SECTOR STUDY . FEBUARY 2024

Together. Creating Value.

DISTRIBUTION | ELECTRICITY

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Distribution | Electricity

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Distribution | Electricity

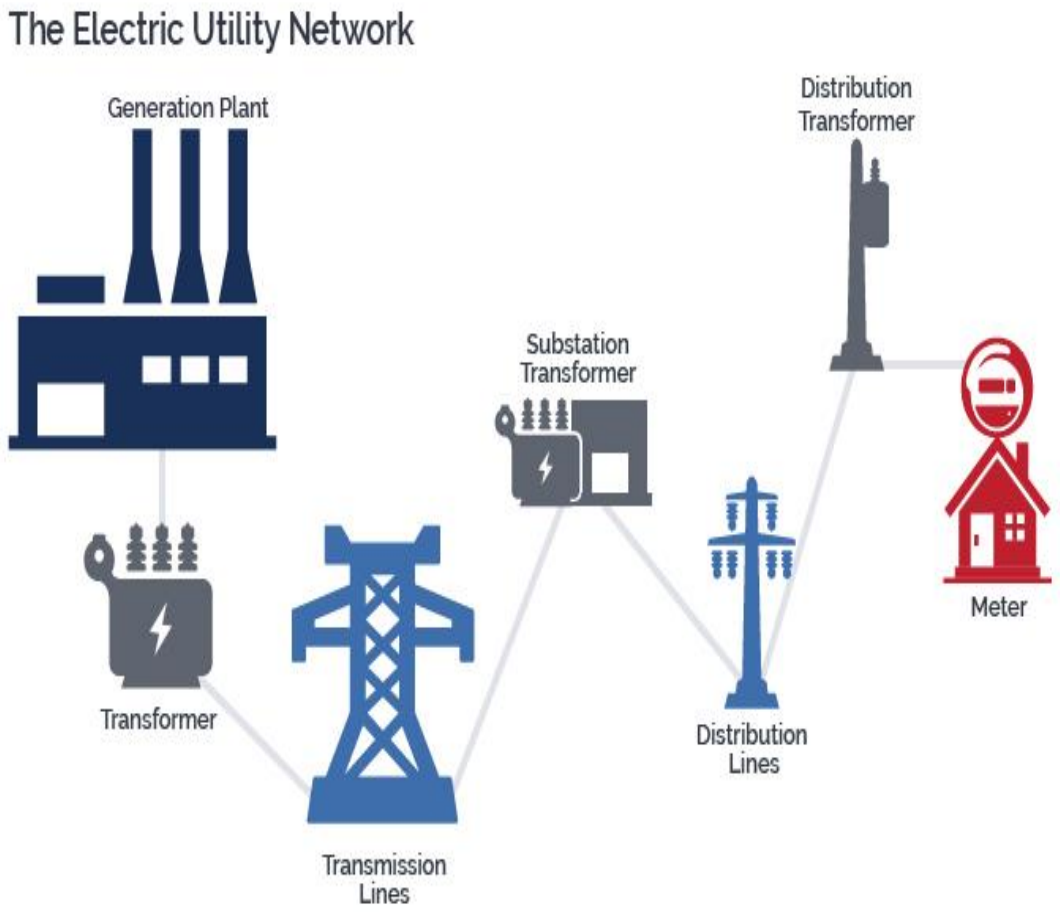
Power | An Overview

- Based on derivation, energy sources can be bifurcated into Primary and Secondary sources. Electricity, a subset of Power, is a secondary energy source, meaning thereby that it is produced through conversion of other energy sources such as coal, natural gas, oil, nuclear etc. These are known as primary energy sources. Primary energy sources are renewable or non-renewable energy.

- Since the 1660s, scientists and inventors, including the likes of Benjamin Franklin, Thomas Edison and Nikola Tesla, have contributed significantly in shaping up our understanding and use of electricity.

- In the late 1800s, Nikola Tesla pioneered the generation, transmission, and use of alternating current (AC) electricity, which reduced the cost of transmitting electricity over long distances.

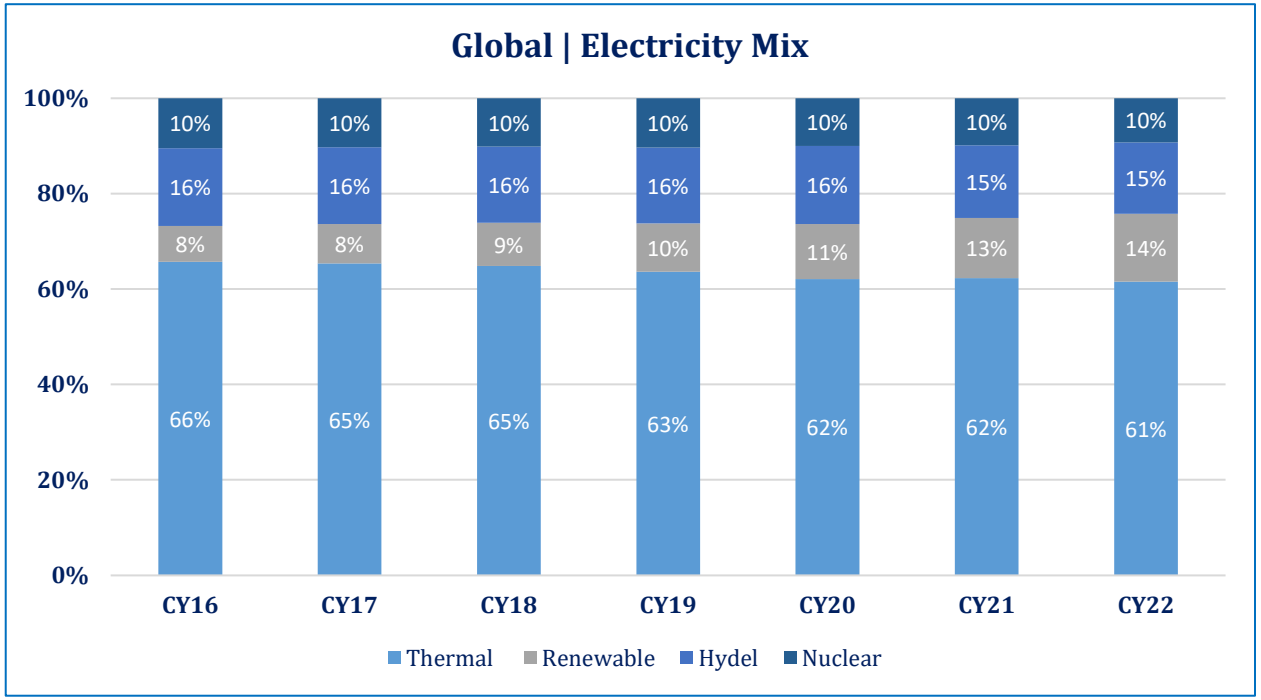
- Electricity is generated at power plants and moves through a complex system, generally called the grid, of electricity substations, transformers, and power lines that connect electricity producers and consumers. This study shall focus on the **Electricity Distribution** system.

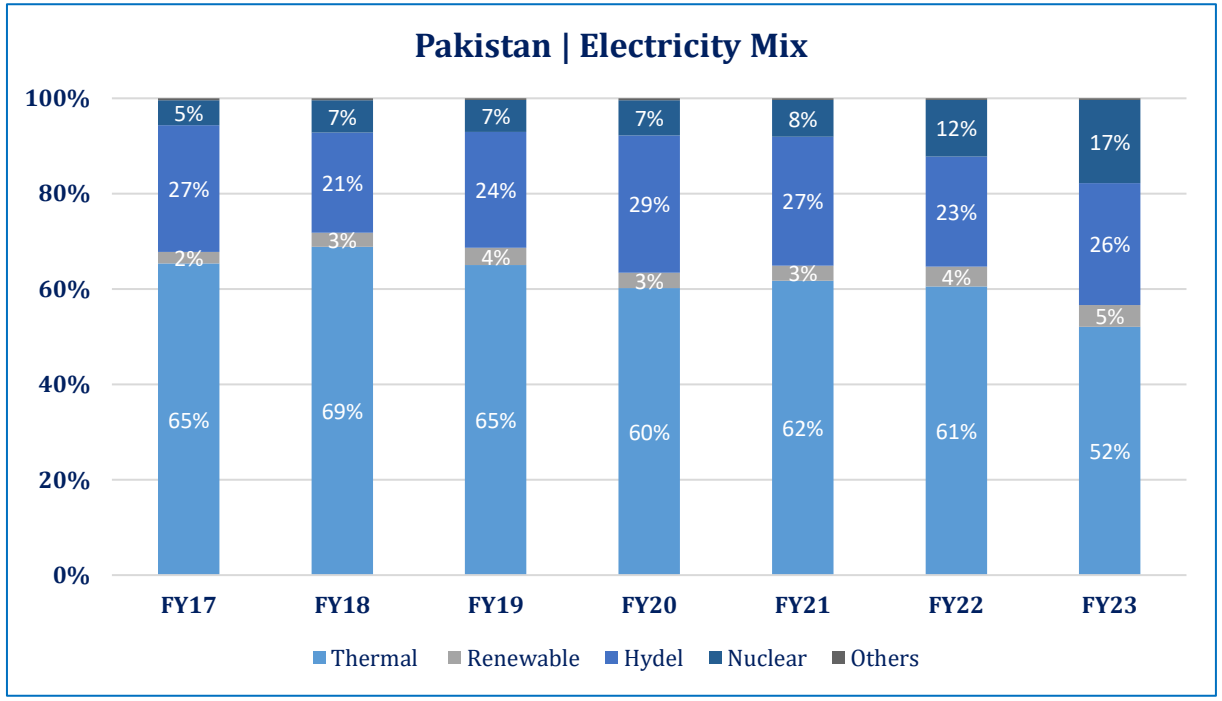


Source: EIA

Distribution | Electricity

Electricity Mix | Global vs. Pakistan





- Global electricity generation mix remains dominated by thermal energy sources (i.e., Coal, Oil & Gas, at ~61% of generation), whereas renewables (i.e., solar & wind) cumulatively comprised ~14.0% share during the same period. Hydel remained the largest clean electricity source at ~15.0% and nuclear the second largest clean electricity source contributing just over ~9.1%.

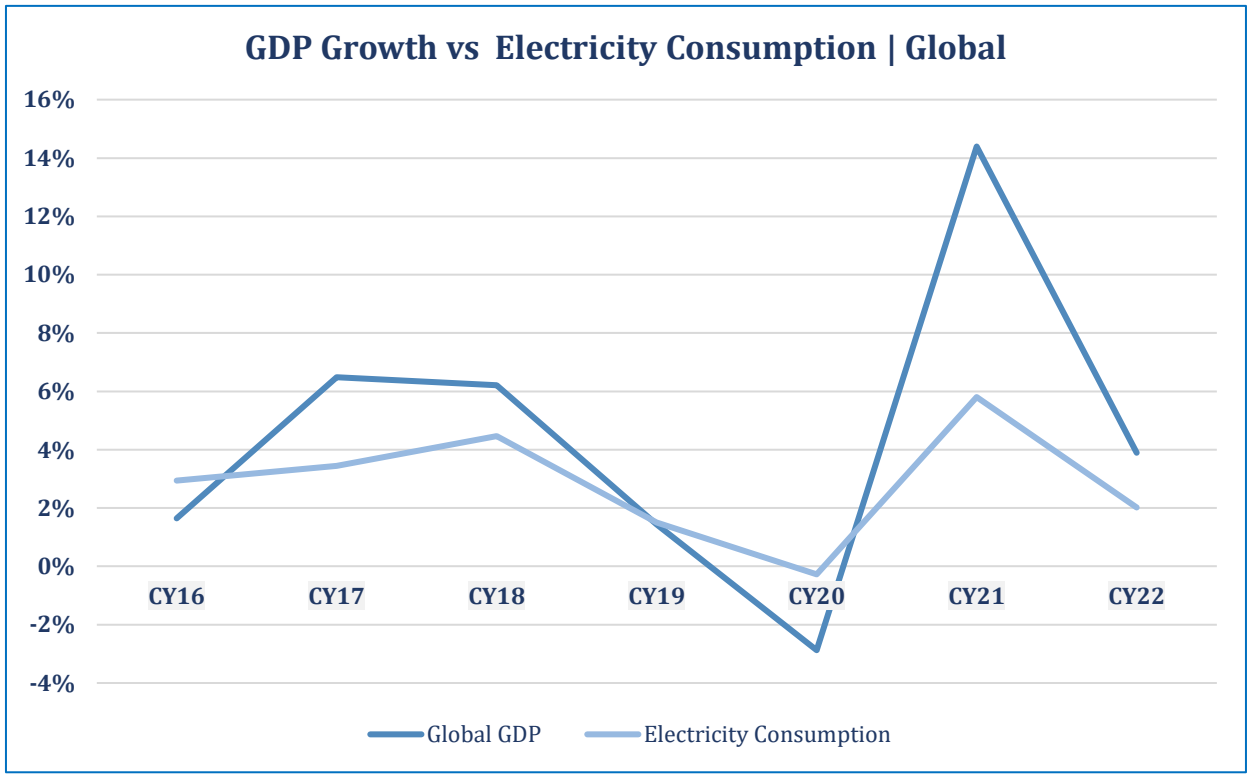
- In the case of Pakistan, share of thermal as a dominant source of electricity generation has declined over the past few years towards nuclear (~5.0% in FY17, ~17.0% in FY23). On the other hand, against total electricity generation of ~138,028GWh, the share of hydel and renewable cumulatively recorded at ~31.0% during FY23 (SPLY: ~27.0%).

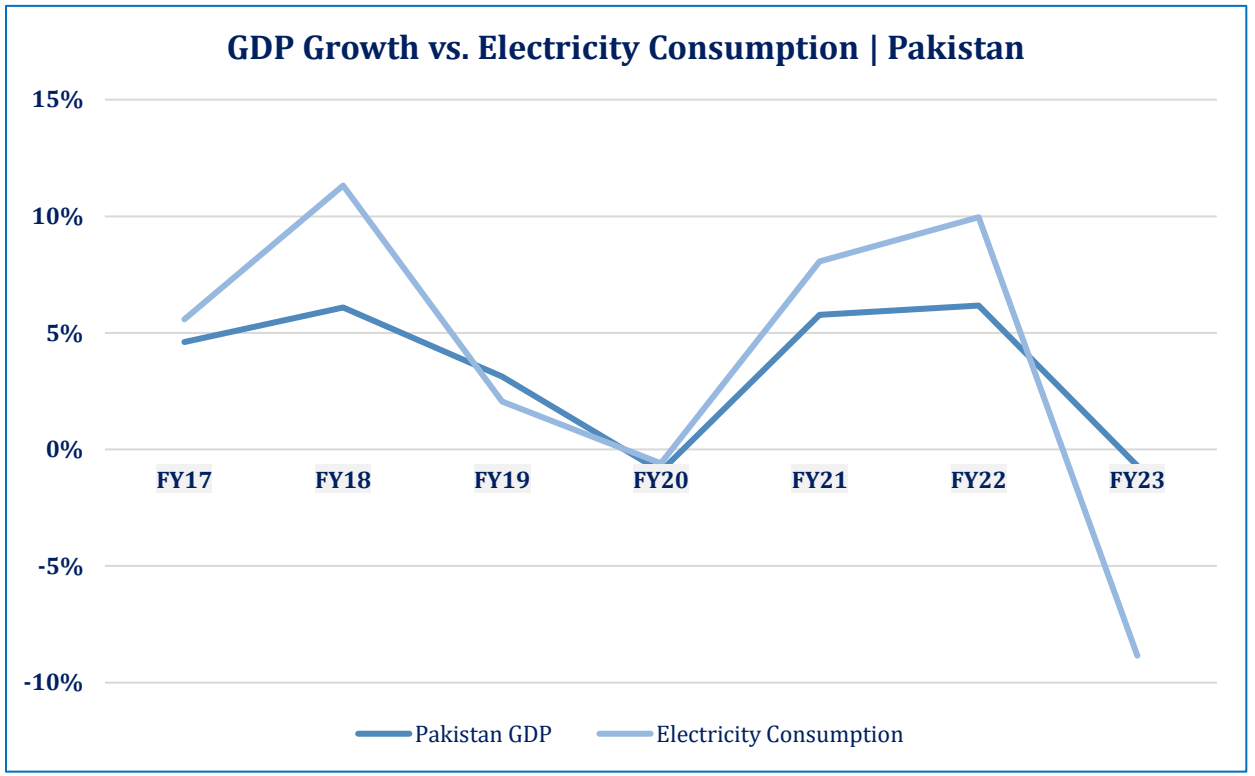
***Note**: "Others" in Pakistan's Electricity mix includes imported electricity from Iran.*

Source: Ember, NEPRA

Distribution | Electricity

Electricity Consumption vs. GDP Growth





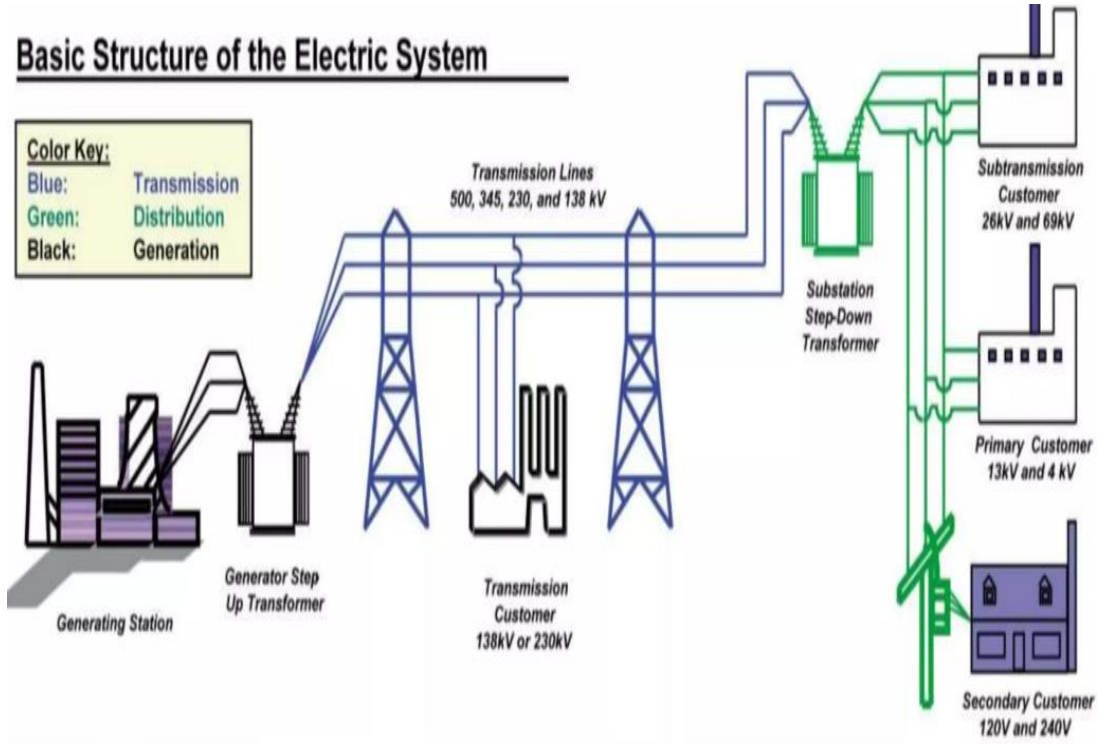
- Global power consumption in CY22 was recorded at ~25,530TWh, a slower increase of ~2% YoY (SPLY: ~6%). Meanwhile, global GDP growth in CY22 slowed down to ~4% (SPLY: ~14%). Pakistan's electricity consumption stood at ~121,852GWh in FY23, marking a YoY decline of ~10%. In line with that, Pakistan's real GDP contracted by ~0.17% YoY, recording at PKR~79.7tln.
- At a global level, this recorded at ~0.98 during CY16-22 indicating a perfect positive correlation between global GDP and electricity consumption.

Source: NEPRA, EMBER, WB, PACRA Database

Distribution | Electricity

Transmission | An Overview

- Electricity Transmission is the vital link between electricity generation and distribution. Transmission lines carry electricity at high voltages over long distances from power plants to distribution companies, which bring electricity to homes and workplaces.
- As per NEPRA Act, there can be only one National Grid Company (NGC) at a particular time. National Transmission & Dispatch Company Limited (NTDC) is acting as an NGC under license issued by NEPRA.
- On Provincial Scale, the NEPRA (Amendment) Act, 2018, provides Provincial Governments the right to establish one Provincial Grid Company (PGC) in each province.
- Under-utilization of efficient power plants, over-loading of transmission lines, insufficient transformation capacity of power transformers, and outages of transmission lines, etc. have been the main constraints for transmission & distribution (T&D) networks.
- Transmission losses as a result of electricity received (~132,028GWh) and delivered (~128,811GWh) were ~2.4% during FY23. The financial cost of transmission losses stood at PKR~30,794mln in FY23.



***Note**: For the purpose of this study, 1GWh= 1,000 MWh*

Source: NEPRA, PACRA Database

Distribution | Electricity

Transmission | Local Structure

- National Transmission & Dispatch Company (NTDC) was incorporated in Nov'98 and commenced commercial operation in Mar'99. It was organized to take over all the properties, rights and assets obligations and liabilities of 220KV and 500KV Grid Stations and Transmission Lines/Network owned by Pakistan Water and Power Development Authority (WAPDA).
- The entity was granted transmission license in Dec'02 by National Electric Power Regularity Authority (NEPRA) to engage in the exclusive transmission business for a term of thirty (30) years.
- KE is the only vertically-integrated power utility in Pakistan, which means the organization manages all three key areas – Generation, Transmission and Distribution – of producing and delivering energy to consumers.

NTDC | Transmission Network (FY23)

No. of Grid Stations	Grid Station Potential (kV)	Transformation Capacity (MVA)	Transmission Lines (km)	Transformers Installed at Grid Stations	
				500/220kV	220/132kV
19	500	34,100	8,825	47	38
50	220	66,230	11,633	-	141
69	-	**100,330**	**20,458**	**47**	**179**

KE | Transmission Network (FY23)

No. of Grid Stations	Grid Station Potential (kV)	Transformation Capacity (MVA)	Transmission Lines (km)	Transformers Installed at Grid Stations	
				220/132kV	132/11kV
11	220	4,580	364	13	-
69	132	7,707	838	-	177
80	-	**12,287**	**1,202**	**13**	**177**

Source: NEPRA

Distribution | Electricity

Transmission | NTDC & KE

NTDC Network			
Year	Generation Capability (MW)	Demand During Peak Hours (MW)	Surplus/(Deficit) MW
Actual			
FY19	24,565	25,627	(1,062)
FY20	27,780	26,252	1,528
FY21	27,819	28,253	(434)
FY22	27,748	24,564	3,184
FY23	30,574	23,679	6,895

Year	Planned Generation Capability (MW)	Projected Growth Rate (%)	Demand During Peak Hours (MW)	Surplus/ (Deficit) MWh
Projected				
FY24	33,953	15.3	27,302	6,651
FY25	38,854	8.7	29,675	9,179
FY26	40,595	5.2	31,227	9,368
FY27	41,865	4.9	32,753	9,112
FY28	43,180	5.1	34,438	8,742

KE Network			
Year	Generation Capability (MW)	Demand During Peak Hours (MW)	Surplus/(Deficit) MW
Actual			
FY19	3,008	3,527	(519)
FY20	3,196	3,530	(334)
FY21	3,202	3,604	(402)
FY22	3,383	3,670	(285)
FY23	3,409	3,654	(245)

Year	Planned Generation Capability (MW)	Projected Growth Rate (%)	Demand During Peak Hours (MW)	Surplus/ (Deficit) MWh
Projected				
FY24	3,678	4.10	3879	(201)
FY25	4,377	4.10	4,070	307
FY26	4,426	4.10	4,252	174
FY27	4,857	4.10	4,367	490
FY28	4.597	4.10	4,474	483

**'Generation capability' is the maximum generation capability of any day recorded during the year and 'Demand' is the maximum demand of any day recorded during the year.*

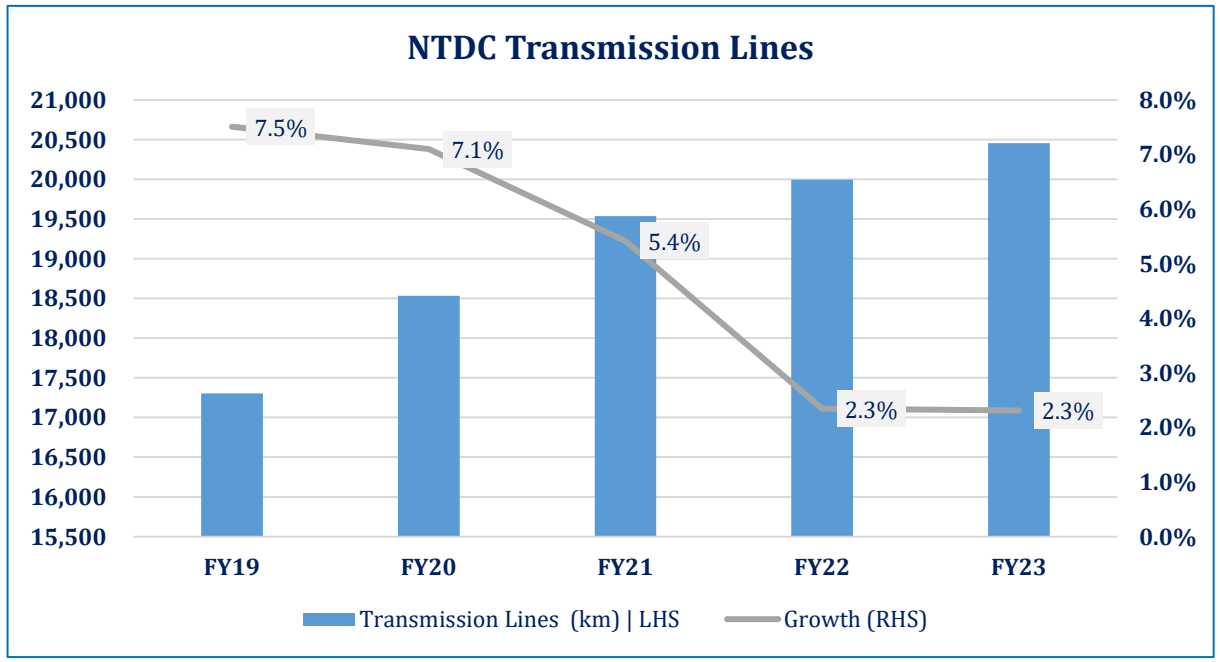
Source: NEPRA

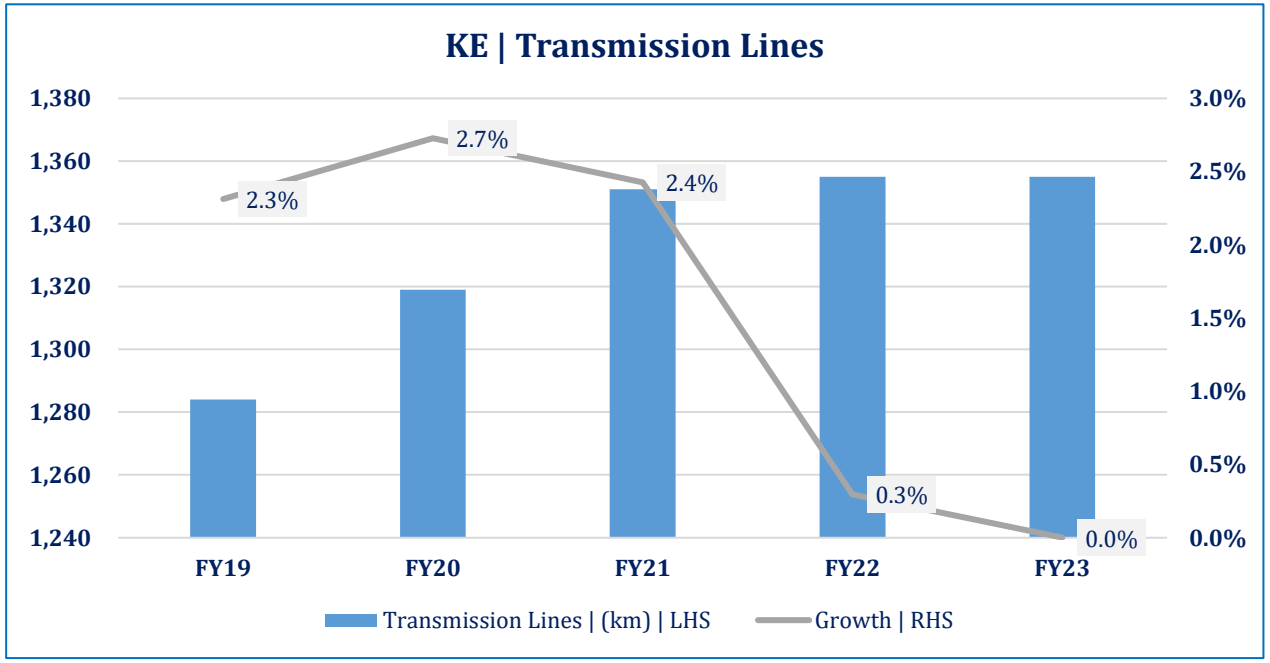
Distribution | Electricity

Transmission | Assets

Grid Stations (No.)	FY19	FY20	FY21	FY22	FY23
NTDC	62	62	62	69	69
KE	76	79	80	80	80
Total	**138**	**141**	**149**	**149**	**149**

Grid Station Capacity (MVA)	FY19	FY20	FY21	FY22	FY23
NTDC	54,010	87,800	88,600	96,220	100,330
KE	10,227	11,531	11,832	12,045	12,287
Total	**64,237**	**99,331**	**100,432**	**108,265**	**112,617**





***Note**: KE grid stations data pertains to 220/132kV grid potential.*

Source: NEPRA

Distribution | Electricity

Transmission | Losses

- Transmission Loss refers to the loss of electricity during movement from a powerplant or power station to different substations.
- Transmission refers to the movement of electricity at high voltage. Losses during transmission are generally lower than those during distribution which carries electricity at lower voltage and larger distances to the end consumers.
- During FY23, transmission losses in NTDC network of 500/220kV grid power were recorded at ~2.4% as compared to ~2.6% in FY22.
- Distribution losses reported are greater than transmission losses i.e. ~16.1% for FY23 and ~16.3% for FY22.

Transmission Losses (500/220kV) (GWh)	FY19	FY20	FY21	FY22	FY23
Units Received (R)	122,302	125,941	132,299	140,346	132,008
Units Delivered (D)	118,838	122,471	128,620	136,674	128,811
Units Lost (R - D)	**3,464**	**3,470**	**3,679**	**3,672**	**3,197**
Transmission Losses (%)	**2.8%**	**2.7%**	**2.7%**	**2.6%**	**2.4%**
Units Received (R)	118,838	122,471	128,620	136,674	128,811
Units Delivered (D)	96,984	98,694	105,797	114,424	108,073
Units Lost (R - D)	**21,854**	**23,777**	**22,823**	**22,250**	**20,738**
Distribution Losses (%)	**18.4%**	**19.4%**	**17.7%**	**16.3%**	**16.1%**

***Note**: Transmission losses in the table refer to NTDC Losses only. Distribution losses pertain to average of DISCOs and KE T&D losses. Units received and delivered in the Distribution sector reflect in-house calculations.*

Source: NEPRA, PACRA Database

Distribution | Electricity

Distribution | An Overview

- Distribution is one of the key functions for the provision of electricity to the end consumers. As at End-June'23, there are ten State Owned Distribution Companies (DISCOs) exclusively responsible for the supply of electricity in their respective areas. These DISCOs are licensed by NEPRA. In addition, KE is also licensed to supply electricity in its designated areas. Following amendments in NEPRA Act in April 2018, separate licenses are required to be obtained for the *supply* of electricity and *sale* of electricity.

- Besides DISCOs and KE, some other local authorities such as DHA, Bahria Town and Industrial Estates Development Authority have also been granted the license to supply electricity in the territory specified in their respective distribution licenses.

Brief Background

- DISCOs and GENCOs were created in Pakistan as a result of WAPDA unbundling in order to restructure the power sector to improve efficiency and transform gradually into a competitive market. For this process to occur smoothly, the Pakistan Electric Company Pvt. Ltd. (PEPCO) was created in 1998 and assigned with the task to unbundle WAPDA into 8 DISCOs then, 4 GENCOs and NTDC. PEPCO is responsible for the management of all the affairs of Corporatized DISCOs, GENCOs and NTDC.

- From 2007 onwards, the Ministry of Water & Power notified NEPRA approved tariff for all DISCOs replacing unified WAPDA tariff.

Source: NEPRA

Distribution | Electricity

Distribution | Local Structure

- DISCOs are responsible for the operations & maintenance of the transmission and distribution assets at 132kV and below. Power Delivery through DISCOs network mainly depends on the adequacy of three major components; (i) 11kV feeders, (ii) Power Transformers and (iii) Distribution Transformers.

DISCOs Operational | FY23
Peshawar Electric Supply Company (PESCO)
Tribal Areas Electric Supply Co. (TESCO)
Islamabad Electric Supply Co. (IESCO)
Gujranwala Electric Power Co. (GEPCO)
Lahore Electric Supply Co. (LESCO)
Faisalabad Electric Supply Co. (FESCO)
Multan Electric Power Co. (MEPCO)
Hyderabad Electric Supply Co. (HESCO)
Sukkur Electric Power Co. (SEPCO)
Quetta Electric Supply Co. (QESCO)
K-Electric (KE)

DISCOs | Assets Structure | FY23	NTDC	KE	Total
Transmission lines – 132kV (km)	31,271	820	**32,091**
Grid Stations – 132 kV	877	69	**946**
Grid Stations Transformation Capacity (MVA)	100,330	7707	**108,037**
Feeders – 11 kV	10,985	2,068	**13,053**
Feeders Length (km)	359,347	10,283	**369,630**
Distribution Transformers (DTs) (No.)	896,474	31,261	**927,735**
Transformation Capacity of DTs (MVA)	59,448	8,807	**68,225**
DTs Low-tension LT lines (km)	247,144	19,370	**266,514**
Connections (Nos.)	**34,684,149**	**3,565,801**	**38,249,950**

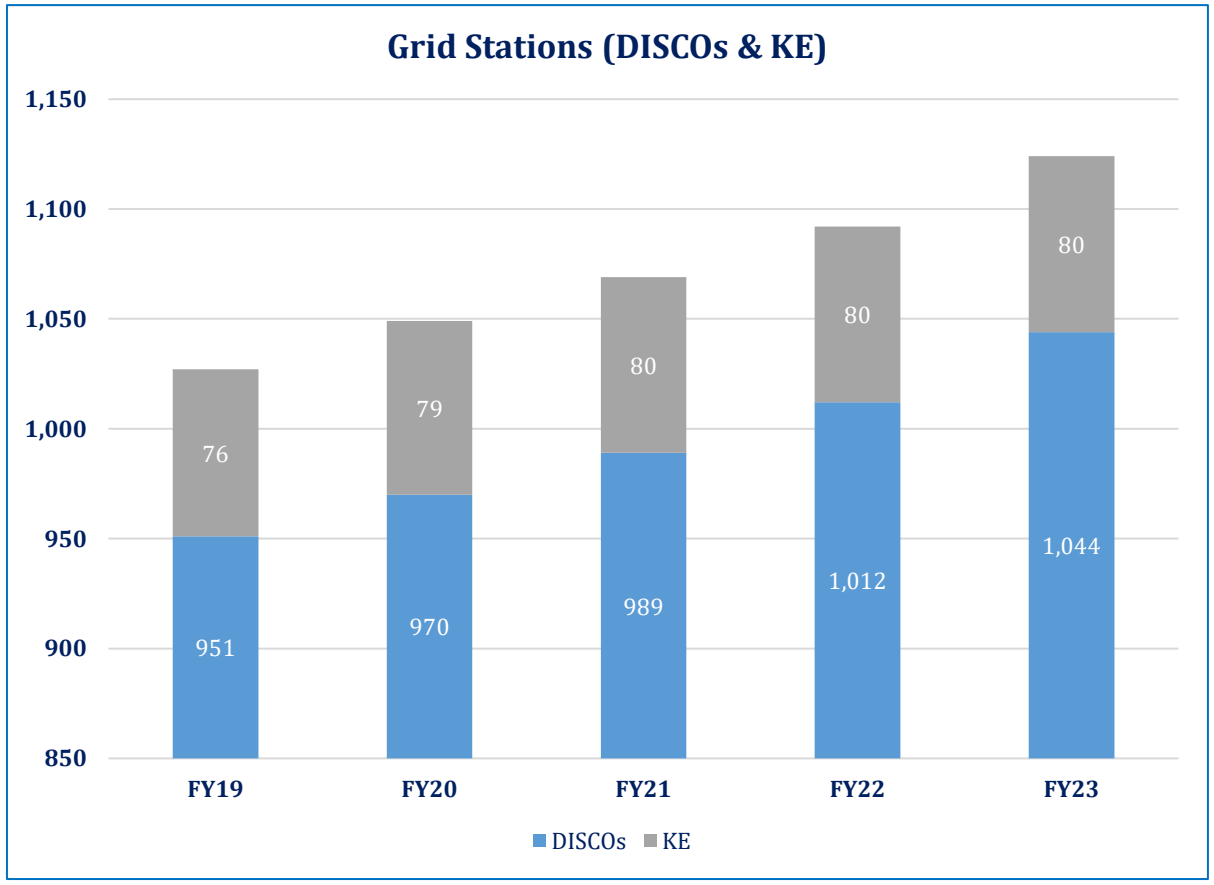
Source: NEPRA

Distribution | Electricity

Local | Assets (Lines & Grid Stations)

The country's Distribution Network is classified into DISCOs, KE and Small & Captive Power Producers. DISCOs purchase power from NTDC through CPPA-G. As of FY23, DISCOs transmission lines cover ~81.0% of Pakistan's geographical area (SPLY: ~79.6%).

Distribution Lines DISCOs (Km)	FY19	FY20	FY21	FY22	FY23
High-Tension (HT) Lines	373,337	379,859	385,933	390,981	395,477
Low-Tension (HT) Lines	237,486	238,053	240,931	242,925	247,144
Sub-total (A)	**610,823**	**617,912**	**626,864**	**633,906**	**642,621**
Distribution Lines KE (Km)	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**
High-Tension (HT) Lines	10,823	11,158	11,269	11,511	11,882
Low-Tension (HT) Lines	19,751	18,367	18,509	18,936	19,370
Sub-total (B)	**30,574**	**29,525**	**29,778**	**30,447**	**31,252**
Grand Total (A+B)	**641,397**	**647,437**	**656,642**	**664,353**	**673,873**



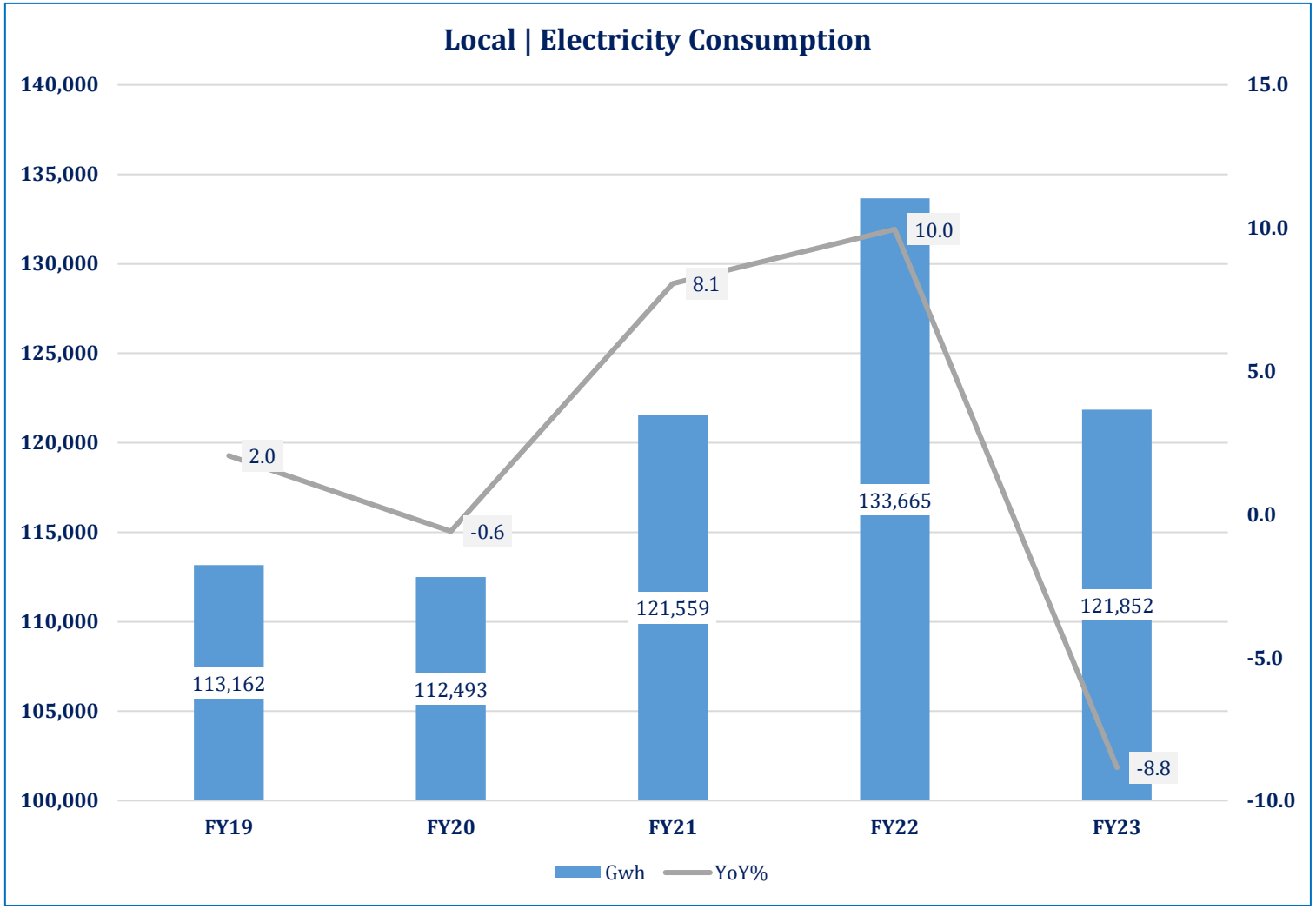
**High Tension Lines carry high voltage (11kV, 33kV etc.), and are used to transmit power to long distances. LT lines carry low voltage (till 1kV) and are used for shorter distances, e.g., households.*

Source: NEPRA

Distribution | Electricity

Local | Demand

- Pakistan's overall power consumption was down ~8.8% YoY in FY23, equivalent to ~82% of the total power generated during the same year.
- Average power consumption per capita recorded at ~519.0KWh in FY23 (SPLY: ~581.0KWh). A cross-country comparison reveals that this recorded at ~12,672KWh in the USA, ~6,206KWh in China and ~1,311KWh in India during CY22.
- As of End-FY23, ~278,815 connections were ripe but were not connected within the prescribed timeframe, reflecting thereby the number of consumers who had made payments but remained without a connection. This resulted in ~1,100MW demand remaining unmet.



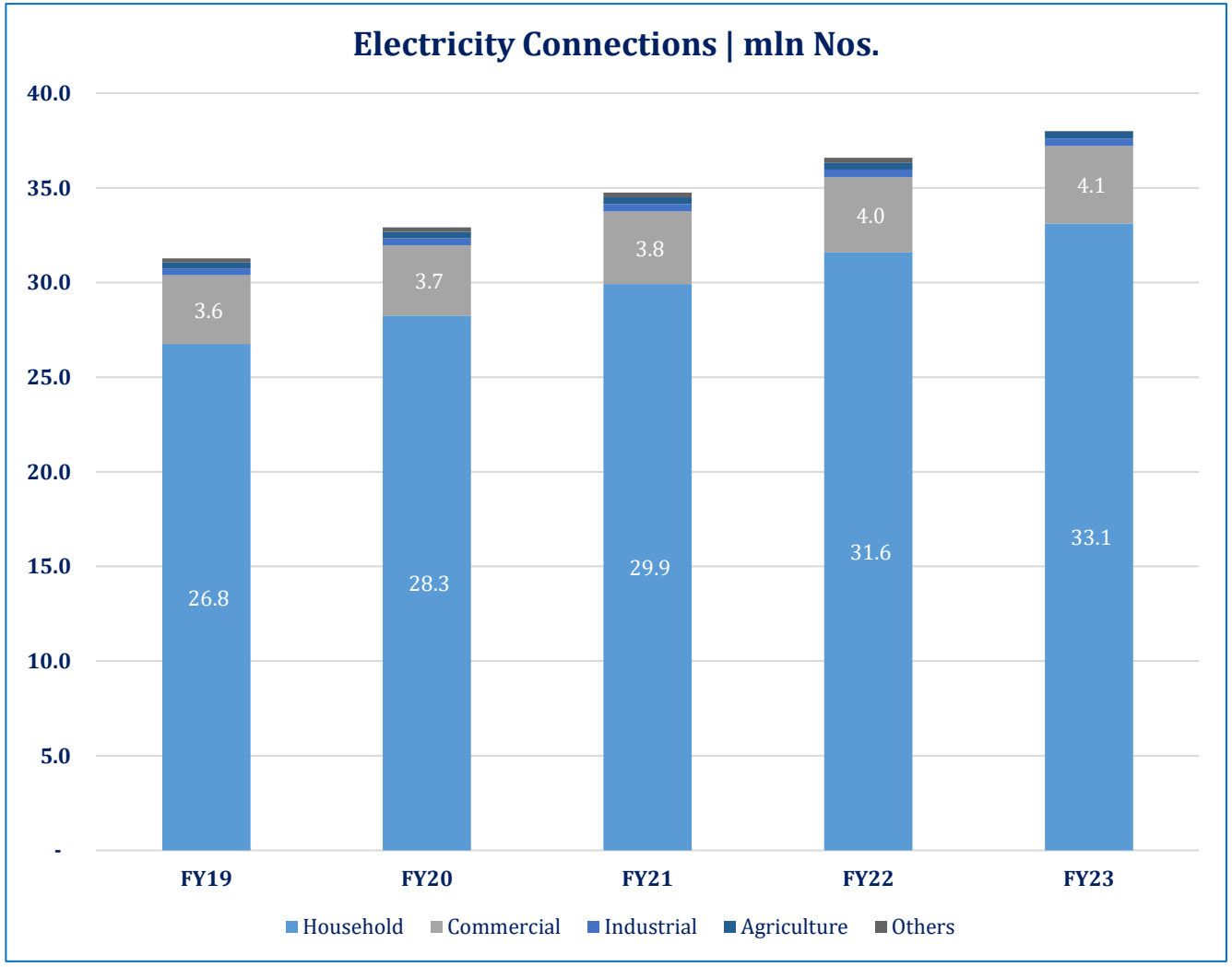
***Note**: For per capita consumption, population levels taken as ~230mln in FY22, ~235mln in FY23.*

Source: NEPRA, PBS, PACRA Database

Distribution | Electricity

Local | Consumer-wise Demand

- Household/ domestic segment make up ~86.5% of total connections in the country followed by commercial and industrial connections. In terms of consumption, household consumption was highest at ~43.9% followed by industrial at ~25.5%.
- Household share in electricity consumption stood at ~44.0% during FY23, while that of industrial segment was recorded at ~26.0%.
- A regional comparison reveals that during FY22, industrial and commercial sectors' cumulative share in total electricity consumption stood at ~49.0% for India, while domestic held ~26.0% share.
- For USA, ~74.1% of electricity was consumed by the residential/ domestic sector, while industrial sector consumed ~25.8% in CY22. Meanwhile, China's industrial sector accounted for ~55.0% of total electricity consumed while residential's share stood at ~17.0%.

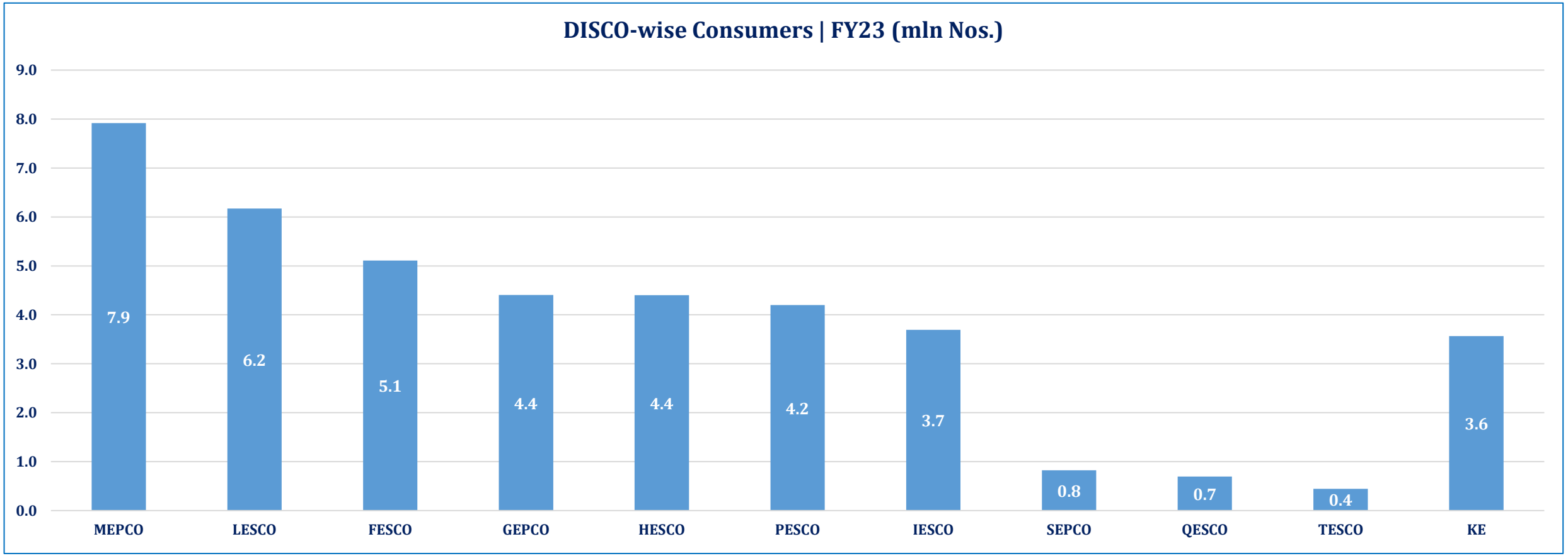


***Note**: Others in the figure above include public lighting, bulk supply of electricity etc.*

Source: Ember, NEPRA, MOSPI, U.S. Department of Energy, Enerdata

Distribution | Electricity

Local | DISCO-Wise Consumers



- As of Jun'23, the total number of electricity consumers nationwide surged to ~38mln (FY22 ~36mln). The largest consumer base is served by MEPCO, followed by LESCO, FESCO and GEPCO.

Source: WB, NEPRA

Distribution | Electricity

Local | Performance Parameters

Transmission & Distribution Losses

- T&D losses are a vital parameter in measuring the performance of DISCOs.
- NEPRA has set targets for the DISCOs to maintain their losses to a certain level. Breaching these targets leads to a significant loss to the national exchequer.
- The performance of DISCOs is benchmarked with their actual losses as against the targets set by NEPRA. The more the actual losses exceed the target, the worse its performance is considered to be.

Recoveries

- DISCOs are ideally required to realize the maximum amount of recoveries against their billing.
- Lower recoveries of DISCOs is the root cause of the crumbling financial issues of the power sector.
- Rising circular debt also stems from the inefficiency of the DISCOs to fully recover their billed amounts and clear their dues to the NTDC and Power Producers in the given time frame.

Load Shedding

Although load shedding has reduced significantly over the years, it is still not eliminated completely as DISCOs' are carrying out load management as per AT&C criteria which is still not in line with the requirements of NEPRA Performance Standards.

Safety

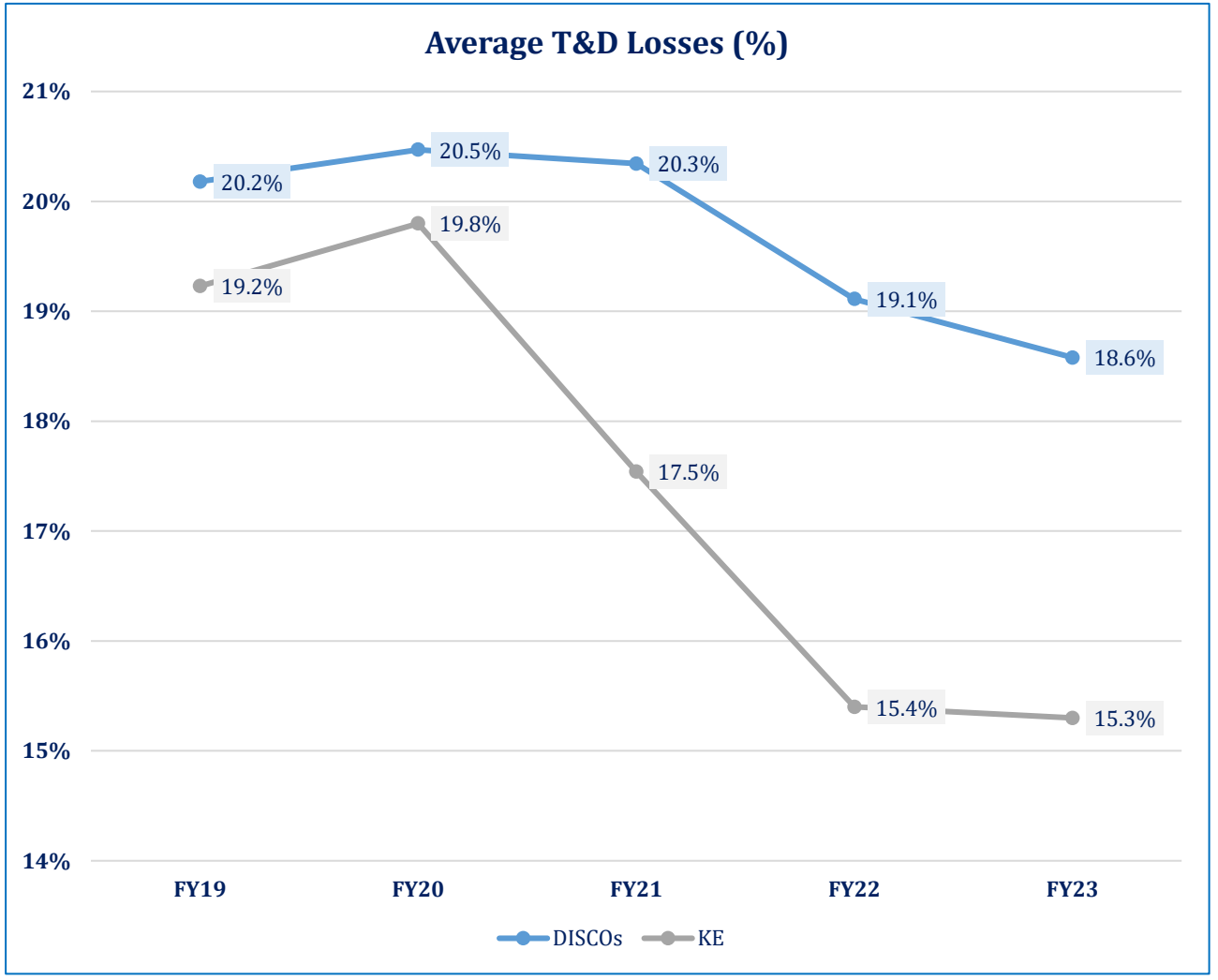
Safety is also one of the very important features in evaluating the quality of infrastructure and maintenance standards of the DISCOs. Increasing number of fatalities for both employees and public on account of electricity accidents is a concern.

Source: NEPRA

Distribution | Electricity

Local | Transmission & Distribution Losses

- NEPRA has allowed a certain percentage of T&D Losses in tariff structure of DISCOs. Any loss above the allowed limit results in financial loss to the national exchequer (covered later).
- Average T&D Losses of the DISCOs and KE were recorded at ~18.3% and ~15.3%, respectively, in FY23 (~18.8% and ~15.4% respectively in FY22). Total average T&D losses for DISCOs and KE recorded at ~17% during FY23.
- During the year, SEPCO, PEPCO and QESCO reported T&D losses over and above NEPA-approved target by ~17.3%, ~17.0% and ~12.4%, respectively, whereas GEPCO, FESCO and IESCO reported ~(0.5)%, ~0% and ~0.3%, respectively.
- KE has been granted a Multi-Year Tariff (MYT) for a period of seven years from FY17-23. In FY23, the company, despite macroeconomic challenges and reduction in industrial sent-out, was able to maintain T&D losses at NEPRA-approved level of ~15.3%.



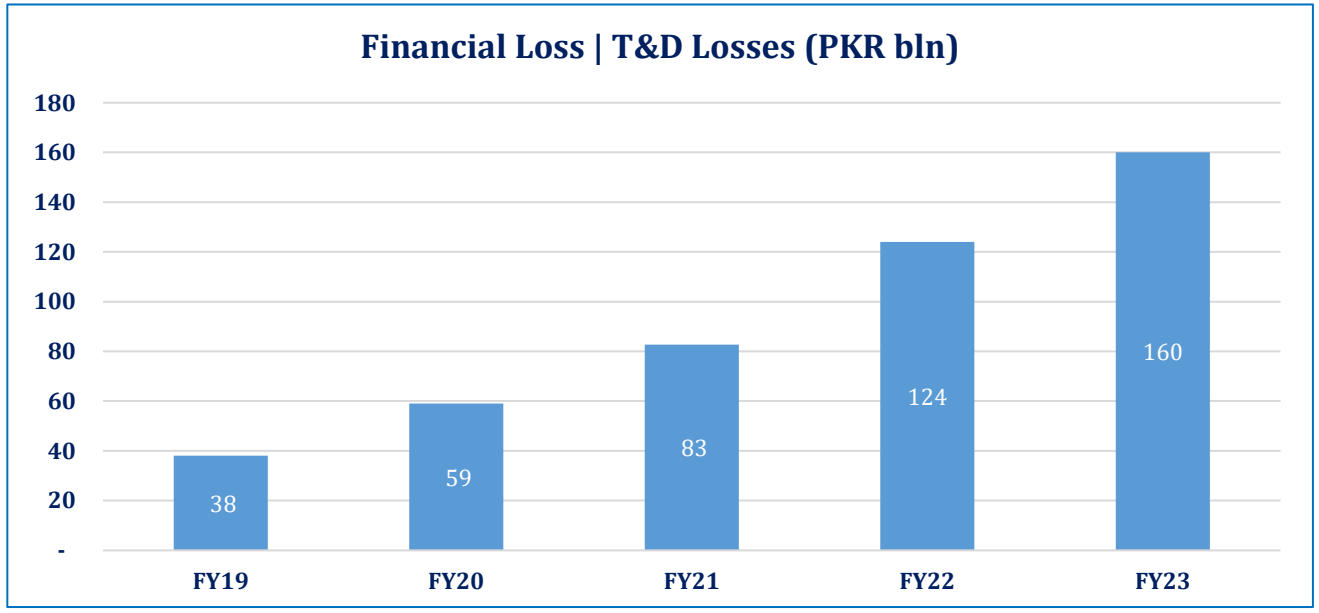
Source: NEPRA, PACRA Database

Distribution | Electricity

Local | Transmission & Distribution Losses

FY23 | Overview of T&D Losses											
DISCO-wise T&D Losses	**PESCO**	**IESCO**	**GEPCO**	**FESCO**	**LESCO**	**MEPCO**	**QESCO**	**SEPCO**	**HESCO**	**TESCO**	**KE**
Actual Reported Loss (%)	37.4%	8.0%	8.6%	8.5%	11.2%	14.2%	26.7%	34.3%	27.4%	9.%	15.2%
Loss (%) Allowed in Tariff by NEPRA (FY23)	20.1%	7.8%	9.1%	8.8%	8.%	12.3%	14.2%	17%	18.5%	9.2%	15.3%
Loss Exceeding/(Less than) Allowance	**17.3%**	**0.2%**	**-0.5%**	**-0.2%**	**3.2%**	**1.8%**	**12.4%**	**17.3%**	**8.9%**	**-0.1%**	**0.1%**

- During FY23, only GEPCO, FESCO and TESCO's T&D losses were lower than their allowed limits by NEPRA, while only SEPCO's were significantly higher than their allocated limits.
- T&D losses result in a significant financial loss to the national exchequer as is witnessed from the adjacent chart. A financial impact of PKR~160bln was recorded in FY23 (up ~36% YoY).



Source: NEPRA

Distribution | Electricity

Local | DISCOs Average Recoveries

Recoveries of Billed Amounts | DISCOs (%)											
Period	**PESCO**	**TESCO**	**IESCO**	**GEPCO**	**LESCO**	**FESCO**	**MEPCO**	**HESCO**	**SEPCO**	**QESCO**	**Overall DISCOs**
FY19	88.6	65.3	87.8	96.3	97.6	91.0	99.5	72.5	63.2	24.4	**87.1**
FY20	87.6	68.1	90.2	94.3	94.4	94.1	92.9	73.1	56.5	49.2	**88.7**
FY21	101.8	83.2	116.8	105.1	98.7	97.2	102.1	75.6	64.4	39.8	**97.3**
FY22	91.9	66.2	95.6	98.1	96.6	94.8	92.0	73.7	63.7	35.2	**90.5**
FY23	91.6	85.1	104.9	98	94.3	100.3	98.2	74.4	66.5	36.9	**93.3**

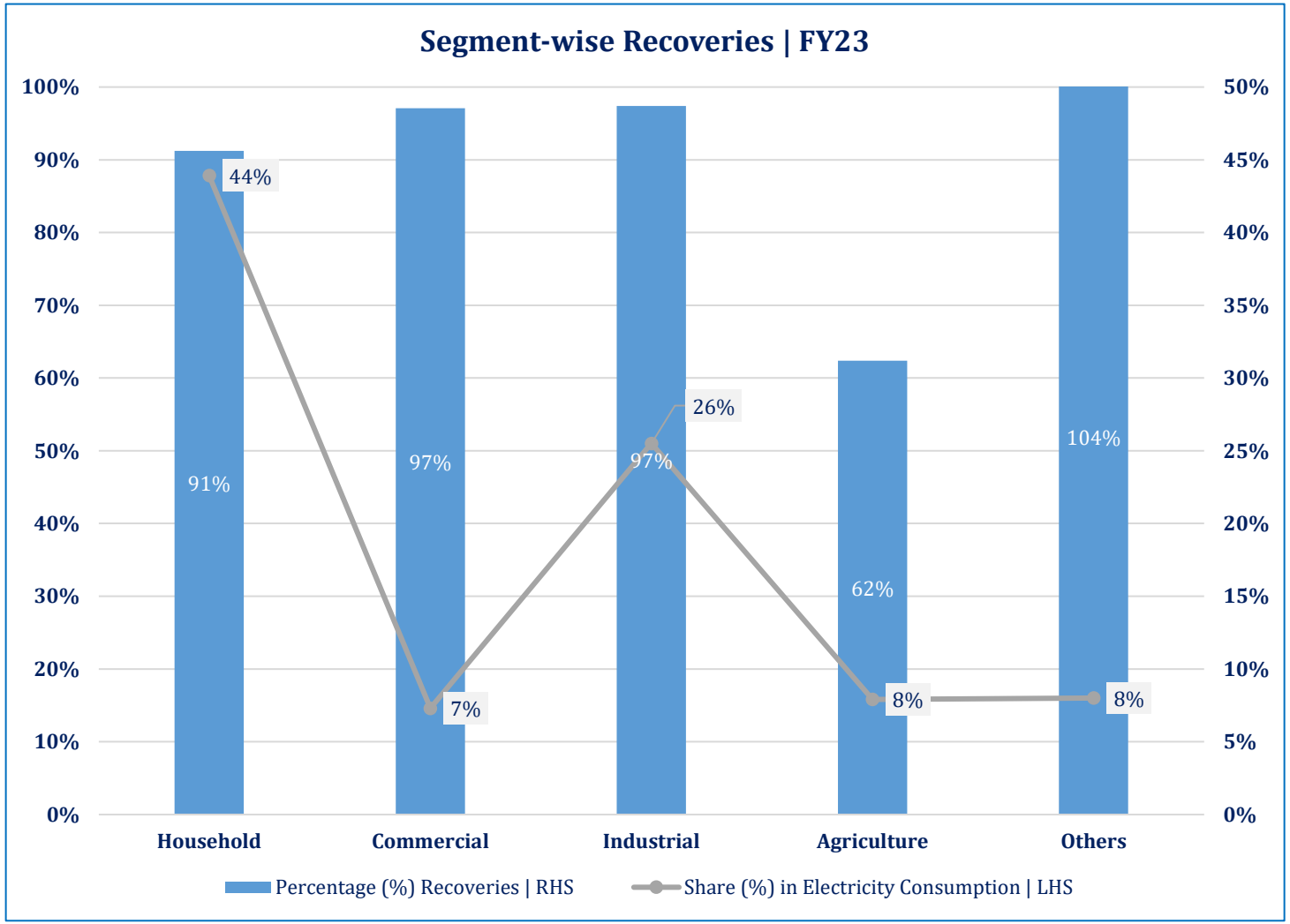
- During FY23, recoveries against the billed amount stood at ~93.3%, up by ~3% YoY (SPLY: ~90.5%), amounting to PKR~3.5tln.
- Given the cyclic nature of payments, the low recovery of DISCOs hampered the ability to make payments to generation and transmission companies through CPPA-G. In FY23, receivables for DISCOs surged to PKR~1,727bln, compared with PKR~1,530bln in FY22, indicating an increase of PKR~196bln or ~12.8% YoY.

Source: NEPRA

Distribution | Electricity

Local | Segment-wise Recoveries

- In FY23, lowest recovery rate was witnessed in agricultural segment at ~62.0% (FY22: ~60.0%), while those from the household segment were reported at ~91.0% (FY22: ~90.0%).
- Recovery rate is highest among the commercial & industrial consumers with ~97.0% each in FY23 (FY22: ~98.0% commercial & ~97.0% industrial).
- 'Others', as depicted in the chart, include public lighting and bulk supply of electricity etc. and recorded a recovery rate of ~104.0% in FY23 (FY22: ~91.0%).



Source: NEPRA

POWER

Circular Debt | The Unfortunate Menace

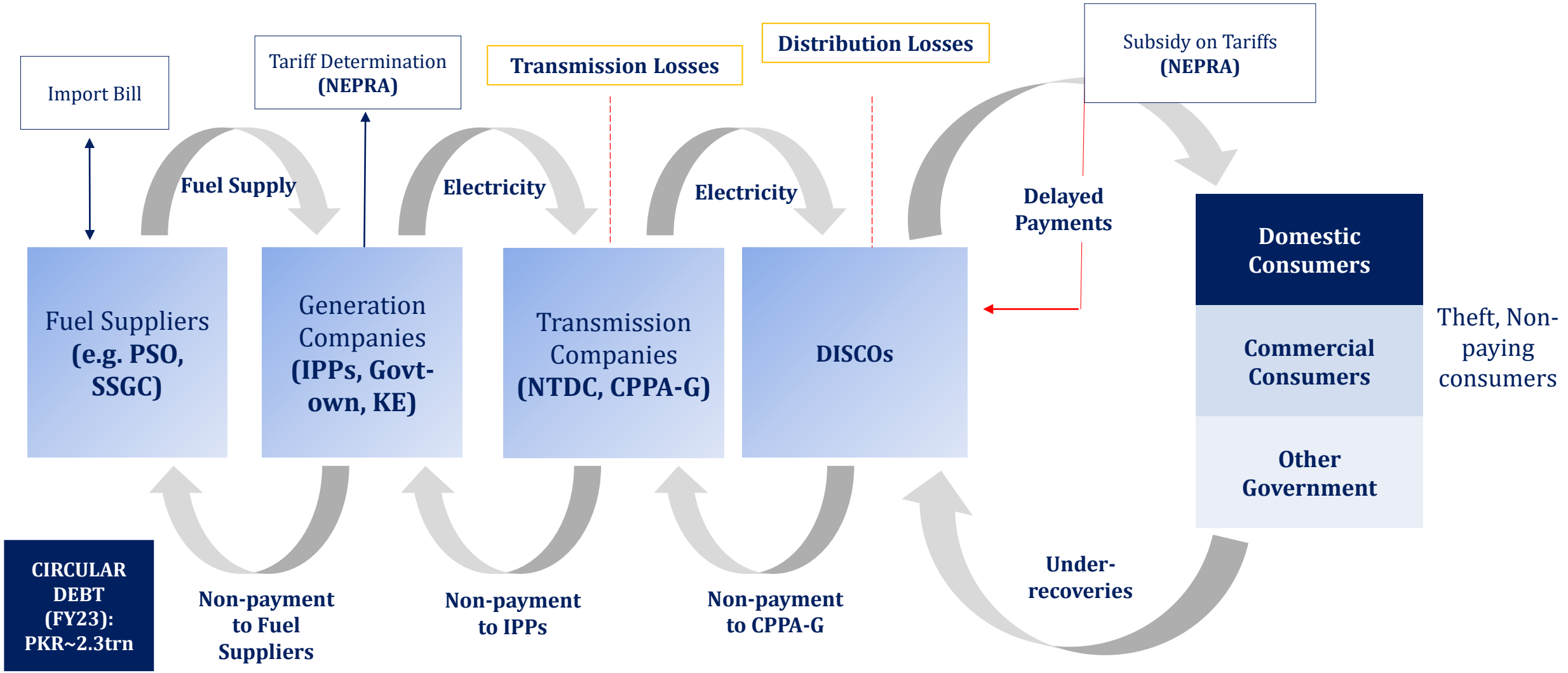
- **Circular Debt is the net unfunded outstanding liability position of the power distribution companies (DISCOs) to the Central Purchasing Power Authority-Guarantee (CPPA-G)**, which further cascades into delayed settlement of payment obligations by the CPPA-G to the Power Generation Companies (GENCOs)/ Independent Power Producers (IPPs). The cash gap at the CPPA-G is bridged through borrowings by the Power Holding Private Limited (PHPL) to settle CPPA-G debts.

- The **five key contributors** include, (i) High cost of power generation, (ii) delays in tariff determination, (iii) high transmission and distribution (T&D) losses and poor revenue collection by the DISCOs, (iv) partial (and often delayed) tariff deferential subsidies (TDS) payment by the GoP to the DISCOs and K-Electric (KE), and (v) high financial costs on PHPL borrowing and late-payment penalty charges on CPPA-G payables.

Source: ADB

POWER

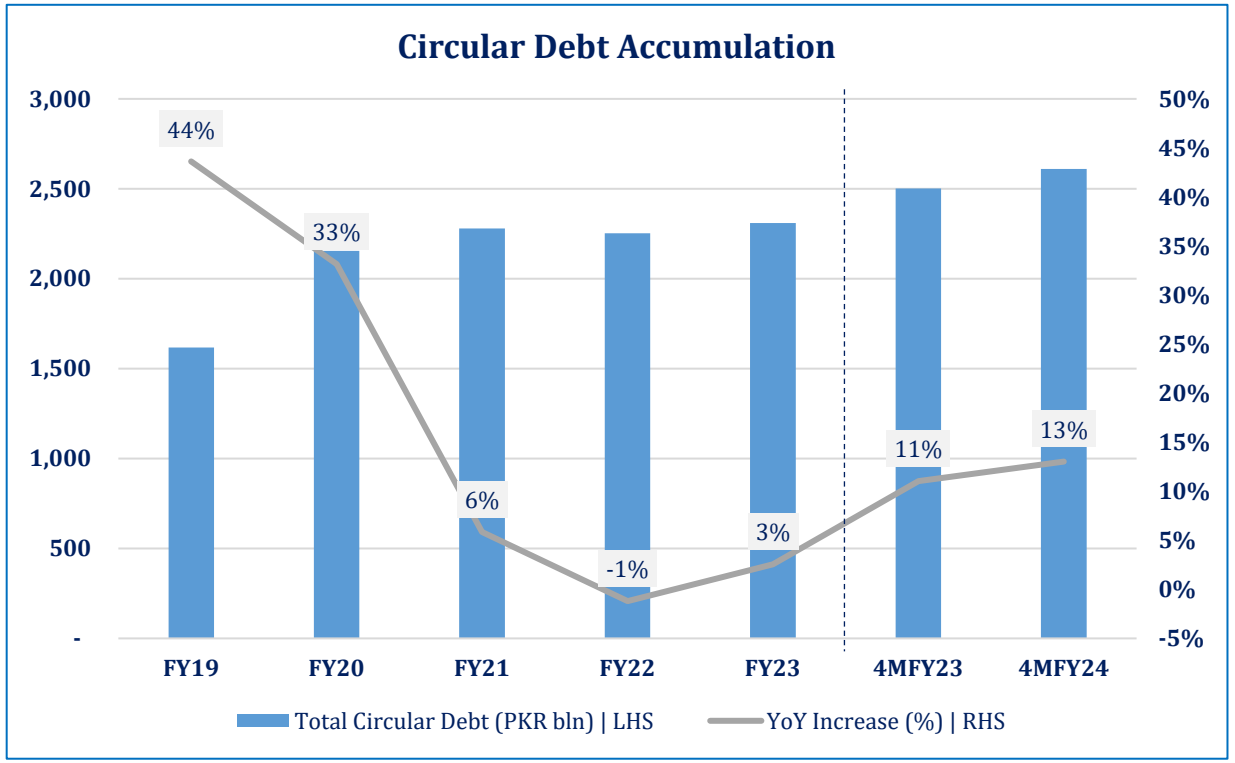
Circular Debt | How it Flows

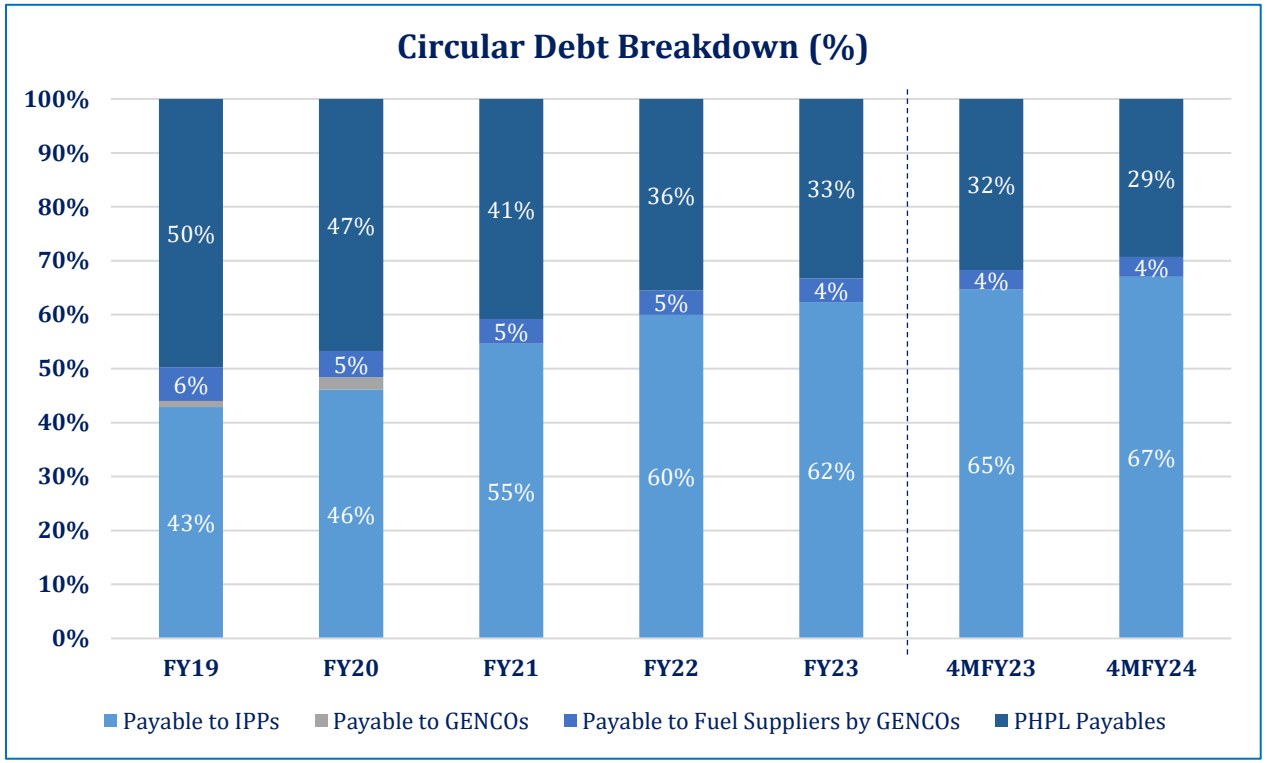


Source: ADB

Distribution | Electricity

Local | Circular Debt Stock





- Pakistan's total circular debt soared to PKR~2.3trn as of End-Jun'23, up ~2.5% YoY (or PKR~57bln), reflecting further accumulation of circular debt. During the said period, circular debt made up ~2.9% of the country's GDP (taken at current prices) (SPLY: ~3.6%).

- As of End-Oct'23, the stock has piled on to PKR~2.6tln, growing by ~13.0% as compared against End-Jun'23 (FY22: PKR~2.3trn). Payables to IPPs and PHPL payables together accounted for ~95% of the circular debt stock in FY23 (SPLY: ~96%).

Source: NEPRA, MoE (Power Division)

Distribution | Electricity

Local | Circular Debt Flow

- Circular debt is not only affecting the liquidity of the fuel supplier, generation, transmission and distribution companies but also increasing the cost of electricity for the end-consumer.

- The increase in circular debt since End-FY23 exceeded GoP's target for 4MFY24 due to lower-than-anticipated tariff rebasing and large DISCOs' under-recoveries in Aug'23 when the re-basing was implemented. Moreover. collections dipped to ~77% during Aug'23 on account of prices hike and greater average monthly consumption per household.

- Higher T&D losses, low recoveries from DISCOs, delay is subsidy payments, increasing receivables from public and private consumers are some of the major reasons contributing to mounting circular debt.

Figures are stated in PKR bln.

Break-up of Increase/ (Decrease)	FY22	FY23	4MFY23	4MFY24
Budgeted but unreleased subsidies	(12)	(0)	74	8
Unclaimed Subsidies	(133)*	(70)*	(10)	-
IPPs Interest Charges on delayed payments	105	100	54	45
PHL Markup paid out of IPPs' claims	29	43		
Pending Generation Cost (QTAs+FCA)	414	250	103	110
Non-payment by K-Electric	107**	53**	65	43
DISCOs Losses Inefficiencies	133	160	61	77
DISCOs Under Recoveries	180	236	163	165
Other Adjustments	(285)	(447)	(254)	(147)
PHL Principal Repayments	(130)	(35)	(7)	-
PHL Unpaid Markup	-	-	-	-
Stock Payments	(434)	(127)	-	-
Total Debt Increase/ (Decrease)	**27**	**57**	**249**	**301**

**Includes release of PKR~21bln in respect of previous year zero-rated outstanding claims.*
***PKR~346bln is receivable from KE as of Jun'23 pending due to subsidy dispute between KE and GoP.*

Source: Power Division

Distribution | Electricity

Indicative Generation Capacity Expansion Policy (IGCEP 2022-31)

- The **IGCEP 2022-31**, developed by NTDC and approved by NEPRA in Feb'23, is to act as a primary document for *adding new capacity for generation* to meet future electrical demand in a scientific and systematic manner.

- The document, covering a horizon of 10 years and to be revised annually, builds on the plans laid down by the preceding iteration and proposes a gradual shift from an energy mix heavily dominated by imported fossils like Coal, Furnace Oil and RLNG towards one pillared by indigenous sources of energy, including Hydel, Thar Coal, Wind and Solar. Moreover, it targets utilization of indigenous and renewable Energy resources for generation of low cost, environment-friendly electricity.

- Furnace oil is expected to be phased out by CY31. Similarly, electricity generation from RLNG and Imported coal will drop to 2% and 8%, respectively, in CY31. At the same time, there will be a substantial increase in the electricity generated by hydel, wind and solar PV. The contribution of hydel, wind and solar PV which currently stands at ~28%, ~4% and ~1% respectively will be increased to ~39%, ~10% and ~10% respectively, thereby increasing the total share of green electricity to ~59%.

- Out of ~120 countries, Pakistan was ranked 107 on the Energy Transition Index (ETI) in CY23, with ETI score of 46.9, reflecting lack of sufficient initiatives aligning with the county's commitment to energy transition efforts. A further bifurcation of this score reveals that with respect to System Performance (SP), the country's score recorded at 55.2, whereas on the Transition Readiness (TR) indicator, it scored 34.5. TR includes factors such as skilled workforce, innovation and physical and digital infrastructure.

Source: NEPRA, World Energy, WEF

Distribution | Electricity

Local | Policy Framework

National Electricity Policy

The Prime Minister Imran Khan in June, 2021 chaired the 47th meeting of the Council of Common Interest (CCI) and approved the National Electricity Policy 2021 for the next 10 years.

- The ***vision*** of the policy is to ensure universal access of electricity through a self-sustainable power sector, developed and premised on: optimal utilization of indigenous resources; integrated planning approach; efficient, liquid and competitive market design; and affordable & environment friendly outcome for the consumers.
- The ***key guiding principles*** included efficiency, transparency, competition, financial viability, indigenization, research & development and environmental responsibility. These principles are used to formulate sub-policies about generation, transmission, renewable energy, market operations, cost of service, energy efficiency & conservation, integrated planning and governance etc. that are a part of the National Electricity Plan.

National Electricity Plan

NEP is broad-based involving six objectives – sustainability; energy equity and financial viability; security of supply; governance and stakeholders' input; research, development and indigenization; market and risks.

De-carbonization: NEP would attempt to handle climate change and decarbonization of energy mix.

Indigenization: Indigenization, to be viewed in terms of both fuel and equipment as the country is lagging behind many developing countries in terms of local content, which increases the dependence, cost and drain of foreign exchange.

Provincial Issues: In energy discussion ensuring participations and satisfactions of all provinces and associated stakeholders.

Demand/Supply: NEP will attempt to handle demand management issues

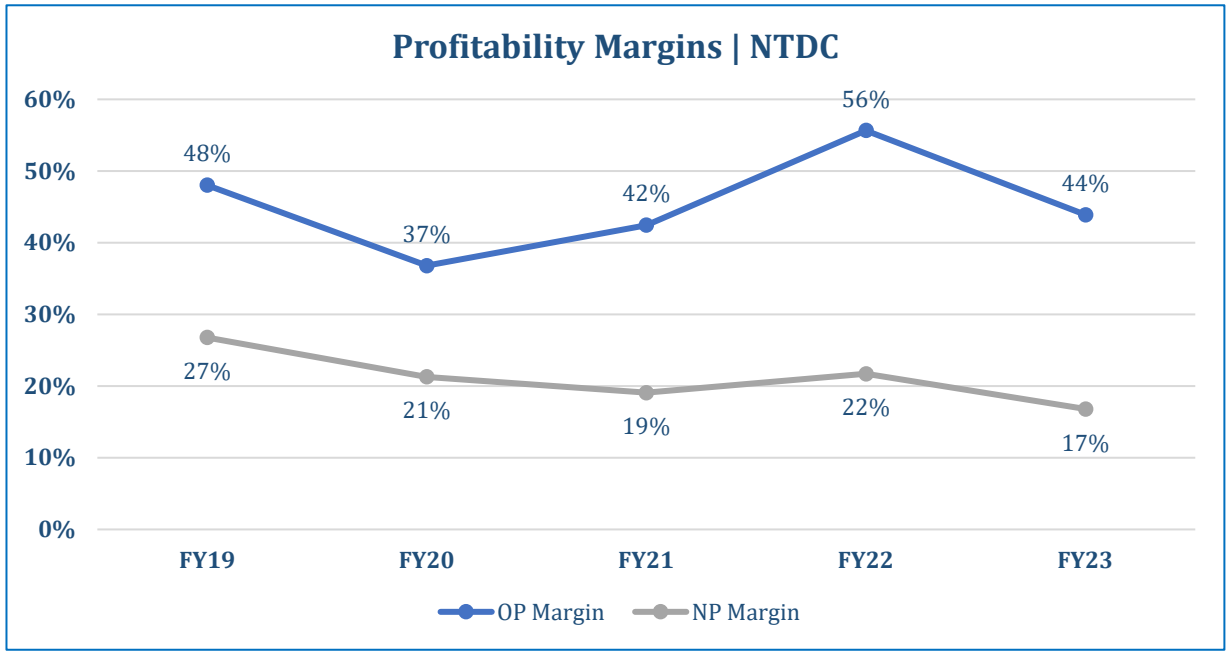
Universal Access: The NEP objective mix, includes universal access/ rural electrification which involves providing energy in remote areas of the country.

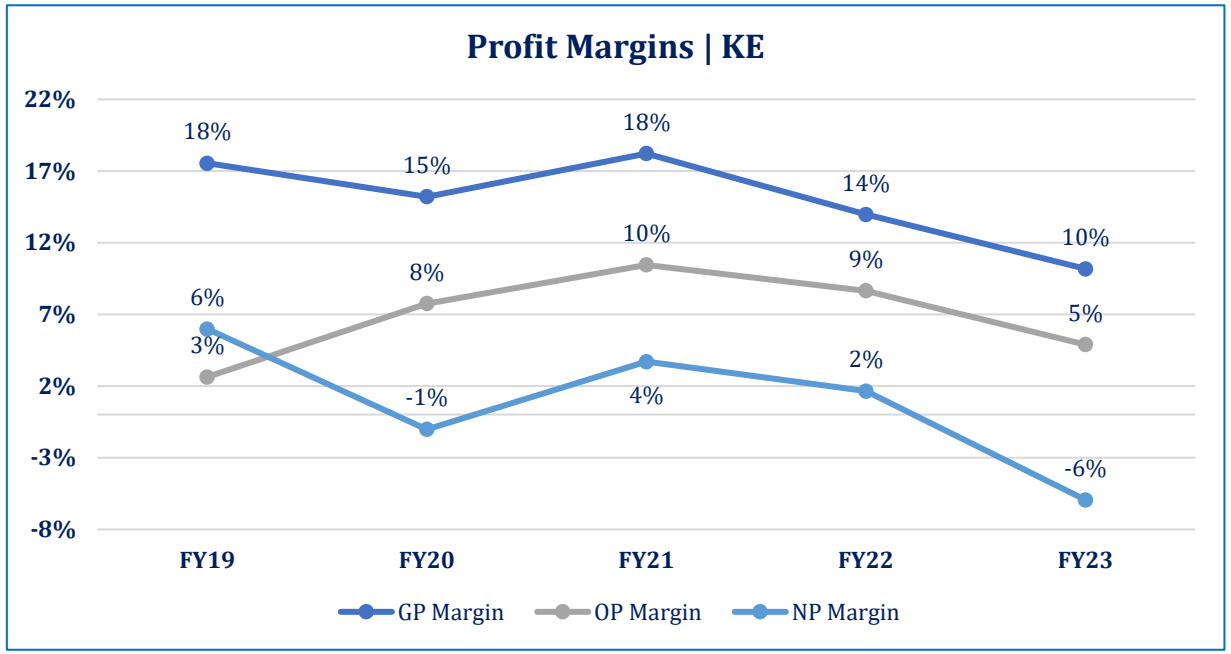
Financial Viability: NEP objectives include financial viability in terms of cost and consumer affordability.

Source: Ministry of Energy

Distribution | Electricity

Business Risk | KE & NTDC





- Despite gross wheeling charges increasing ~0.1% YoY for NTDC, the entity's gross/ operating profit margin dipped to ~44% in FY23 on account of imposition of sales tax amounting to PKR ~12,838mln, in addition to ~0.2% YoY increase in operating expenses. Similarly, net profit margin was also down to ~17% during the year, on account of ~0.5% YoY increase in finance costs. The latter comprise mainly of long-term financing for the projects, namely, SSRL/SECL T/L Project and Jhimpir-II T/Line Project.

- Average gross profit margin for DISCOs registered a decline to ~10.0%, despite net revenue inching up ~10.5% YoY, owing to ~20.7% YoY lower tariff adjustment and ~3.6% YoY increase in COGS, a considerable portion of which stemmed from purchase of electricity from NTDC/ CPPA-G. Moreover, on account of ~128.6% YoY surge in finance cost, entity's net profit margin diluted to ~(6)%.

***Note**: KE is involved in all 3 verticals of Power sector while NTDC is involved in transmission only.*

Source: PACRA Database

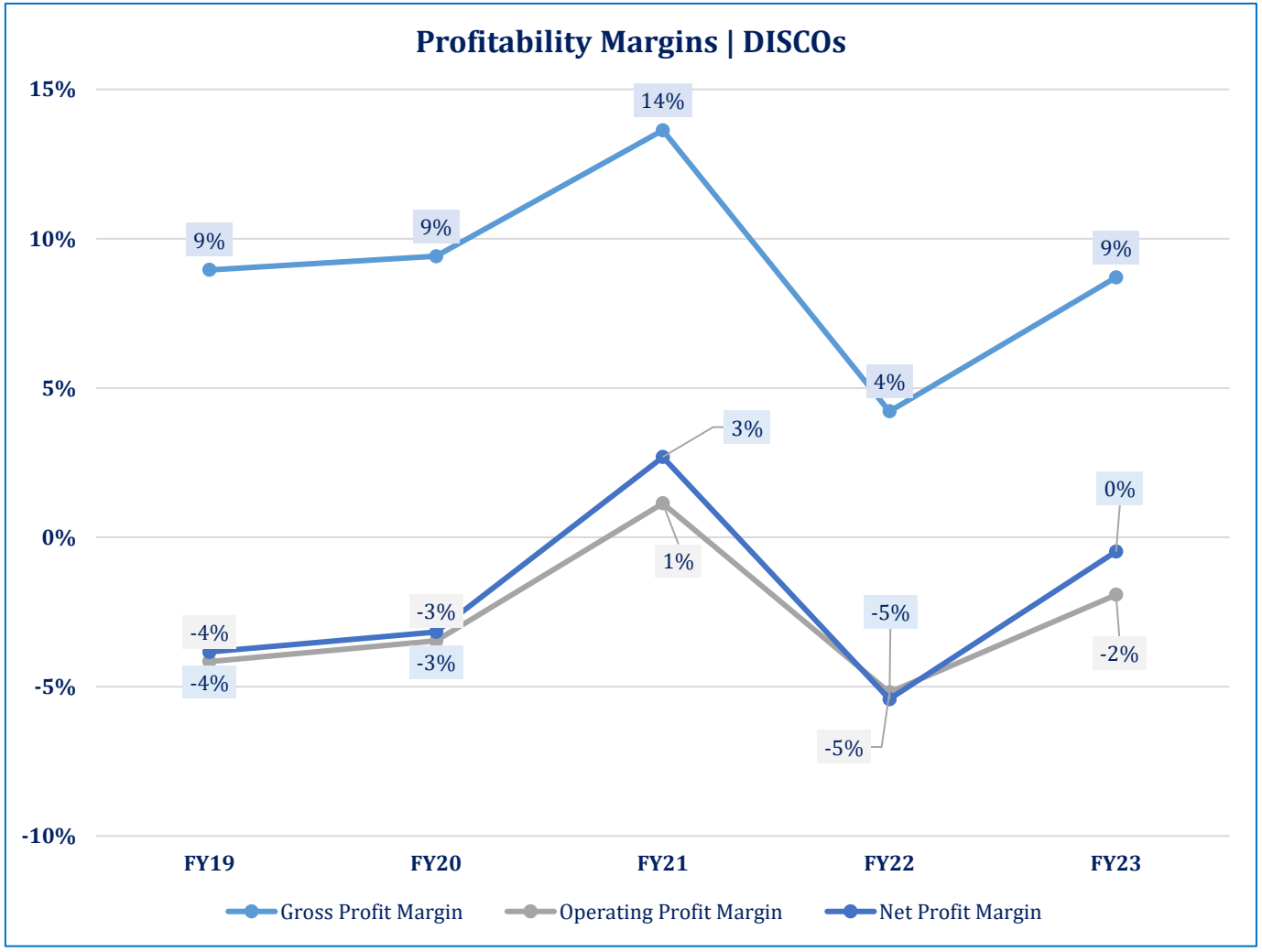
Distribution | Electricity

Business Risk | DISCOs

- At the distribution stage of electricity, DISCOs are allowed distribution margins to cover O&M cost, salaries, wages and other benefits, depreciation, other operating expenses, return on rate base, other income, T&D losses (as covered earlier) as well as prior year adjustments.

- The average gross profit margin of sector players increased to ~9% in FY23 (FY22: ~4%) on account of ~14.6% YoY increase in revenue, while COGS was up ~15.8% YoY during the year.

- Meanwhile, average net profit margin also improved to ~0% in FY23 from ~(5)% in FY22 on account of ~10.2% decline YoY in finance costs for the sector players.

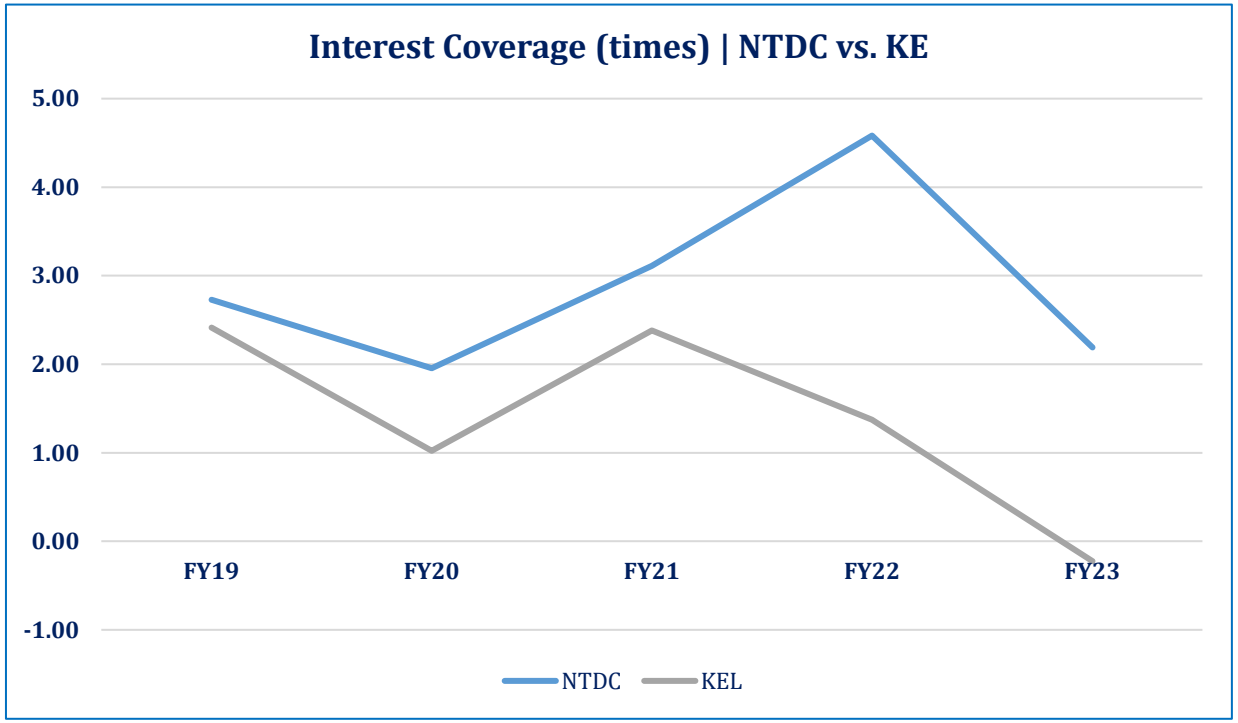


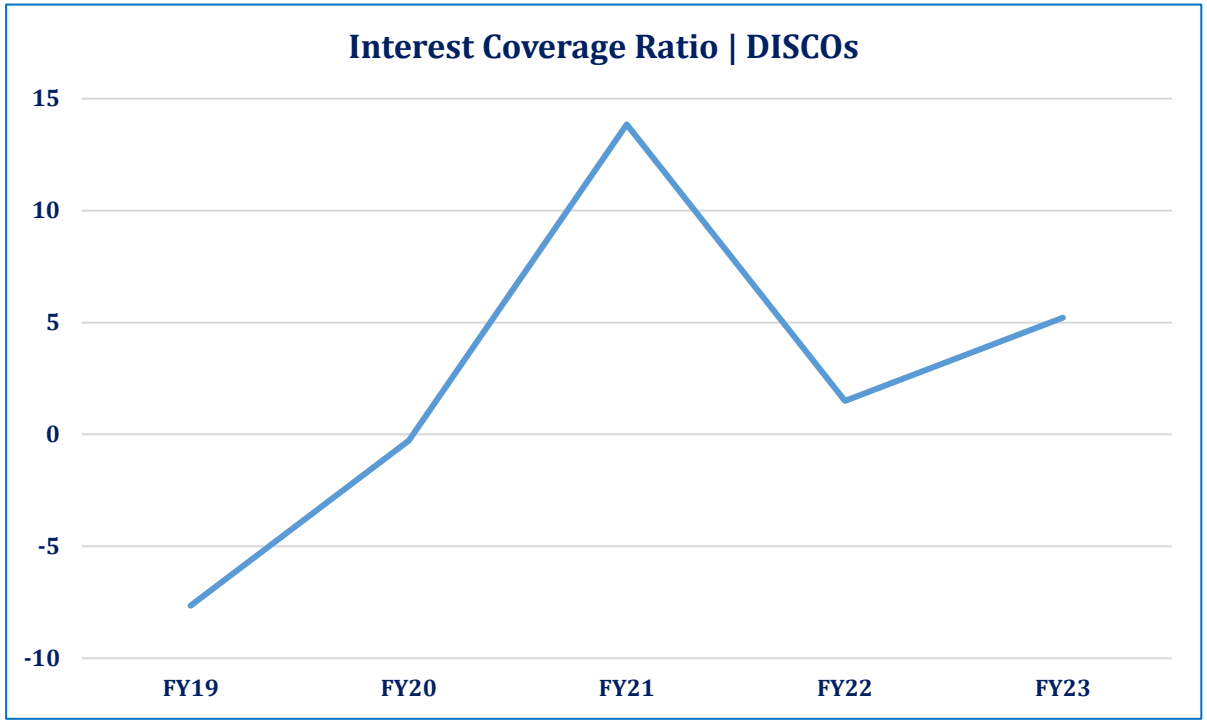
***Note**: DISCO's data is indictive of 4 DISCOs: MEPCO, GEPCO, IESCO & FESCO.*

Source: PACRA Database, SBP

Distribution | Electricity

Financial Risk | KE & NTDC





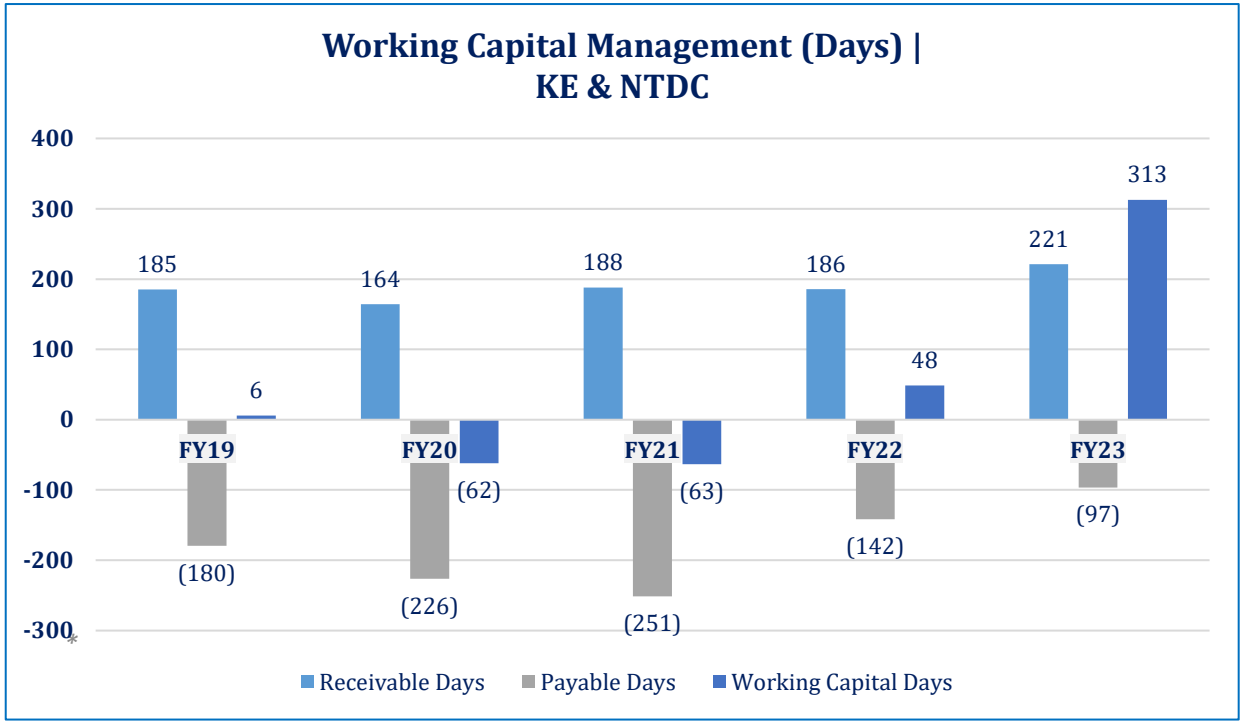
- Average leverage ratio for NTDC and KE fluctuated between ~39% to ~51% over the past five years (FY18-FY22) and recorded at ~7% in FY23. While interest coverage for NTDC improved in FY22 to ~4.6x, it deteriorated to ~2.2x in FY23, on the back of ~22.5% YoY higher short-term borrowing. For KE, while this stood at ~1.4x in FY22, it further dipped to ~(0.2)x in FY23, reflecting higher borrowing.
- In the case of DISCOs, while interest coverage had dropped sharply to ~1.5x in FY22, it recovered to ~5.2x in FY23, likely owing to ~10.2% YoY decline in average finance costs.

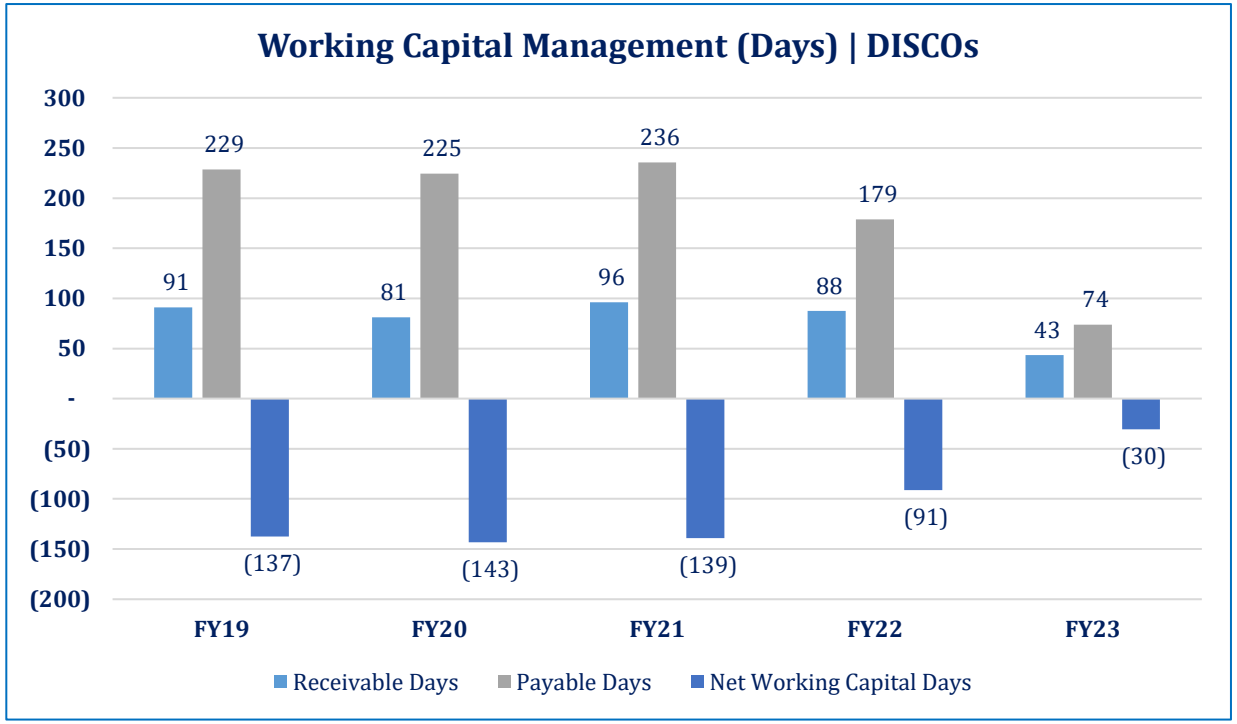
***Note**: DISCO's data is indictive of 4 DISCOs: MEPCO, GEPCO, IESCO & FESCO. KE is involved in all 3 verticals of Power sector while NTDC is involved in transmission only.*

Source: PACRA Database

Distribution | Electricity

Financial Risk | Working Capital Management





- Average net working capital days of NTDC & KE increased to ~313 days in FY23 (SPLY: ~48 days), mainly on the back of increased receivable days at ~221 days. However, average payable days improved from ~(142) days in FY22 to ~(97) days in FY23.
- For the DISCOs, average working days improved from ~(91) in FY22 to ~(30) in FY23. Receivable days improved to ~43 days in FY23, while payable days also improved to ~74 days.
- Negative working capital days are a result of low recoveries/ line losses by electricity distribution and transmission companies as well as delay in receipts of subsidies from the government which results in payment delays to creditors.

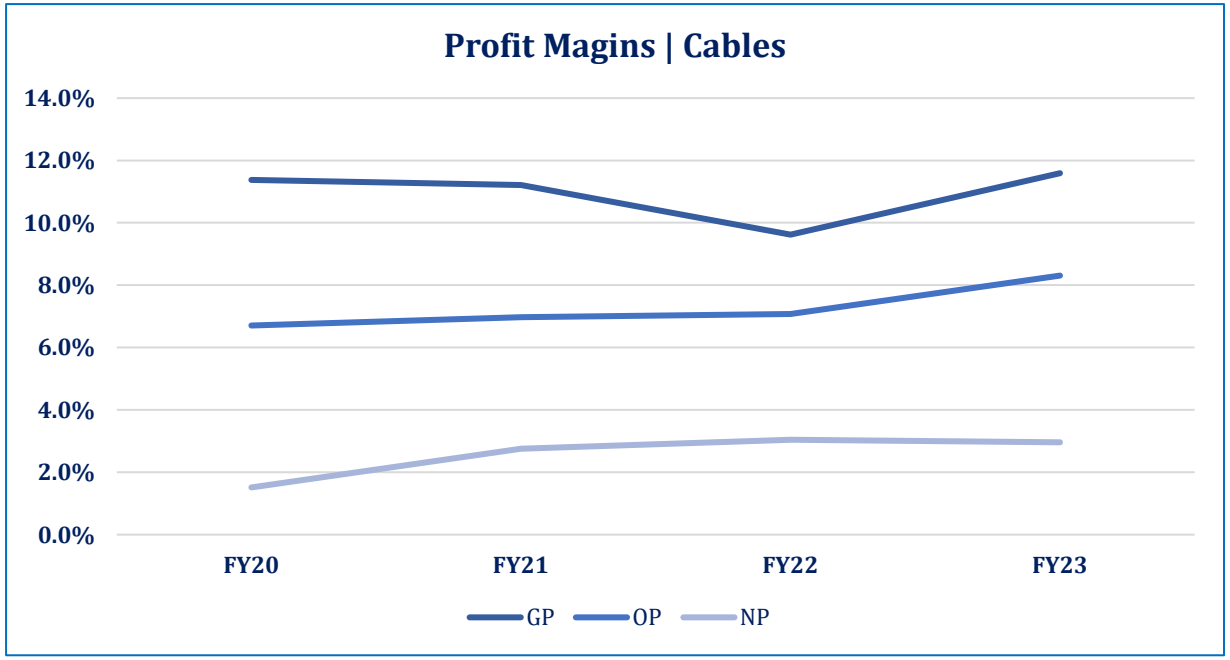
***Note**: DISCO's data is indictive of 4 DISCOs: MEPCO, GEPCO, IESCO & FESCO. KE is involved in all 3 verticals of Power sector while NTDC is involved in transmission only.*

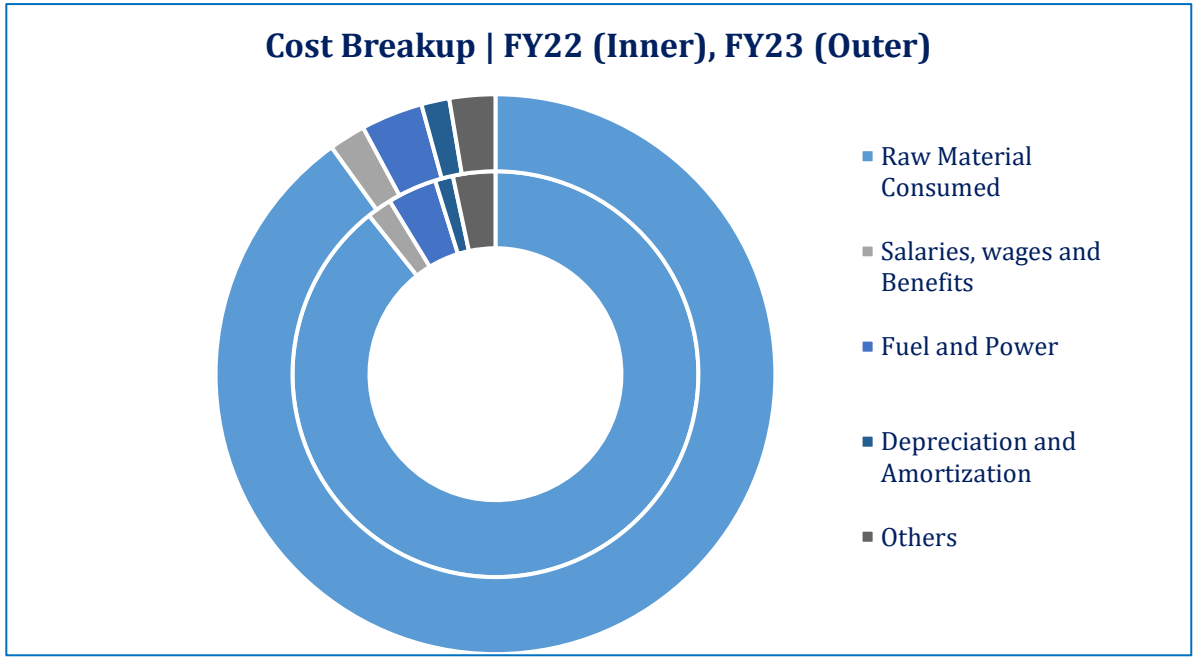
Source: PACRA Database

Distribution | Electricity

Margins & Cost Structure | Cables

- Average gross margins of the segment during FY20-22 period stood at ~10.7% and increased to ~11.7% in FY23. Moreover, ~15.4% YoY increase in revenue was enough to offset ~12.9% YoY increase in COGS.
- Similarly, average operating margins for the segment also rose to ~8.3% in FY23 (SPLY: ~7.1%), reflecting better expense management and the substantial increase in revenue being enough to absorb the increase in operating and non-operating costs. However, average net margins remained stable at ~3.0% in FY23 (SPLY: ~3.0%).
- The largest component of the segment's direct costs is raw material which constituted ~90% of direct costs in FY23. Thus, any fluctuation in the price and availability of raw material can have a significant impact upon the sector players' performance.





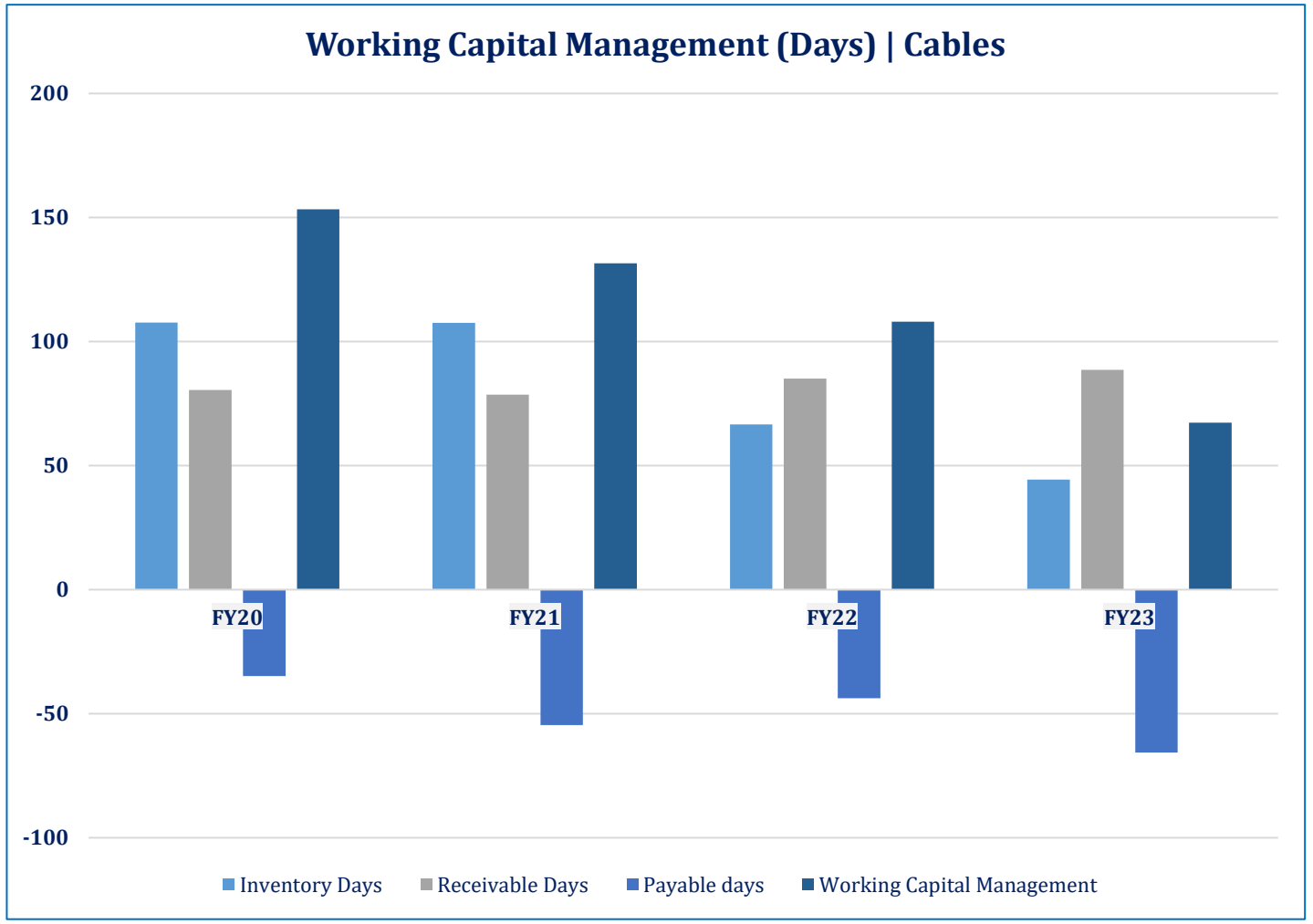
Note: *Data is reflective of PACRA-rated sector players.*

Source: PACRA Database, PSX

Distribution | Electricity

Financial Risk | Working Capital Management | Cables

- The segment's working capital management is largely a function of its trade receivables and payables. Average working capital cycle recorded at ~131 days during FY20-22, improving in FY23 to ~67 days (SPLY: ~108 days).
- The decrease in working capital cycle came on the back of increase in payable days, which rose to ~66 day in FY23 (SPLY: ~44 days). This, in tur, reflects segment players' lower repayment capacity to debtors.



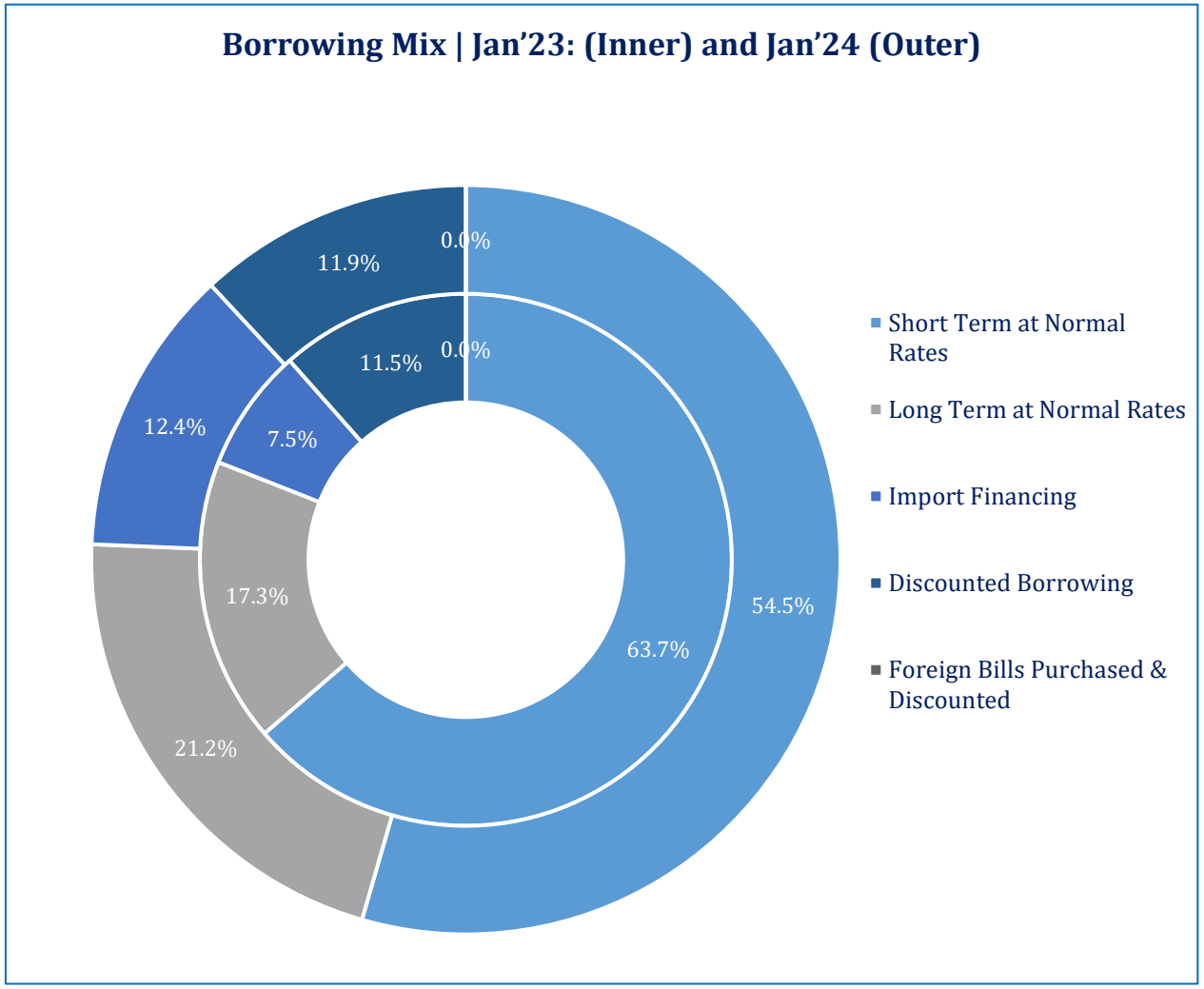
Note: *Data is reflective of PACRA-rated sector players.*

Source: PACRA Database, PSX

Distribution | Electricity

Financial Risk | Borrowings | Cables

- The cable segment recorded a total borrowing of PKR~18.1bln as at End-Jan'24, marking a YoY increase of ~13.2%.
- The largest component in the sector's borrowings are short-term borrowings (STBs), which constituted ~56.3% of the total borrowing as of End-Jan'24 and stood at PKR~10.3bln as at End-Jan'24, marking ~17.2% YoY decrease.
- Meanwhile, long-term borrowings (LTBs) constituted ~21.2% and were recorded at PKR~4.0bln as at End-Jan'24, while import financing constituted ~12.4%, recording at PKR~2.4bln.
- The segment is moderately leveraged with an average leveraging ratio of ~27.2% and recorded interest coverage of ~1.6x in CY23 (SPLY: ~2.0x).



Note: *Leverage is based on the PACRA-rated player. Borrowing data is reflective of SBP classification "Manufacture of Other Electronic and Electric Wires and Cables"*

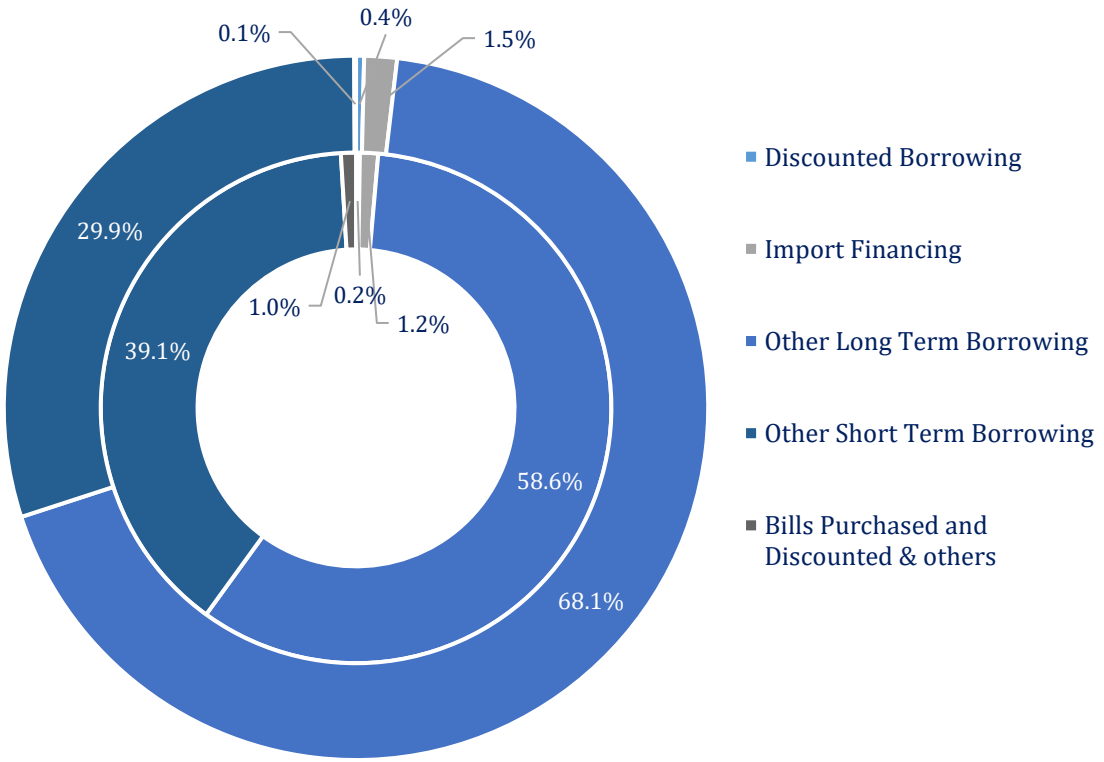
Source: SBP, PACRA Database

Distribution | Electricity

Financial Risk | Borrowing Mix

- The total borrowing of the segment stood at PKR~466,504mln as End-Jan'24 (SPLY: PKR~596,249mln), down ~21.8% YoY.
- The largest component of borrowing comprise the fixed long-term loans which constituted ~68.3% of total borrowing and stood at PKR~638,108mln as of End-Jan'24 (SPLY: PKR~294,899mln). Meanwhile, the working capital component formed ~31.6% of the total borrowing and stood at PKR~294,899mln as at End-Jan'24 .
- The total outstanding loans in the renewable power sector (excluding Hydel) stood at PKR~451,245mln as at End-Jan'24. This is ~48% of the total outstanding loan in the power sector.

Borrowing Mix | End-Jan'23 (Inner), End-Jan'24 (Outer)

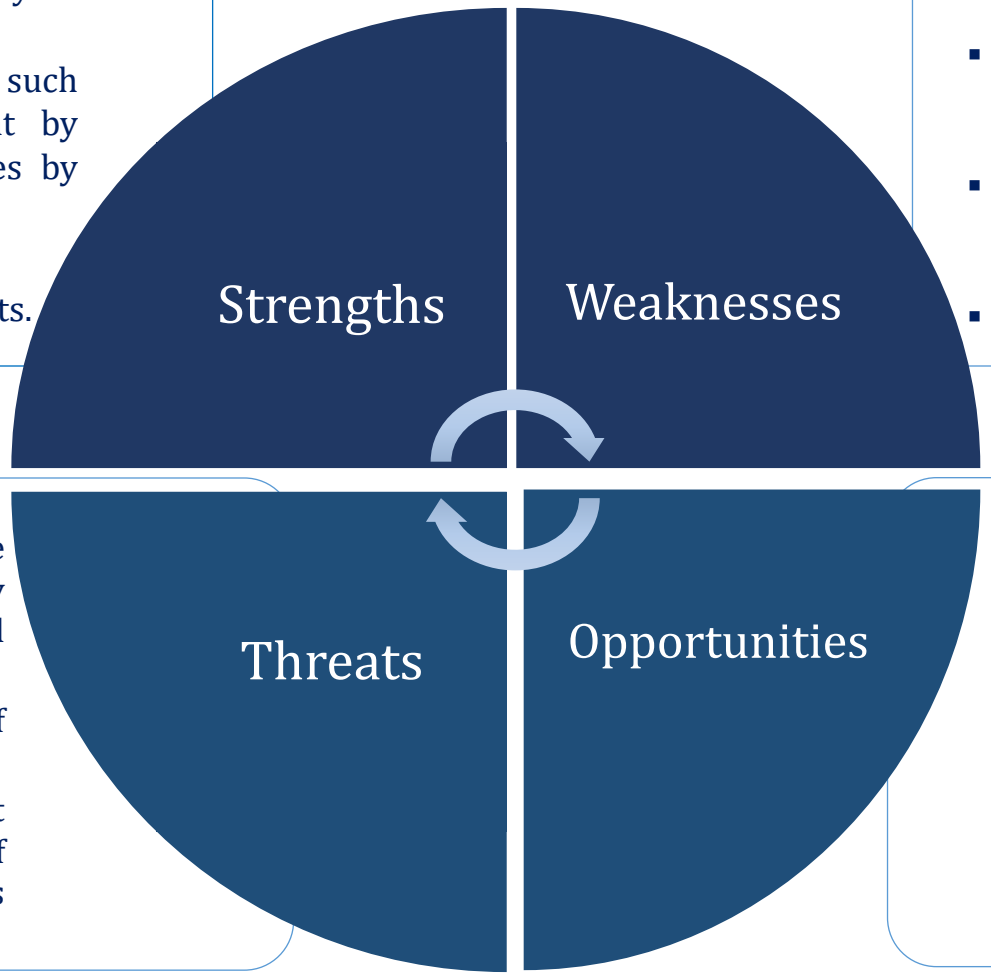


***Note**: Data is reflective of SBP classification "Electric Power Generation, Transmission and Distribution"*

Source: SBP

Distribution | Electricity

SWOT Analysis



- Backbone of the economy, with players operating in a regulated environment.
- Low business risk due to risk mitigants such as sovereign guarantees on payment by purchaser and performance guarantees by contractors.
- Fixed distribution margins.
- Regulator allowances for T&D Loss Limits.

- Centralized Control of PEPCO over DISCOs despite unbundling of WAPDA.
- Power structural reforms as envisaged could not be achieved due to DISCOs not becoming entirely independent autonomous entities.
- Inefficiency in distribution system leading to power outages despite available capacity (T&D losses and fatalities).
- Lack of investment in T&D infrastructure.

- Mounting Circular Debt
- Increased T&D Losses weakening the financial discipline of power supply chain. Low Recoveries from End Consumers.
- Liquidity Damages (LDs) on account of non-performance of FSA.
- Change in regulatory environment leading to lower/or no guaranteed off take for new plants and change of terms for existing ones.

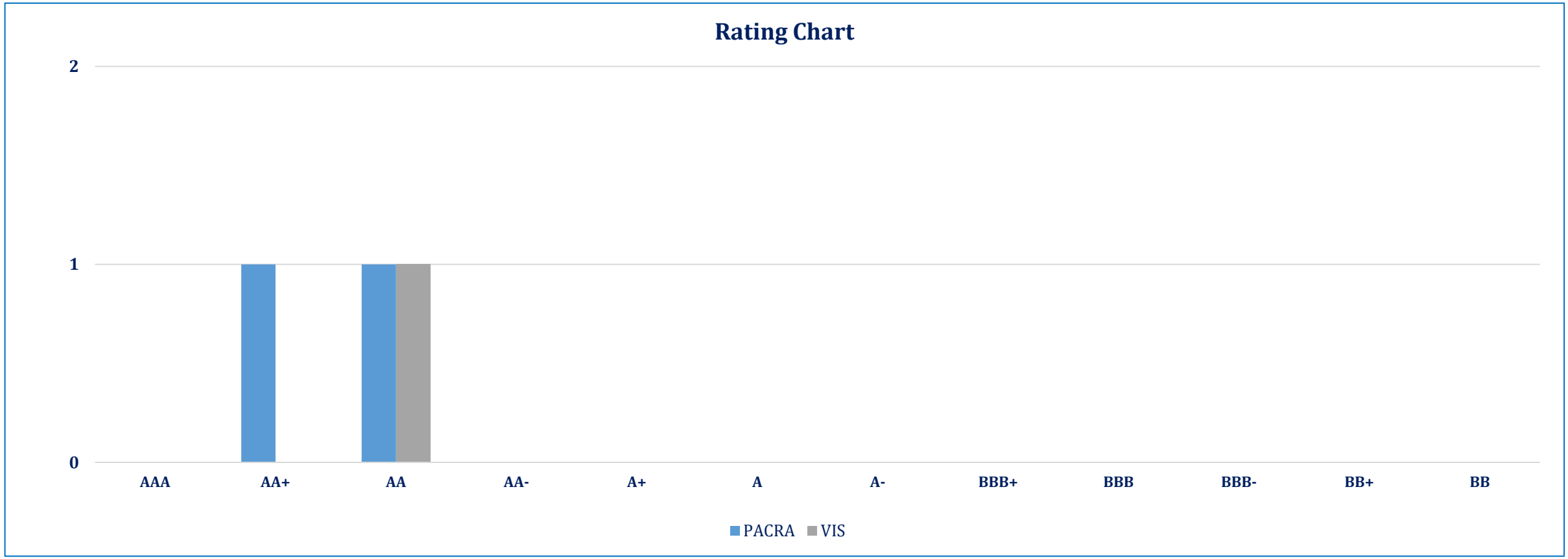
- Revival in economic activity resulting in increased demand.
- Amendment to PPAs to revise the payment and tariff structure for power purchase from IPPs. This will improve the financial distress on the sector.
- Exploration of Coal reserves leading to significant coal based power projects and investments in the Hydel and Renewable Energy Power plants.

Source: PACRA Database

Distribution | Electricity

Rating Curve

- PACRA rates 2 entities in the Pakistan Electricity (Distribution) sector, namely, NTDC and K-Electric, with ratings bandwidth ranging between AA+ and AA.



Source: PACRA Database

Distribution | Electricity

Outlook: Stable

- The sector is considered the backbone of country's economy, seeing as Pakistan's GDP growth and electricity consumption exhibit a strong correlation over a 7-year horizon (FY17-23), with a Pearson coefficient of ~0.94, indicating a strong positive correlation. Pakistan's overall power consumption was down ~8.8% YoY in FY23, equivalent to ~88% of the total power generated during the same year.
- However, the sector has grappled with persistent challenges, including high Transmission & Distribution (T&D) losses and inadequate bill recovery by the DISCOs. Governance issues have significantly contributed to the mounting circular debt, which reached a staggering PKR~2.3tln in FY23, a YoY build-up of PKR~57bln and formed ~2.9% of country's GDP. Payables to IPPs and PHPL payables together accounted for ~95% of the circular debt stock in FY23 (SPLY: ~96%). As of End-Oct'23, the stock further filed up to PKR~2.6tln, up ~13.0% as compared against End-Jun'23.
- Moreover, while average T&D losses of the DISCOs and KE were recorded at ~18.3% and ~15.3%, respectively, in FY23 (~18.8% and ~15.4%, respectively, in FY22), these resulted in a financial impact of PKR~160bln in FY23 (up ~36% YoY). While recoveries against the billed amount stood at ~93.3%, up by ~3% YoY, low recoveries led to DISCOs receivables surging to PKR~1,727bln, a ~12.8% YoY increase.
- During FY23, for NTDC, gross/ operating profit margin dipped to ~44% in FY22. Similarly, net profit margin was also down to ~17% during the year. On the other hand, average gross profit margin for DISCOs registered a decline to ~10%, despite net revenue inching up ~10.5% YoY and the entity's net profit margin diluted to ~(6)%. Along with a dip in electricity consumption, sector players faced high energy and finance costs, on the back of overall high inflation and SBP's hawkish monetary stance.
- Although Pakistan's electricity distribution capability is sufficient to meet its demand, it is equally essential to strengthen and expand the T&D network of the country in order to achieve optimal utilization of the distribution capacity. Immediate measures are required for an integrated planning and investment in the National Grid System to remove the T&D constraints and ensure smooth transmission of cheaper electricity to the end consumers.

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- Enerdata
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