SECTOR STUDY . FEBRUARY 2025

Together. Creating Value.

POWER

Research Team

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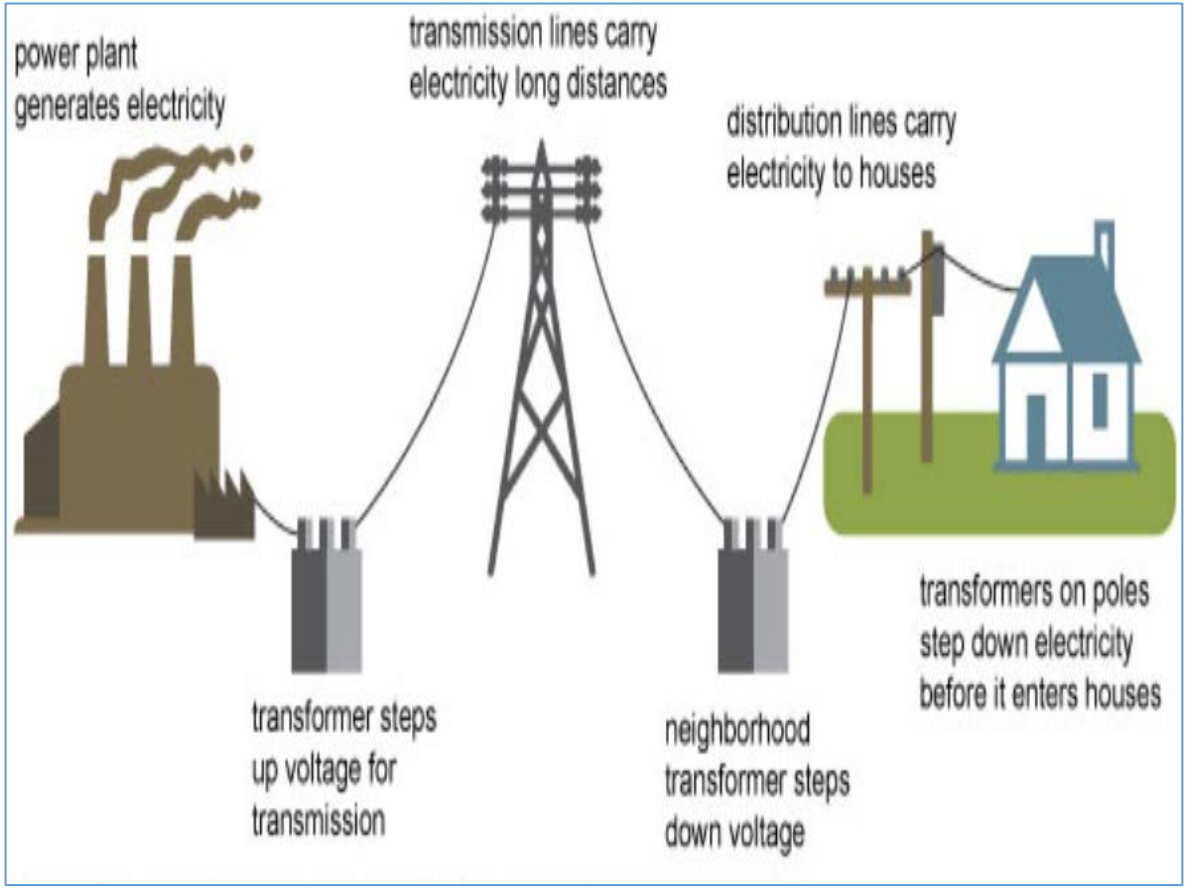
Introduction

- 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 the conversion of other energy sources such as Coal, Natural Gas, Oil, and Nuclear power, among others. These are known as primary energy sources. Primary energy sources can be 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 to shaping 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, sometimes called the grid, of electricity substations, transformers, and power lines that connect electricity producers and consumers. This study shall focus on the **power generation system**.



***Note**: 1GWh= 1,000 MWh*

Source: EIA

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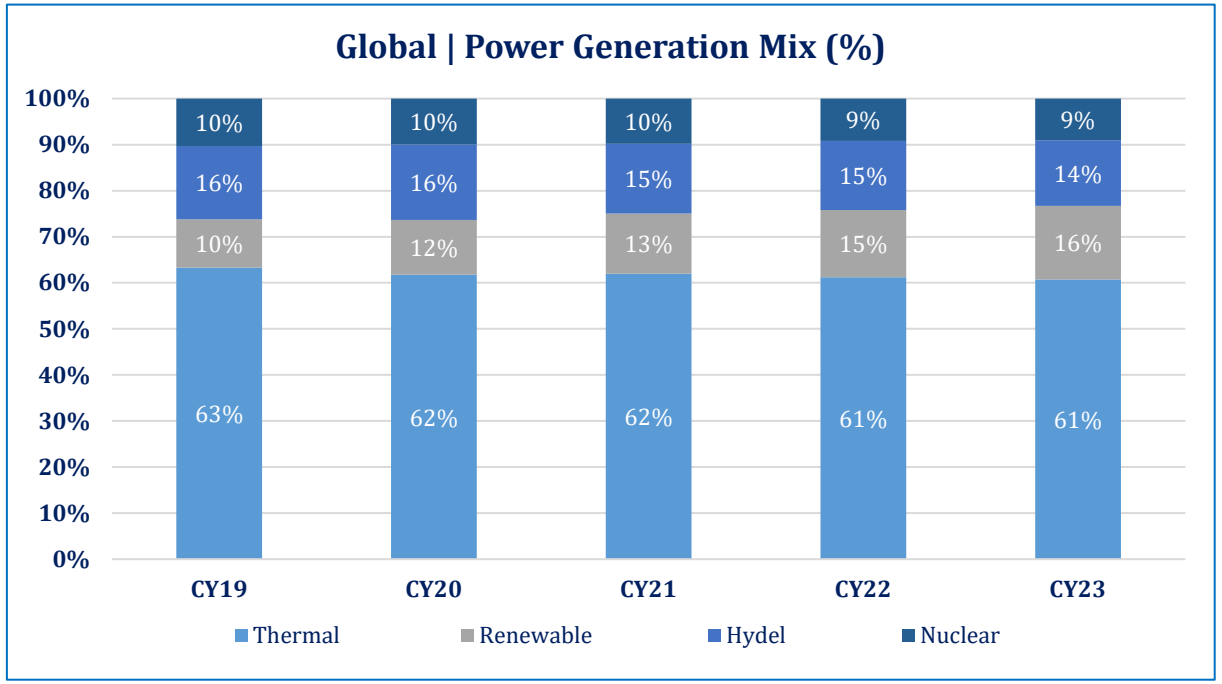
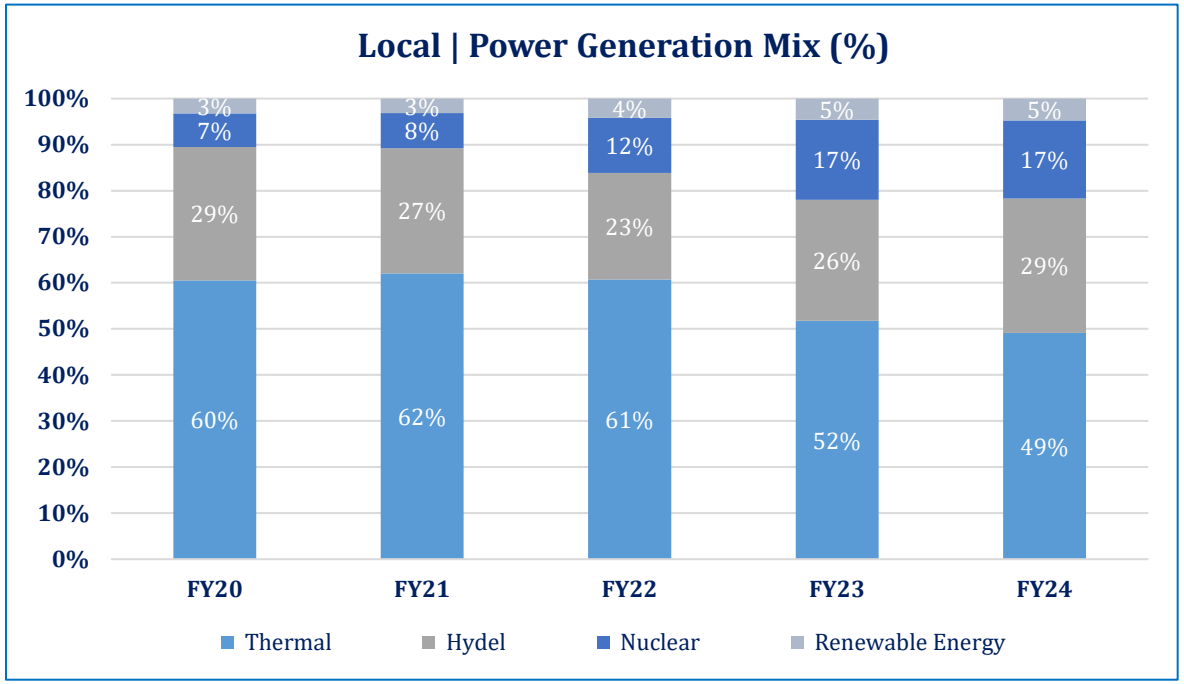
Power Generation Mix | Global vs. Local





- The global power generation mix continues to be dominated by thermal energy sources, including Coal, Oil, and Gas, which accounted for ~61.0% of total generation in CY23. Meanwhile, renewable energy sources, such as solar and wind, collectively represented ~16.0% of the mix during the year. Hydel remained the largest clean energy source, contributing ~14.0%, while nuclear energy ranked second among clean electricity sources with a ~9.0% share in CY23.
- In the case of Pakistan, the share of thermal as a dominant source of power generation has declined since FY21(~61.0%; FY24: ~49.0%) shifting towards renewables (FY20: ~3%; FY24: ~5%). On the other hand, against a total power generation of ~137,196 GWh in FY24, the share of hydel and renewables was cumulatively recorded at ~34.0% during FY24 (FY23: ~31.0%).

Source: Ember, NEPRA

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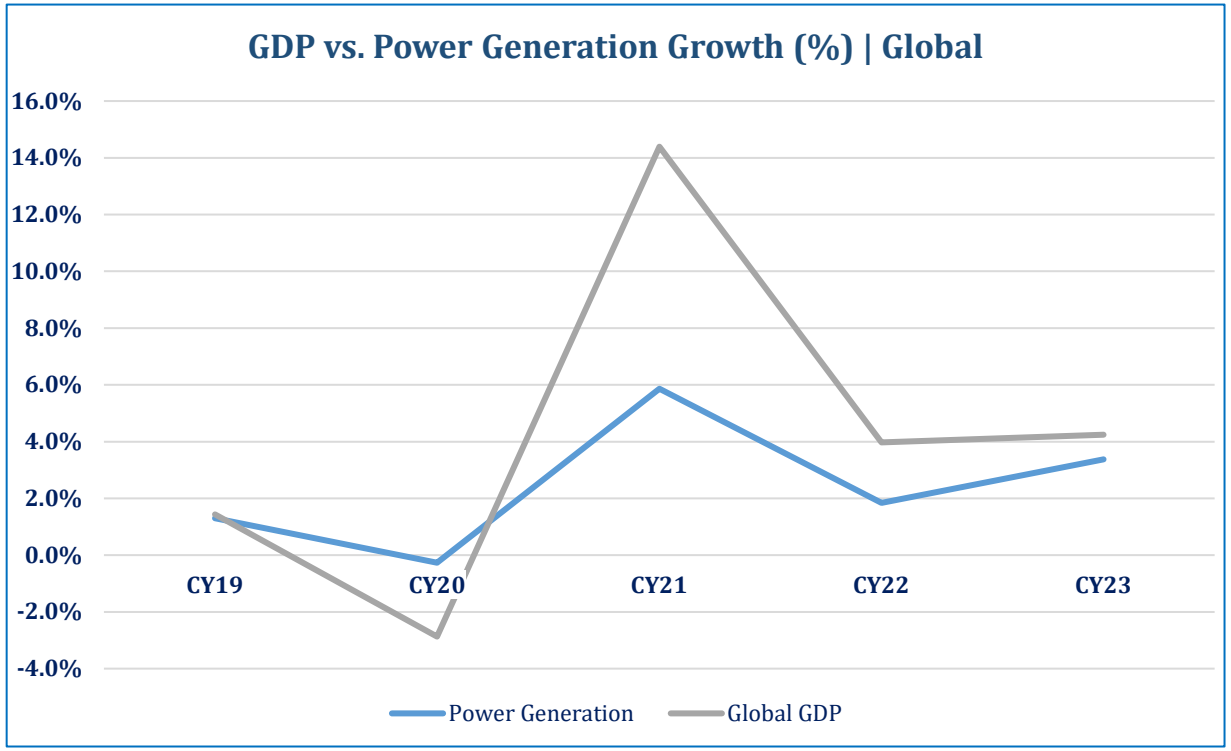
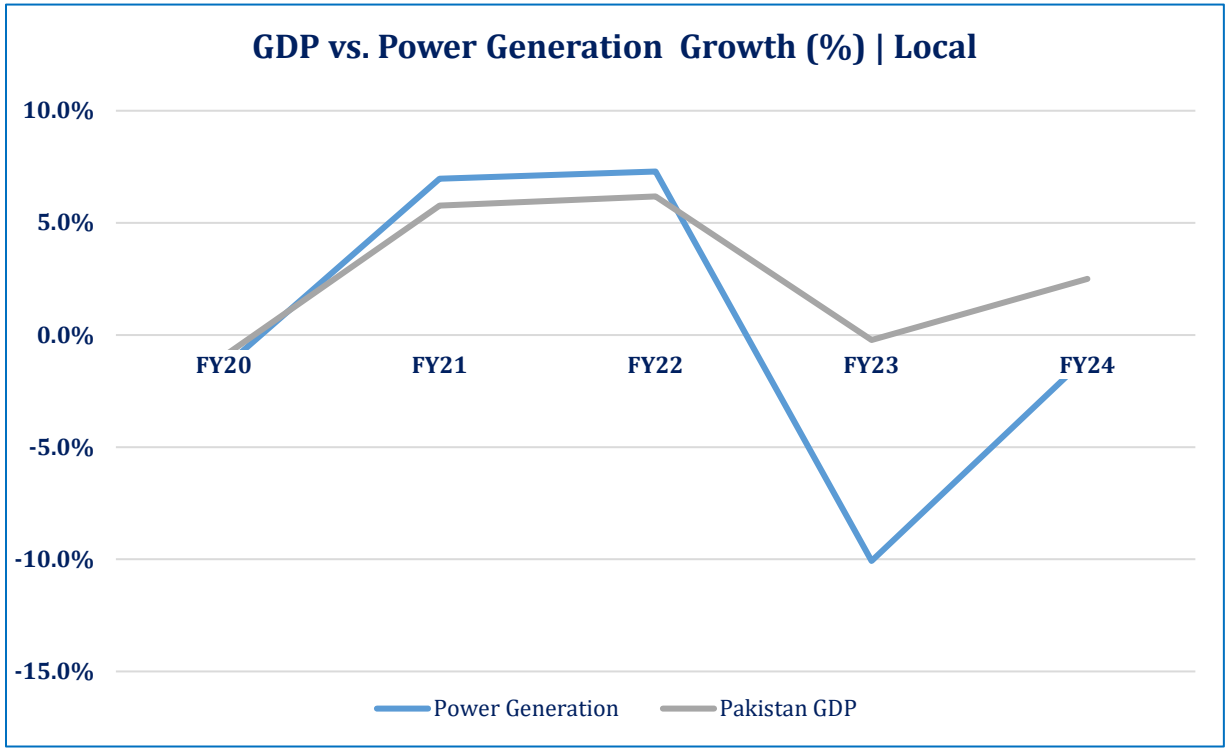
GDP and Power Generation | Global vs. Local

- Global electricity generation reached ~29,471TWh in CY23, up ~3.4% YoY (SPLY: ~28,510TWh). Meanwhile, the global GDP grew by ~4.2% YoY during the same period, recording at USD~105.4trn.

- Pakistan's power generation stood at ~137,196GWh in FY24, marking a decline of ~1.0% YoY while on the other hand, GDP grew, in real terms, by ~2.5% YoY from a negative growth of ~0.2% YoY in FY23.





Note: *Local power generation data reflects the CPPA-G and KE systems.*
MW is converted into GWh

Source: WB, Ember, SBP, NEPRA, PBS

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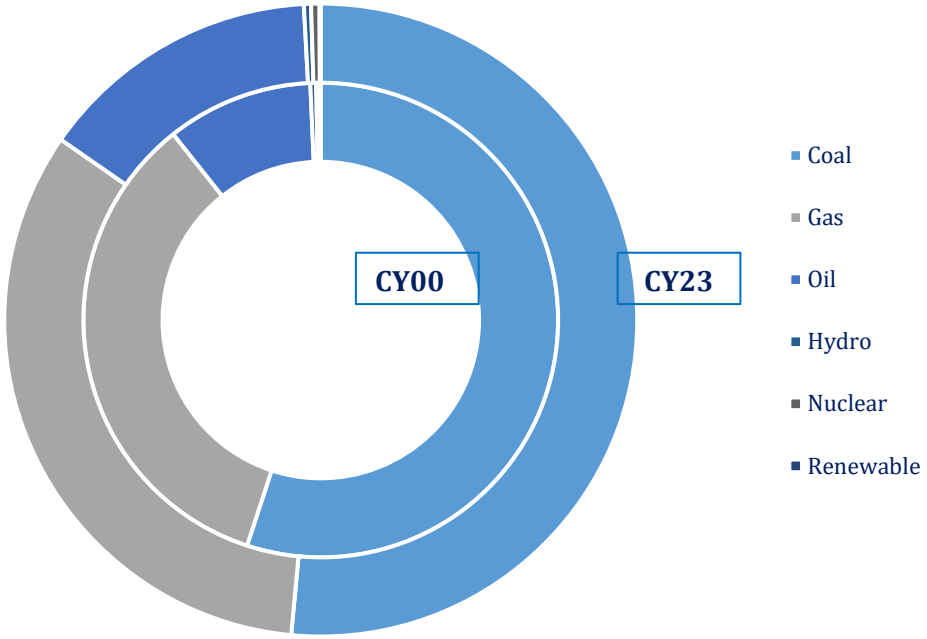
Global | Carbon Emissions | Power Generation

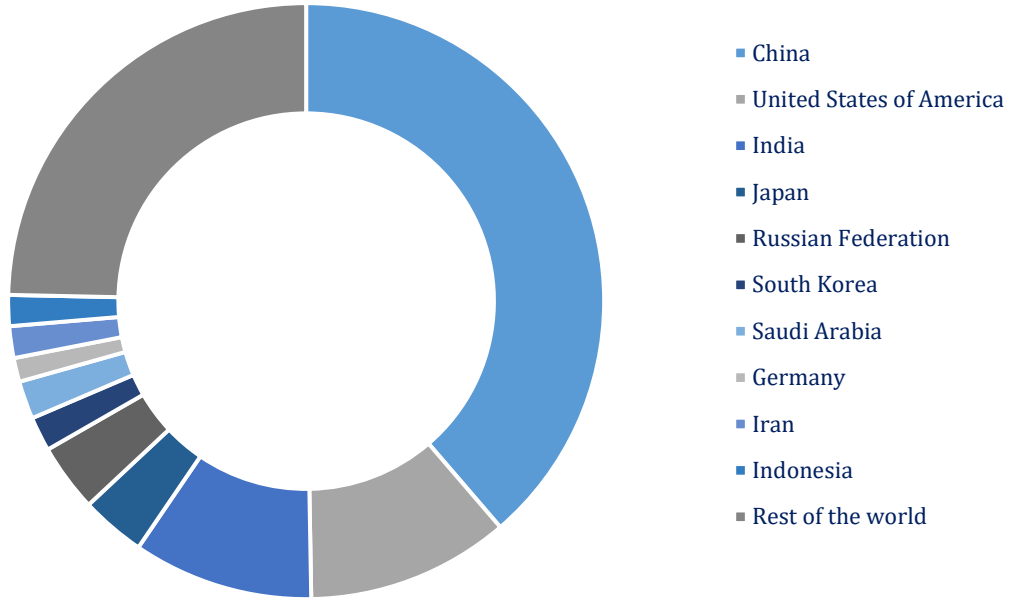
- In CY23, the global carbon emissions from power generation rose to ~14,221mln MT, growing at a CAGR of ~2.6% since CY00. Country-wise, the USA and China alone contributed ~50.0% of the global carbon emissions emanating from power generation during the same period.

- Pakistan contributed just ~0.5% of global carbon emissions from power generation during CY23 (CY22: ~0.5%). However, it was the fifth most vulnerable country at risk of climate change during the same period.

Power Generation | CO_2 Emission by Fuel Type



Power Generation | Country-wise CO_2 Emissions (%) CY23



Source: Ember, UN Habitat, UNDP, Global Climate Risk Index

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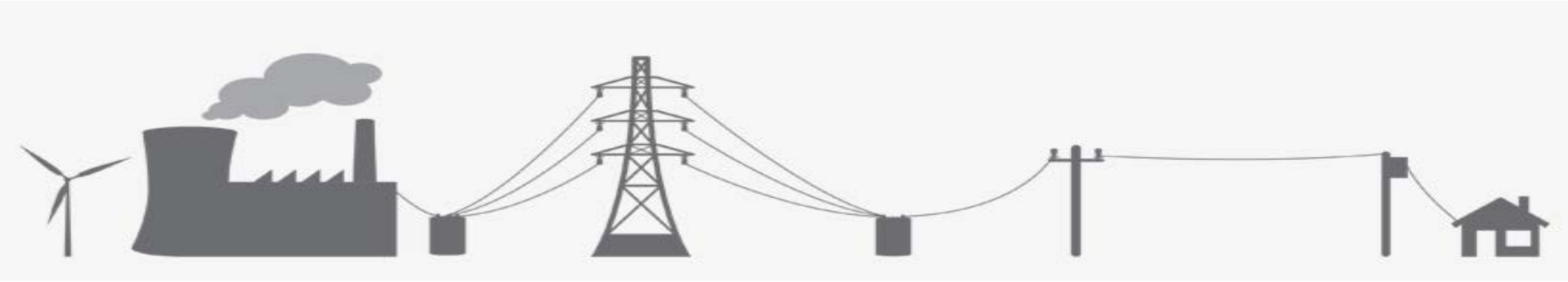
Local | Industry Structure



Generation

IPPs, GENCOs, WAPDA, KE

- **Fossil Fuels**
  Coal, Gas/RLNG
  Furnace Oil
- **Renewable**
  Hydel, Wind, Solar,
  Bagasse
- **Nuclear**

Transmission

- National Transmission and Dispatch Company Limited (NTDC)
- K-Electric (KE)

Distribution

Distribution Companies (DISCOs)

FESCO
GEPCO
HESCO
IESCO
LESCO
MEPCO
PEPCO
QESCO
SEPCO
TESCO
KE

Consumption

Domestic,
Commercial,
Industries,
Agriculture,
Government
&
Others

Note: *KE Operates in all three segments of the Power Sector*

Source: PACRA Database

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Local | Regulatory Structure

Governance Ministry of Energy	Regulator NEPRA	Market Operator CPPA-G
The Power division oversees the entire power sector of Pakistan.	NEPRA is an autonomous body mandated by the law to regulate the Power Sector to ensure that the interests of investor and customer are protected and the sector moves towards a competitive environment. The authority is also responsible for tariff determination.	Power market is operated by Central Power Purchasing Agency (CPPA-G). It procures power on behalf of DISCOs and settles the balances among all the market players. Its objective is to facilitate the power market transition from current single buyer model to competitive market.

Generation Companies (GENCOs) | Oversight

PAEC

- Development of nuclear power remains the responsibility of the Pakistan Atomic Energy Commission.

AEDB

- Renewable Power Projects are overseen by the Alternative Energy Development Board. As of Jun-23, AEDB has been merged with PPIB.

PPIB

- Thermal & Hydel Independent Power Projects are governed by the Private Power & Infrastructure Board.

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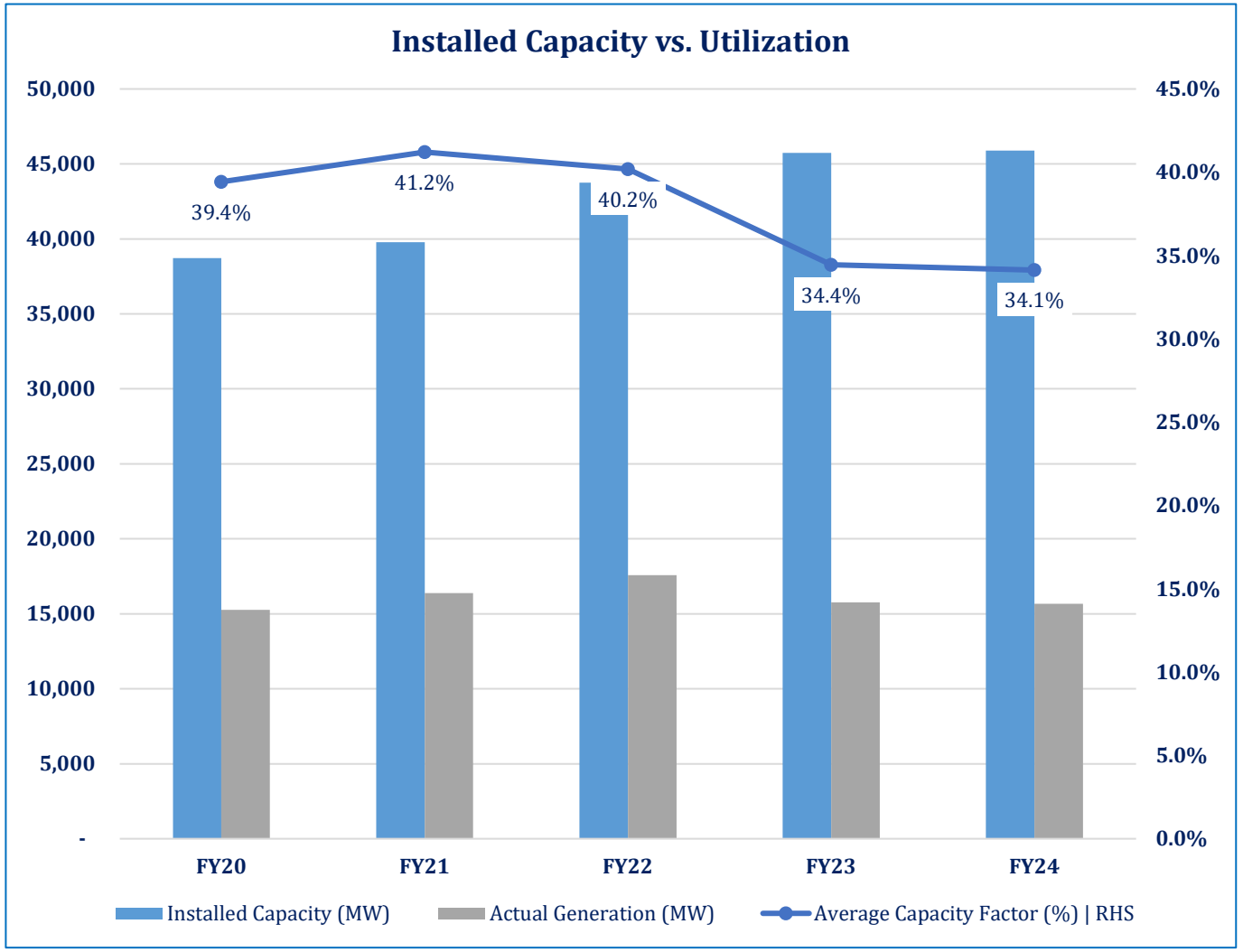
Local | Installed Capacity vs. Utilization

- The country's total installed power generation capacity was recorded at ~45,888MW in FY24, up ~0.3% YoY (FY23: ~45,738MW), while the actual power generation was recorded at ~15,662MW, down ~0.6% YoY.
- Meanwhile, average capacity factor was recorded at ~34.1% in FY24 (FY23: ~34.4%). The capacity factor measures the percentage of installed capacity that is utilized. A low-capacity factor indicates inefficiency in the system usage.
- Total generation from the public power plants in FY24 comprised ~61.4% of the total generation, whereas private sector plants contributed ~38.6% (SPLY: ~51.0% and ~49%, respectively).
- Moreover, the CPPA-G contributed ~93.0% to the overall power generated in FY24, while KE comprised the remaining ~7.0%. In addition, Pakistan also imports power from Iran.



Source: NEPRA, SBP

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Local | Power Plants

Generation Type	Nature of Entities (Public/Private)	No. of Power Plants	% Share in Country's Installed Capacity (FY24)	Description
Thermal				
IPPs	Private	42	45.2%	Major IPPs include KAPCO, Hub Power, Huaneng Shandong Ruyi, NPPMCL, Port Qasim Electric and China Power Hub.
GENCOs	Public	09	9.9%	Major GENCOs include TPS Muzaffargarh and Jamshoro.
KE – Own	Public	10	6.9%	Major plant includes Bin Qasim TPS-I.
Total		**61**	**62.0%**	
Hydel				
WAPDA	Public	22	20.3%	Major Hydropower units include Tarbela, Tarbela 4th extension, Ghazi Barotha and Mangla Warsak units. Among the IPPs, Karot Hydropower has the largest installed capacity.
IPPs	Public/ Private	11	2.7%	
Total		**33**	**23.0%**	
Nuclear				
CHASHNUPP & KANUPP	Public	07	7.8%	CHASHNUPP (I, II, III, IV) with installed capacities of ~1,330 MW and KANUPP (I, II & III) with installed capacities of ~2,290 MW.
Total		**07**	**7.8%**	
Renewables				
Wind IPPs	Public/Private	36	3.9%	All projects have individual installed capacities of less than ~100 MW.
Solar IPPs	Public/Private	07	2.4%	All projects have individual installed capacities of ~100 MW or less.
Bagasse/ Biomass	Public/Private	09	0.6%	All projects have individual installed capacities of ~100 MW or less except Fatima Energy (installed capacity of ~120 MW).
Total		**52**	**6.9%**	
Total Installed Power Plants		**155**	**100%**	

***Note**: Data pertains to FY24. *Installed Capacity as per valid Generation License.*

Source: NEPRA

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Local | Plant-wise Installed Capacities

The CPPA-G basket includes all Power Generation Plants of the country except those falling in the K-Electric (KE) ambit, which is responsible for generating, transmitting, and distributing electricity to all the residential, commercial, industrial, and agricultural areas of Karachi and its outskirts.

% Share in Installed Capacity (MW)	FY20	% Share	FY21	% Share	FY22	% Share	FY23	%Share	FY24	% Share
CPPA-G System	**35,735**	**92%**	**36,934**	**90%**	**40,813**	**93%**	**42,362**	**93%**	**42,512**	**93%**
Hydel	**9,861**	**25%**	**9,915**	**25%**	**10,635**	**24%**	**10,635**	**23%**	**10,635**	**23%**
- WAPDA	9,389	24%	9,443	24%	9,389	22%	9,389	21%	9,389	20%
- IPPs	472	1%	472	1%	1,246	3%	1,246	3%	1,246	3%
Thermal	**22,497**	**58%**	**22,497**	**57%**	**23,821**	**54%**	**25,490**	**56%**	**25,490**	**56%**
- GENCOs	4,881	13%	4,881	12%	4,731	11%	4,587	10%	4,587	10%
- IPPs	17,276	45%	17,276	43%	18,750	43%	20,563	45%	20,563	45%
- SPPS/CPPs	340	1%	340	1%	340	1%	340	1%	340	1%
Nuclear	**1,330**	**3%**	**2,475**	**6%**	**3,620**	**8%**	**3,620**	**8%**	**3,620**	**8%**
Renewable	**2,047**	**6%**	**2,047**	**5%**	**2,737**	**7%**	**2,617**	**6%**	**2,767**	**6%**
K-Electric System	**2,984**	**8%**	**2,838**	**7%**	**3,022**	**7%**	**3,376**	**7%**	**3,376**	**7%**
KE – Own	2,294	6%	2,084	5%	2,345	5%	2,816	6%	2,816	6%
IPPs	366	1%	366	1%	366	1%	366	1%	366	1%
SPPs/CPPs	87	0%	151	0%	151	0%	94	0%	94	0%
KANUPP	137	0%	137	0%	0	0%	0	0%	-	0%
Solar	100	0%	100	0%	100	0%	100	0%	100	0%
Total (CPPA-G + KE)	**38,719**	**100%**	**39,772**	**100%**	**43,835**	**100%**	**45,738**	**100%**	**45,888**	**100%**

***Note**: The breakdown reflects installed and not dependable capacities.*

Source: NEPRA

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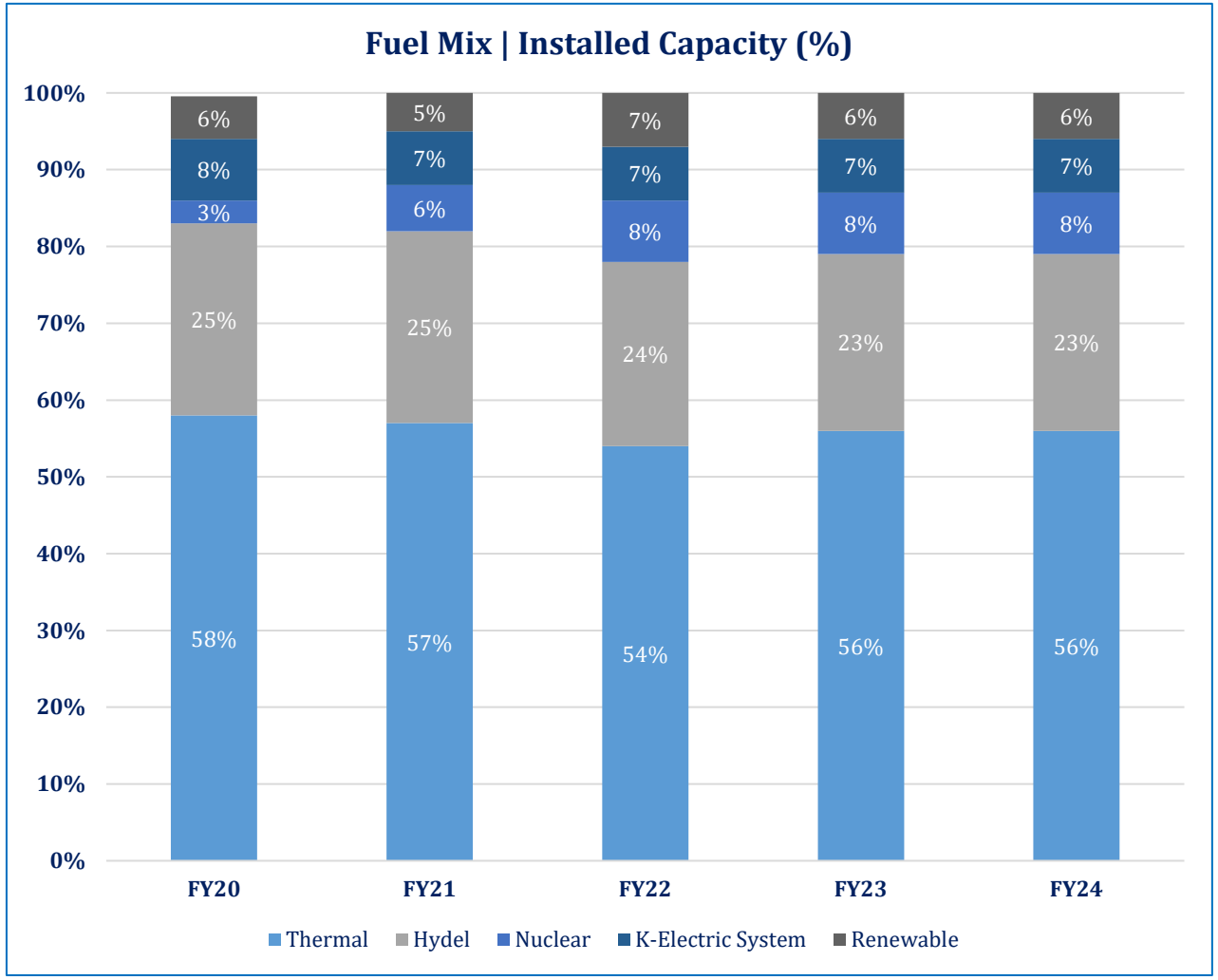
Fuel Mix | Installed Capacity

- The total installed capacity of the country as of FY24 stood at ~45,888MW, up ~0.3% YoY, and comprised the following:
    - Thermal (~25,490MW), remained the same as in FY23;
    - Hydel (~10,635MW), remained the same as in FY23;
    - Nuclear (~3,620MW), remained the same as in FY23;
    - Renewables (~2,767MW), a YoY increase of ~5.7%. During the year, ~36 wind power projects of ~1,838MW cumulative capacity were operational and provided electricity to the grid, while ~7 solar projects of ~680MW cumulative capacity were also operational.
- Total dependable capacity was recorded at ~40,667MW in FY24, down ~7.0% YoY. With respect to the CPPA-G system, dependable capacities for Hydel, Thermal, Nuclear and Renewables stood at ~10,666MW (up ~0.7% YoY), ~20,701MW (down ~13.5% YoY), ~3,326MW (down ~7.0% YoY) and ~2,757MW (up ~9.5% YoY), respectively.
- Meanwhile, KE system recorded ~3.1% YoY in its overall dependable capacity.



Source: NEPRA

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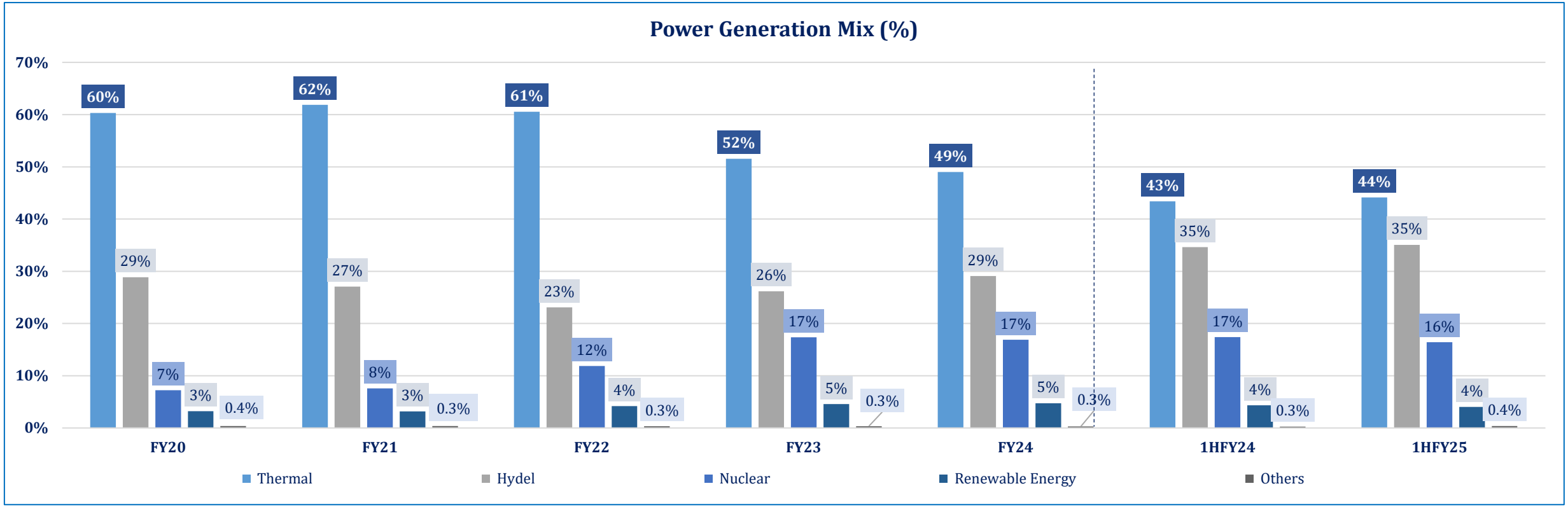
Local | Power Generation Mix



- Similar to the installed capacity, thermal fuels take the lead in the power generation mix of the country. However, due to costlier fuel charges and depletion of local natural gas reserves, the GoP is focused on gradually shifting towards hydel and other renewable energy sources (FY20-24) for power generation. During FY24, power generation from renewables remained largely the same as in FY23.

***Note**: Others include electricity imported from Iran.*

Source: NEPRA, SBP

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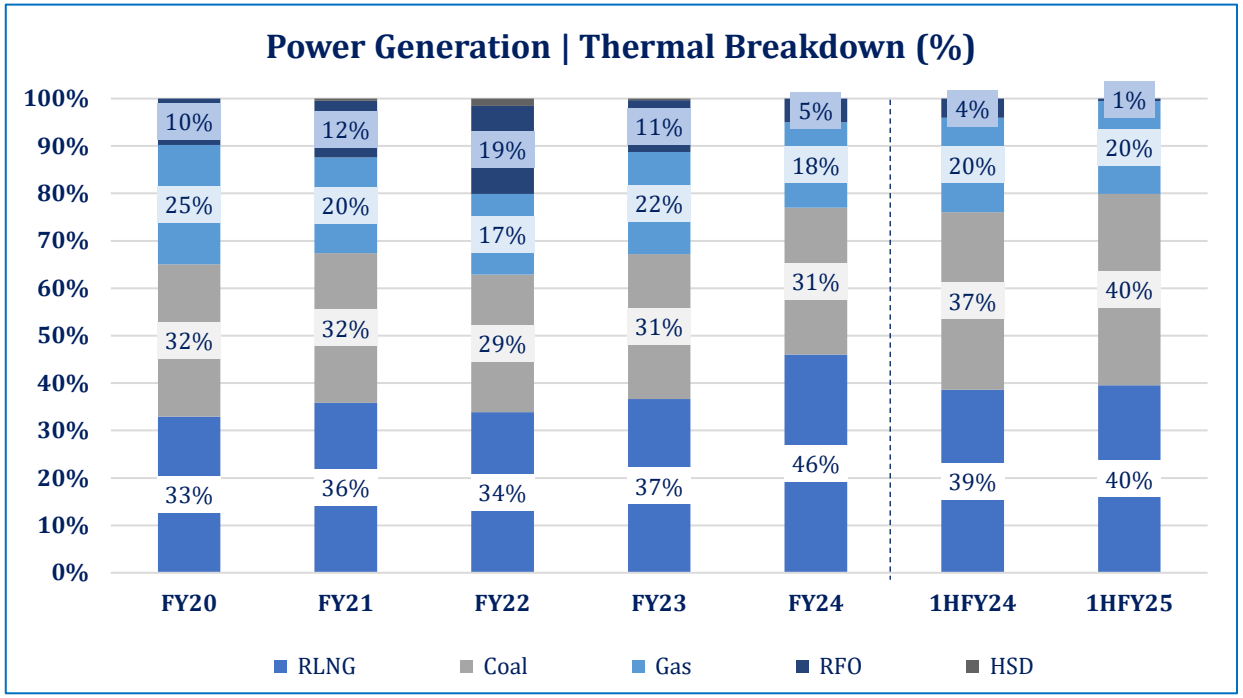
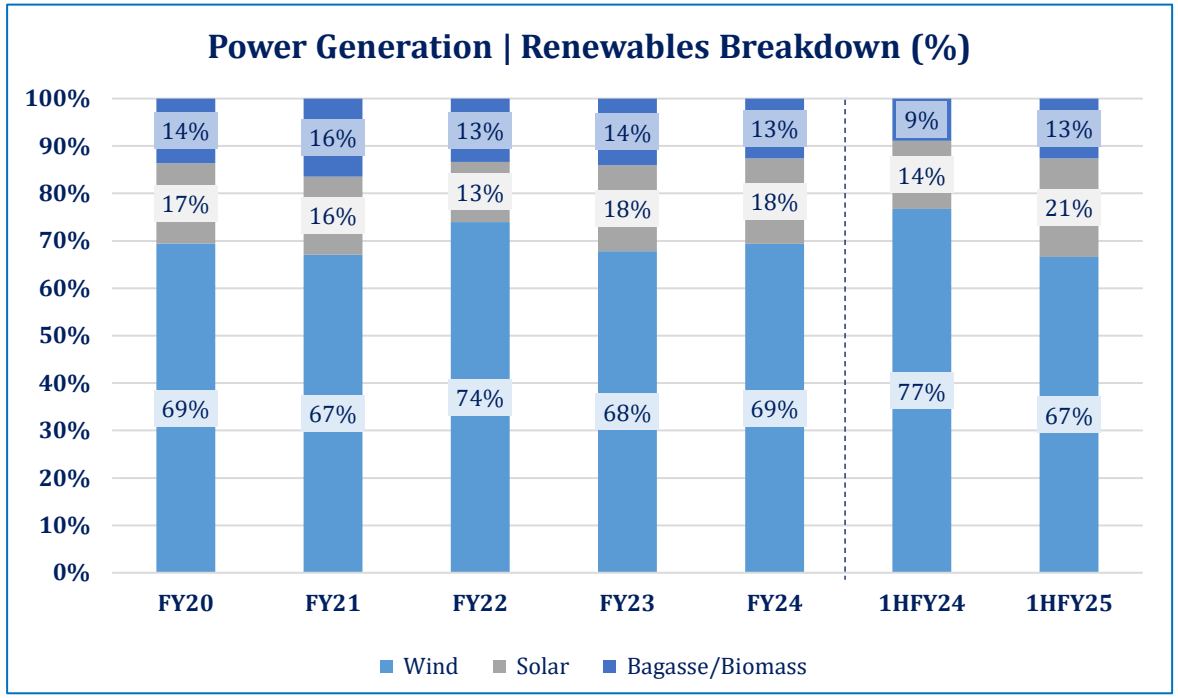
Fuel-wise Generation Mix | Thermal & Renewable Breakdown





- Within the thermal generation segment, reliance has shifted from Natural Gas (~25.0%) and RFO (~10.0%) in FY20 to RLNG (~46.0%) and Coal (~31.0%) in FY24. This transition is driven mainly by depleting local natural gas reserves and higher generation costs from RFO.

- Renewable energy remains the cheapest power generation source, followed by hydel energy (covered later). However, its potential remains underutilized in FY24. Hydel energy accounted for ~29.0% of the total Power generation, up ~3.0% YoY, while solar, wind, and bagasse collectively contributed ~5.0% to the Power mix of the country.

Source: NEPRA

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Power Generation Companies | IPPs

Brief History

- Until the 1980s, Pakistan was continually facing the chronic issue of power shortage due to the rapidly increasing power demand (~7%-8% YoY) and lower supply. The disruption in power supply was impeding the country's industrial progress. This situation called for an immediate intervention by the GoP.
- Because developing power generation capacity is capital intensive and could absorb a high portion of the allocated federal budget, the GoP made in principle decision to seek private sector investment in power generation. For this purpose, a dedicated organization, PPIB, was created as a one-window facilitator for attracting private investment in the power sector.
- HUBCO was the first private power generation project in Pakistan, founded in 1994. As of End-Jun'24, the Power Sector comprises GENCOs, WAPDA, and IPPs, with a total of 105 IPPs distributed under Renewable (52 IPPs), Thermal (42 IPPs), and hydel (11 IPPs) mix.
- Private Power Projects include Foreign-Local partnerships, including groups like Nishat, Sapphire, Attock, Engro and Fauji group.

Key Features

- IPPs are governed under Implementation Agreements (IAs), Power Purchase Agreements (PPAs) and fuel/gas supply agreements.
- The long-term nature of the PPAs (spanning 25-30 years) shields them from adverse macroeconomic changes. Moreover, the underlying take-or-pay mechanism, established under the PPAs, insulates them from risk arising due to variations in the quantity of power purchased from them (through capacity charges).
- IPPs operate in a single buyer market – the CPPA-G (and KE in its respective geography). Under the IA between the GoP and the IPPs, a Guarantee is provided by the GoP of the payment obligations of the Power Purchaser. Any failure of the Power Purchaser to fulfil its payment obligations towards the IPPs is secured by the Government Guarantee.
- Minimum Equity Requirement for the IPPs is set at ~20% of the total project cost. Tariffs for the IPPs are determined by NEPRA and can be determined via (i) Upfront Tariff, (ii) Cost-Plus Tariff and (iii) Competitive Bidding.

Source: CPPA-G, PPIB

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Power Generation Companies | WAPDA

- Pakistan Water & Power Development Authority (WAPDA), established through an Act of Parliament in 1958, is an autonomous and statutory body under the Federal Government's control. It operates with four verticals, namely, (i) Power Wing (ii) Water Wing (iii) Finance Wing, and (iv) Administration Wing.

- The Power Wing is responsible for the operation and maintenance of the Hydel Power Stations, electricity produced from which is delivered to the NTDC grid system, and invoices raised to CPPA-G according to the tariff approved by NEPRA. Presently, WAPDA is operating ~21 Hydel Power Plants with an installed capacity of ~9,389MW (~20.5% of the total system capacity).

- Hydel generation is the cheapest electricity source in the country, therefore, plays a pivotal role in the development of the economic and social sectors by stabilizing the overall power tariff for the consumers.

- The impact of hydel electricity on the national economy can be gauged from the fact that the generation cost of hydel electricity by WAPDA stood at PKR~3.8/kWh in FY24. In contrast, generation cost from thermal sources averaged PKR~25.6/kWh during the same period.

Source: WAPDA

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Upcoming Hydel Projects | WAPDA

Projects Under Construction					
Sr.	**Project Name**	**Generation Capacity (MW)**	**Annual Energy (GWh)**	**Location**	**Expected Completion Date**
1.	Mohmand Dam	800	2,862	Swat River, KP	Dec'25
2.	Diamer Basha Dam	4,500	18,097	Indus River, Near Chilas	Feb'29
3.	Dasu Hydropower Project	4,320 (Stage-I: 2,160)	21,485	Indus River, ~74Km downstream of Diamer Basha	2027
4.	Tarbela 5th Extension	1,530 (3 units, 510 each)	1,347	Indus River, KP	May'26
Total		**11,150**	**43,791**		

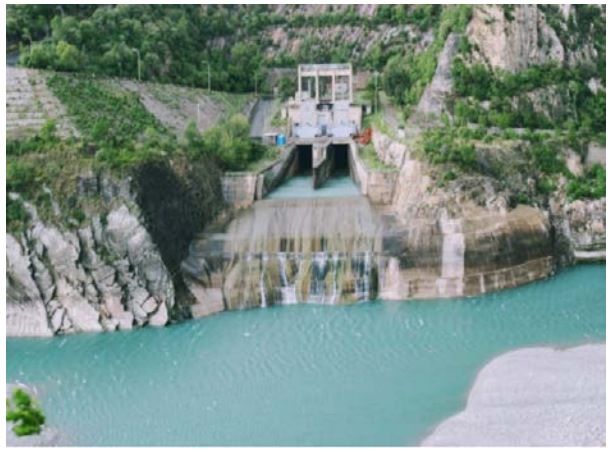
- Of the total ~10 projects under construction, the table above depicts four, with the potential of providing ~43,791GWh. The rest include the Kachhi Canal, Nai Gaj Dam, Kurram Tangi Dam, and Keyal Khwar Hydropower, among others.

- Moreover, ~5 projects are ready for construction, namely, Naulong Dam, Bunji, Lower Spat Gah, Lower Palas Valley Hydropower and Chashma Right Bank Canal Project.

Mohmand Dam

Diamer Basha Dam

Dasu Hydropower Project



Tarbela 5th Extension

Source: WAPDA

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Upcoming Hydel Projects | IPPs

Sr.	Projects	Expected Capacity (MW)	Location	Expected Completion Date	Status
1.	Raili-II Hydropower**	7.1	Ghori Wala Nullah, Muzafarrabad AJK	Dec'26	LOS issued. Under Construction.
2.	Kathai-II Hydropower	8.0	Kathai Nullah Hattian, AJK	Dec'27	LOS issued. FC in progress.
3.	Azad Pattan Hydropower*	700.7	Jhelum River, Sudhnoti, AJK	Sep'32	LOS issued. FC in progress.
4.	Kohala Hydropower*	1,124.0	Jhelum River, Kohala, AJK	Mar'34	LOS issued. FC in progress.
5.	Athmuqam Hydropower	450.0	Neelum River, AJK	Dec'28	LOI Issued. FS completed and approved by POE.
6.	Turtonas- Uzghor Hydropower (Candidate project in the IGCEP portfolio)	82.3	Golen Gol River, Chitral, KP	Dec'29	LOI Issued. FS completed and approved by POE.
7.	Mahl Hydropower	640.0	Jhelum River, AJK/PUNJAB	Dec'32	LOI Issued. FS completed and approved by POE. Tariff determined by NEPRA.
8.	Ashkot Hydropower	300.0	Neelum River, AJK	Sep'31	Project has been transferred by GoAJK to PPIB for further processing as per IGCEP.
9.	Rajdhani Hydropower Project	132.0	Pooch River, AJ&K	Dec'31	To be processed as per the requirements of new capacity in IGCEP.
10.	Kaigah Hydropower Project	548.0	Kaigah, Indus River, KP	To be processed as per the requirements of new capacity in the IGCEP.	
11.	Chakothi-Hattian Hydropower Project	500.0	Muzaffarabad, AJ&K		
12.	Neckeherdim-Paur Hydropower Project	80.0	Yarkun River, Chitral Valley KP		
	Total	**4,572.1**			

***Note**: Data is updated as of Nov'24. FS (Feasibility Study), LOI (Letter of Intent), LOS (Letter of Support), POE (Panel of Experts), IGCEP (Indicative Generative Capacity Expansion Plan). *CPEC Project **Likely to get late due to various issues,*

Source: PPIB

Upcoming Solar Projects | IPPs

- In FY24, ~3 solar projects were successfully integrated into the national grid with an overall capacity of ~150 MW. Other solar projects in progress are mentioned below.

Sr.	Upcoming Projects	Expected Capacity (MW)	Location	Expected Completion Date	Status
1.	Zorlu Solar Pakistan Ltd.	100.0	Bahawalpur, Punjab	Oct'25	TLOS issued. FC in progress.
2.	Siachen Energy Ltd.	100.0	District Thatta, Sindh	Jun'28	Tariff determination is awaited from NEPRA.
3.	Access Solar Pvt. Ltd.	11.5	Jhelum, Punjab	Apr'26	LOS issued. FC in progress.
4.	Safe Solar Pakistan Ltd.	10.3	Bahawalnagar, Punjab	Aug'25	LOS issued. Slow progress.
5.	Access Electric Pvt. Ltd.	10.0	Jhelum, Punjab	Apr'26	LOS issued. FC in progress.
Total		**381.8**			

***Note**: FS (Feasibility Study), LOI (Letter of Intent), POE (Panel of Experts), IGCEP (Indicative Generative Capacity Expansion Plan). Data is updated as of Sep'24.*

Source: PPIB, CPPA-G

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Upcoming Projects | Wind | IPPs

- As of FY24, thirty-six (~36) wind power projects of ~1,790MW cumulative capacity have achieved Commercial Operation and are supplying electricity to the National Grid.
- Of these, ~5 (located in Thatta) fall under the ambit of CPEC with a cumulative capacity amounting to ~297 MW.

Wind Power Plants | To be Constructed				
Project Name	**Expected Capacity (MW)**	**Expected Commissioning Year**	**Location**	**Status**
Western Energy Pvt. Ltd.	50	Jun'28	Jhampir District, Thatta	Tariff determination is awaited from NEPRA.
Transatlantic Energy Pvt. Ltd	50	Jun'28	Jhampir District, Thatta	Tariff determination is awaited from NEPRA
Total	**100**			

***Note**: Data is updated as of Sept'24.*

Source: PPIB

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Upcoming Projects | Bagasse | IPPs

- There are ~89 sugar mills presently operating in the country, producing more than ~5.0MT of sugarcane (~6.0MT during MY18-23). It is estimated that, for every ~3.0MT of sugarcane, ~1.0MT of bagasse can be processed.
- The installed capacity of bagasse/ biomass power plants connected with the NTDC system as of FY24 stood at ~275MW, with ~9 sugar mills/ companies having achieved commercial operational dates (CODs).
- The sugar sector in Pakistan offers good potential for energy efficiency, vis-à-vis High-Pressure Cogeneration (HPC) technology.
- If the production of bagasse is ~4.4MT annually, Pakistan has the potential to generate ~830GWh of excess electricity annually.

Sr.	Project Name	Expected Capacity (MW)	Expected Commissioning Year	Location
1.	Shahtaj Sugar Mills Ltd.*	32.0	Dec'24	Mandi Bahauddin
2.	Tay Powergen Company (Private) Limited	30	Dec'25	Cat-I Project.

Note: *Data is available as of Sept'24. *Waiting for Commencement of Date (COD) expected to generate in FY24-25.*

Source: PPIB, NEPRA, NEECA, CPPA-G, PACRA Database

POWER

Local | Generation License & CODs

During FY24, a total of 8 licenses were issued with a cumulative capacity of ~255.6 MW.
Following is the list:

Solar

1. YDE SA (SMC-Private) Limited (~5.0 MW).
2. Foundation Solar Energy (Pvt.) Limited-Nowshera (~1.0 MW)
3. Foundation Solar Energy (Pvt.) Limited-CMH Lahore (~0.5 MW)
4. Foundation Solar Energy (Pvt.) Limited-Mangla (~1.0 MW)
5. Foundation Solar Energy (Pvt.) Limited-Patoki (~1.5 MW)
6. Foundation Solar Energy (Pvt.) Limited-Risalpur (~1.5 MW)

Hydel

1. PEDO for Gabral Kalam HPP (~88.0 MW).
2. PEDO for Madyan HPP (~157.0 MW).

Capacity and Generation Licenses | Overview

Type	FY20		FY21		FY22		FY23		FY24	
	No. of Licenses	Capacity (MW)	No. of Licenses	Capacity (MW)	No. of Licenses	Capacity (MW)	No. of Licenses	Capacity (MW)	No. of Licenses	Capacity (MW)
Hydel	2	117	4	294	1	152	4	656	2	245
Solar	16	621	18	50	9	35	5	8	6	10.6
Thermal	4	316	1	55	0	0	1	566	-	-
Wind	4	139	-	-	0	0	0	0	-	-
Nuclear	1	1145	1	1145	0	0	0	0	-	-
Bagasse	-	-	3	48	0	0	0	0	-	-
Coal	-	-	-	-	1	10	0	0	-	-
Solid waste	-	-	-	-	0	0	0	0	-	-
RLNG	-	-	-	-	1	5	0	0	-	-
Total	**27**	**2,338**	**27**	**1,591**	**12**	**201**	**10**	**1,229**	**8**	**255.6**

Source: NEPRA

POWER

Local | Tariff Determination

- Determined by NEPRA, tariffs are structured to recover costs charged by GENCOs, energy charges, and DISCOs margin to cover operation and maintenance (O&M) and administrative costs, depreciation, and rate of return.

- The GoP rates are notified with delays and also deviate from the recommended rates, thereby creating cash shortages for the DISCOs.

Generation

- Tariff is determined based on the power purchase agreements (PPAs) between power producers (IPPs and GENCOs) and a single buyer – Central Power Purchasing Agency (CPPA-G).

- This tariff has three components: (1) Capacity Charge (CC) – majorly including construction and design costs of power units, debt financing charges, and ROE (2) Energy Charge (EC) – majorly including the price of fuel and (3) Variable Operations & Maintenance Costs (O&M).

- The Capacity Charge is indexed with parameters such as exchange rates and interest rates. Also, it is based on 'take or pay' method, which implies that power producers are allowed to impose it irrespective of the amount of electricity produced and sold, unlike variable charges which are based on the amount of electricity produced and sold, reference fuel mix and their price. However, the 'take or pay' is currently under review as the government is negotiating with IPPs to shift from 'take or pay' to 'take and pay' model.

Transmission

- Tariff includes the 'Use of System Charge (UoSC) payable to NTDC.

- This amount is calculated using NTDC's required revenue (after incorporating certain permissible expenses) divided by the sum of the maximum demand index of all DISCOs and bulk power consumers connected to the NTDC transmission network.

Distribution

- This includes tariffs determined at the generation and transmission levels (CC + EC + O&M + UoSC) as well as fixed distribution margins of the DISCOs. Additionally, this tariff also includes allowed transmission and distribution losses.

- While the end-user tariff is determined by NEPRA, the actual tariff is notified by the Government to unify tariff across all DISCOs.

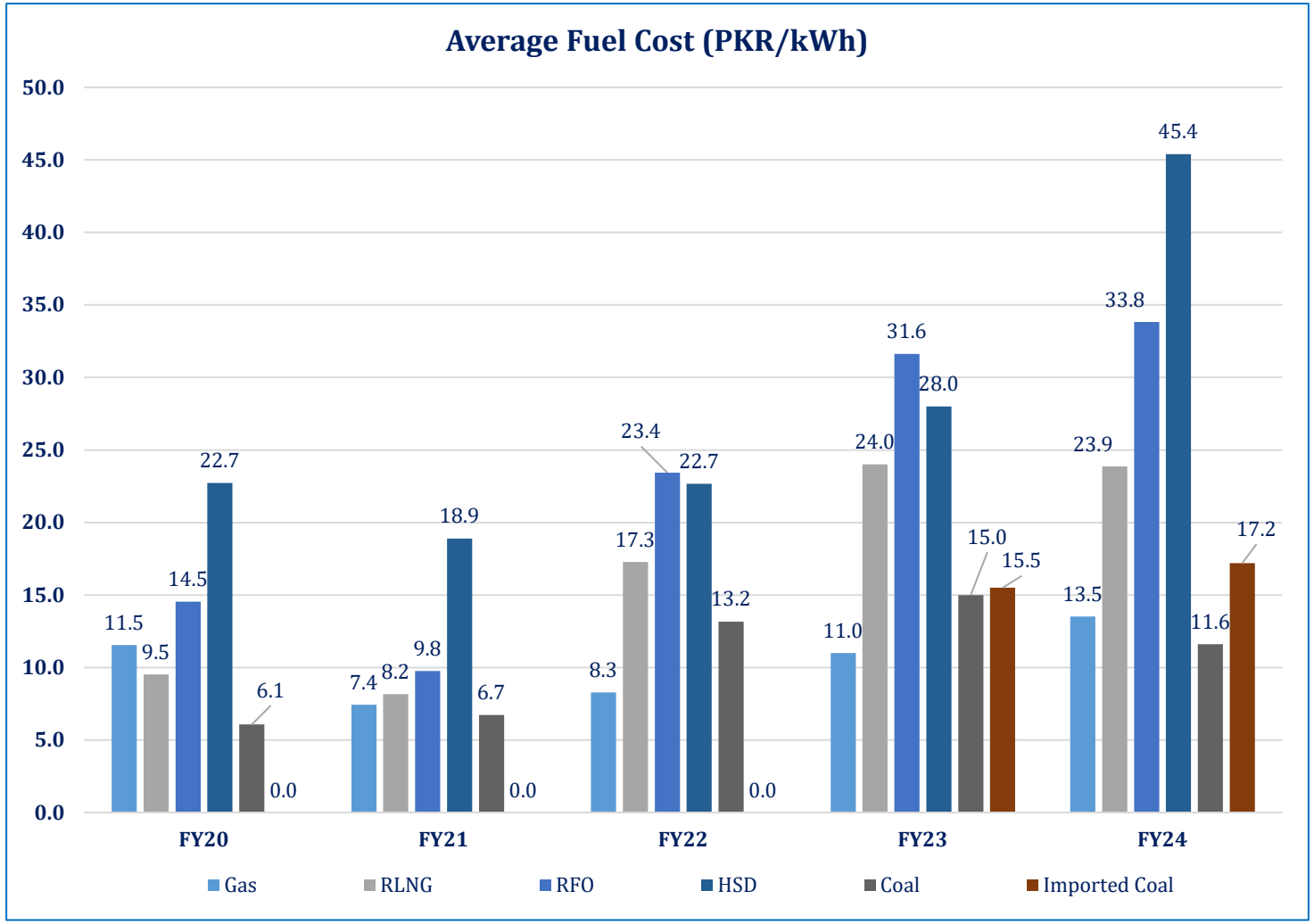
***Note**: This is a general overview of the tariff structure and does not include details such as prior year adjustments, NEPRA fuel price benchmarking, etc.*

Source: SBP, ADB

POWER

Local | Average Fuel Cost

- During FY24, the average generation cost of power (using thermal sources) comprised ~50% of the consumer-end tariff, net of taxes. The cheapest sources of fuel are renewable energy sources followed by hydel energy.
- In FY24, the average cost of hydel electricity produced by WAPDA was assessed at PKR~3.8/kWh for FY24 (FY23: PKR~4.9/kWh), while generation cost from thermal sources averaged at PKR~25.6/kWh (FY23: PKR~21.0/kWh).
- During FY24, HSD and RFO continued to be the most expensive fuel sources for power supply. However, their combined share in the country's generation mix was reduced to only ~2.5% of the total generation mix of the country.
- On the other hand, power produced from local coal has been the cheapest among fossil fuels during FY24 at an average cost of PKR~11.6/kWh). The cost of imported coal clocked in at PKR~17.2/kWh in FY24 (FY23: ~15.5 kWh).
- RLNG fuel cost reduced to PKR~23.9/kWh, while fuel cost by natural gas rose by ~22.7% to PKR~13.5/kWh.

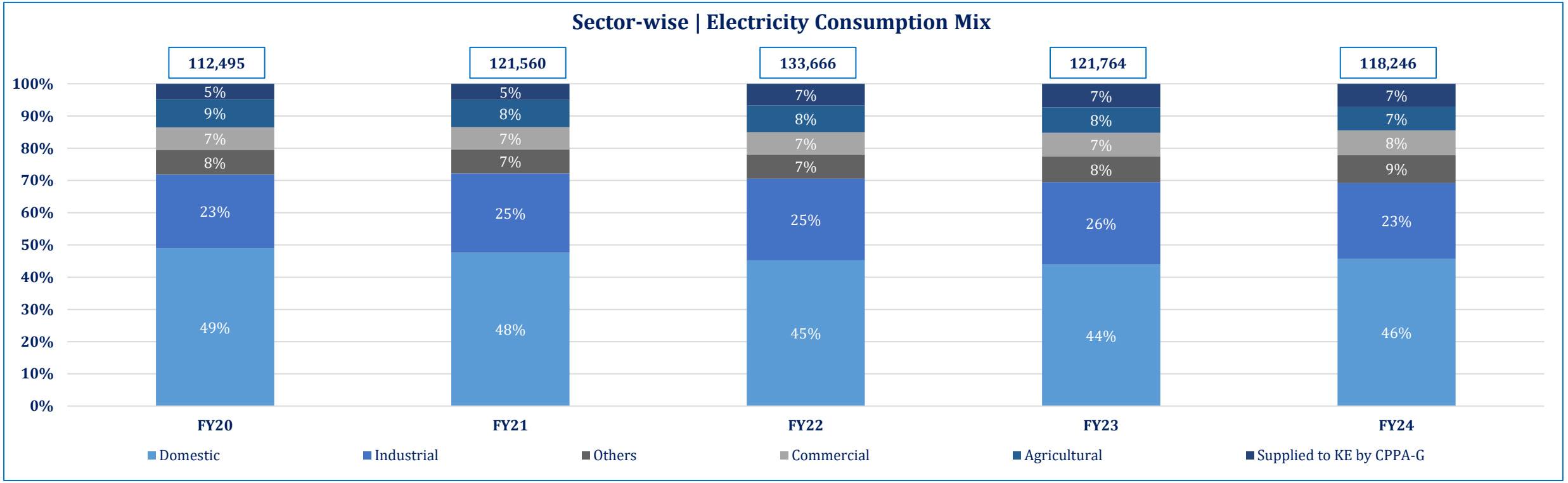


***Note**: Prior to FY23, average fuel cost for Coal had included both the local and imported components, whereas for FY24, these have been reported separately.*

Source: NEPRA

Local | Sectoral Power Consumption

Totals stated in GWh



- Pakistan's overall power consumption declined by ~2.9% YoY in FY24 (FY23: ~-8.9%), equivalent to ~86.2% of the total power generated during FY24. This likely reflects power losses owing to transmission/ distribution losses. The average power consumption per capita was recorded at ~458.0 kWh in FY23 (SPLY: ~517.0 kWh). A regional comparison reveals per capita power consumption stands at ~11,855.0 kWh in the USA, ~3,963.0 kWh in China and ~846.0 kWh in India during CY23.
- In FY24, transmission losses in CPPA-G system clocked in at ~2.5% (SPLY: ~2.4%), while distribution losses accrued to ~18.3% during the same year (FY23: ~16.7%).

***Note**: "Others" refers to 'public lighting, bulk supply and Others', as per NEPRA's disclosure. The data includes both systems i.e., CPPA-G and KE.*

Source: NEPRA, Ember, Energydata, U.S. Department of Energy

POWER

Local | Sectoral Tariffs

- Residential and commercial consumers are charged the highest average tariffs among the peer groups. In contrast, industrial and agriculture sectors are charged the lowest, due to different subsidies provided for the end-consumers as well as the low base effect of hydel fuel charges.
- For FY25, average tariffs for residential, commercial, industries, and agriculture segments were revised to PKR~35.2/kWh, PKR~45.5/kWh, PKR~31.8/kWh, and PKR~34.23/kWh, respectively.

Sector	FY21	FY22	FY23*	FY24
	Uniform Determined Tariff – Variable Charges (PKR/kWh)			
Residential	4.0-21.7	26.64	20.73	32.25
Commercial	19.2-19.5	26.58	29.55	34.25
Industrial	12.6 – 21.2	24.8-27.8	25.42	30.2-34.4
Agricultural	13.0 – 23.7	25.11	16.6-29.85	24.5-38.5

Note: *The ranges reflect Time of Use. Data is for Off-peak hours. *Oct'22 onwards*

Source: NEPRA

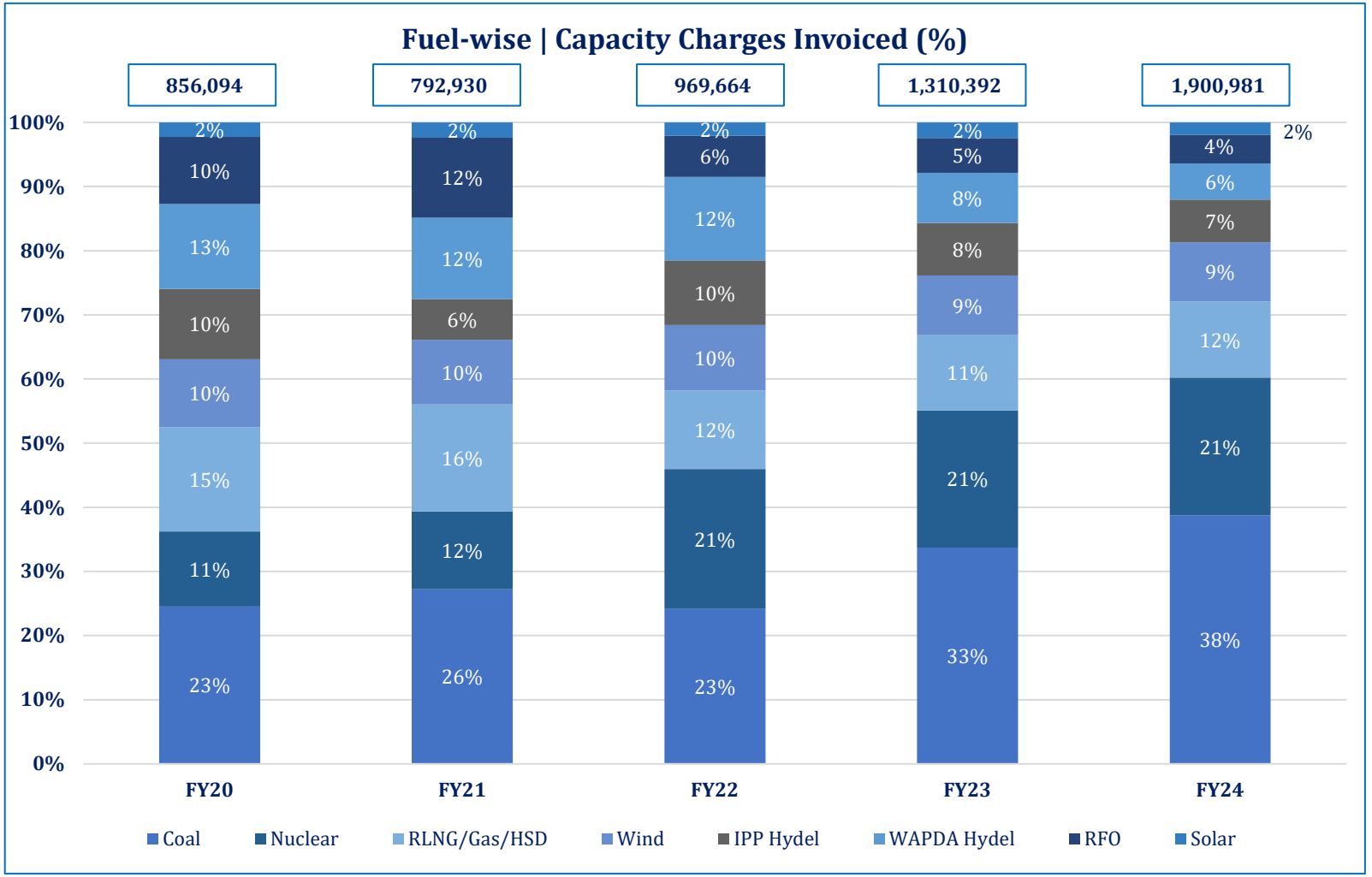
POWER

Local | Fuel-wise Capacity Charges

- Most of the PPAs with base load thermal power plants are capacity-based 'Take or Pay' contracts under which capacity payments are necessarily required to be paid against available generation capacity irrespective of whether it was utilized or not.

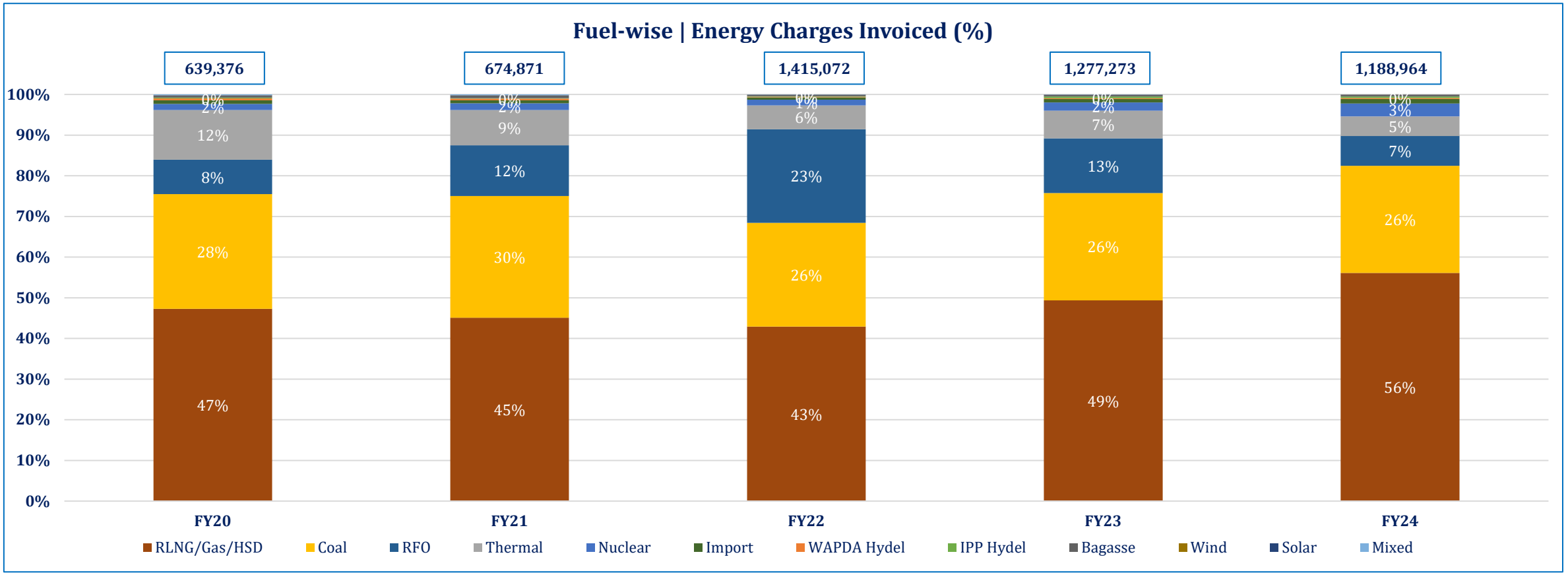
- The 'Take or Pay' compulsion calls for maximum utilization of such power plants to avoid unnecessary capacity payments which translate into a higher per unit cost of electricity for the end-consumers.

Totals stated in PKR mln.



Local | Fuel-wise Energy Charges

Totals stated in PKR mln.



- Energy charges invoiced by the IPPs declined by ~6.9% in FY24 (FY23: ~-9.7% YoY), with RLNG/Gas/HSD, RFO, and coal making up ~89.0% of the total energy charges. The rise in energy charges was driven by higher RLNG dispatch for generation, increasing RLNG/GAS/HSD costs, which contributed ~56.0% to total energy charges (SPLY: ~49.0%).

POWER

Demand & Supply during Peak Hours | NTDC & KE

NTDC Network			
Year	Generation Capability (MW)	Demand During Peak Hours (MW)	Surplus/(Deficit) MW
Actual			
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
FY24	31,545	25,516	6,029

Year	Planned Generation Capability (MW)	Projected Growth Rate (%)	Demand During Peak Hours (MW)	Surplus/ (Deficit) MWh
Projected				
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
FY29	44928	4.9	36,139	8,789

KE Network			
Year	Generation Capability (MW)	Demand During Peak Hours (MW)	Surplus/(Deficit) MW
Actual			
FY20	3,196	3,530	(334)
FY21	3,202	3,604	(402)
FY22	3,383	3,670	(285)
FY23	3,409	3,654	(245)
FY24	3,550	3,568	(18)

Year	Planned Generation Capability (MW)	Projected Growth Rate (%)	Demand During Peak Hours (MW)	Surplus/ (Deficit) MWh
Projected				
FY25	4,698	4.70	3,857	841
FY26	4,698	4.70	4,064	634
FY27	5,179	4.70	4,203	976
FY28	4,950	4.70	4,308	642
FY29	4,950	4.70	4,489	461

***Note**: '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

POWER

Circular Debt | The Unfortunate Menace

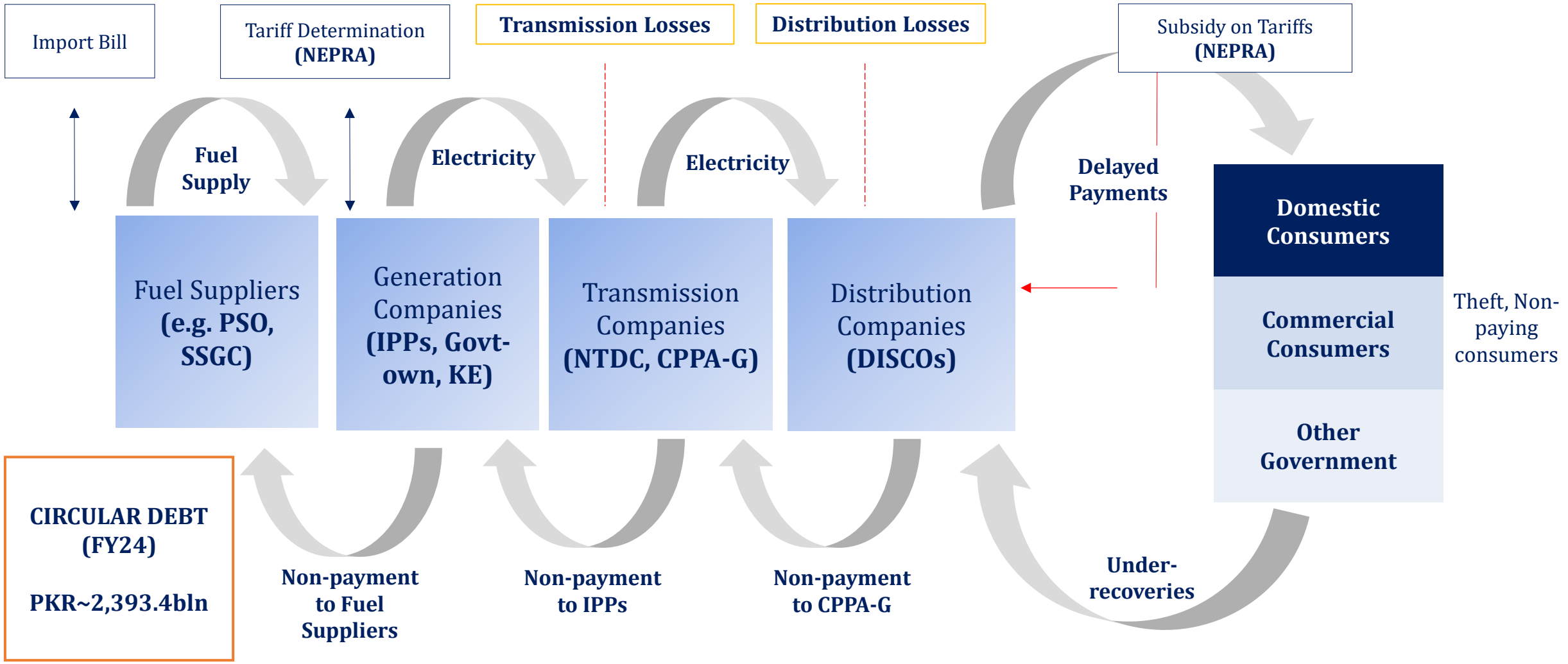
- **Circular Debt is the net unfunded outstanding liability position of the power distribution companies (DISCOs) to the Central Purchasing Power Authority-Guarantee (CPPA-G)**, which further cascades into delayed settlement of payment obligations by the CPPA-G to the Power Generation Companies (GENCOs)/Independent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

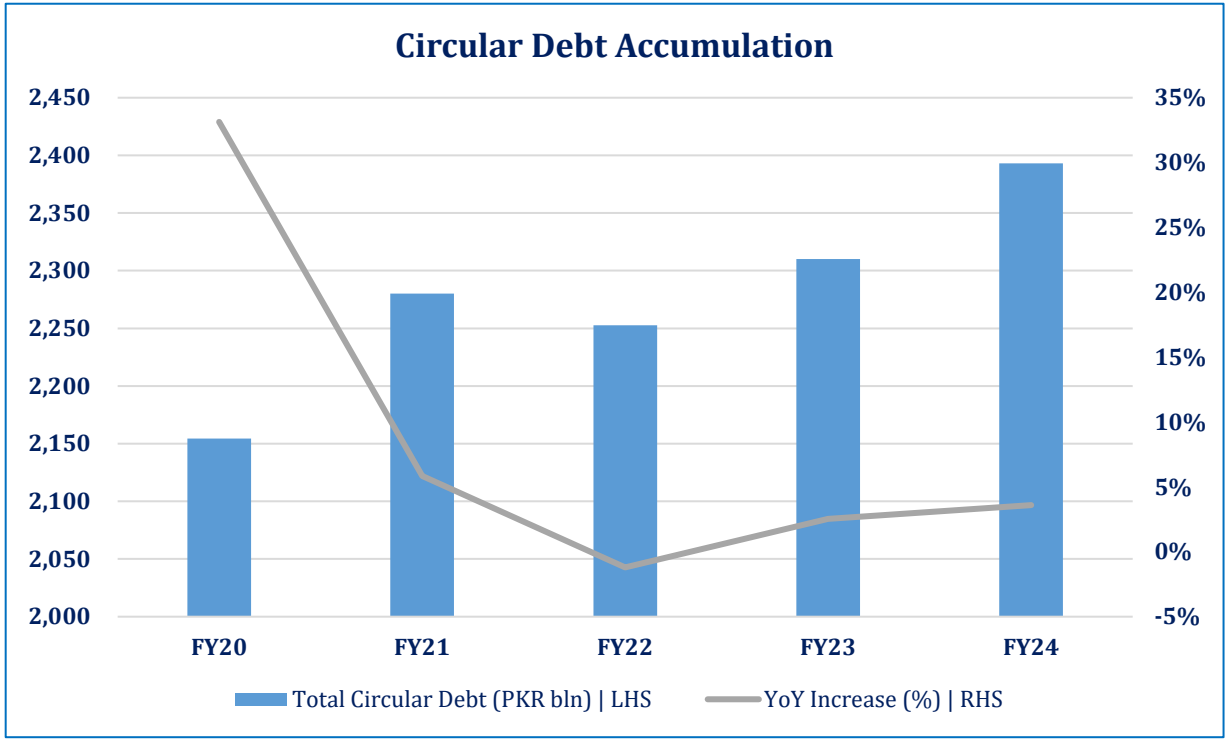
Circular Debt | How it Flows

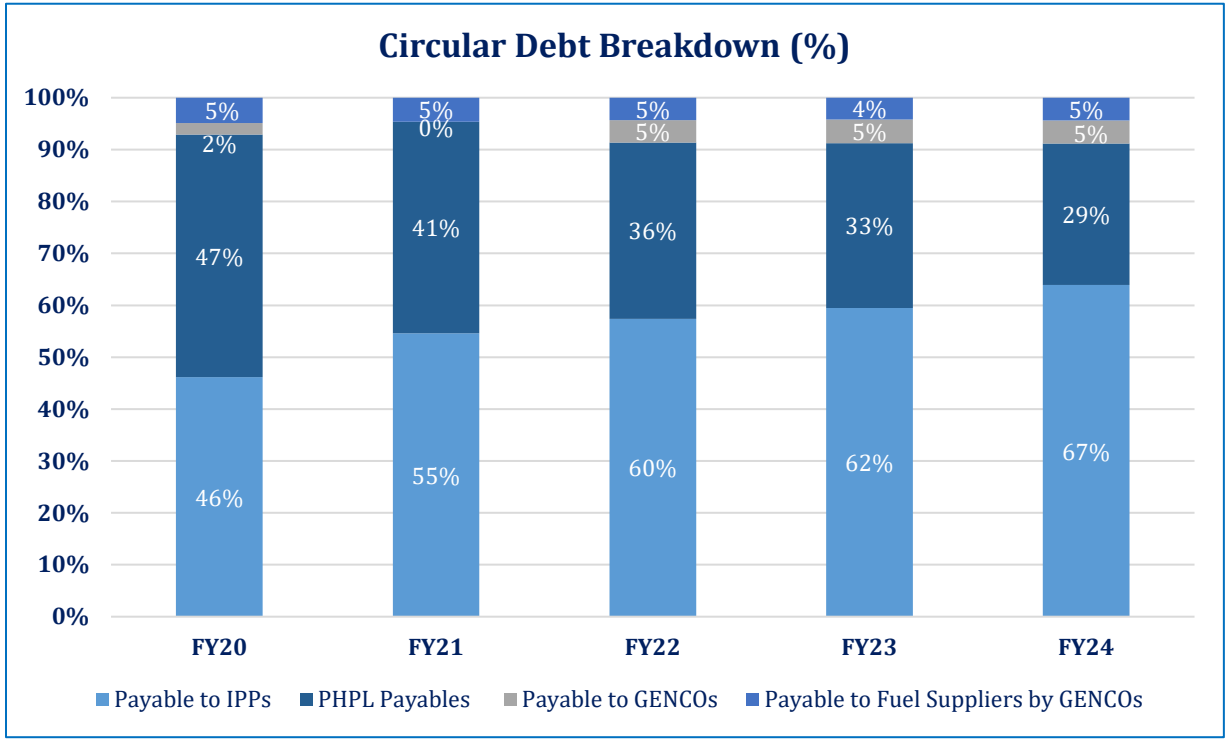


Source: ADB

POWER

Local | Circular Debt Stock





- Pakistan's total circular debt soared to PKR~2,393.4bln as of FY24, up ~3.6% YoY, reflecting the continuing accumulation of circular debt. A further breakdown of circular debt flow is described later. During the said period, circular debt made up ~2.3% of the country's GDP (taken at current prices) (FY23: ~2.9%).
- However, as of End-Nov'24, the stock was down by a marginal ~0.5% to PKR~2,381bln, as compared against End-Jun'24. Payables to IPPs and PHPL payables together accounted for ~96.0% of the circular debt stock in FY24 (SPLY: ~95.0%).

Source: NEPRA, PBS

POWER

Local | Circular Debt Flow

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

- DISCOs continue to underperform putting pressure on the financial health of the power sector. In FY24, DISCOs' shortfall added PKR~276.4bln to the circular debt.

- Higher T&D losses rose to ~18.3% in FY24 (FY23: ~16.8%) while, recoveries against the billed amount stood at ~92.4% (FY23: ~92.4%). The shortfall in the recovery added PKR~314.5bln to the circular debt.

- In FY24, receivables for DISCOs continued to surge and were registered at PKR~2,017.1bln (FY23: PKR~1,727.0bln), an increase of PKR~290.1bln or ~16.8% YoY. Delays in subsidy payments and increasing receivables from public and private consumers are some of the major contributing factors to the mounting power circular debt.

Figures are stated in PKR bln.

Break-up of Increase/(Decrease)	FY23	FY24	5MFY24	5MFY25
Budgeted but unreleased subsidies	0	0	10	5
Unclaimed Subsidies	-70	-63	-	-
IPPs Interest Charges on delayed payments	100	138	63	70
PHL Markup paid out of IPPs' claims	43	-	-	-
Pending Generation Cost (QTAs + FCA)	250	145	146	-31
Non-payment by K-Electric	(53)	-155	59	11
DISCOs Losses Inefficiencies	160	276	70	94
DISCOs Under Recoveries	236	125	153	76
Other Adjustments (prior year recovery, etc.)	-447	-198	-133	-234
PHL Principal Repayments	-35	-82	-	-
PHL Unpaid Markup	-	-	-	-
Stock Payments	-127	-292	-	-4
Total Debt Increase/ (Decrease)	**57**	**106**	**368**	**-13**

Source: Power Division, NEPRA

Local | Recalibrating Circular Debt

Circular Debt Management Plan (CDMP) 2024-25

- The Government has devised a comprehensive two-year Circular Debt Management Plan to curtail the growing circular debt at PKR~2,310bln FY23 level (i.e., zero debt accumulation in FY24). It includes budgeted subsidy of PKR~976.0bln (~0.9% of the GDP) to the power sector during the year including direct support of PKR~584.0bln (~0.6% of GDP) and circular debt stock payments of PKR~392.0bln (~0.4% of the GDP) [PHPL principal settlements of PKR~82.0bln and payments to IPPs/GPPs to the tune of PKR~310.0bln]. Under the IMF SBA, in Jan'24, the following key measures were established to achieve these targets:
  - Continued timely alignment of tariffs with cost recovery levels.
  - Collections enhancement. Under-recoveries are expected at PKR~263.0bln (~0.3% of GDP) for FY24. Enhanced collection efforts initiated in Sep'24 will complement tariff increases.
  - Further progress on reforms to improve input prices, moving towards private sector management of DISCOs through long-term concession from FY24 and renegotiating the remaining power purchase agreements (covered later).
- The CDMP was formulated when the currency parity stood at USD~296.0/PKR and gained approval from the federal cabinet after NEPRA endorsed tariff re-basing in Jul'23 (covered later).
- Despite this, circular debt swelled further in FY24, due to transmission and distribution losses across all DISCOs adding PKR~276.4bln to the debt while unrecovered bills clocked in at PKR~314.5bln. IPPs outstanding dues of PKR~1,094.9bln continue to be a thorn in the shoe.

Source: IMF

POWER

Local | Recalibrating Circular Debt

IPPs | Amendments to the PPAs

- In CY21, the Government of Pakistan (GoP) initiated reforms in the sector to renegotiate the Power Purchase Agreements (PPAs) with the IPPs to reduce the rising power tariffs and contain the increasing accumulation of circular debt. However, most of the negotiation remained unresolved.
- The Government of Pakistan in CY24 resumed the negotiation process with the IPPs and formed a special task force to take charge of it. However, this time, the process does not only involve 'renegotiation' with the IPPs but also an early 'termination' of some of the PPAs.
- Furthermore, renegotiation features would involve a shift of agreements from 'Take or Pay' to 'Take and Pay model'.
- In the initial phase of the process, the GoP has terminated PPAs of ~5 IPPs which were operational under the Power Policy of 1994 and 2002. The GoP, in return, has agreed to clear all outstanding dues on its part as of End-Sep'24, in the context of capacity payments, energy purchase price and pass-through items, by End-Dec'24.
- The GoP believes in saving around PKR~411.0bln to the national exchequer over the remaining contract periods of these terminated IPPs and reducing the power unit cost by PKR~0.71/kWh. Overall, the government expects to cut PKR~8-10/kWh as part of the overall policy measures.
- In the second phase, following the termination of five Independent Power Producers (IPPs) under the 1994 and 2002 Power Policy, the government has successfully negotiated revised agreements with ~8 bagasse IPPs and is now renegotiating with ~18 additional IPPs established under the 1994 and 2002 Power Policies.
- These IPPs will be transitioned from a 'Take or Pay' model to a 'Hybrid Take and Pay' model, aiming to improve efficiency and reduce financial burdens. However, the government has yet to reveal whether additional IPPs terminations are planned as part of this restructuring.

Source: IMF, PACRA Database

Local | Recalibrating Circular Debt

IPPs | Amendments to the PPAs | Salient Features of 'Take or Pay' to 'Take and Pay Model'

The Amendment Agreement shall be effective from November 01, 2024.

- Indexation mechanism of O&M has been changed;
- Tariff of Cost of working capital and O&M has been rebased.
- Return on Equity tariff component will be paid in a hybrid take-and-pay mode.
- Insurance premium tariff is capped at 0.9% of EPC Cost.
- The Company will share profits till FY23 and it will be adjusted against receivables from CPPA.
- GOP will unconditionally withdraw Arbitration under Arbitration Submission Agreements (ASA).
- The undertaking provided to the Power Purchaser by the Company to retain its receivables till the conclusion of Arbitration under ASA shall be returned.
- Payment of outstanding receivables as of End-Oct'24, within ~90 days of approval of the Agreement by the Cabinet.
- Waiver of Delay Payments till End-Oct'24.
- The London Court of International Arbitration (LCIA) clause in PPA will be substituted with Islamabad-seated Arbitration under the local laws.

Note: *These pertain to Nishat Chunian's latest PSX notification concerning its revised Power Purchase Agreement (PPA).*

Source: PSX

Policy Framework | Recent Developments

- **National Electricity Plan 2023-2027 (First Plan)**
  - The plan outlines the implementation framework for National Electricity Policy 2021 under the umbrella of 6 overarching objectives that include diversification, resilience & accessibility, self-sufficiency, affordability, financial viability and sustainability.
  - It also includes a tangible action plan covering ~20 priority areas including investments, subsidies, fiscal incentives, regional integration, localization, digitalization, tariff design, climate change mitigation, governance, research & development, and capacity building.
- **Fast Track Solar PV Initiatives 2022**

The main objectives of these initiatives are as follows:

- Substitute expensive imported fossil fuels used for power generation with Solar PV energy deployments.
- Utilize existing transmission networks to the maximum for offtake of electric power for Federally-owned public power utilities (FPUs).
- Easing the pressure on foreign exchange reserves through reduced reliance on imported fossil fuels.
- Solarization of Public Buildings.
- Solar PV Generation on ~11 kV Feeders

- In continuation with the above, the GoP has set the target for renewable energy share to ~20% by CY25 and ~30% by CY30 according to the ARE Policy, CY20, to bring down high prices of electricity and ensure sustainable use of resources.
- In FY24, the government launched the Anti-Theft Campaign to combat electricity theft. The operation involved resolving numerous cases, filing FIRs, making arrests, and suspending several employees.
- Despite these efforts, the campaign had a minimal financial impact, yielding recoveries of PKR~12.2bln from defaulters and PKR~8.3bln from fines and recoveries. However, transmission and distribution (T&D) losses, along with the non-recovery of bills, continued to escalate, contributing PKR~591.0bln to the circular debt during FY24.

Source: Power Division

Policy Framework | Recent Developments

- As per the Advanced Metering Infrastructure (AMI) roll out plan in DISCOs, ~1,064,448 AMI meters are to be installed till Jun'25. Aerial Bundled Cable (ABC) is another project to control and pre-empt illegal connections through direct hooking thereby controlling the menace of *kundas* and reducing line losses in high losses areas. PESCO and SEPCO have already started installation of these cables.
- Installation of Asset Performance Monitoring System (APMS) has been initiated on distribution transformers for:
  i. Real-time control
  ii. Energy audit
  iii. Theft control
  iv. Targeted commercial load shedding
  v. Protect the transformer against overloads and short circuits.
- Apart from large-scale solar PV projects, the GoP also encouraged the utilization of solar energy technology at the consumer end across domestic, commercial, and industrial sectors. As of End-Jun'24, the number of net-metering-based solar consumers reached up to ~157,844 (FY23: ~75,724) with a cumulative capacity of ~2,498.0 MW. During FY24, ~1,181MW of net-metering-based capacity solar capacity was added, in comparison with ~583MW in FY23.
- As per IMF directives about the Staff-Level Agreement (SLA) of Jul'23, the federal government raised the base tariff of electricity across the country by PKR~4.96/unit w.e.f. July 01, 2023, taking the base tariff to PKR~29.78/unit (FY23: ~24.8/kWh). Moreover, NEPRA was directed to continue with automatic notifications of regular QTAs and FPAs in line with established formulas on time, supported by efforts to spare the protected slabs (with the aim of efficient cost recovery and progressivity of tariff structure for residential consumers). In FY25, this was further increased to PKR~35.5/kWh, where energy charges increased to PKR~10.94/kWh from PKR~7.63/kWh, while capacity charges rose by PKR~1.38/KWh recording at PKR~18.39/KWh.
- Out of total increase of PKR~5.72/kWh in FY25, an increase of PKR~3.29/kWh was passed on to the consumers during Jul-Sep'24, and PKR~4.55/kWh thereafter till Jun'25. The differential amount would be picked up the Federal Government in the form of subsidy.

Source: Power Division, IMF, NEPRA

Indicative Generation Capacity Expansion Policy (IGCEP 2022-31)

- The IGCEP 2022-31, developed by NTDC and approved by NEPRA in Feb'23, serves as a key document for planning new generation capacity to meet future electricity demand scientifically and systematically.

- 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 using indigenous and renewable energy resources to generate 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%.

- However, the development of IGCEP was not finalized, and hence, the government formed a technical committee to finalize the assumption sets for IGCEP. Building on this framework, NTDC developed the latest iteration, IGCEP 2024-34, aligning it with the newly approved Grid Code 2023 and the directives outlined in the National Electricity Policy 2021 and the National Electricity Plan 2023-2027.

- NTDC/System Operator submitted ISP-2024, integrating IGCEP 2024-34 and TSEP 2024-34, for the Authority's review. However, the case was returned for further sensitivity analysis, which NTDC delayed, leaving it still pending.

- Out of ~120 countries, Pakistan was ranked ~113 on the Energy Transition Index (ETI) in CY23, with an ETI score of ~46.2, reflecting a lack of sufficient initiatives aligning with the county's commitment to energy transition efforts. A further bifurcation of this score reveals that for System Performance (SP), the country's score was 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

POWER

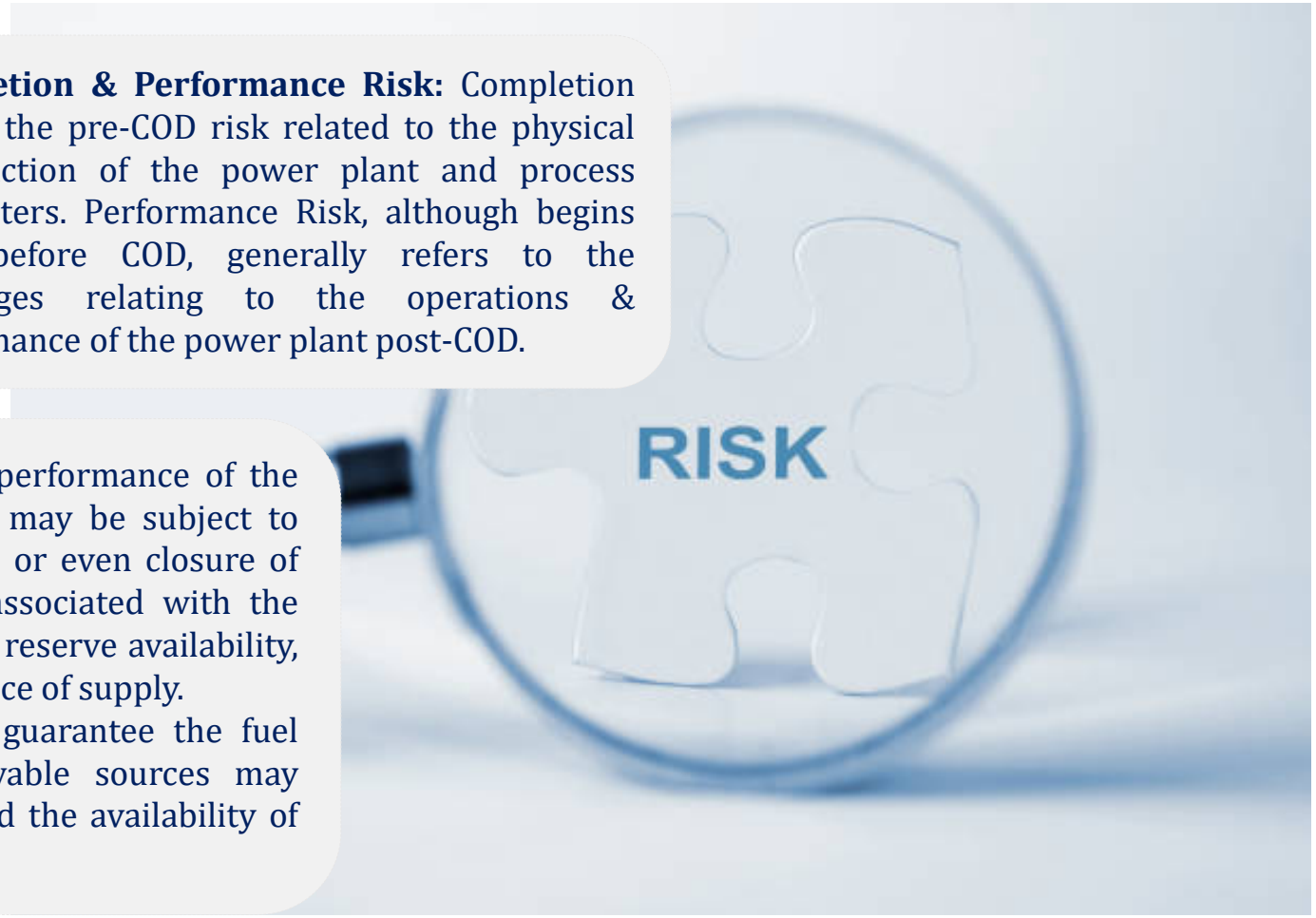
Local | Business Risk

This Sector Study focuses on the Business & Financial Risk of Independent Power Producers (IPPs) (majorly thermal).

Plant Performance Risk: This includes, but is not limited to, plant availability, dependable capacity, efficiency measured in terms of electricity generated per type of fuel, penalty payments under the PPA, higher operational costs and loss of revenue due to breakdown of machinery.

Completion & Performance Risk: Completion Risk is the pre-COD risk related to the physical construction of the power plant and process parameters. Performance Risk, although begins even before COD, generally refers to the challenges relating to the operations & maintenance of the power plant post-COD.

Fuel Supply Risk: In the event of non-performance of the Fuel Supply Agreement (FSA), the IPPs may be subject to operational risks due to underutilization or even closure of plants. This can further include risks associated with the supply of fuels, distance from the source, reserve availability, contractual obligation of the seller and price of supply.
The Government of Pakistan does not guarantee the fuel supplier's obligations. Risks for renewable sources may include wind speed, solar irradiation, and the availability of sufficient crops for bagasse.



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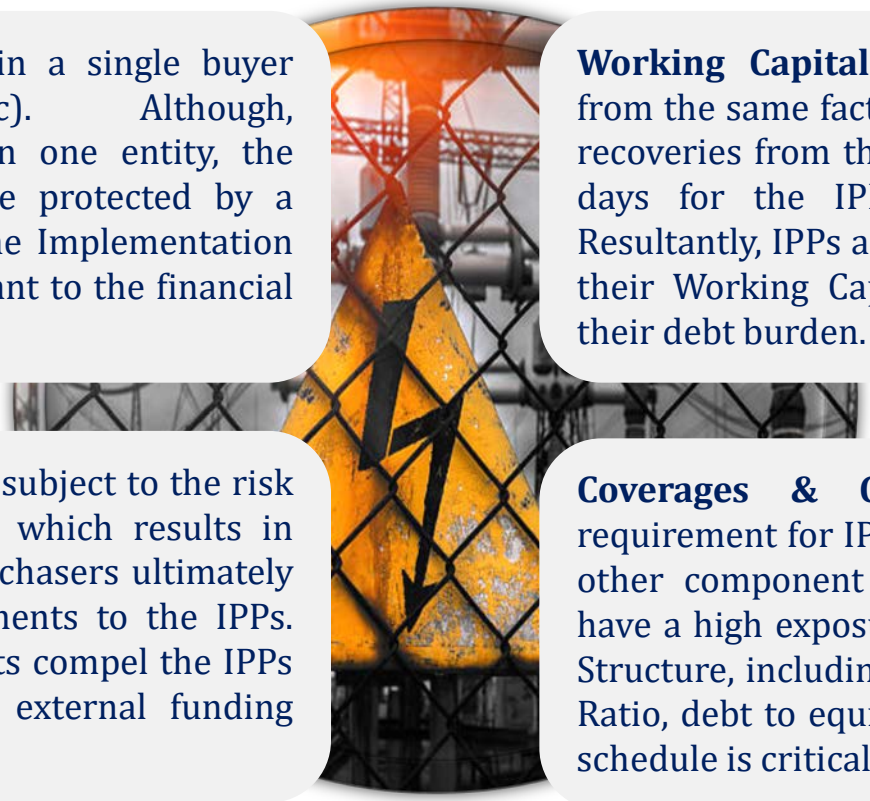
Local | Financial Risk

Off-taker Risk: IPPs operate in a single buyer market (CPPA-G/K-Electric). Although, dependence is concentrated on one entity, the obligations of the off-taker are protected by a Sovereign Guarantee through the Implementation Agreement. This acts as a mitigant to the financial risk relating to the off-taker.



Working Capital Financing: This risk emanates from the same factor as for liquidity risk. Volatility in recoveries from the off-taker balloons the receivable days for the IPPs – a component of the CD. Resultantly, IPPs are forced to obtain STBs to manage their Working Capital Needs, exerting pressure on their debt burden.

Liquidity Risk: The DISCOs are subject to the risk of non-payment by consumers which results in delayed payments to power purchasers ultimately creating volatility in cash payments to the IPPs. Any extended delays in payments compel the IPPs to obtain a Sponsor Loan or external funding (short-term borrowing).

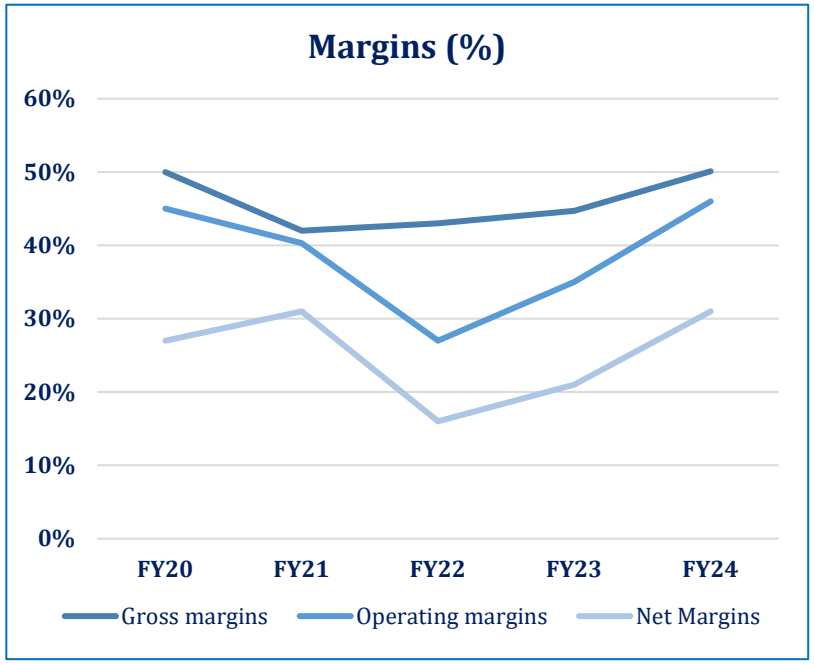
Coverages & Capital: The minimum equity requirement for IPPs is ~20% of the project cost, the other component being debt. The IPPs, therefore, have a high exposure to External Funding. Financing Structure, including Minimum Debt Service Coverage Ratio, debt to equity movement and debt repayment schedule is critical.

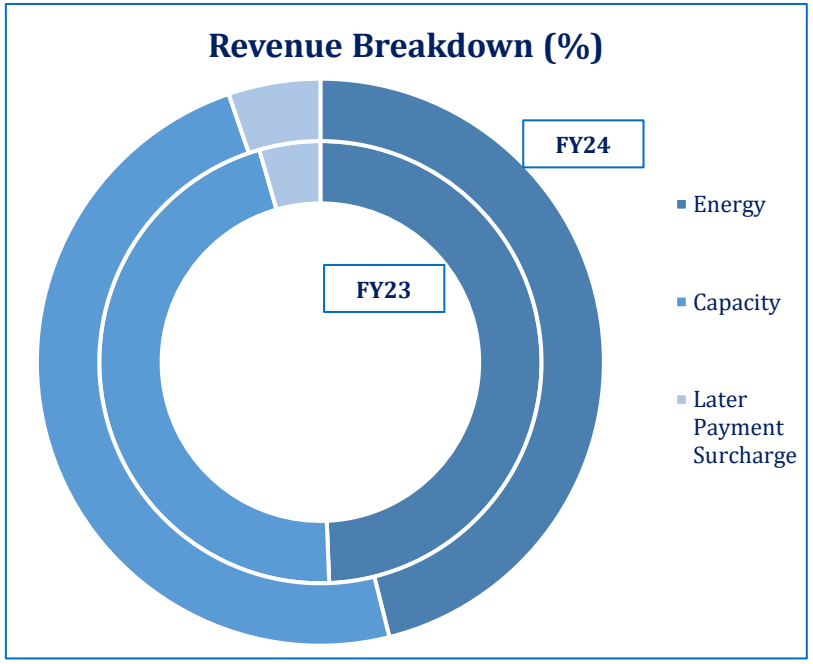
POWER

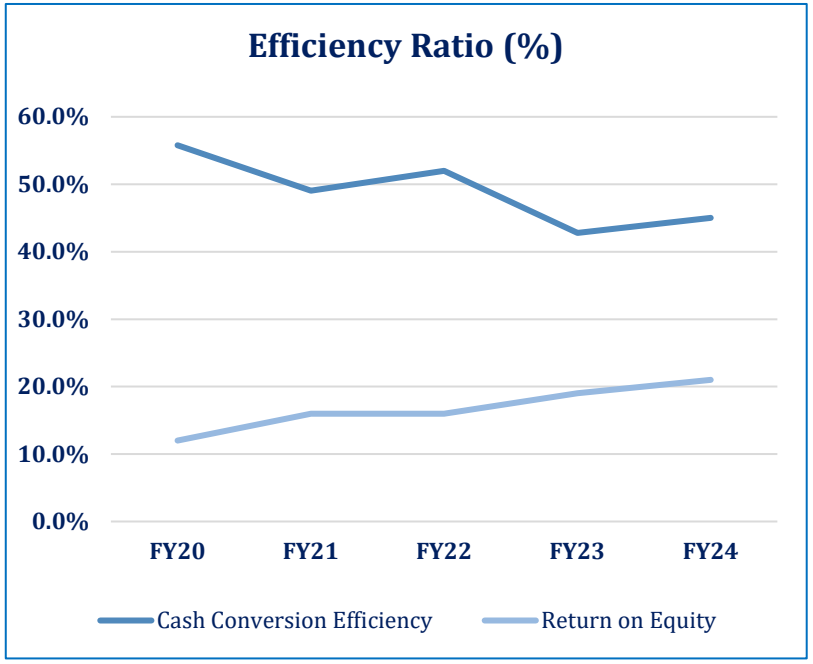
Business Risk | Margins

- A breakdown of the revenue in FY24 reveals that energy and capacity payments comprised ~95% of the overall revenue earned, with the mix staying relatively stable compared to FY23. Moreover, raw materials comprised ~57.6% of the total costs incurred by the sector (FY23: ~50.9%), whereas energy made up ~7.8% in FY24 compared to ~22.4% in FY23. Raw materials usually include Coal, Furnace Oil, HSD, RLNG and others depending on the type of fuel used.

- Given that Sector players have been operating on a "Take or Pay" model, capacity charges comprise a constant revenue stream, regardless of the said players supplying power to consumers, therefore, supporting profit margins. Moreover, these players also operate with fixed returns on equity (as per the relevant policy) as well as O&M costs that, in turn, comprise the fixed as well as variable component.







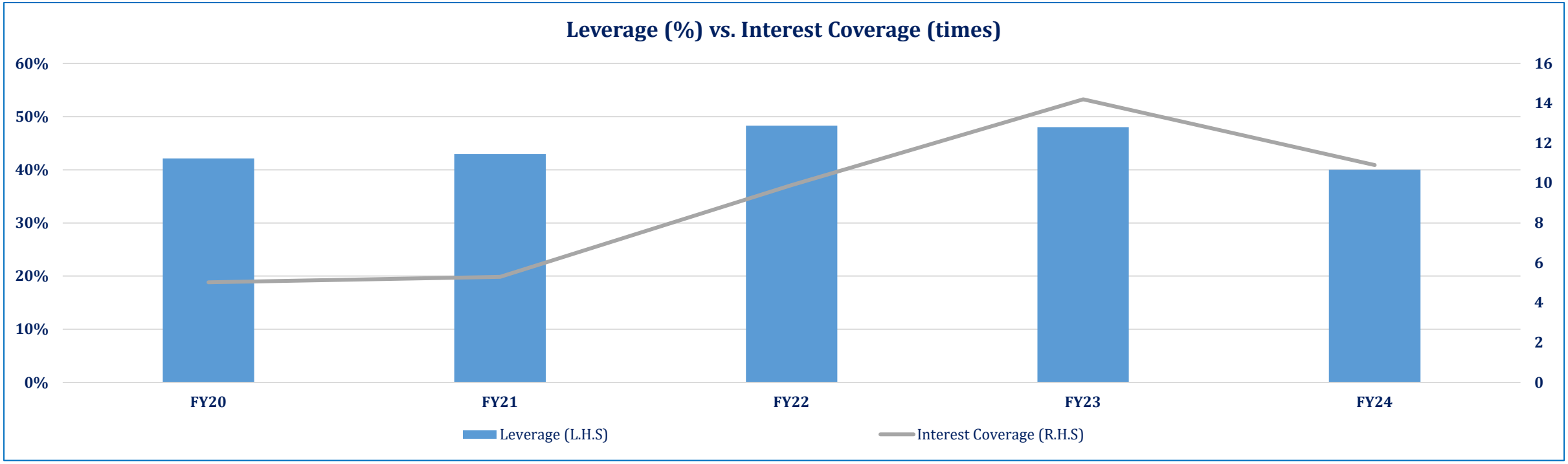
***Note**: Data is reflective of ~36 rated sector players.*

Source: PACRA Database

POWER

Financial Risk | Leverage & Interest Coverage

- The debt servicing capacity of Independent Power Producers (IPPs) has weakened due to rising finance costs, driven by increased borrowing, as a substantial portion of their long-term debt remains outstanding.
- The total leverage of the sector went down from ~48.0% in FY23 to ~40% in FY24, reflecting lower reliance on borrowing on the back of cash flow being generated vis-à-vis regular payments by the power purchaser.
- The GoP, under its sovereign guarantee, covers all obligations of the aforementioned power purchasers provided that IPPs meet their performance parameters. This acts as a mitigant of financial risk related to the sector players.

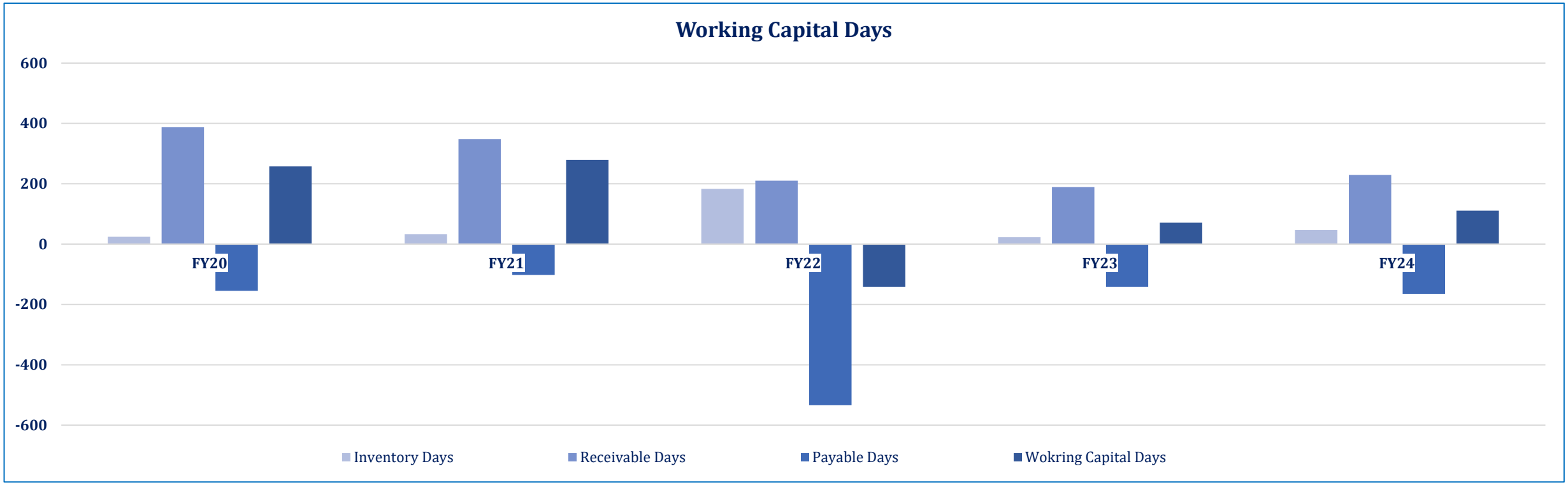


***Note**: Data is reflective of ~36 rated sector players from FY22 onwards. For the previous years, data is reflective of ~29 rated players.*

Source: PACRA Database

POWER

Financial Risk | Working Capital Management



- The Working Capital Cycle of IPPs is majorly a function of their receivables and payables. Receivables of the sector rely on the CPPA-G payments in return for the electricity being supplied according to the Power Purchasing Agreements (PPAs).

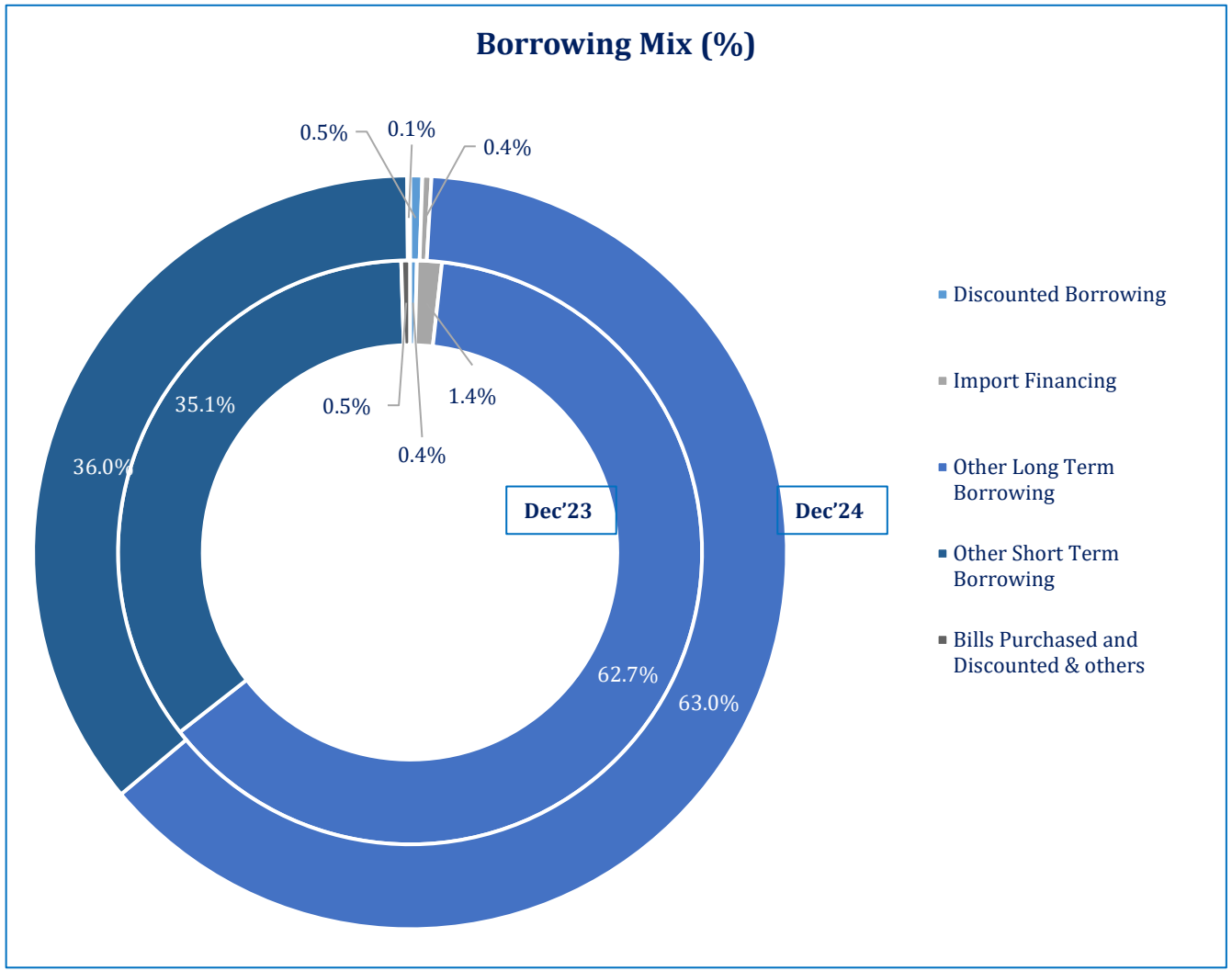
***Note**: Data is reflective of ~36 rated sector players.*

Source: SBP, PACRA Database

POWER

Financial Risk | Borrowing Mix

- The total borrowing of the sector stood at PKR~481,481mln as End-Dec'24 (SPLY: PKR~507,196mln), down ~5.5% YoY.
- The largest component of borrowing comprises the fixed long-term loans which constituted ~63.2% of the total borrowing and stood at PKR~303,487mln as of End-Dec'24 (End-Dec'23: PKR~318,787mln).
- Meanwhile, the short-term borrowing formed ~36.1% of the total borrowing and stood at PKR~173,205mln as at End-Dec'24.
- The total outstanding loans in the renewable power sector (excluding Hydel) stood at PKR~54,671mln as at End-Dec'24. This is ~15.0% of the total outstanding loans in the power sector.



Source: SBP

POWER

Financial Risk | Borrowing Mix

PKR millions

Fuel Type	Total Borrowings		YoY Change (%)	Short-term Borrowing			Long-term Borrowing		Foreign Bills Discounted
	Dec'24	Dec'23		Import Financing	EFS	Other Short-term	LTFF	Other Long-term	
Coal	119,408	116,189	2.8%	-	0	41,890	60	53,221	0
Thermal	109,510	136,451	-19.7%	139	0	60,227	0	49,097	0
Wind	47,512	57,052	-16.7%	289	0	14	0	46,242	0
Hydel	32,094	23,151	38.6%	-	0	19,743	0	12,351	0
Solar	14,647	12,252	19.50%	1,448	850	693	1	13,284	0
Others	158,310	161,787	-2.3%	-	0	45,171	987	101,520	265
Industry Total	**481,481**	**507,196**	**-5.1%**	**1,876**	**850**	**167,739**	**1,047**	**275,714**	**265**

Source: SBP

POWER

SWOT Analysis

Strengths

- Backbone of the economy.
- Players operate in a regulated environment.
- Low business risk due to risk mitigating factors such as sovereign guarantees on payment by purchasers and Performance Guarantees by the Contractors.

Weaknesses

- Single Buyer Market with two generation baskets, creating inefficiency in the generation system.
- Under-utilization of efficient plants: GENCO's efficiency scale has deteriorated over the years.
- Low Available Capacity Factor.
- Delay in commissioning of cheap indigenous fuel power plants.
- Weak governance of DISCOs.

Threats

- Circular debt pile-up.
- T&D Losses weaken the financial discipline of the power supply chain.
- Liquidity Damages (LDs) on account of non-performance of FSA.
- Change in the regulatory environment leading to lower or no guaranteed off-take for new plants and change of terms for existing ones.

Opportunities

- Revival in Industrial Activity resulting in increased demand.
- Amendment to PPAs in the process of revising the payment and tariff structure for power purchase from IPPs.
- Exploration of Coal reserves leading to significant coal-based power projects; coal is a cheaper fuel of energy.
- Investments in the Hydel and Renewable Energy Power plants.

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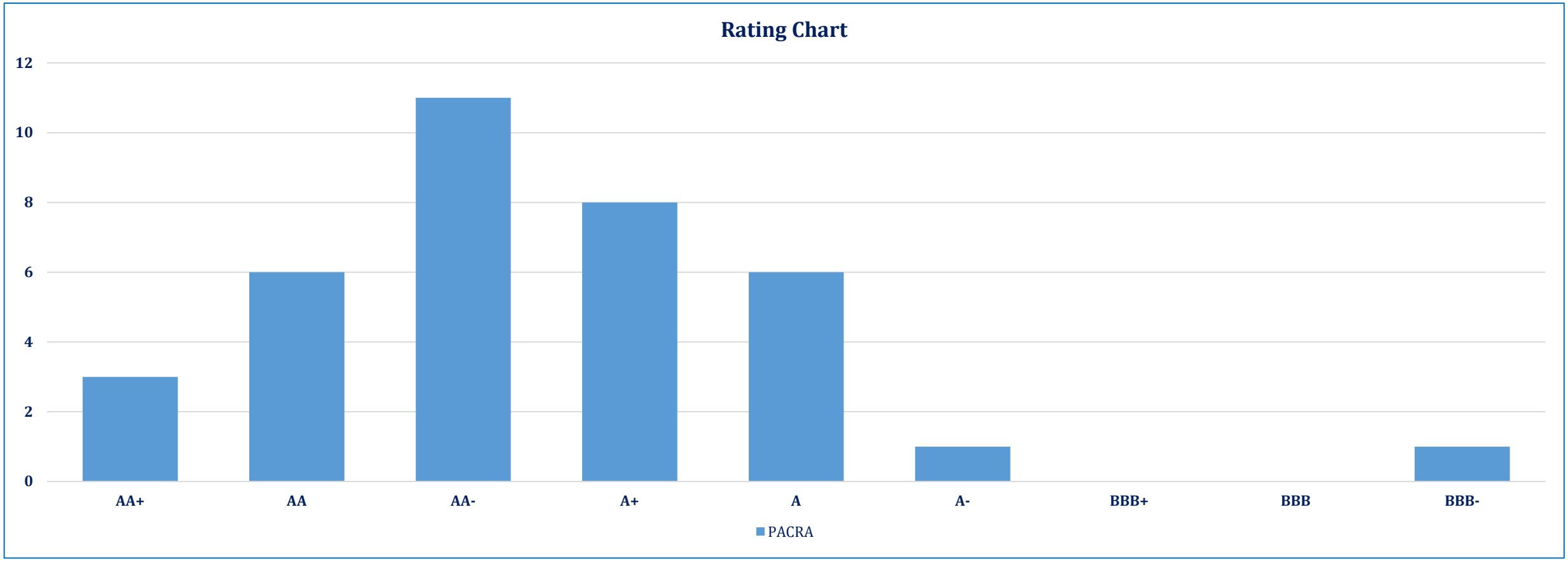
Rating Curve

- PACRA rates ~36 entities in the Power Sector, within the rating bandwidth of AA+ to BBB-.



Source: PACRA Database

POWER

Outlook: Watch - Developing

- Pakistan's power sector is the backbone of economic growth and industrialization. However, it has long struggled with deep-rooted challenges, including an escalating circular debt, high tariffs, weak macroeconomic conditions, and inefficiencies across generation, transmission, and distribution. To curb rising tariffs and circular debt, the GoP is renegotiating IPPs' Power Purchase Agreements (PPAs), shifting from a 'Take or Pay' to a 'Hybrid Take-and-Pay' model. While the aim is to stabilize tariffs and reduce debt, concerns over the effectiveness and clarity of this strategy persist. The GoP also attempted PPA renegotiations in the past in 1998, 2012, 2021, and now in 2024.
- During the current contract revisions, PPAs with five IPPs were terminated as a first step (Hubco, Rouch, Lalpir, Atlas and Saba Power Plants). The GoP, in return, agreed to clear all outstanding dues on its part as of Sep'24, in the context of capacity payments, energy purchase price and pass-through items, by Dec'24. 18 other IPPs face possible conversion to "Take-and-Pay" contracts, whereby the state-owned off-taker will only be liable to pay for energy consumed by the grid, eliminating capacity charges. Of the ~18 IPPs under negotiation, ~17 have an average cost of PKR~29.5/kWh.
- In this regard, Nishat Chunian has formally executed the Amendment Agreement, while another IPP, Pakgen Power Ltd (PKGP), has officially terminated its Power Purchase Agreement (PPA) and other agreements with the federal government as of Jan'25 [PPAs for the IPPs have included payment guarantees, dollar indexation, and high return on equity allowances, contributing to Pakistan's ever-rising power sector circular debt; capacity payments grew to PKR~2.1trn in FY24, with ~33.0% projected increase for FY25].
- The GoP believes in saving around PKR~411.0bln to the national exchequer over the remaining contract periods of these terminated IPPs and reducing the power unit cost by PKR~0.71/kWh. Overall, the GoP expects to cut PKR~8-10/kWh as part of the overall policy measures. The core problem of Pakistan's power sector, however, remains unsolved: underutilization of power generation. Despite an installed capacity of ~45,888 MW in FY24, low utilization factor (~33.9%) and operational constraints in transmission and distribution have led to increased capacity payments and rising consumer-end tariffs. Inefficiency of government-owned power plants is another issue, with fuel costs reaching PKR~33.6/kWh. The GoP is promoting alternative renewable energy, particularly solar energy, to harness its vast potential, focusing on solarizing agricultural tube wells to ease the burden on DISCOs, where recovery rates remain low (FY24: ~68.8%).
- Power suppliers' governance issues, regulatory non-compliance, and excessive supplementary charges further burden consumers, driving a shift towards distributed generation, particularly rooftop solar. There is an urgent need for comprehensive reforms to enhance efficiency, optimize capacity utilization, and ensure a reliable, affordable power supply for sustainable economic growth while aligning with the International Monetary Fund (IMF) requirements.

**Quantitative Information pertains to ~74 IPPs as per NEPRA's Merit Order list FY24.*

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