KDA				

1. The project was envisaged in 2020 and initial scope with cost estimate was included in mid-term review of MYT 2017-23 in March 2020.
2. An independent consultant was appointed in Feb 2021 to review and finalize the design, scope of works and costing.
3. Based on consultant's study, following major scope changes were identified:
 - a) Increase in quantities of 132kV GIS bays
 - b) Addition of 2km 132kV underground circuit due to population near Vinder Grid station
 - c) Change in conductor type from Hechura to Greely due to loading requirement.
 - d) Change in quantity and types of Towers and Poles along with civil/allied works due to conductor size
 - e) Increase in ROW amount as previously it was envisaged that Govt. of Balochistan will provide corridor laying of Transmission Line.
 - f) Moreover, earlier estimates were prepared based on old projects which were awarded in pre-COVID period. However, prices are significantly increased in post-COVID period.

S. No	Site	Quantity	Unit	Fiscal Year	Amount PKR in Mn	Reasoning
Current Limiting Reactor Addition to Limit SC-Level						
1	NPQ/PIPRI CKT 1 & 2	1	EA	2025	1,337	For controlling/ managing the increase of short circuit level at existing grids.
132kV Bays Replacement						
2	Landhi	1	EA	2028	359	One PTR Bay to shift the PTR from old Landhi to New Landhi after decommissioning of old Landhi. Existing Landhi Grid Age would be 64 years (Commissioning year: 1965)
3	Dhabeji	2	EA	2029	710	Two PTR Bays to shift existing two PTRs from old Dhabeji to New Dhabeji Existing Dhabeji Grid Age would be 59 years (Commissioning year: 1968)
4	Fedral A/B	4	EA	2030	1,421	Two PTR Bays to be added keeping in view the additional power transformers required for load growth. (Loading Profile In 2030: 83%) Two Line Bays are required for proper LILO connection of the Federal A Grid which is at present in T-Off arrangement.
		7			2,490	
ATRs Replacement						
5	Baldia	1	EA	2029	777	Commissioning Date 1985. Age 44 years
6	Pipri West	1	EA	2030	777	Commissioning Date 1983. Age 47 years
	Spare ATR	1	EA	2024	782	
		3			2,336	
Replacement of OFC Cable (UG)						
7	Defence - Gizri	4.69	KM	2028	1,273	Length 4.685 km Existing Cable type 800 mm2 Year of commissioning 1995 May be replaced with 1200 sqmm XLPE Cable Circuit.
8	Defence - Korangi West	4.74	KM	2028	1,289	Length 4.744 km Existing Cable type 800 mm2 Year of commissioning 1996 May be replaced with 1200 sqmm XLPE Cable Circuit.
9	Gulshan - Civic	2.70	KM	2029	725	Length 2.697 km Existing Cable type 800 mm2 Year of commissioning 1992 May be replaced with 1200 sqmm XLPE Cable Circuit.
10	CAA - Landhi	1.60	KM	2030	430	Length 1.6 km Existing Cable type 800 mm2 Year of commissioning 1972 May be replaced with 1200 sqmm XLPE Cable Circuit.
11	CAA - Malir	4.37	KM	2030	1,174	Length 2.873+1.584 km Existing Cable type 800 mm2 Year of commissioning 1997 + 1991 May be replaced with 1200 sqmm XLPE Cable Circuit.
12	Jacob - Garden	1.53	KM	2030	410	Length 1.525 km Existing Cable type 800 mm2 Year of commissioning 1996 May be replaced with 1200 sqmm XLPE Cable Circuit.
		19.62			5,301	

Classification of any rehabilitation works is being done in accordance with the applicable accounting standards (IFRS) and capitalization threshold limits.

Major activities which are classified into O&M include cable oil replacement, GIS Gas replacement, hiring lifting & transportation services, daily wages to hired labor, fire alarm services and maintenance, uniforms and safety PPEs, cleaning of line insulators, local consumable supplies and services for routine maintenance and breakdowns, road cutting charges for fault detection and rectification, annual licenses for SCADA, etc.

Major activities which are classified into Capex include replacement of 11kV Switchgears, power transformers, auto transformers, relays equipment, current and voltage transformers, control panels, breakers, capacitors, conductors, insulators, damper spacers, overhauling of GIS bays, RTV coating, civil works, etc.

Extract from KE PPA with IPPs

“Metering System” — All meters and metering devices (including, if applicable, any remote terminal units and electronic data-recording and telemetry system) ***to be procured by the Seller on behalf of the Purchaser or directly by the Purchaser*** (subject to Section 7.1(b)), and thereafter installed and tested by the Seller and transferred to the Purchaser, and thereafter owned and maintained by the Purchaser and used to measure the Net Delivered Energy.

“Back-Up Metering System” — All meters and metering devices (including any remote terminal units and an electronic data recording system) ***installed by the Seller*** and thereafter owned and maintained by the Seller as back-up to the Metering System.

Extract from NTDC PPA with IPPs

“Metering System” — All meters and metering devices (including any remote terminal units and an electronic data recording system) ***to be procured by Power Purchaser***, and thereafter installed and tested by the Company and transferred to the Power Purchaser, and thereafter owned and maintained by the Power Purchaser and used to measure the Net Electrical Output from the Complex.

“Back-Up Metering System” — All meters and metering devices (including any remote terminal units and an electronic data recording system) ***installed by the Company*** and thereafter owned and maintained by the Company as back-up to the Metering System.



	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30
Planned Additions of Capacity (in MW)							
- Thermal Additions			330 ¹	330		330	
- Renewable Additions		500		200	100	282 ¹	100
	-	500	330	530	100	612	100

¹ No cost has been assumed for SEL and Uzghor as it will be procured through wheeling arrangement

KE's proposed investment of PKR 484 Billion does not include expenditure expected for the consumer funded grids, which will be carried out based on consumer's request with payment. Accordingly, KE has excluded them from the investment plan and the Regulatory Asset Base. Therefore, capex relating to these investments & consumers inflows falling in Deferred revenue and amortization of deferred revenue on these assets, shall not be made part of RAB and other income for the Tariff.

Further, with respect to inflows from consumers in the form of Grid Sharing charges for their dedicated connection as per Grid Sharing Policy, the same shall be passed through in tariff at actual and shall be actualized annually for calculation of RAB in the Annual Investment Update.

KE will annually report the breakup of addition to deferred revenue each year in consumer funding received on Grid Sharing charges and received for dedicated Grids as explained in para above.

Annual Investment Update:

For the below sample illustration, it is assumed that **Average USD Exchange Rate** has increased to PKR 259 per USD, **Average US CPI** has increased to 290, **Average Pak CPI** has increased to 165 by the end of 2024:

S.No.	Description	Legend	Values	FY 2024
				(Rs. In Mn)
1	Foreign Proportion in Overall CAPEX (FY24)	a	90%	41,965
2	Local Proportion in Overall CAPEX (FY24)	b	10%	4,663
3	Original Allowed Capex for FY24	c	100%	46,628
4	Reference Exchange Rate	d	206	
5	Revised Exchange Rate	e	259	
6	Indexation for Exchange Rate (%)	$f = e / d * 100$	125.73%	
7	Reference US CPI	g	282.03	
8	Revised US CPI	h	290	
9	Indexation for US CPI (%)	$i = h / g * 100$	102.83%	
10	Reference Pak CPI	j	158.48	
11	Revised Pak CPI	k	165	
12	Indexation for Pak CPI (%)	$l = k / j * 100$	104.11%	
13	Indexed Allowed Capex for FY24	$m = (a * f * i) + (b * l)$		59,108
14	Actual CAPEX for FY24	n		56,449
15	(Over) / Under Spent CAPEX for FY24	$o = m - n$		2,659

*If Actual CAPEX incurred by KE is lower than the Indexed Allowed CAPEX for FY24 then the tariff will be based on actual CAPEX incurred and the remaining amount is requested to be carried forward to FY25, whereas in case of higher CAPEX, the same will be disallowed by NEPRA.

A nighttime photograph of a cityscape. In the background, a large port area is visible with several large gantry cranes and industrial buildings, all illuminated by bright lights. A body of water is in front of the port. In the middle ground, a tall, dark building with a clock tower is prominent, featuring a glowing blue circular logo. The foreground shows a busy street with light trails from cars, a large church with a clock tower, and various urban buildings. The sky is a deep blue, indicating twilight.

Back – up (Distribution)

SAIFI and SAIDI in Current MYT

Description	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23
Distribution - SAIFI (Faults)	32.80	29.00	27.60	28.10	27.40	29.50
Distribution - SAIDI (Faults) – hours	41.30	49.20	44.30	42.70	34.60	37.30

Proposed targets for SAIFI & SAIDI in the upcoming MYT

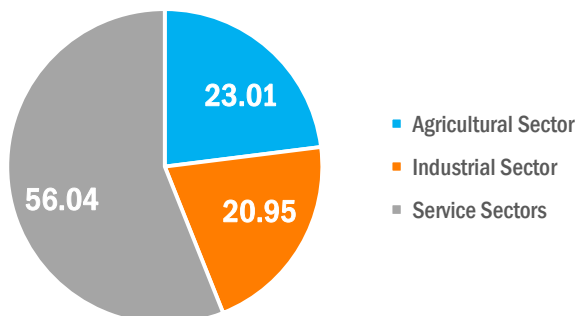
Description	Target Measure	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30
SAIFI – Planned	Numbers	14	14	16	16	16	16	16	16
SAIFI - Unplanned	Numbers	102	108	105	99	89	76	68	62
SAIDI – Planned	Hours	6	7	11	11	11	11	11	11
SAIDI – Unplanned	Hours	99	105	102	97	88	76	69	64

CAGR	GDP	Demand	Elasticity
FY 06-13 (7 yrs)	3.5%	2.9%	0.82
FY 06-21 (15 yrs)	3.6%	2.6%	0.73
FY 12-21 (10 yrs)	3.7%	2.5%	0.67
FY 15-22 (7 yrs)	3.4%	2.4%	0.67

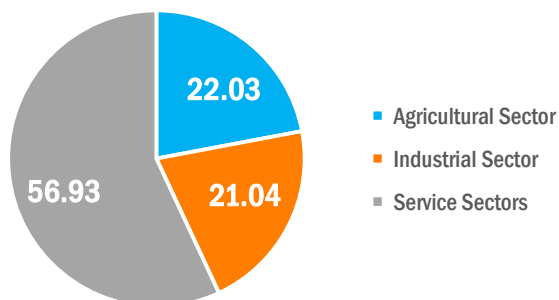
- Based on historic trend, Pakistan has not experienced a consistent GDP growth of 5% or above except for FY17 and FY18 in last 10 years. Moreover, Current GDP projections have been subject to frequent changes.
- Based on CAGR of GDP growths and updated Elasticity factor of 0.67, the growth demand is taken at 2.4% based on last 7 years average demand growth.

GDP Composition

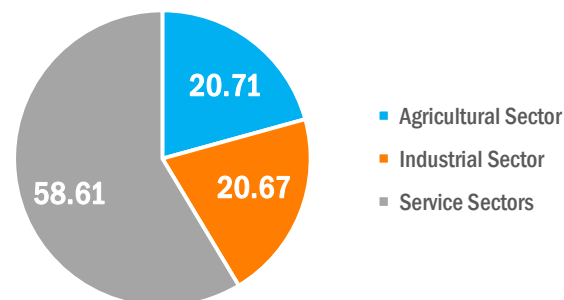
FY06



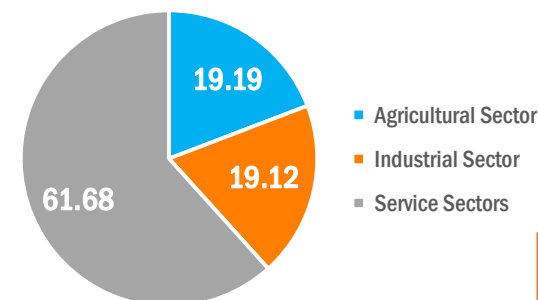
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FY15

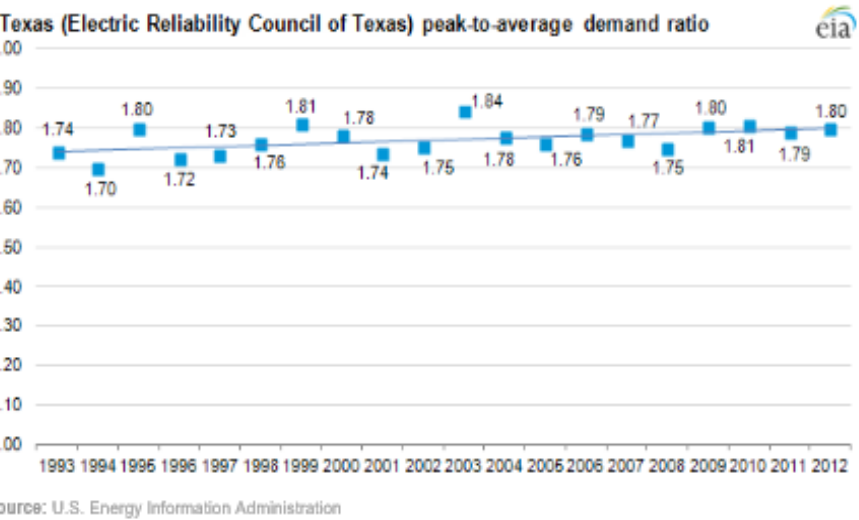
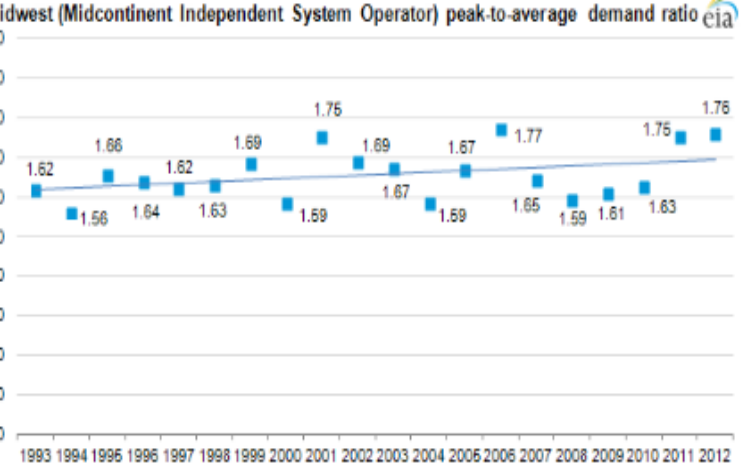
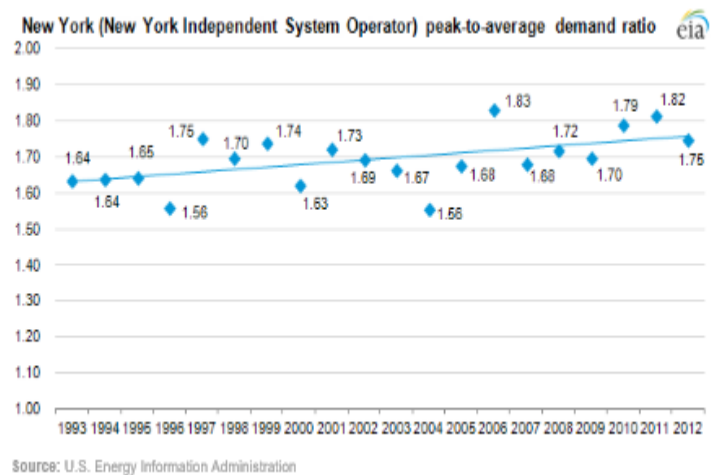
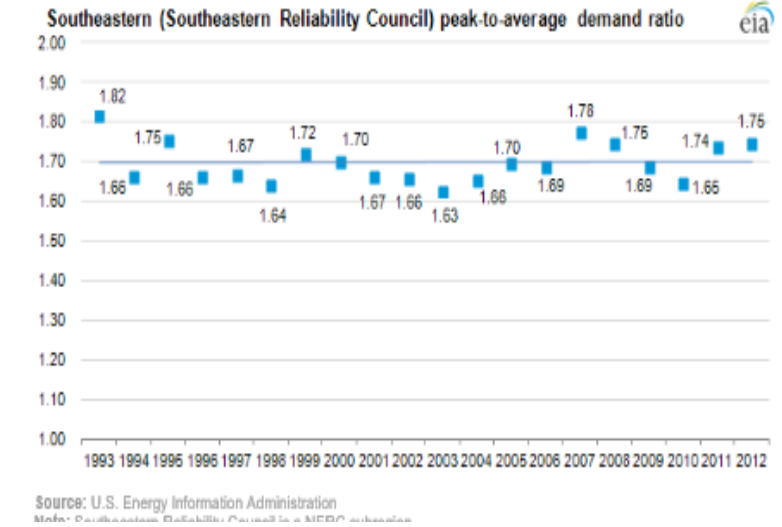
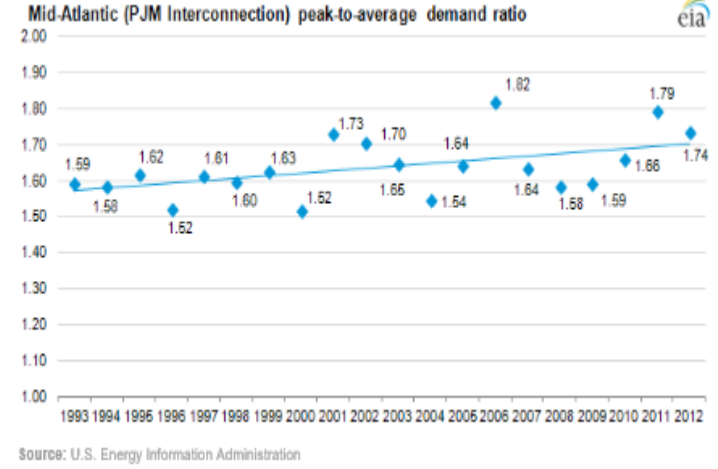
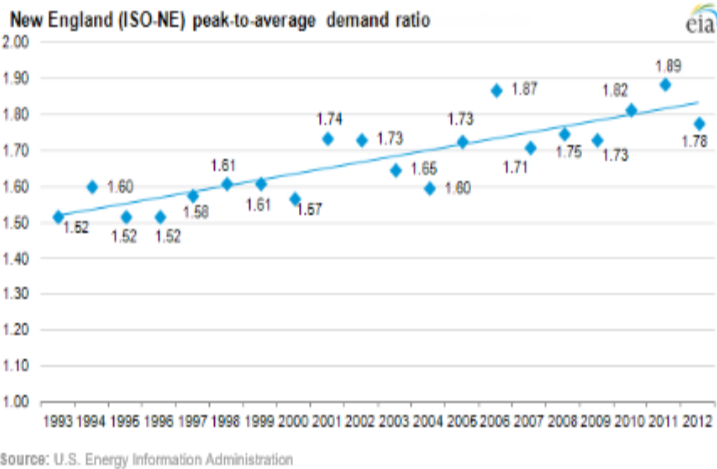


FY21





Utilities in USA with Peak Average Demand Ratio



Methodology



Captive and Industrial connections

- Consumer List / NC Applications on hand (firmed-up load)



Ind/Non-Industry Load Projection

- IBC assessment on area-wise growth potential considering ground realities



Applied Load Factors

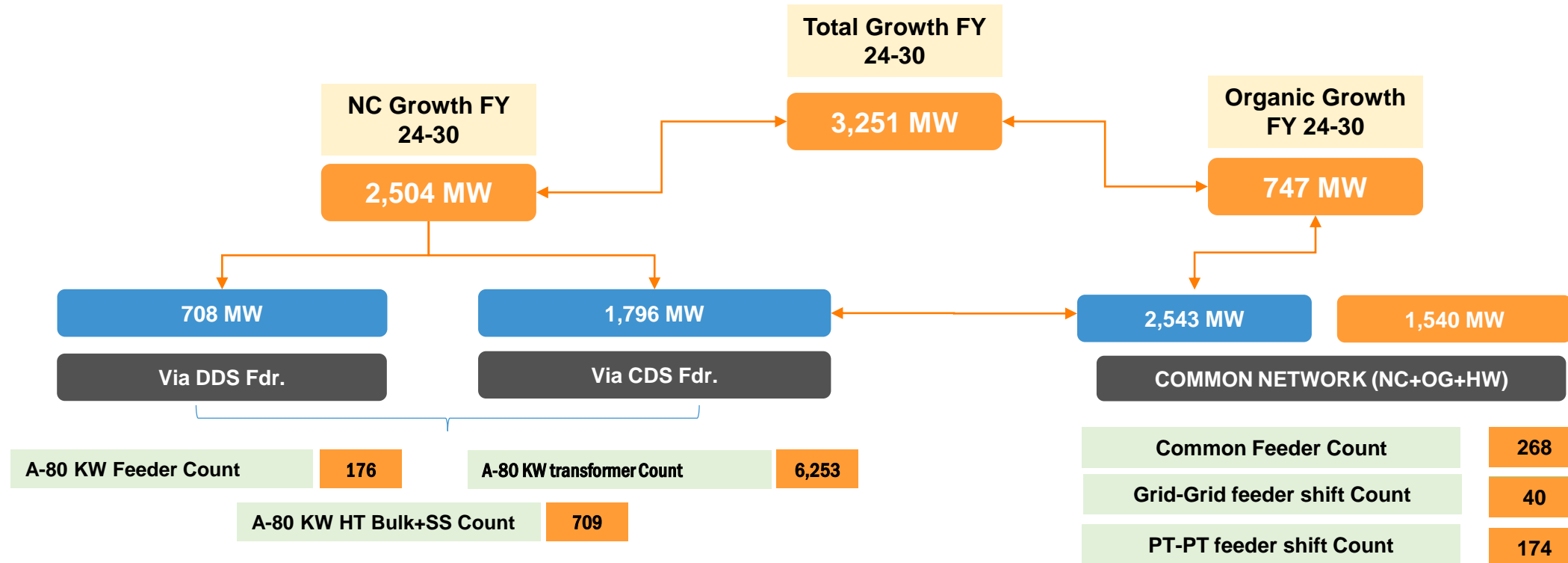
- To determine Grid Capacity Utilization

Grid categorization

Matured | Projected Growth: 1.5%
 Diminishing | Projected Growth: 0%
 Growing | Projected Growth: 9.4%
 Exception | Projected Growth: 2.3%

Load Factor & Co-incidence Factor

Industry Consumers : 0.6
 Non-industry Consumers : 0.2
 Captive Consumers: 0.6



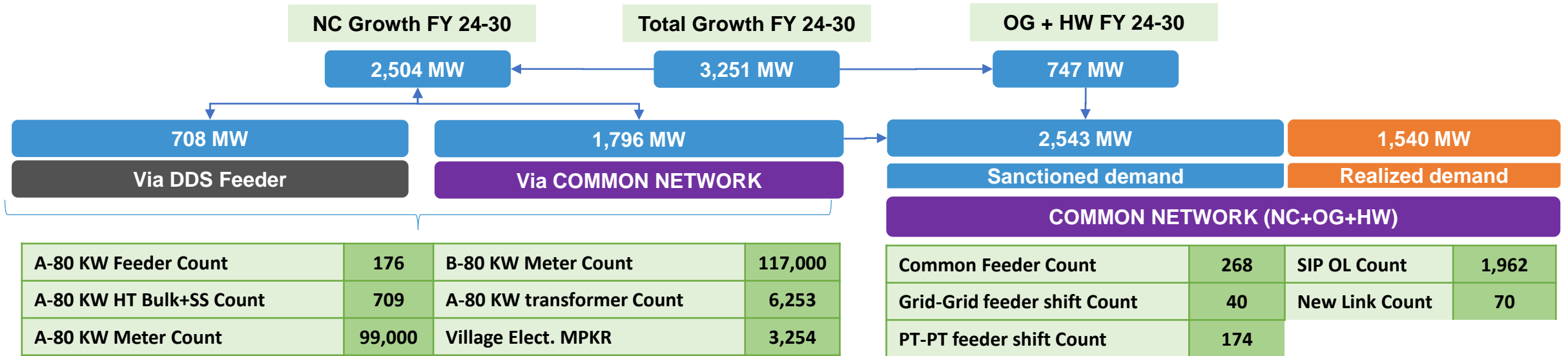


Energy Demand | Peak Demand | Sent Out (FY17 – FY 23)

		FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	CAGR
Gross Demand (Gwh)	A	18,648	18,749	19,526	19,365	18,868	20,621	21,199	21,490	2.0%
Average Demand (MW)	B = A/8760	2,123	2,140	2,229	2,211	2,148	2,354	2,420	2,453	2.1%
Peak Demand	C	3,195	3,270	3,527	3,530	3,558	3,604	3,670	4,010	3.3%
Load Shed % Demand	D	11.3%	11.6%	10.8%	8.6%	5.8%	5.5%	6.5%	12.0%	0.4%
Load Shed (GWh)	G = D * A	2,103	2,169	2,109	1,665	1,087	1,134	1,381	2,554	3.0%
Sent Out (GWh)	H = A - G	16,545	16,580	17,417	17,697	17,781	19,487	19,803	18,807	1.8%
T&D Loss		22.2%	21.7%	20.4%	19.1%	19.7%	17.5%	15.4%	14.7%	7.5%
KE Recovery Ratio		88.5%	91.0%	91.0%	92.6%	92.1%	94.9%	96.7%	94.5%	6.0%

Total Demand Outlook / 3,251 MW from FY-24-30

Comprising of Industry, Captive, Non-Industry, Heat wave & Organic growth



Growth Rates

New Connection : 2.4%

Organic Growth : 2.0%

Heat Wave : 4.1%

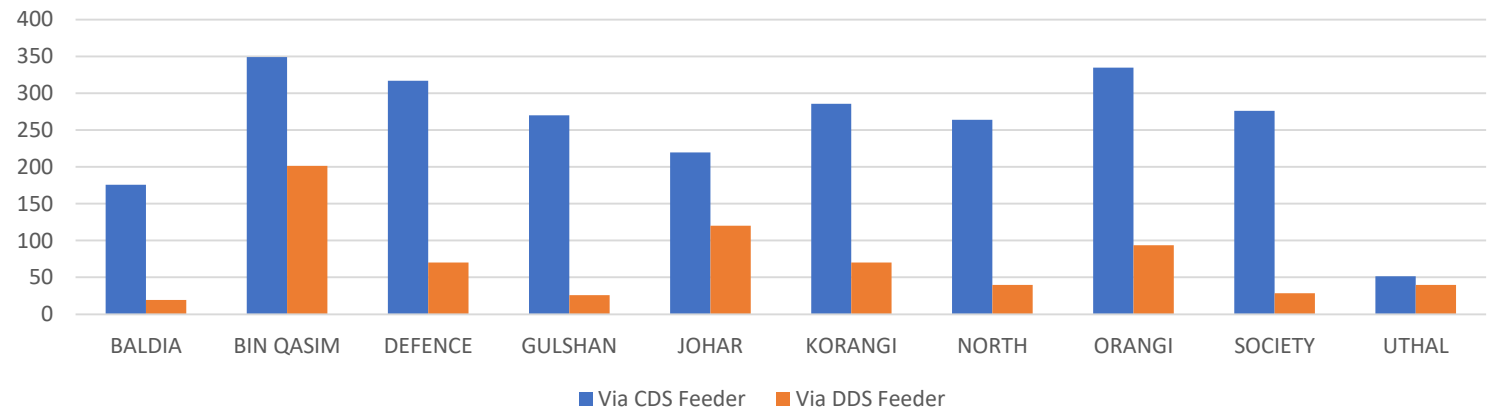
Load Factor & Co-incidence Factor

Industry Consumers : 0.6

Non-industry Consumers : 0.2

Captive Consumers: 0.6

Cluster wise Growth Break-up of 3,251 MW



- Existing load shed regime will continue throughout till FY30 - (0,0,6,10,10)
- Overall loss reduction in KE and specific Loss Reduction projects will result in feeder category shift
- The reduction in LS will subsequently increase unit sent-out

Feeder category shift - LR

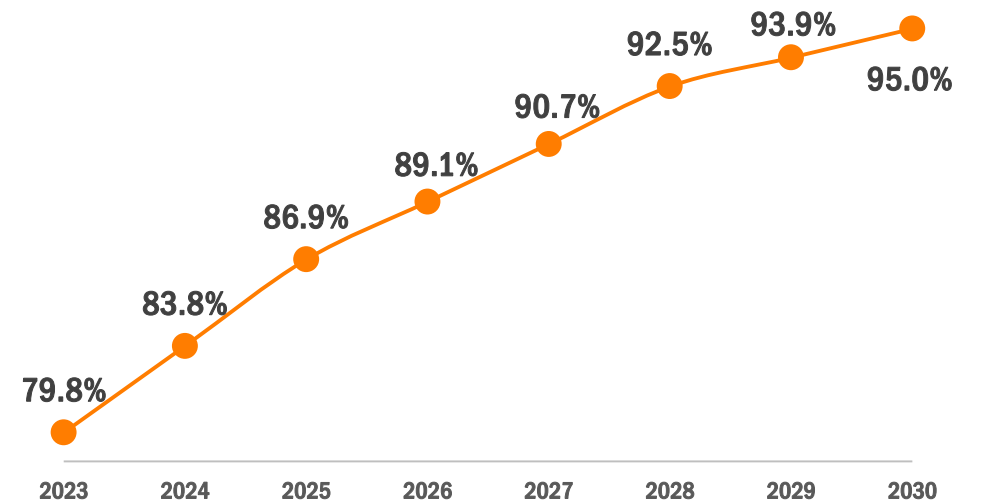
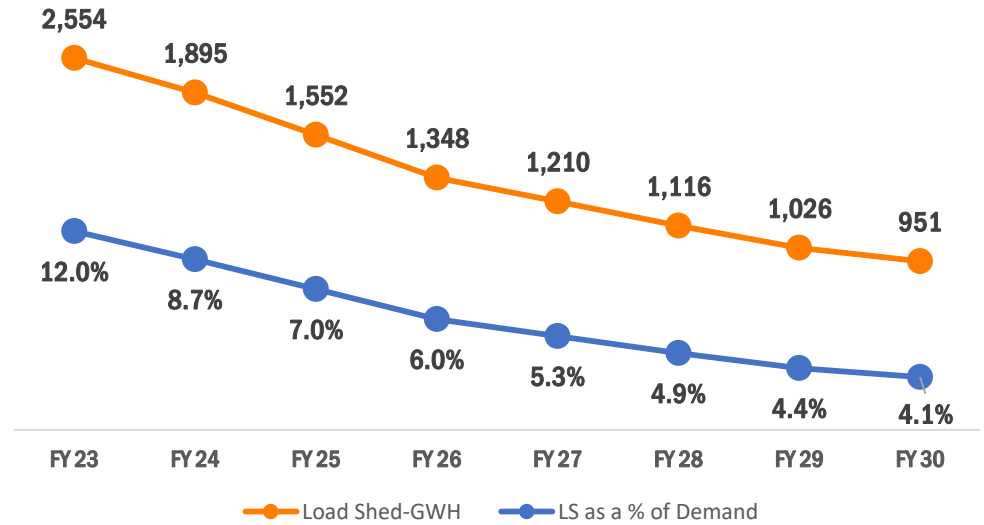
Unit: Feeder

	FY'23	FY'24	FY'25	FY'26	FY'27	FY'28	FY'29	FY'30
ML to LL	72	78	61	41	29	35	27	24
HL to ML	138	14	41	17	18	20	15	13
VHL to HL	81	40	25	9	8	6	7	3

Feeder position

Unit: Feeder

	FY'23	FY'24	FY'25	FY'26	FY'27	FY'28	FY'29	FY'30
LL	1234	1345	1439	1528	1615	1721	1829	1917
ML	213	149	129	105	94	79	67	56
HL	84	110	94	86	76	62	54	44
VHL	124	84	59	50	42	36	29	26
Industrial	429	432	435	443	452	464	477	485
Total	2,084	2,120	2,156	2,212	2,279	2,362	2,456	2,528
Exemption	79.8%	83.8%	86.9%	89.1%	90.7%	92.5%	93.9%	95.0%



Load Shed Plan FY 24 - 30

- Existing load shed regime will continue throughout till FY30 – (0,0,6,10,10)
- Overall loss reduction in KE and specific Loss Reduction projects will result in feeder category shift
- The reduction in LS will subsequently increase unit sent-out

Planned Feeder category shift – LR *

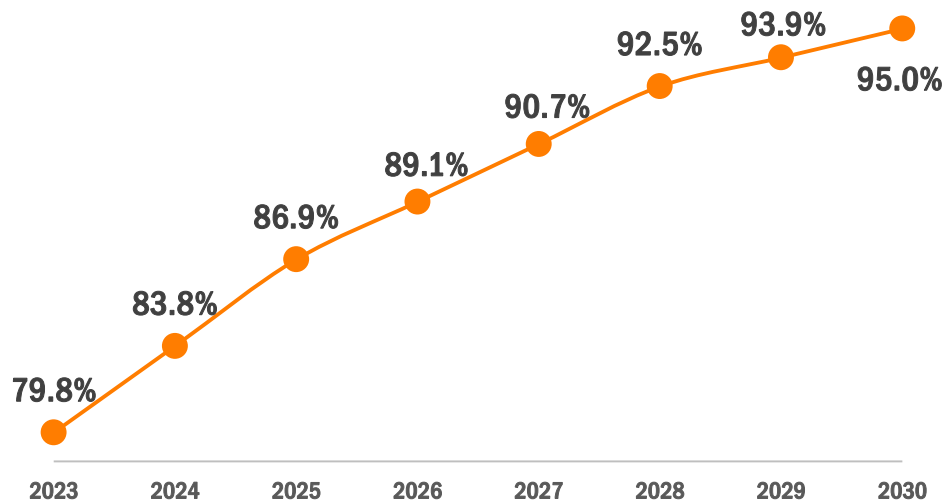
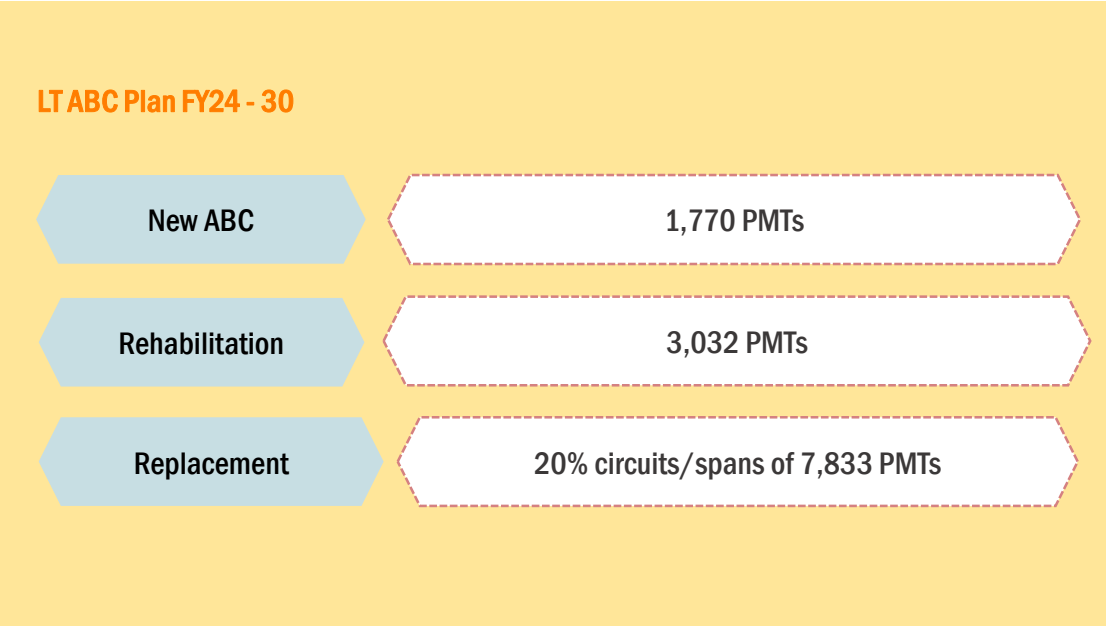
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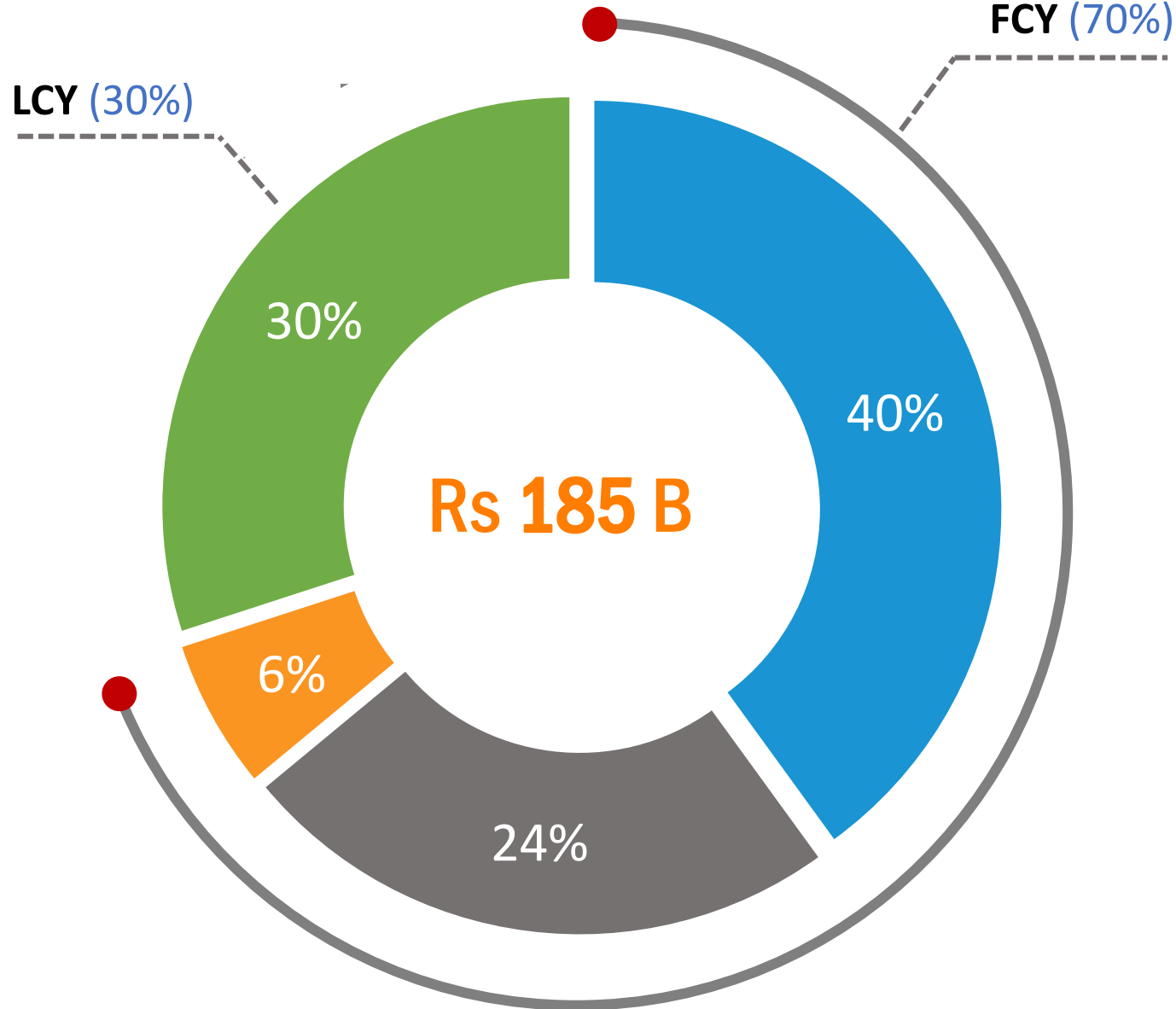
Planned Feeder position *

Unit: Feeder

	FY'23	FY'24	FY'25	FY'26	FY'27	FY'28	FY'29	FY'30
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Exemption	79.8%	83.8%	86.9%	89.1%	90.7%	92.5%	93.9%	95.0%



* Subject to timely approval of investments plan and stable economic environment including but not limited to timely imports and consistent growth in disposable income.



----- Major materials -----

Indirect Imports

- HT Aluminum Cables
- LT Aluminum Cables
- Single phase meters
- Three phase meters
- Smart meters
- Transformers
- Conductors
- HT Poles
- LT Poles
- Vacuum Circuit Breakers

Direct + Indirect Imports

- Switchgears
- Busbar
- Other Cables
- Other conductors
- GI Clamps
- Lattice Poles
- Boxes
- Fuses
- Connectors

Direct Imports

- ADMS (GIS)
- MDMS
- System upgrades
- HHU devices

Local

- Distribution Services
- Civil works
- LT Spun Poles
- Brackets, rods

Extracts from National Electric Power Policy

As per para 5.3.1. of National Electric Power Policy:

“The distribution segment is the interface of the entire sector with the consumers of electricity. The financial viability of the entire sector is premised on the efficient operations of the distribution system and timely recoveries from consumers. The existing operations have resulted in non - recovery of costs determined by the Regulator (in addition to operational costs over and above the revenue requirement determined by the Regulator), leading to accumulation of circular debt, thus threatening the sustainability of the entire sector.”

Further, as per para 5.3.2:

“So as to ensure and put in place efficient tariff structures for sufficient liquidity in the power market, the target for losses and collections shall be revisited by the Regulator, in order to align the same with the current market realities. These targets shall be reflected in the determinations of the Regulator. Moreover, timely recovery of bad debt that is prudent shall be allowed by the Regulator with the incorporation of facilitative provisions in the regulatory framework as per industry practices and procedures.”