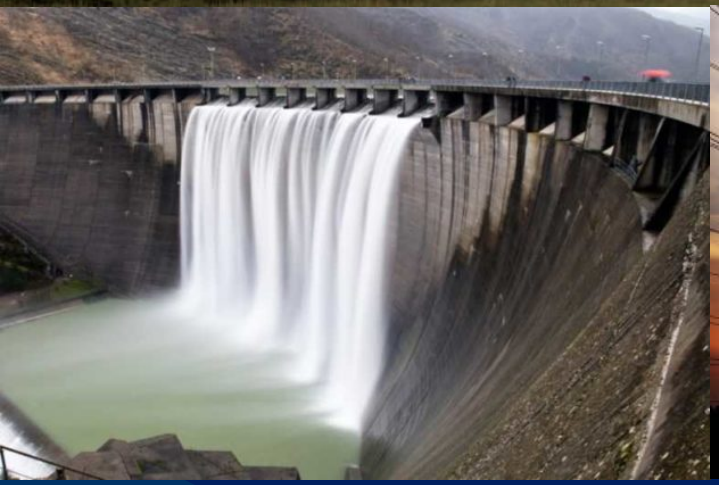

POWER GENERATION

Sector Study

January 2022

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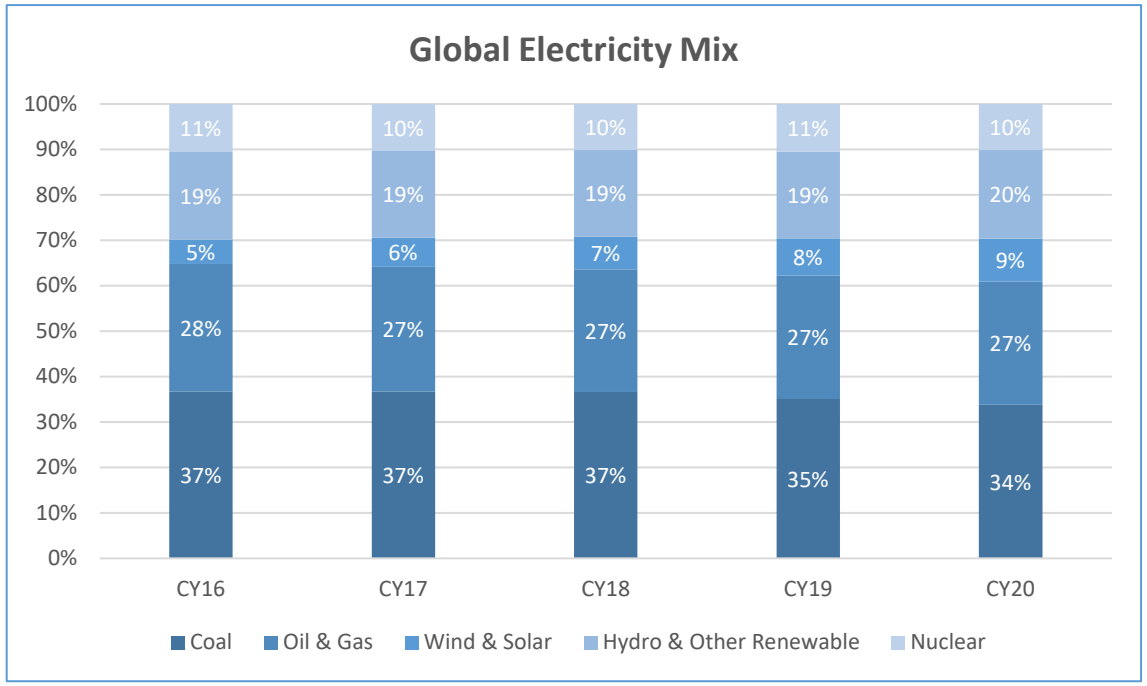
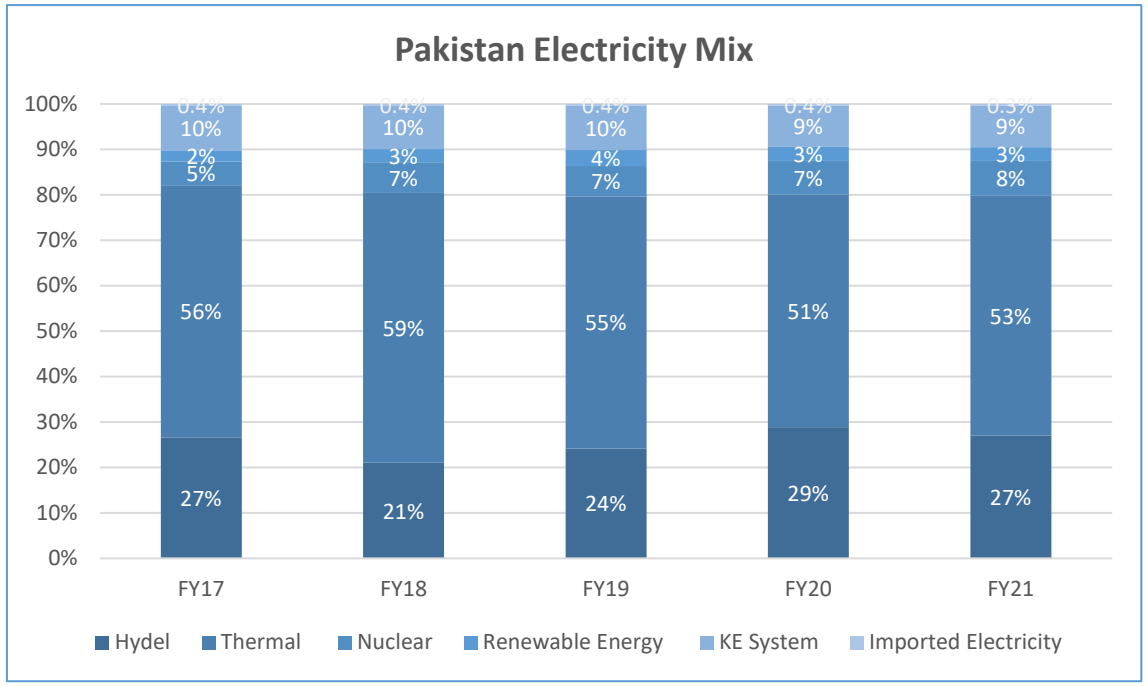
Electricity Mix | Global Vs Pakistan





- World electricity mix is dominated by fossil fuels, particularly coal (~34%) oil & gas (~27%), despite increasing trend to shift towards cleaner fuels for environment safety and declining world oil reserves. The “clean” electricity boom still is not keeping up with fast-rising electricity demand.

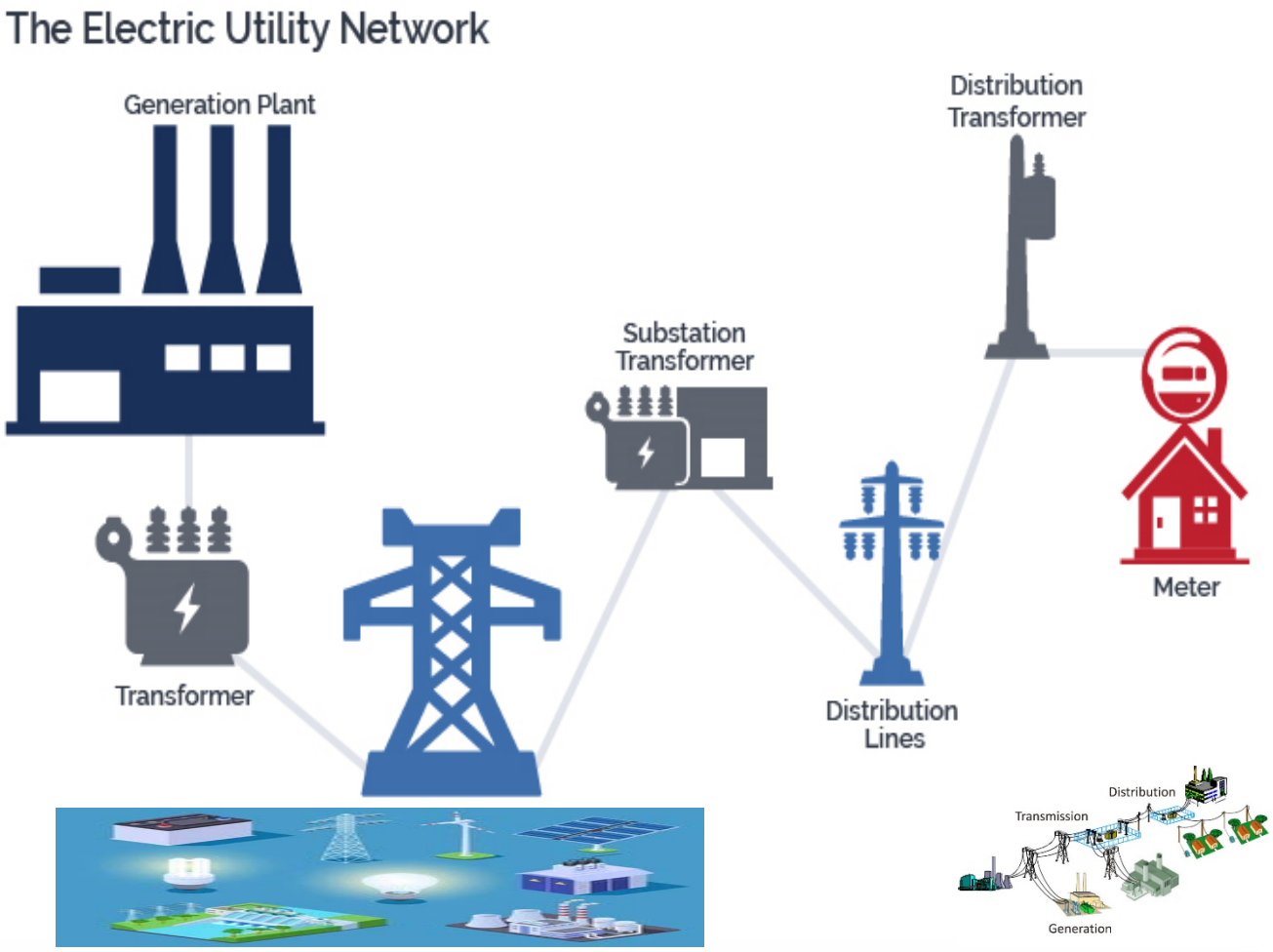
- Pakistan’s electricity mix is also diversified similar to the global mix, with fossil fuels dominating the market. Pakistan’s generation mix also contains a fair share of hydel energy (~27%). Moreover, Pakistan has lately been relying on imported RLNG for meeting its electricity demand as country’s own gas resources are rapidly depleting.

Source: Ember Global Electricity Review - 2021

POWER GENERATION

Power – An Overview

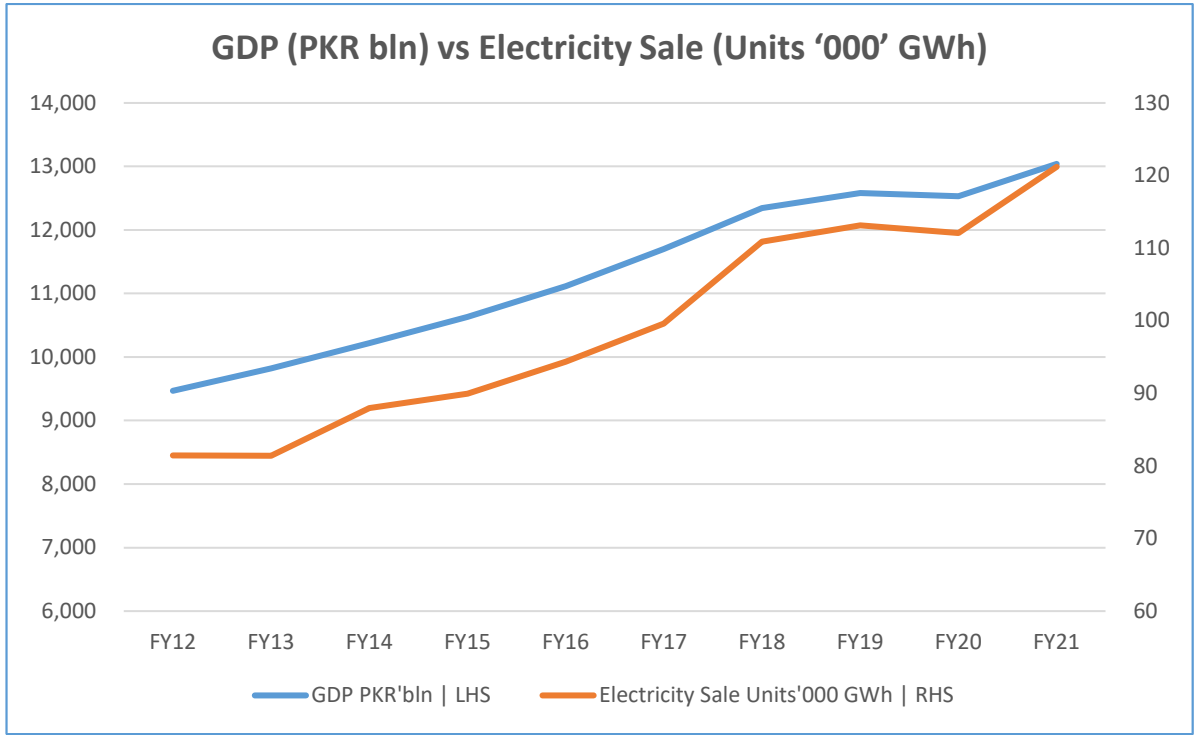
- Energy is the engine of all sectors of the economy. Energy consumption needs are directly related to the GDP growth of a country.
- Pakistan's GDP recovered and grew by ~3.9% in FY21 since the contraction by ~0.4% in FY20, owing to the unprecedented outbreak of COVID-19 pandemic.
- Pakistan's primary energy supplies (forms of energy converted to final energy) comprise of oil, gas, coal, nuclear electricity and hydro-electricity net generation, while final energy products (converted from primary energy supplies) consist of gasoline, diesel, purified coal, purified gas, **electricity** and mechanical energy.
- The Country's Power Sector is classified into three verticals (i) Generation, (ii) Transmission and (iii) Distribution. This Sector Study shall focus on the analysis of the **Power Generation System**.

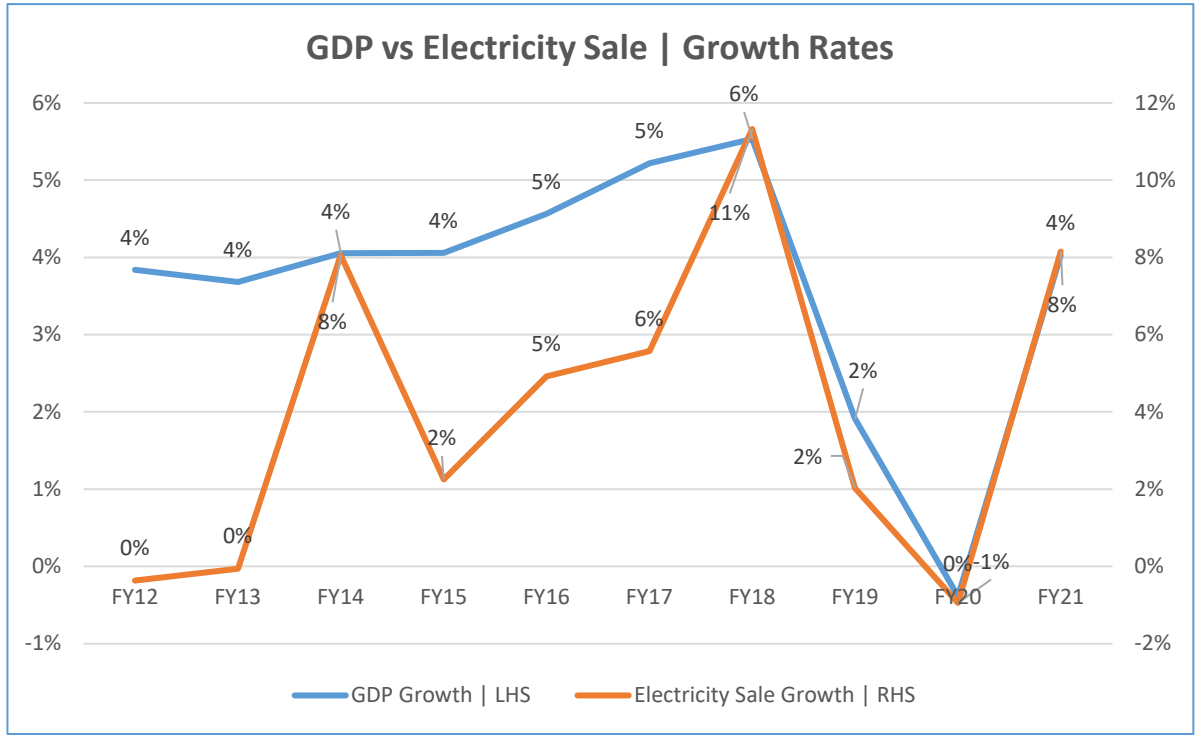


Source: Pakistan Energy Year Book and Pakistan Economic Survey

POWER GENERATION

GDP & Electricity Distribution





The growth of economy along with its global competitiveness hinges on the availability of reliable and affordable power to all consumers throughout the country. As an emerging economy, Pakistan's demand for electricity is enormous and its GDP is positively related with the sale of electricity.

Source: NEPRA, PACRA Database

POWER GENERATION

Structure of the Industry

Pakistan Electricity Network

Generation | **Transmission** | **Distribution** | **Consumption**

IPPs, GENCOs WAPDA KE

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

→

National Transmission and Dispatch Company Limited (NTDC)

K-Electric (KE)

→

Distribution Companies (DISCOs)

FESCO
GEPCO
HESCO
IESCO
LESCO
MEPCO
PEPCO
QESCO
SEPCO
TESCO
KE

→

Domestic,
Commercial,
Industries,
Agriculture,
Government
&
Others

KE Operates in all three segments of the Power Sector

Source: PACRA Database

POWER GENERATION

Regulatory Bodies

Governance – Ministry of Energy

Power division oversees the entire power sector of Pakistan. This task is accomplished by various boards and authorities.

Regulator – NEPRA

Power is a highly regulated sector. The Regulatory authority for this purpose is NEPRA, which is an autonomous body mandated by 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.

Market Operator – CPPA-G

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 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.

PPIB

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

POWER GENERATION

An Overview of Power Plants

Generation Type	Nature of Entities - Public/Private Sector	No. of Power Plants	% Share in Country Installed Capacity*	Major Power Plants
HYDEL				
WAPDA	Public	24	24%	Major Hydropower units include Tarbela, Ghazi Barotha, Mangla Warsak and Chashma units
IPPs	Private	8	1%	Major Hydro-IPP include Laraib Energy and Malakand-III Hydro (PPDCL)
		32	**25%**	
THERMAL				
GENCOs	Public	12	14%	Major GENCOs include TPS Muzaffargarh and Jamshoro
IPPs	Private	37	46%	Major IPPs include KAPCO, Hub Power, Huaneng Shandong Ruyi, NPPMCL, Port Qasim Electric and China Power Hub
KE-Own	Public	5	6%	Major plant includes Bin Qasim TPS-I
		54	**65%**	
NUCLEAR				
CHASHNUPP & KANUPP	Public	6	4%	Major Nuclear Project include CHASNUPP – I, II & III
		6	**4%**	
RENEWABLE				
Wind IPPs	Private	24	3%	Currently, all Wind Power projects have individual installed capacities of less than 100MWs.
Solar IPPs	Private	6	1%	Currently, all Solar Power projects have individual installed capacities of 100MWs or less.
Bagasse/Biomass	Private	9	1%	
		39	**6%**	
TOTAL INSTALLED POWER PLANTS		**131**	**100%**	

as at June 30, 2021

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Entity Wise Share in Installed Capacity

Pakistan's electricity generation system is divided into two baskets (i) CPPA-G Basket and (ii) K-Electric Basket. CPPA-G Basket covers all Power Generation Plants of the country except those falling in the ambit of K-Electric (KE). KE is responsible for the generation, transmission and distribution of electricity to all residential, commercial, industrial and agricultural areas of Karachi and its outskirts.

% Share in Installed Capacity	FY17	% Share	FY18	% Share	FY19	% Share	FY20	% Share	FY21	% Share
CPPA-G System	**26,389**	**92%**	**33,096**	**92%**	**36,061**	**92%**	**35,735**	**92%**	**36,930**	**93%**
Hydel	**7,116**	**25%**	**8,713**	**24%**	**9,761**	**25%**	**9,861**	**25%**	**9,915**	**25%**
- WAPDA	6902	**24%**	8341	**23%**	9,389	**24%**	9,389	**24%**	9,443	**24%**
- IPPs	214	**1%**	372	**1%**	372	**1%**	472	**1%**	472	**1%**
Thermal	**17,808**	**62%**	**22,604**	**63%**	**24,253**	**62%**	**23,827**	**62%**	**24,972**	**63%**
- GENCOs	5,897	**21%**	5,637	**16%**	5,637	**14%**	4,881	**13%**	4,881	**12%**
- IPPs	10,566	**37%**	15,297	**43%**	16,946	**43%**	17,276	**45%**	17,276	**43%**
- SPPS/CPPs	340	**1%**	340	**1%**	340	**1%**	340	**1%**	340	**1%**
- Nuclear	1,005	**3%**	1,330	**4%**	1,330	**3%**	1,330	**3%**	2,475	**6%**
Renewable	**1,465**	**5%**	**1,779**	**5%**	**2,047**	**5%**	**2,047**	**5%**	**2,043**	**5%**
K-Electric System	**2,350**	**8%**	**2,884**	**8%**	**2,934**	**8%**	**2,984**	**8%**	**2,842**	**7%**
-KE – Own	1,874	**7%**	2,294	**6%**	2,294	**6%**	2,294	**6%**	2,084	**5%**
-IPPs	252	**1%**	366	**1%**	366	**1%**	366	**1%**	366	**1%**
-SPPs/CPPs	87	**0%**	87	**0%**	87	**0%**	87	**0%**	155	**0%**
-KANUPP	137	**0%**	137	**0%**	137	**0%**	137	**0%**	137	**0%**
-Solar	-	**0%**	-	**0%**	50	**0%**	100	**0%**	100	**0%**
Total (CPPA-G + KE)	**28,739**	**100%**	**35,980**	**100%**	**38,995**	**100%**	**38,719**	**100%**	**39,772**	**100%**

Share of Thermal IPPs in total electricity generation has increased over the years (37% in FY17 to 63% FY21) after the emergence of Power Policy, 2002, which was introduced to encourage private sector investment in the power sector.

Source: NEPRA 'State of the Industry Report' 2021

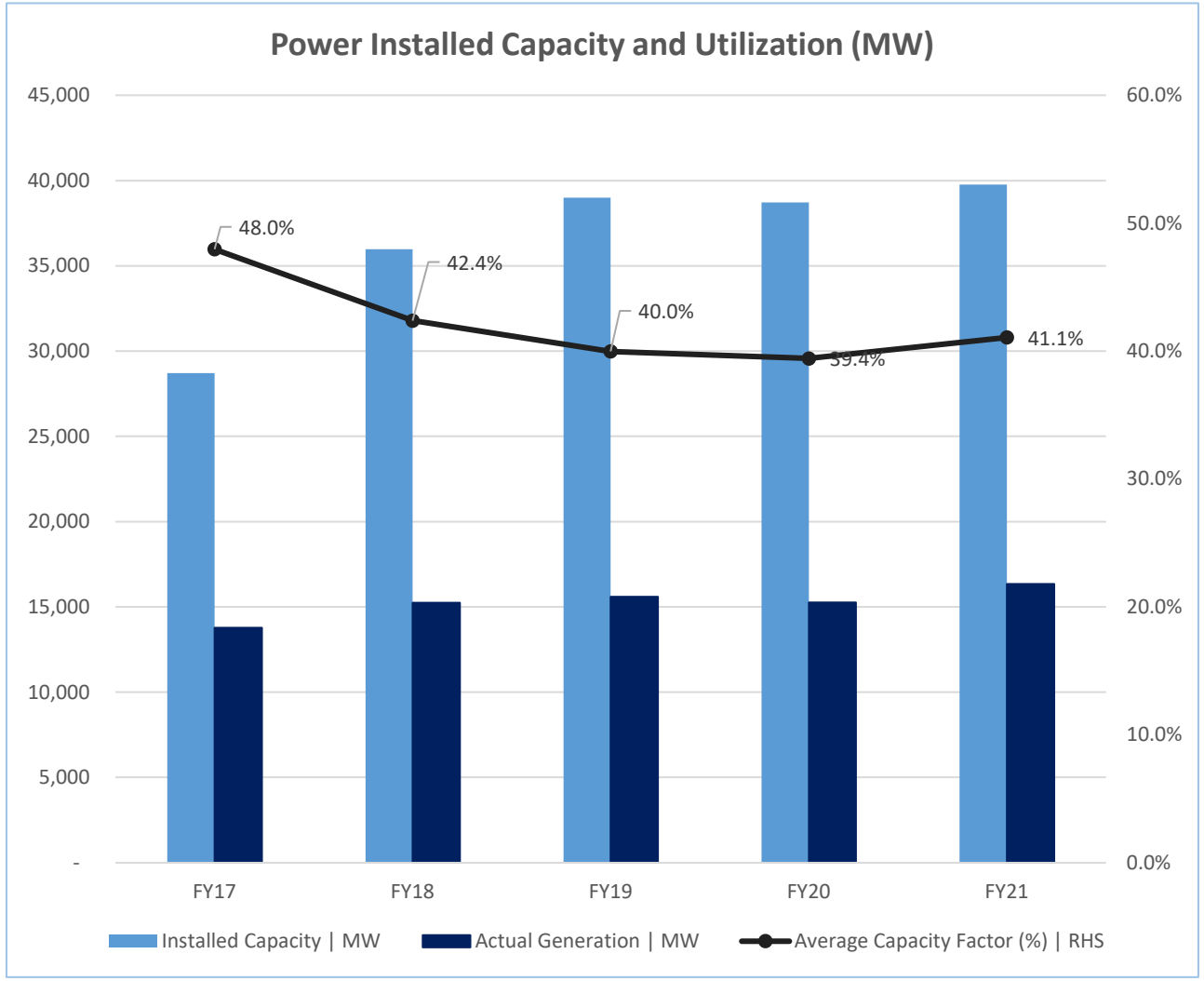
POWER GENERATION

Installed Capacity and Utilization

- The power generation sector comprises power plants set up in the Public Sector as well as Private Sector. Share of public and private sector power plants is almost equal (~50%). Based on energy source type, these plants include hydropower plants, thermal power plants, nuclear power plants and renewable energy (RE – wind, solar, bagasse/biomass). In addition, Pakistan also imports electric power from Iran.

- The total installed generation capacity was recorded at ~39,772MW as in FY21 (~38,719MW FY20) up ~3% YoY basis, while actual power generation was recorded at 143,091GWh in FY21 (134,746GWh in FY20), up ~7% YoY basis.

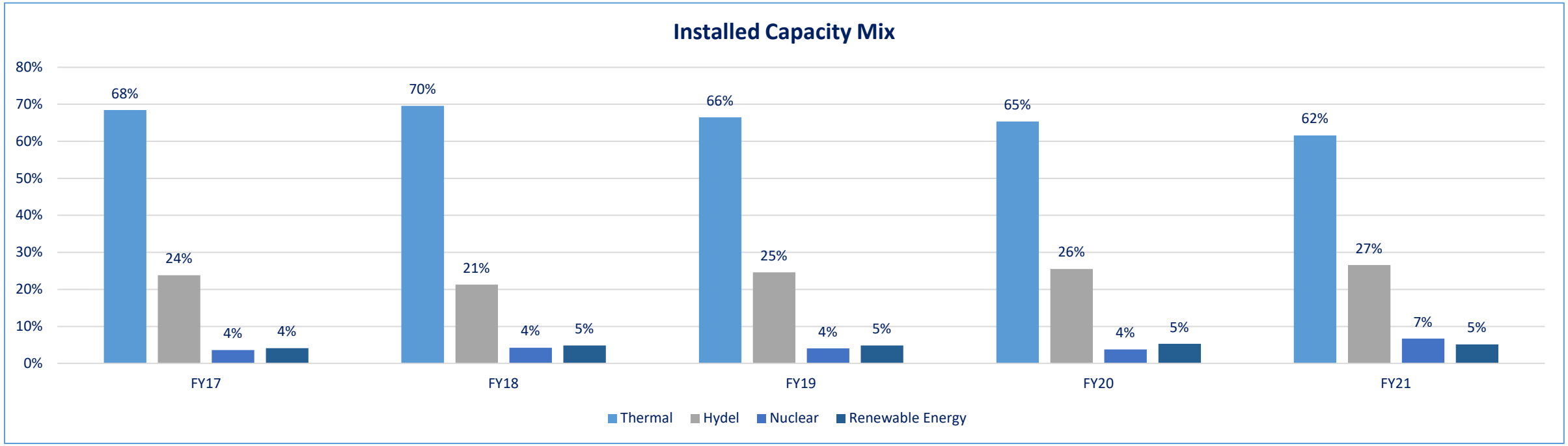
- Annual Capacity Factor of the Sector was recorded at ~41% in FY21 (~40% FY20). Capacity Factor measures the percentage of installed capacity that is utilized. A low capacity factor indicates inefficiency in system usage. The country's annual capacity factor has declined gradually from ~48% in FY17 to ~41% in FY21 reflecting reduction in efficient system utilization on a timeline basis.



Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Fuel Mix in Installed Capacity

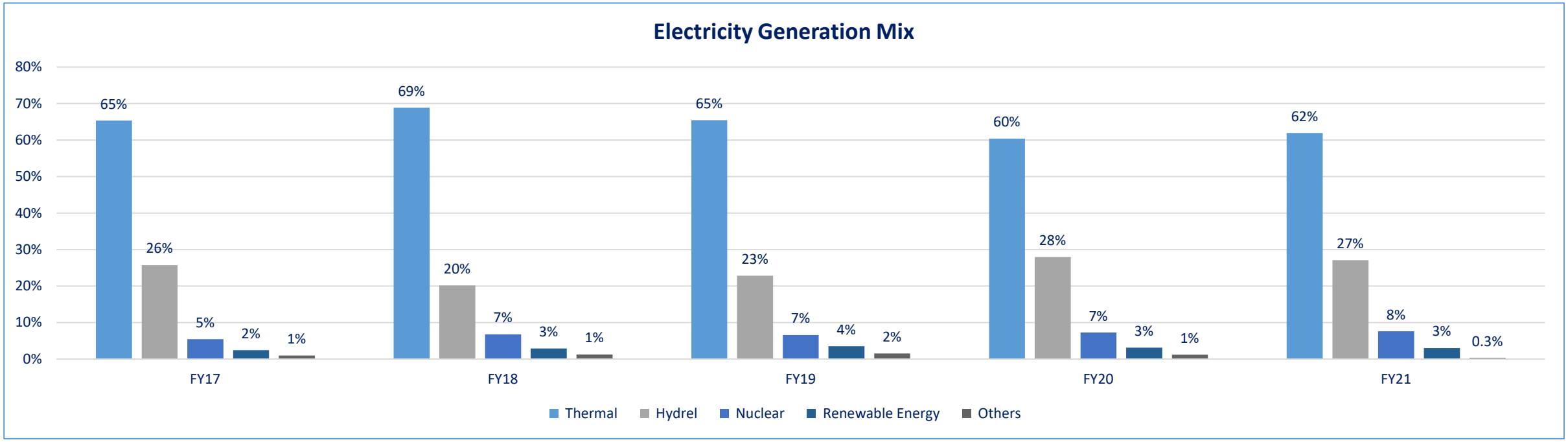


- Thermal Energy Mix continues to contribute the highest to the installed power generation capacity of the country, followed by hydel electricity capacity which now stands at ~27% of the total Installed Capacity of the country.
- The total installed capacity of the country as at End-FY21 stood at ~39,772MW (~22,915MW thermal, ~9,872MW hydroelectric, ~1,235MW wind, ~536MW Solar, ~252MW bagasse and ~2,520MW of nuclear).

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Fuel Mix in Generation Capacity



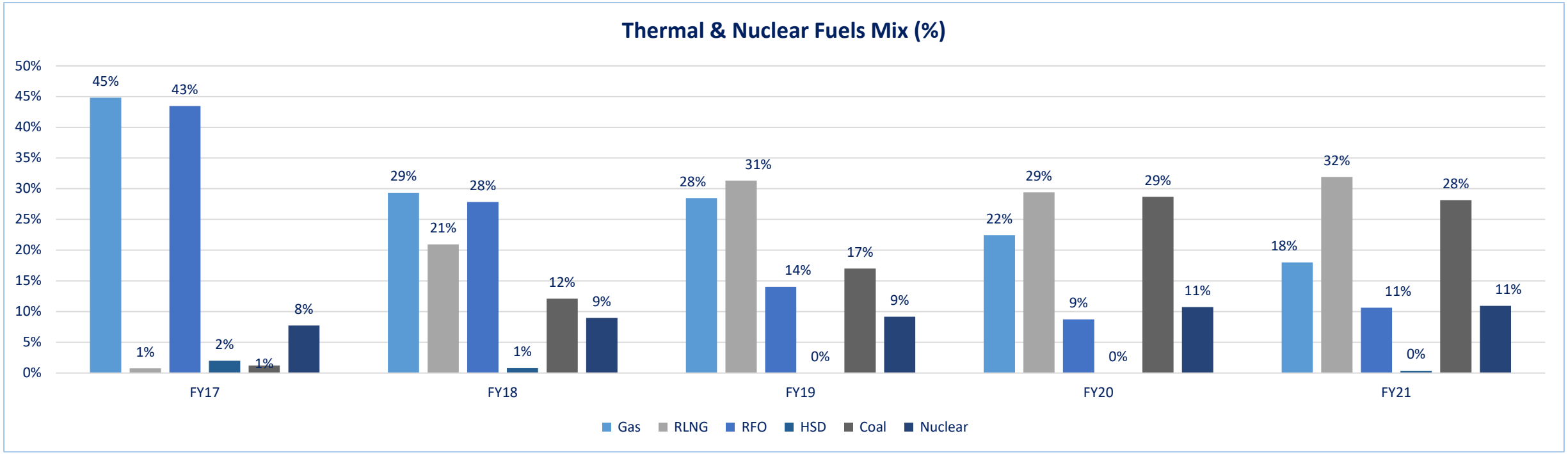
*Others include electricity imported from Iran and mixed fuels

- Just like Installed capacity, thermal fuels take the lead in the power generation mix of the country. However, due to costlier fuel charges and depletion of natural gas reserves in the country, the Government is keenly focused on gradually shifting towards hydel and other renewable sources of energy for electricity generation.

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Fuel Wise Generation Mix | Thermal & Nuclear

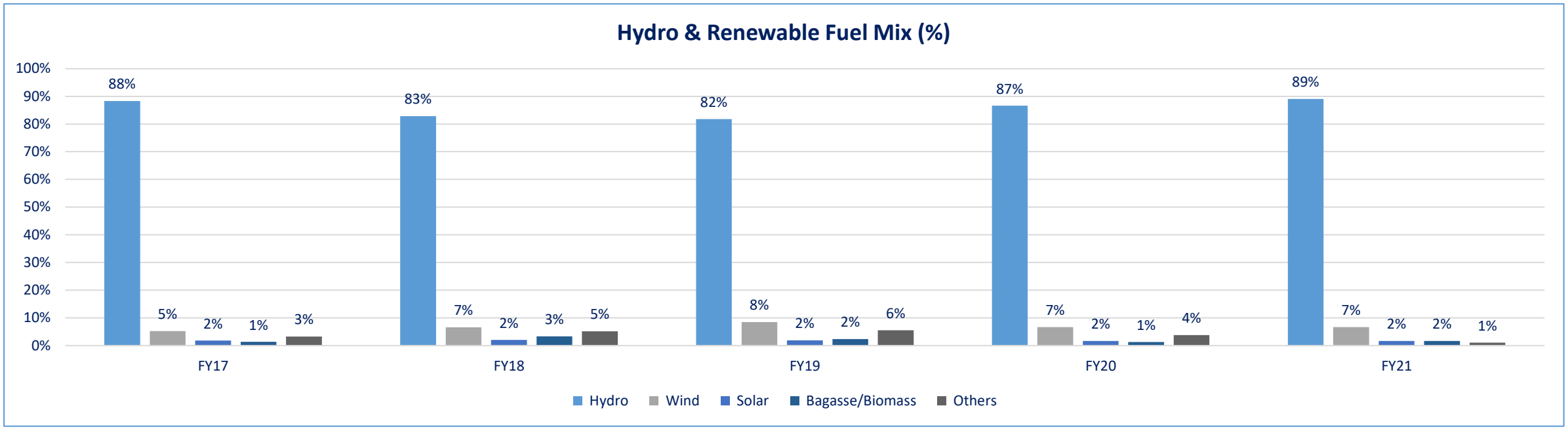


- Within the thermal segment, a shift is being observed from Gas (~45%) and RFO (~43%) in FY17 to alternate fuels, i.e., RLNG (~32%) and Coal (~28%) in FY21; the first due to depleting natural resources as the country's gas reserves have gone down considerably and the latter due to high cost of generation as crude oil prices have almost doubled since FY17.
- Pakistan's reliance on thermal, which includes imported coal, local coal, RLNG and natural gas, residual fuel oil (RFO) has been gradually decreasing over the last few years, dropping from ~65% in FY17 to ~62% in FY21 in total generation mix.

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Fuel Wise Generation Mix | Hydel & Renewables



- The country's depleting natural gas reserves are necessitating a shift of fuels. The share of renewable energy has steadily increased over the years. The government is also taking measures to increase the shares of Hydel and Renewables in energy-mix.
- The cheapest sources of fuel are renewable energy sources followed by hydel energy. The fuel cost component in these energy sources is almost negligible. Hydel power contributes around ~89% to the electricity generated from renewable sources while others including solar, wind and bagasse collectively make up a small share of ~11%.

*Others include import from Iran and mixed fuels

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Power Generation Companies | IPPs – What you need to know

A Brief History

- Until 1980s, Pakistan was continually facing the chronic issue of power shortage due to rapidly increasing power demand (7-8% YoY) and lower supply. The disruption in power supply was impeding the industrial progress of the country. This situation called for an immediate intervention by the GoP.

- Considering the fact that 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.

- Currently, there are 80 IPPs commercially operating within the country. Private Power Projects include Foreign-Local partnerships, including groups like Nishat, Saphhire, Attock, Engro and Fauji group from the local side.

Key Features

- **Minimum Equity Requirement:** The minimum equity requirement for IPPs is set at 20% of the total project cost.

- **Bulk Power Tariff:** A Bulk Power Tariff of US Cents 6.5/kWh (in PKR) is offered to the IPPs by the GoP as an average for the first 10 years of sale of electricity. Additionally, a minimum levelized tariff of US Cents 5.9/kWh (PKR1.776/kWh) is set as the final parameter for the acceptance of the tariff. The tariff is indicative and is calculated on an annual plant factor of ~60%. The actual tariff has two components: **Capacity Price** & **Energy Price.**
- Capacity Price is paid to the IPPs on a monthly basis: it covers the debt servicing cost, fixed O&M costs, insurance expense and ROE. This monthly capacity price keeps the IPPs' investors insulated against variations in energy purchased ('Take or Pay').
- The Energy Price is paid in PKR/kWh on actual energy sold by IPPs.
- Moreover, a mechanism has been provided for indexation/adjustment of the certain tariff components based on Rupee/Dollar exchange rate, fuel price variations and inflation.

Source : PPIB

Power Generation Companies | WAPDA – What you need to know

A Brief History

- 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.
- WAPDA has four verticals – (i) Power Wing (ii) Water Wing (iii) Finance Wing and (iv) Administration Wing. WAPDA was unbundled in 2007 whereby the functions of its Power Wing were redefined as Hydel Power Generation and Operation & Maintenance (O&M) of power houses.
- Following this unbundling, WAPDA's mandate is now focused on development of water and hydropower resources in an efficient manner. The Power Wing of WAPDA is now split up into 15 different companies, i.e., NTDC, 10 DISCOs and 4 GENCOs, each having separate management.
- Currently WAPDA is operating 24 Hydel Power Plants with an installed capacity of ~9,443MW (~24% share overall). Hydro-electricity is a cheaper source of fuel in relevance to thermal generation. Therefore, the GoP is keenly focused on undertaking new hydel power projects in order to supply electricity at cheaper rates.
- It is worth mentioning here that hydel generation is the cheapest electricity, produced in the country. That is why, it plays a pivotal role for development in 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 generation cost of hydel electricity by WAPDA stand at merely PKR~2.82 per unit, while generation cost from thermal sources remains PKR~13.14 per unit on the average during FY21.
- Several New Hydro Power Projects are under construction including Mohmand Dam, Diamer Basha Dam and Tarbela 5th Extension.

Source: WAPDA

POWER GENERATION

Upcoming Projects | Thermal | IPPs

Thermal Power Plants | Under Construction						
Under Construction	**Sponsor**	**Expected Capacity**	**Location**	**Fuel**	**Expected Completion**	**Status**
Thar Coal Based Power Project	Lucky Electric Company Limited	660	Port Qasim, Khi	Coal	Dec'21*	FC Achieved - Under Construction
1263 MW RLNG based Project	PTPL	1,263	Trimmu Barrage, Jhang	RLNG	April'22	FC Achieved - Under Construction
Thar Coal Based Power Project	Thar Energy Limited	330	Thar Block-II Sindh	Coal	March'22	FC Achieved - Under Construction
Thar Coal Based Power Project	Thar Coal Block-I Power Generation Co. Ltd.	1,320	Thar Block-I Sindh	Coal	May'22	FC Achieved - Under Construction
Thar Coal Based Power Project	Thal Nova Power Thar (Pvt.) Ltd.	330	Thar Block-II Sindh	Coal	June'22	FC Achieved - Under Construction
300 MW Imported Coal Based Power Project	CIHC Pak Power Co. Ltd	300	Gwadar, Balochistan	Coal	June'23	LOS issued, FC In progress
330 MW Coal Based Power Project	SiddiqSons Energy Limited	330	Thar Block-I Sindh	Coal	April'24	LOS issued, FC In progress
1320 MW Coal Based Power Project	Oracle Coal Fields PLC England	1,320	Thar Block-VI Sindh	Coal	Dec'26	Project Proposal Under Evaluation
TOTAL		**5,853**				

**Expected COD may change due to COVID-19 Pandemic/other factors.*

- Thermal IPPs contribute around 43% to the Country's total Installed Capacity for power generation.
- Pakistan has the 5th largest coal reserves in the world, i.e., total ~185bln tons and around ~176bln tons in the Tharparkar District of Sindh. The Thar Blocks possess an immense potential for electricity generation. Therefore, almost ~78% of the Upcoming Thermal Power Projects are coal based.

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Upcoming Projects | Hydel | WAPDA

WAPDA Hydel Power Plants | Under Construction					
Under Construction	**No. of Power Projects**	**Expected Capacity (MW)**	**Location**	**Expected Completion Date**	**Status**
Dasu Hydropower Project	1	4,320	Dasu Town, Indus River	April'26	Under Construction - Physical Progress 9%
Kuram Tangi Dam	1	83.4	Kuram River, North Waziristan	June'23	Under Construction - Physical Progress 60.75%
Mohmand Dam	1	800	Swat River, Mohmand District KP	Dec'25	Under Construction - Physical Progress 9.61%
Diamir Basha Dam	1	4,500	Indus River, Chilas KP	Feb'29	Under Construction - Physical Progress 10%
TOTAL	**4**	**9,703.4**			

**Other Upgradations in process include Warsak Power Rehabilitation and Mangla Rehabilitation*

WAPDA Hydel Power Plants | Ready for Construction					
Ready for Construction	**No. of Power Project**	**Expected Capacity (MW)**	**Location**	**Expected Completion Date**	**Status**
Keyal Khwar Hydropower Project	1	128	Keyal Khwar Nallah, Indus River	-	Updated PC-1 submitted for approval
Bunji	1	7,100	Indus River, Gilgit	9 Years after commencement	To be commenced
Harpo	1	34.5	Harpo Nullah, Indus River	Phase-1: June'21 Phase-II: 48 months after Phase-I	Ready For Construction
Tarbela Extension	1	1,410	Swabi, KP	May'26	Ready For Construction
	5	**8,672.5**			

FY21		
Power Plants in Operation	**No. of Power Plants**	**Installed Capacity (MW)**
WAPDA Hydel Power Plants	24	9,443
IPPs Hydel Plants	8	472
TOTAL	**32**	9,915

- Currently, Hydel power contributes ~27% to the total Installed Capacity, of which WAPDA has almost ~95% of the share. WAPDA further envisages to increase installed hydropower capacity by ~19,146MWs of which projects worth ~9,703MWs are already under construction.

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Upcoming Projects | Hydel | IPPs

IPPs | Upcoming Projects					
Projects	**No. of Plants**	**Expected Capacity (MW)**	**Location**	**Expected Completion Date**	**Status**
Karot Hydropower Project*	1	720	Jehlum River, Rawalpindi	Dec'21**	Financial Close Achieved - Under Construction
Suki Kinari Hydropower	1	884	Kunhar River, Mansehra KP	Dec'22	Financial Close Achieved - Under Construction
Raili - II Hydropower	1	7.08	Ghori Wala Nullah, Muzafarrabad AJK	Jan'23	LOS issued under Financial Close - Under Construction
Kathai-II Hydropower	1	8	Kathai Nullah Hattian, AJK	May'24	LOS issued - FC in progress
Azad Pattan Hydropower	1	700.7	Jhelum River, Sudhnoti, AJK	Sep'27	LOS issued - FC in progress
Kohala Hydropower	1	1,124	Jhelum River, Kohala, AJK	Dec'28	LOS issued - FC in progress
Athmuqam Hydropower	1	450	Neelum River, AJK	Dec'28	LOI Issued - Tariff determination process
Turtonas- Uzghor Hydropower	1	82	Golen Gol River, Chitral, KP	Dec'28	LOI Issued - Tariff determination process
Mahi Hydropower	1	640	Jhelum River, AJK/PUNJAB	June'29	LOI Issued - LOS in progress- Tariff determination process
Ashkot Hydropower	1	300	Neelum River, AJK	Dec'30	Under Evaluation
	10	**4,916.1**			

**CPEC Project*

***Expected RCOD as per PPA may change due to COVID-19 Pandemic/other factors.*

- Alongside WAPDA, Hydel IPPs also embark on significant additions to their installed capacity in the next 10 years. Most of the projects are located in the KP and AJK regions.
- Together, WAPDA and Hydel IPPs are projecting to uplift the Hydel Installed Capacity of the country to ~33,206MWs in the next 10 years.

Source: PPIB

POWER GENERATION

Upcoming Projects | Renewable | Solar IPPs

Solar Power Plants | Under Construction			
Project Name	**Expected Capacity (MW)**	**Location**	**Status**
M/S Access Electric Pvt. Ltd.	10	Pind Dadan Khan	Process of Achieving FC Underway
M/S Bukhsh Solar Pvt. Ltd.	10	Lodhran	Process of Achieving FC Underway
M/S Safe Solar Pvt. Ltd.	10.28	Bahawalnagar	Process of Achieving FC Underway
M/S Access Solar Pvt. Ltd.	11.52	Pind Dadan Khan	Process of Achieving FC Underway
TOTAL	**41.8**		

- Six (06) solar power projects of 430 MW capacity are operational.
- Four (04) IPPs with a cumulative capacity of 41.80 MW have obtained Letter of Support (LOS) while another Twelve (12) Solar PV power projects of 419 MW cumulative capacity have obtained LOI from AEDB and are at different stages of project development.

Solar Power Plants | To be Constructed			
Project Name	**Expected Capacity (MW)**	**Location**	**Status**
IPS Solar Park - IPS 22 Pvt. Ltd.	50	Nooriabad, Sindh	Project Development
IPS Solar Park - JA 23 Pvt. Ltd.	50	Nooriabad, Sindh	Project Development
IPS Solar Park - SB 24 Pvt. Ltd.	50	Nooriabad, Sindh	Project Development
R.E Solar I Pvt. Ltd	20	Dadu, Sindh	Project Development
R.E Solar II Pvt. Ltd	20	Dadu, Sindh	Project Development
ET Solar Pvt. Ltd.	25	Thatta, Sindh	Project Development
ACT Solar Pvt. Ltd.	50	Thatta, Sindh	Project Development
Janpur Energy Limited	12	Sultanabad, RYK	Project Development
Lalpir Solar Energy Limited	12	Mehmood Kot, Muzzafargarh	Project Development
Siddiqsons Solar Ltd.	50	Kalar Kahar, Chakwal	Project Development
ET Solar Pvt. Ltd.	50	Fateh Jang, Attock	Project Development
Asia Petroleum Limited	30	Bahawalnagar	Project Development
TOTAL	**419**		

Source: AEDB

POWER GENERATION

Upcoming Projects | Renewable | Wind IPPs

Wind Power Plants | Under Construction			
Project Name	**Expected Capacity (MW)**	**Location**	**Status**
Lakeside Energy (Pvt.) Ltd.	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Artistic Wind Power (Pvt.) Ltd.	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Liberty Wind Power 1 (Pvt.) Ltd.	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Indus Wind Energy Limited	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Act2 Wind (Pvt.) Limited	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Metro Power Company Ltd.	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Liberty Wind Power 2 (Pvt.) Ltd.	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Gul Ahmed Electric Limited	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Din Energy Limited	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
Nasda Green Energy (Pvt.) Ltd.	50	Jhampir District, Thatta	FC Achieved in Nov'19 - Under Construction
TOTAL	**500**		

- Twenty-Six (26) wind power projects of 1335 MW cumulative capacity have achieved Commercial Operation and are supplying electricity to National Grid.
- Ten (10) wind power projects of 510 MW capacity have achieved Financial Closing and are under construction.

Wind Power Plants | To be Constructed			
Project Name	**Expected Capacity (MW)**	**Location**	**Status**
Western Energy Pvt. Ltd.	50	Jhampir District, Thatta	Project Development
Burj Wind Energy Pvt. Ltd	14	Gujju District, Thatta	Project Development
Shaheen Foundation	51	Jhampir District, Thatta	Project Development
Trans Atlanstis Energy Pvt. Ltd	50	Jhampir District, Thatta	Project Development
TOTAL	**165**		

Source: AEDB

POWER GENERATION

Upcoming Projects | Renewable | Bagasse IPPs

Bagasse/Bio-mass Plants | To be Constructed			
Project Name	**Expected Capacity (MW)**	**Expected COD**	**Status**
Etthad Power Generation Limited	74.4		
Shahtaj Sugar Mills Ltd.	32	FY22	**LOS Stage**
Hunza Power (Pvt.) Ltd.	49. 8	FY22	
Ittefaq Power (Pvt.) Ltd.	31.2	FY22	
Kashmir Power (Pvt.) Ltd.	40	FY22	
Indus Energy Limited	31	FY22	
Bahawalpur Energy Limited	31.2	FY22	
Alliance Sugar Mills Ltd.	30	FY22	
RYK Energy Limited	25	FY22	
Two Star Industries (Pvt.) Ltd.	48.9	FY22	
TAY Powergen Co. Pvt. Ltd.	30	FY22	
Hamza Sugar Mills Unit-II	30	FY22	
Faran Power (Pvt.) Ltd.	26.5	FY22	
Shiekhoo Power Ltd.	30	FY22	
Mehran Energy Ltd.	26.5	FY22	
Habib Sugar Mills Ltd.	26.5	FY22	
Thai Industries Corporation Ltd.	20	FY22	**Tariff and Generation License required**
Hamza Sugar Mills Unit-lll	15	FY22	
Digri Gen Ltd	25	FY22	
Popular Energy (Pvt.) ltd.	30	FY22	
TOTAL	**653.3**		

**Expected COD of Bagasse based Power Projects is subject to the outcomes of the Court decision as the projects are sub-judice and subject to review of the Tariff Determination by NEPRA.*

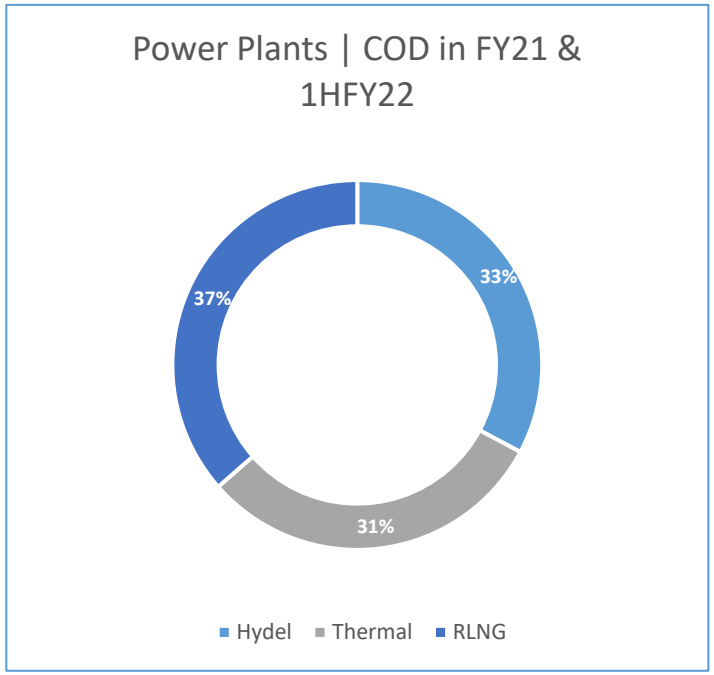
- Pakistan is the fifth largest sugarcane producer in the world and has a potential to generate more than ~2,000MW of electricity through Co-Generation.
- The installed capacity of bagasse/biomass power plants connected with NTDC System as on 30-06-2021 was 369 MW

Source: AEDB

POWER GENERATION

Generation License & CODs | FY21 and 1HFY22

Capacity – Generation Licenses								
Type	FY18		FY19		FY20		FY21	
	No. of Licenses	Capacity	No. of Licenses	Capacity	No. of Licenses	Capacity	No. of Licenses	Capacity
Thermal		-		-	4	316	1	55
Hydel	6	30	1	11.8	2	117	4	294.113
Wind	8	410	1	50	4	138.7	-	-
Solar	6	450	3	66.2	16	621.4	18	49.7
Nuclear		-		-	1	1145	1	1145
Bagasse	8	237	4	148	-	-	3	47.55
Coal	2	65	2	336.5	-	-	-	-
Solid waste		-	1	40	-	-	-	-
RLNG	1	1279		-	-	-	-	-
Total	**31**	**2,471**	**12**	**653**	**27**	**2,338**	**27**	**1,591**



- During FY21 and 1HFY22, the following power plants achieved/expected Commercial Operations Date (COD):

- **Hydel:** Karot Project – Capacity 720MW – COD – Dec'21.
- **Local Coal:** Lucky Electric Thar Coal Project – Capacity 660MW – COD June'21.
- **RLNG:** RLNG based PTPL Project – Capacity 800MW – COD October'21.

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Power Tariffs – How they are determined

In accordance with NEPRA Tariff Standard & Procedure Rules, 1998, NEPRA is responsible for determining the tariffs for all generation, transmission and distribution companies of the Sector. In order to understand the tariff system, it is divided into three levels (i) the generation level (ii) transmission level and (iii) distribution level.

Generation:

- At the generation level, the 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 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, the capacity charge 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.

Transmission:

- At the transmission level, the 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 maximum demand index of all DISCOs and bulk power consumers connected to the NTDC transmission network.

Distribution

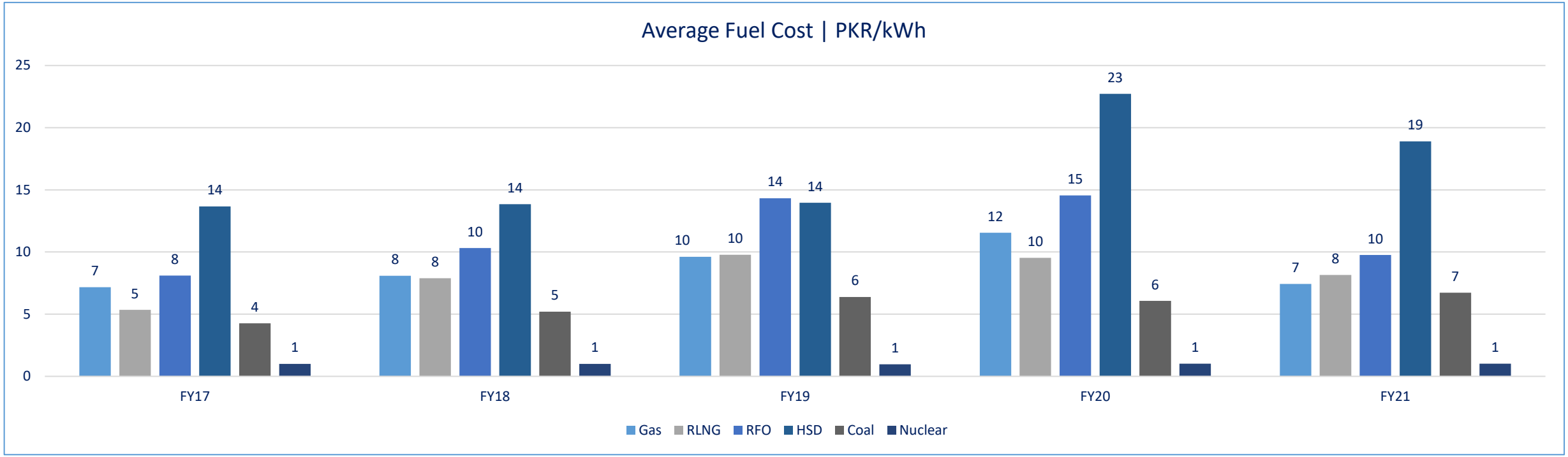
- Finally, the retail tariff is determined at the distribution stage. This includes tariff determined at the generation and transmission levels (CC + EC + O&M + UoSC) as well as fixed distribution margins of the DISCOs. Additionally, this tariff also includes allowed transmission and distribution losses.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

POWER GENERATION

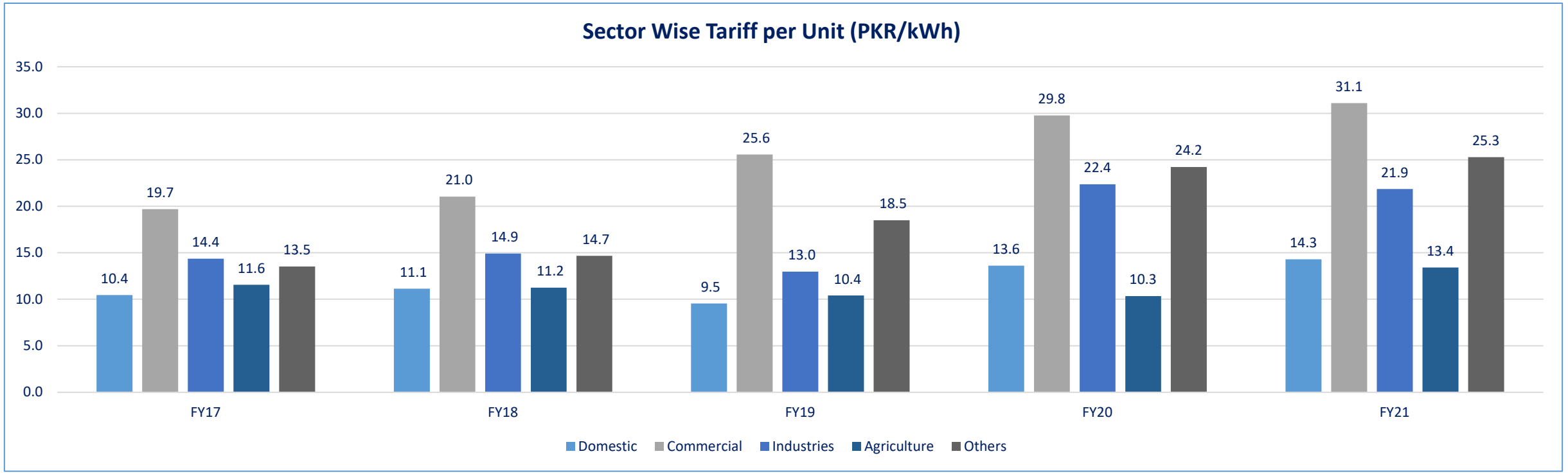
Average Fuel Cost



- The cheapest source of fuel are renewable energy sources followed by hydel energy. The fuel cost component in renewable energy sources is almost negligible. Hydel generation is the cheapest electricity, produced in the country. Average cost of hydel electricity produced by WAPDA stood at merely PKR~2.8 per unit, while generation cost from thermal sources averaged PKR~13.1 per unit during FY21.
- HSD is the most expensive source of fuel for electricity supply but its share in the country's generation mix is restricted to ~1% or lower. On the other hand, electricity produced from coal has been the cheapest among fossil fuels over the years. Imported RLNG has a comparatively lower fuel cost as compared to other imported fuel sources.

Source: WAPDA, NEPRA 'State of the Industry Report' 2021

Average Consumer Tariffs by Sectors



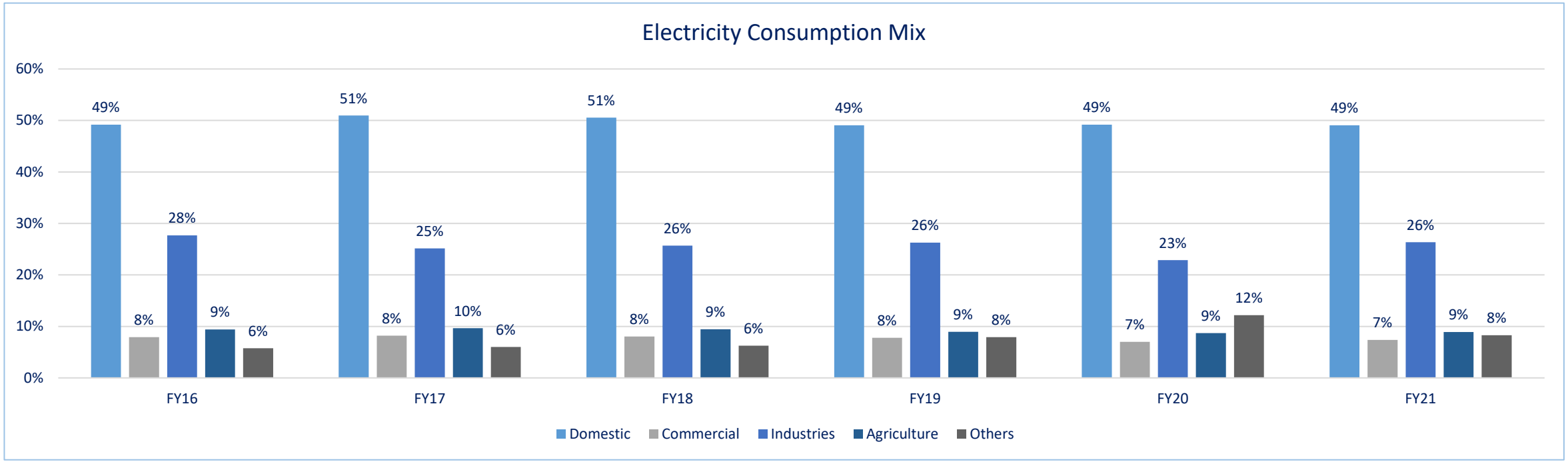
Tariff chart includes PEPCO consumers only.

- In terms of Sectors, Commercial and Industrial consumers are charged the highest average tariffs, while agricultural and domestic sectors are charged the lowest, due to different subsidies provided for the end consumers as well as low base effect of hydel fuel charges.

Source: WAPDA, NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Sector Wise Power Consumption Share



*Others refer to 'public lighting and bulk supply'

- Pakistan's overall electricity consumption was recorded at ~121,206GWh during FY21 (~112,069GWh in FY20), up ~8.2% YoY basis. This is equivalent to ~85% of the total electricity generated in FY21 (~143,090GWh). Almost 91% of the Energy Sales is made through the CPPA-G System while the remaining ~9% is sold to the KE System.
- The domestic sector contributes the highest towards electricity consumption, being ~49% during FY21. Pakistan's average per capita electricity consumption hovers around ~585kWh.

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Demand & Supply during Peak Hours | NTDC & KE

- Up till FY21, Pakistan's installed capacity was not sufficient to fully contribute to the maximum demand of the country for a particular point in time. It was due to reasons such as auxiliary consumption, impact of site reference conditions and seasonality effects on the renewable and large hydropower plants. After accounting for these factors, the capacity known as 'generation capability' is effectively used for meeting the electricity demand. FY20 was, however, an exception when the electricity demand became drastically low, putting up a surplus situation for the NTDC Network. With the expected peak demand for FY22, Pakistan is expected to achieve a surplus generation capability on NTDC Network from FY22 onwards. For KE system, the surplus is expected to come by FY23.

NTDC			
Year	Generation Capability (MW)	Demand During Peak Hours (MW)	Surplus/(Deficit) MW
Actual			
FY17	19,020	25,117	(6,097)
FY18	23,766	26,741	(2,975)
FY19	24,565	25,627	(1,062)
FY20	27,780	26,252	1,528
FY21	27,819	28,253	(434)
Projected			
FY22	29,761	25,101	4,660
FY23	31,868	25,715	6,153
FY24	34,151	27,311	6,840
FY25	34,885	28,322	6,563
FY26	38,574	29,398	9,176

KE			
Year	Generation Capability (MW)	Demand During Peak Hours (MW)	Surplus/(Deficit) MWh
Actual			
FY17	2,860	3,195	(335)
FY18	2,920	3,270	(350)
FY19	3,008	3,527	(519)
FY20	3,196	3,530	(334)
FY21	3,202	3,604	(402)
Projected			
FY22	3,682	3,856	(174)
FY23	4,086	4,049	37
FY24	4,511	4,252	259
FY25	4,511	4,464	47
FY26	4,830	4,687	143

**'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 'State of the Industry Report' 2021

POWER GENERATION

THE RISK MATRIX

- **High Cost of Electricity:** With the induction of substantial amount of generation capacity during last few years, though the availability of electricity has improved significantly but the cost of electricity for end-consumers has increased owing to various reasons like high T&D losses, low recovery, circular debt, huge capacity payments, currency devaluation, fuel cost, under-utilization of efficient power plants etc.

- **Circular Debt:** (Covered in detail in the next sheets).

- **Inefficiency in Power Generation:** The availability factor of gas/RLNG power plants is 92%, coal power plants is 85% and RFO power plants is 88%. Under utilization of efficient power plants increases the cost of electricity and also spikes the burden of capacity payments for un-utilized capacity. The efficiency of GENCO power plants has also deteriorated over time which increases burning of more fuel and thus cost of generation.

- **Non-Availability of RLNG to Power Plants:** RLNG is a cheaper source of fuel being imported in the country due to depleting gas reserves. Non-availability of RLNG to gas based plants results in under-utilization or non-utilization of power plants.

- **Centralized Control of DISCOs and GENCOs:**

- **Transmission Constraints:** Overloading of transmission lines, insufficient transformation capacity of transformers, outages and faults are a few of the constraints in transmission system.

- **Two Generation baskets in the Country:** CPPA-G and KE. Efficiency can be achieved through one generation basket.

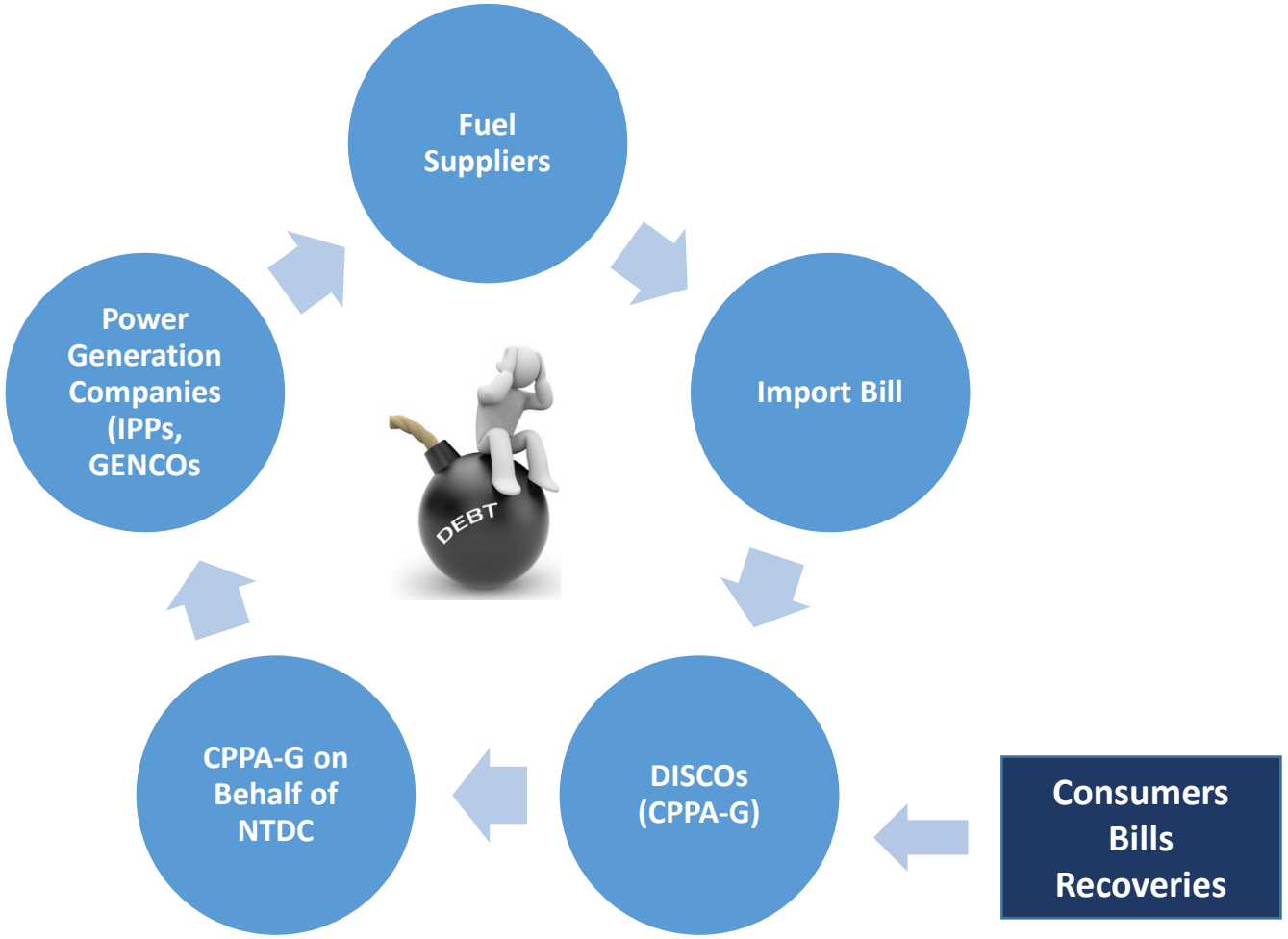
- **Transmission & Distribution Losses:** Transmission and Distribution (T&D) losses are not unusual in electrical power system but losses exceeding the acceptable limits increase the price of electricity unnecessarily for consumers.

Source: NEPRA 'State of the Industry Report' 2021

CIRCULAR DEBT | THE UNFORTUNATE MENACE

What is Circular Debt?

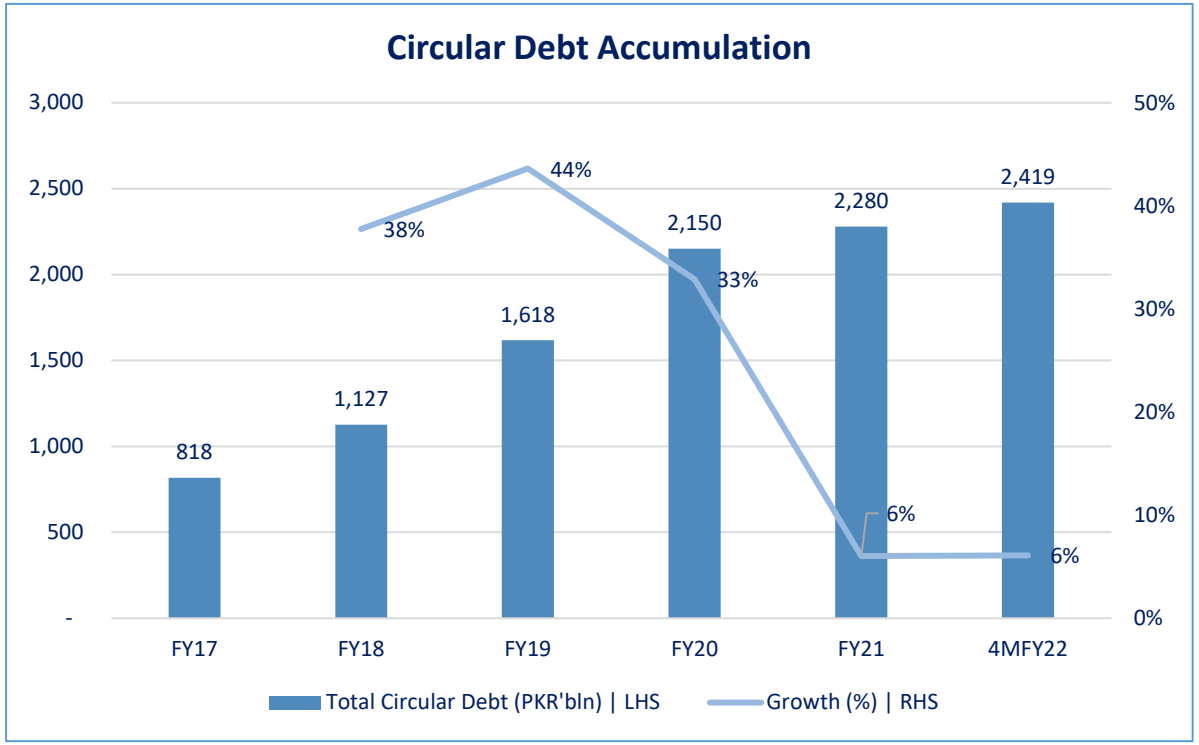
- The Power Generation Companies produce electric power which is sold to CPPA-G on behalf of DISCOs through the transmission Company – NTDC. The DISCOs supply the electric power to the end consumers.
- The CPPA-G has to make payments to the power producing Companies and NTDC on behalf of DISCOs within a given timeframe.
- The problem stems from the DISCOs being unable to make timely payments due to reasons including low recoveries from end consumers and T&D losses. This in turn hinders CPPA-G in making payments to power producing Companies and transmission Companies. The cycle goes on as the power producing Companies are unable to make payments to fuel suppliers. Under the PPAs, the delayed payments to power companies bears mark-up and increases financial liability.

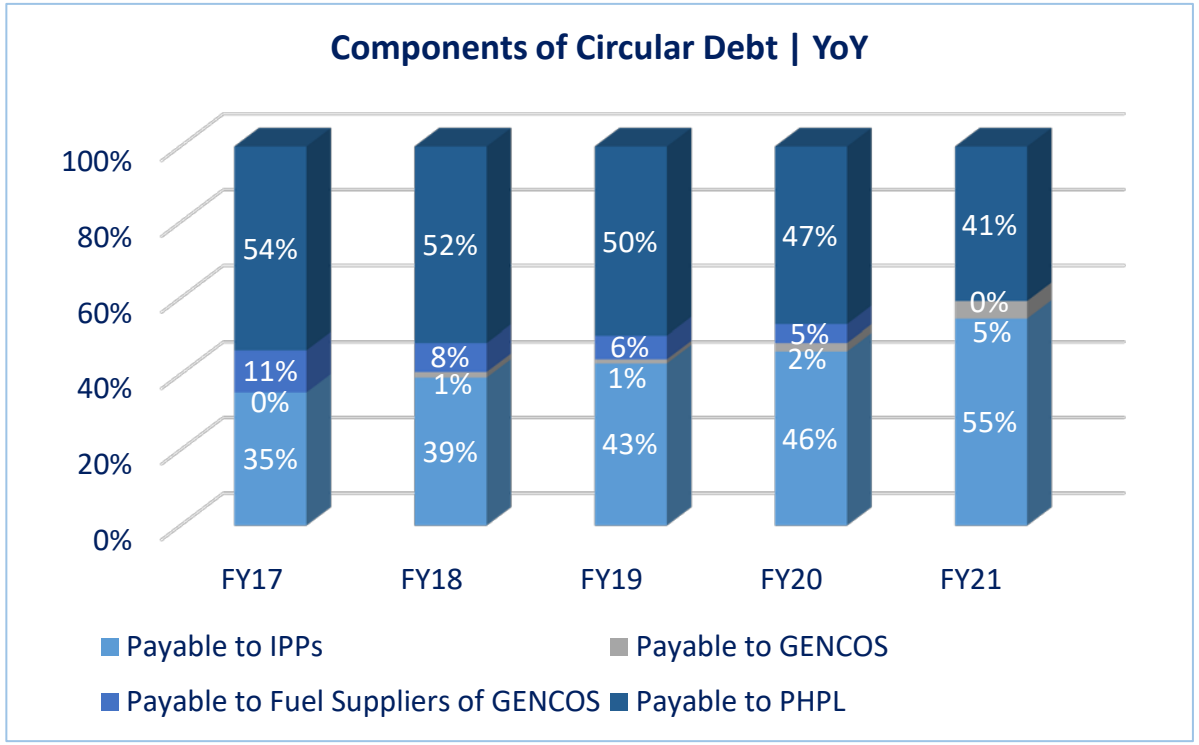


Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Accumulation of Circular Debt





- Pakistan's total circular debt soared to PKR~2.4trn as at End-Oct'21 (up ~6% from End-June'21). The total amount of circular debt was recorded at PKR~2.3trn as at End-FY21, representing an increase of PKR~130bln, a monthly run rate of PKR~11bln addition to the misnomer pile. This, although still large, is reflecting a slowdown in the accumulation of Circular debt, whose growth went exorbitantly high in FY19 by ~44% but then slowed to ~33% in FY20 and declined to just ~6% in FY21.

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Circular Debt – Initiatives to stop accumulation

- In recent years, the major build-up in the circular debt has been caused by capacity payments to large power projects set up since 2015, primarily as part of the multibillion-dollar CPEC initiative, with Chinese money.
- 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.
- Higher T&D losses, low recoveries from DISCO's, delay is subsidy payments, increasing receivables from public and private consumers are some of the major reasons contributing to mounting circular debt.
- The strategies listed in the adjacent table are in consideration by the GoP to address the circular debt menace.

Major Components of Circular Debt - PKR'bln	FY20	FY21
Operational Inefficiencies	752	846
Non-Payment by QESCO Agriculture Tube well	306	306
Limitations & Delays in Regulatory Approval	270	270
Non-payment of subsidies	260	332
Non-Payment by K-Electric	212	294
Outstanding Amounts by AJK	144	144
Others	140	(7)
Interest Payment on Power Sector Debt by PHPL	66	95
Total Debt	**2,150**	**2,280**

Issue	Way Forward
Excess/expensive generation capacity	-Negotiation with IPPs -Reduction of RoE of govt. owned power plants -Shut down of inefficient GENCOs -CPEC projects
Non-payment by K-Electric	Early signing of PPA by K-Electric based on commercially viable terms
Outstanding amount of AJK	Removal of GaP of AJ&K tariff differential-summary initiated
Delay tariff determinations	Tariff rebasing to be announced by NEPRA to reduce the gap
Quetta Agriculture tube wells	Provincial govt. support required for recovery drive and installation
Non-payment of subsidies	Full amount of summary to be budgeted and released
PHPL interest charges	Amendments of NEPRA Act

Source: NEPRA 'State of the Industry Report' 2021

POWER GENERATION

Latest Developments

National Electricity Policy 2021

This 10 year policy is focused on power expansion on a competitive, least cost and transparent basis. Development of local fuels and more reliance on clean energy to generate inexpensive and eco-friendly electricity, are the hallmark of the national electricity policy.

Circular Debt Management Plan 2021-23

The Government has devised a comprehensive two year Circular Debt Management Plan to curtail the growing circular debt by transferring the burden onto the consumers through increase in power tariff and quarterly adjustments in billing. Additionally, the electricity distribution companies collections are planned to be increased and losses are planned to be reduced through efficiency gains. Moreover, the plan includes measures such reduction in unplanned subsidies, conversion of PHLC debt to public debt, mark up payments through fiscal spaces and receipt of payables by KE.

NEPRA Act Amendment 2021:

After Amendment in the Act, NEPRA has the autonomy with regard to setting the electricity tariff. This amendment will enable the Government to collect 10 percent surcharge on electricity bills which will be resourceful in sorting the circular debt issue.

IPPs | Amendments to the PPAs:

IPPs who signed the MoUs in Aug'20 have agreed to enter into the legally binding contracts with the GoP. The development will be a turning point for the power sector. The 'take-or-pay' method of tariff structure is revised as the O&Ms Savings will be shared with the Power Purchaser. Also, delinking components of tariff to USD index has reduced the burden of capacity payments and related mounting debt financing costs. The other silo of this transaction - clearance of IPPs dues considered essential, is expected to resolve circular debt issue to an extent. Meanwhile, this will also improve liquidity position of IPPs.

Under this revised agreements with 47 IPPs, the government was to pay 40% of the total dues of IPPs. The total dues amounted to PKR 403bln as of 30 November 2020. The government has paid the 40% as first instalment to about 35 IPPs and their revised tariffs are now applicable. However, 12 IPPs didn't get the 40% of their dues so far. Now after the Law Division has managed approval from NAB, the power division will soon start paying the dues to 11 IPPs except one whose case is still under investigation. The total dues of 11 IPPs stood at PKR 145.7bln till November 30, 2020. As soon as the 40% (PKR 58.4bln) of the dues will be paid, NEPRA will enforce their discounted tariff.

Progress towards Hydel & Renewable Energy:

With sufficient resources available, the GoP is focused on increasing proportion of cleaner and cheaper fuel in the power generation of the country. Resultantly, 25 out of 27 licenses issued during FY21 pertained to Renewable and Hydropower plants. The mix of Power generation from Hydel energy has also improved during FY21. Mohmand Dam and Diamer Basha Dam, two of the mega projects in the hydel power, are also under construction.

Source: Dawn, e-tribune and PACRA Database

National Electricity Policy 2021

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

POWER GENERATION

Indicative Generation Capacity Expansion Policy (IGCEP 2021-30)

The **IGCEP** 2021-30, developed by NTDC, deals with long-term energy security with timely investments to supply energy in line with economic developments and environmental needs.

Salient Features of the IGCEP:

- ❑ Significant Induction of REs (clean and indigenous)
- ❑ Tapping of indigenous coal-based power
- ❑ Balancing the overall basket price with increased share of hydro power
- ❑ Optimal indigenization: less reliance on imported fuel i.e. coal, RFO, RLNG etc.
- ❑ Substantial reduction in carbon emission owing to induction of REs and hydro

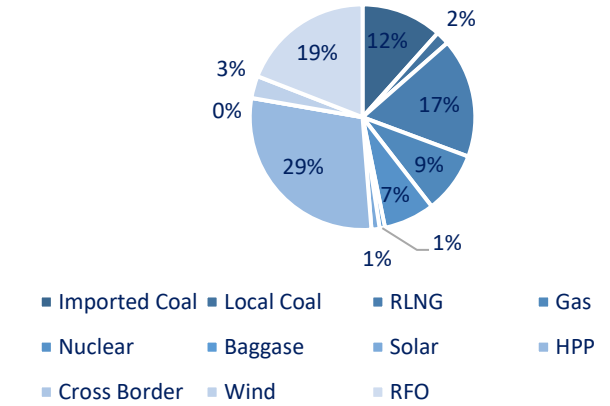
Pakistan ranks 99th among 110 countries in terms of energy security by the World Energy Council for CY20. Pakistan imports nearly one third of its energy resources in the form of oil, coal, and RLNG, and currently 47% of existing installed capacity relies on imported fuel for energy generation.

According to the IGCEP, the highly skewed energy mix of the country towards imported fuels including coal, furnace oil and RLNG, would be substituted with indigenous resources including hydel, local coal, bagasse, wind and solar on least cost basis.

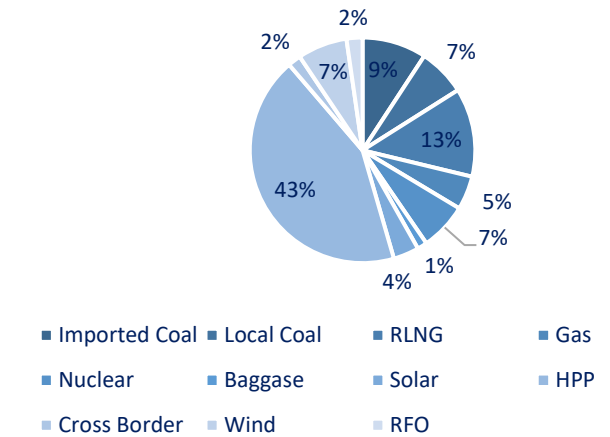
The use of furnace oil would be reduced to 2% only from the current usage of 19%. Similarly, the use of RLNG and imported coal would be decreased to 13% and 9% from their current usage of 17% and 12%, respectively.

The policy envisions massive increase in the contribution of hydropower and other renewable energy resources, including bagasse, wind and solar. The contribution of hydel, wind and solar, which currently stands at 29 percent, 3 percent and 1 percent, respectively would be increased to 43%, 7% and 4%, thereby increasing the total share of RE to the tune of more than ~55%.

Energy Capacity Mix 2021



Energy Capacity Mix 2030



Source: NEPRA

POWER GENERATION

Business Risk – An Overview

- This Sector Study focuses on the Business & Financial Risk of Independent Power Producers (IPPs) (majorly thermal).
- IPPs are Special Purpose Companies that operate in a firmly regulated environment, which shields them from multiple business and financial risks. Some cushions available against business risk are listed below:

❖ IPPs enjoy tax-free status.

❖ All IPPs are governed by project agreements (Implementation Agreement (IA), Power Purchase Agreement (PPA) and fuel/gas supply agreements), by way of which they are protected against multiple business and financial uncertainties.

❖ The long term nature of PPAs spanning over a period of 25-30 years shields the IPPs from economic vicissitudes. Also, the underlying take-or-pay mechanism in the PPAs insulates them from the risk arising due to variations in the quantity of power purchased from them (through capacity charges).

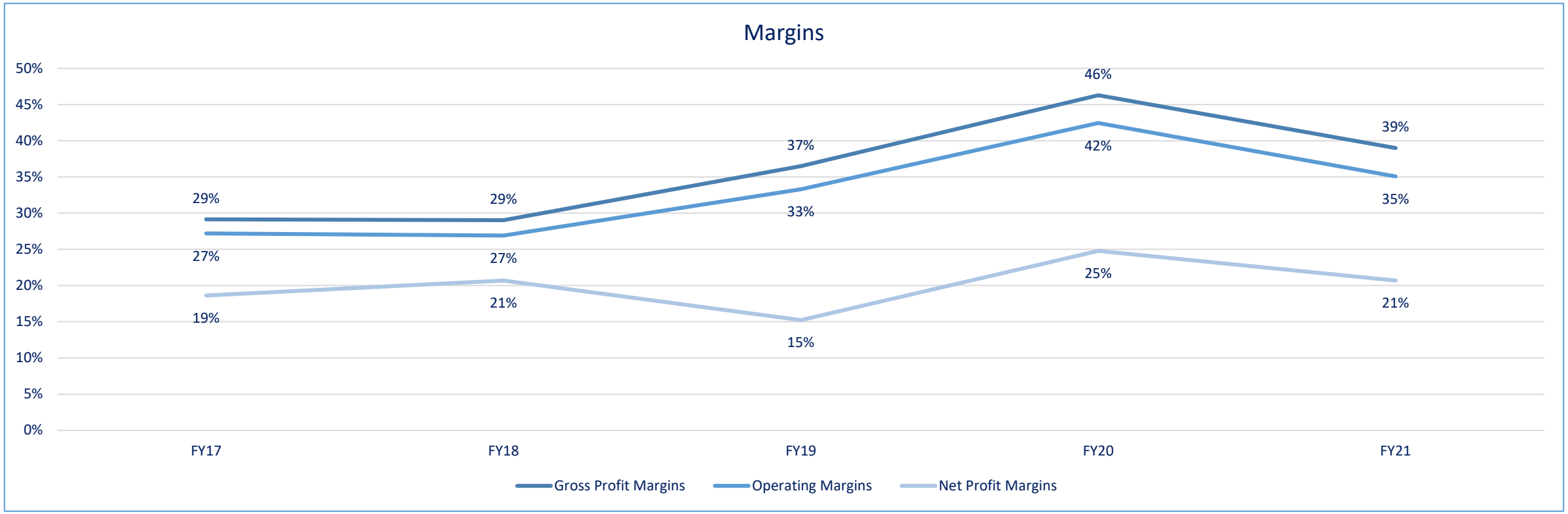
❖ IPPs operate in a single buyer market – the CPPA-G (and KE in its respect geography). Under the IA between the GoP and the IPPs, a Guarantee is provided by the GoP of the payment obligations of the Power Purchaser. Any failure of the Power Purchaser to fulfill its payment obligations towards the IPPs is secured by the Government Guarantee.

- The business risk of IPPs is largely linked to qualitative issues which can impede their operational performance. One of the key risks is the **fuel supply risk**. In the latest PPAs, the GoP does not guarantee the fuel supplier's obligations underlying in the Fuel Supply Arrangement (FSA). In the event of non-performance of an FSA, the IPPs may be subject to operational risks due to underutilization or even closure of plants.
- **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.

Source: PACRA Database

POWER GENERATION

Business Risk – Margins



- The largest contributor to the IPPs' direct costs is the fuel charges.
- The overall margins of IPPs registered a decline after a temporary hike in FY20 when the fuel costs went significantly low.

Margins are based on average of 30 entities in Power Sector rated by PACRA.

Source: PACRA Database

POWER GENERATION

Business Risk | Latest Developments

Pakistan has been able to achieve power capacity surplus by far but at a very heavy cost of growing Circular Debt (CD) mammoth. In order to arrest the growing concern, the GoP in Aug'20, had signed MoUs with 47 IPPs to address issues relating to mechanism of their payments, terms of tariff structure and other pertinent modalities. Tariff delink with USD is expected to lower the income of the IPPs. On the contrary, the amendment obliging the payment of IPPs' receivables is a positive development for the cashflows of the IPPs. A snapshot of the major amendments to the PPAs with reference to tariff structure is given below:

Impact	Revision	Original
Tariff Component – ROE and ROEDC | Local Investment	17% per annum (PKR) Current USD Equity shall be converted to PKR @ an exchange rate of PKR/USD 148.	15% (USD)
Tariff Component – ROE and ROEDC | Foreign Equity	12% USD per annum	
Tariff USD Indexation	**No**	**Yes**
Late Payment Surcharge (LPS) (Revised Rates shall be effective only subject to ensuring that payments follow the PPA mandated FIFO payment principles)	Reduce to KIBOR + 2.0% for the first sixty days and then revert to KIBOR + 4.5% as per the PPA.	KIBOR + 4.5%
O&M Savings**	To be shared with the Power Purchaser	Retained by the IPP
Receivables of the IPPs	Essential	Not an essential feature

NEPRA Tariff Components – IPPs	Impact
Capacity Charges	**> Downward Impact on IPPs' Incomes due to:** - Tariff delink with USD. - Revised Rates of ROE and ROEDC. **> Positive Impact on IPPs' cash flow due to:** - Payments of IPPs' receivables made an essential feature of the MoUs.
Fixed O&M – Foreign and Local	
Working Capital Costs	
Return on Equity (ROE)	
Return on Equity During Construction (ROEDC)	
Variable O&M	
O&M – Foreign and Local	

According to news sources, the GoP had agreed to pay PKR~450bln outstanding dues to IPPs and PKR~89bln transactions was made as first instalment to IPPs as committed under the settlement agreement signed in February. The federal cabinet also green-lit the payment of PKR~134bln to IPPs as a second instalment on Nov'21 taking total payment to PKR~225bln.

Source: PACRA Database, Dawn News

POWER GENERATION

Financial Risk – An Overview

- **Off-taker Risk:** Unlike most other Corporates, IPPs operate in a single buyer market (CPPA-G/K-Electric). The off-taker for the IPPs is this single buyer. Although, dependence is concentrated on one Entity, the obligations of the off-taker are protected by a Sovereign Guarantee through the IA. This acts as a mitigant to the financial risk relating to the off-taker.

- **Liquidity Risk:** The financial discipline of the Power Sector is relatively weak. The DISCOs are subject to risk of non-payment by consumers which results in delayed payments to power purchaser ultimately creating volatility in cash payments to the IPPs. Any extended delays in payments compels the IPPs to obtain Sponsor Loan or external funding (short term borrowings (STBs)).

- **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.

- **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.

Source: PACRA Database

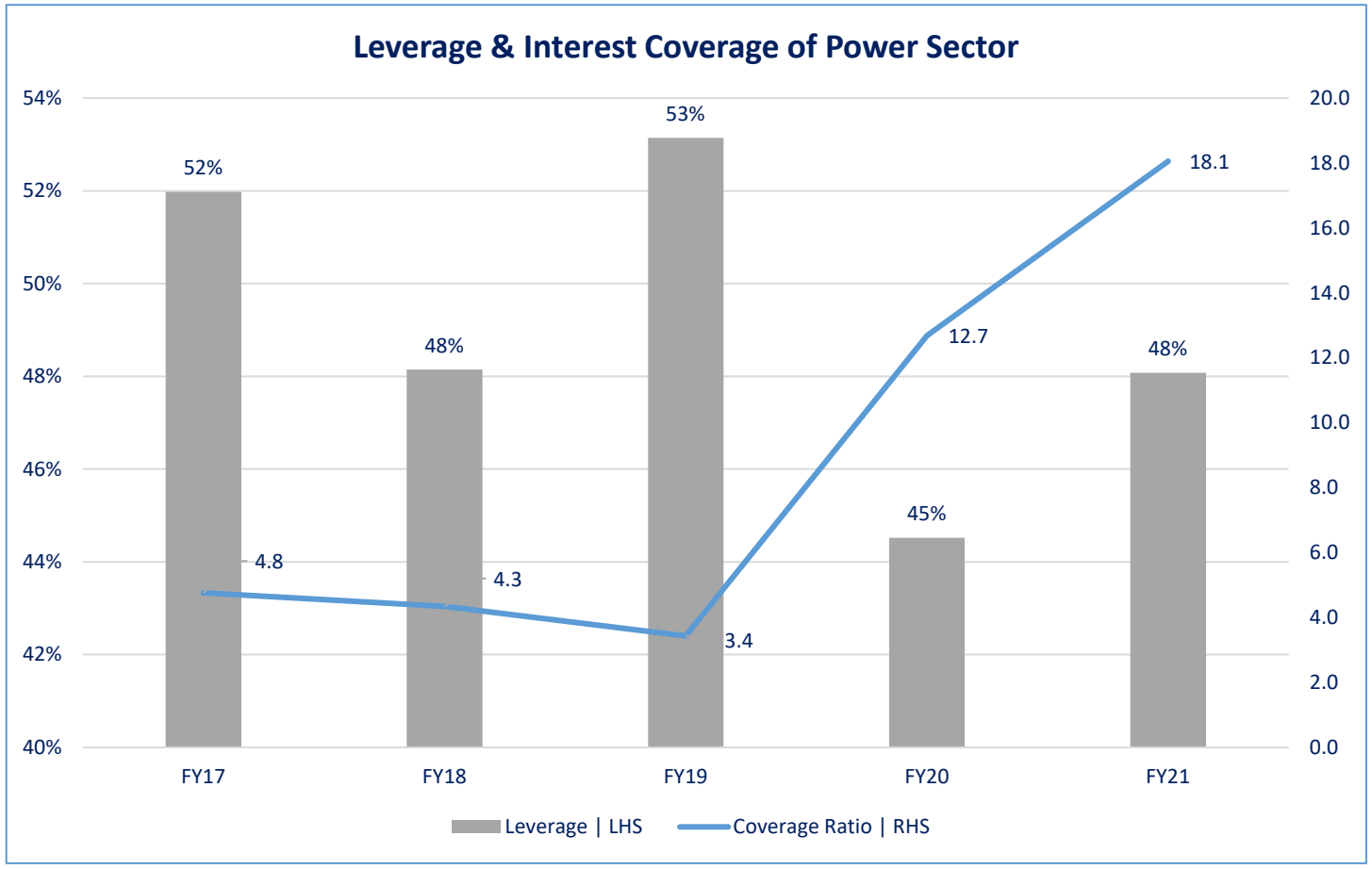
POWER GENERATION

Financial Risk – Sector Leverage & Interest Coverage

The debt servicing capacity of the IPPs has improved over the years due to a decrease in finance cost resulting from the decline in borrowing as significant portion of long term debt of independent power projects have been paid off. However, short term borrowings to manage larger receivables on the backdrop of blocked recoveries is still a major issue in the power sector.

The total leverage of the Power Sector has gone down from 52% in FY17 to 48% in FY21.

The interest coverage ratio is expected to decline going forward due to higher finance cost on account of increase in policy rate by 275 bps after a cut by 625 bps in FY21.



Ratios are based on average of 30 entities in the Power Sector rated by PACRA.

Source: SBP, PACRA Database

POWER GENERATION

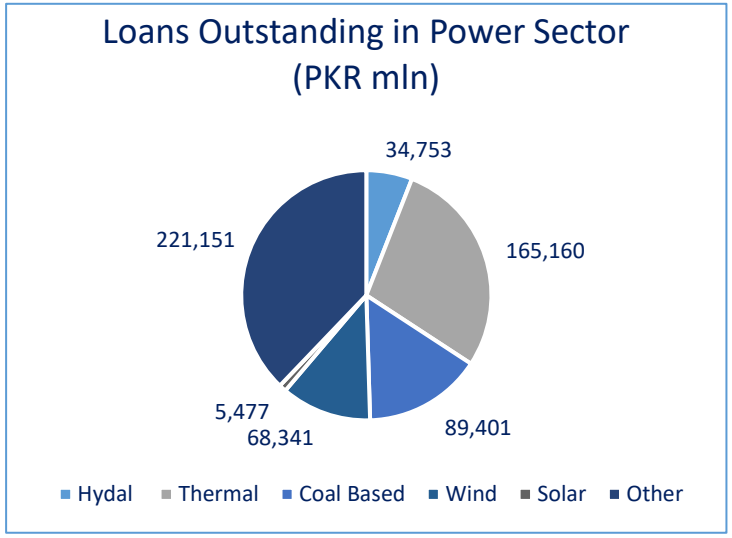
Financial Risk – Borrowing

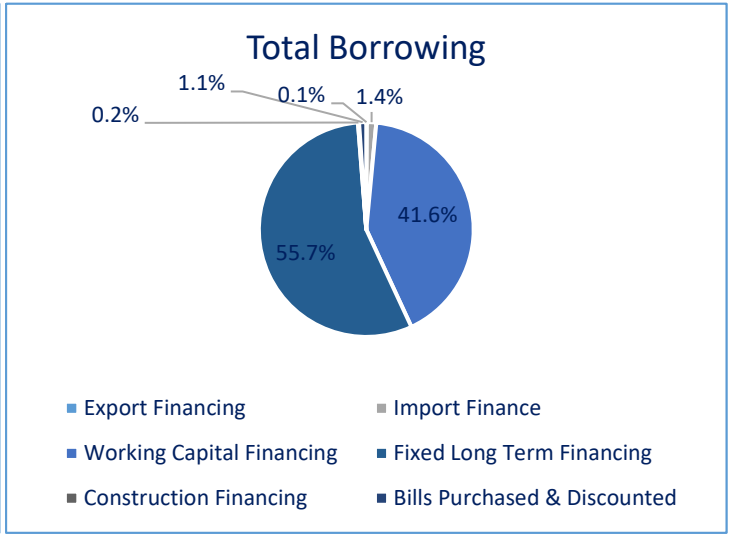
- The total borrowing of "*Electric Power Generation, Transmission and Distribution*" (as per SBP) stood at PKR~584,284mln as on 30th Nov'21 (PKR~485,930mln Nov'20), up ~20% YoY.

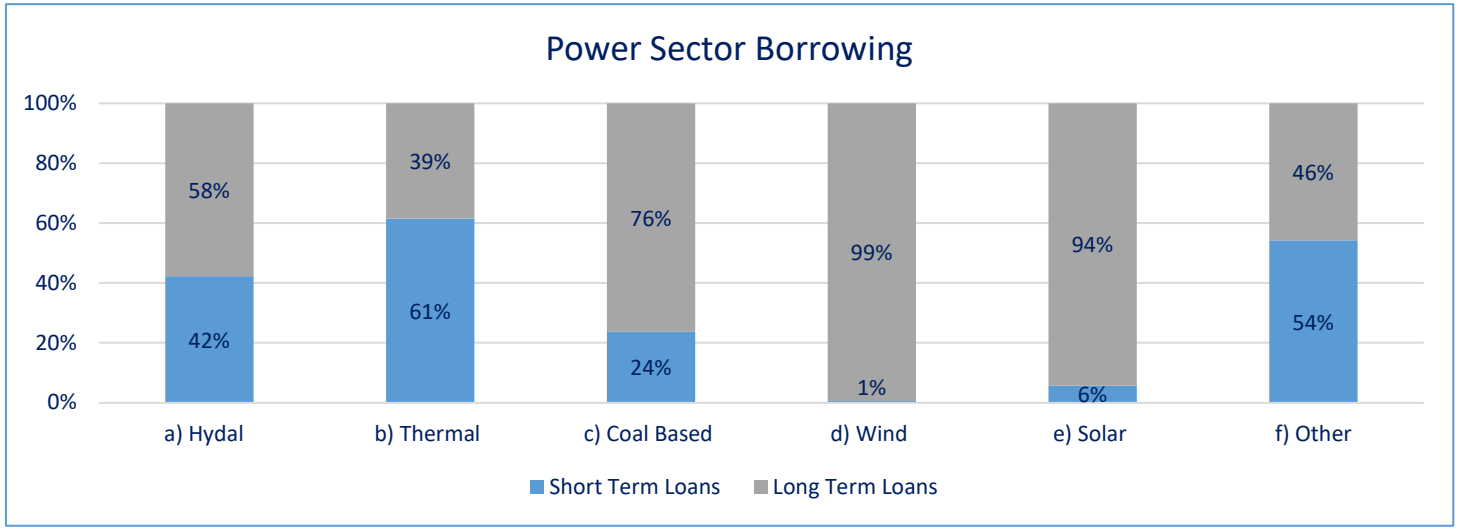
- The largest component of borrowing is fixed long term loans which constitutes 56% of total borrowing and stood at PKR~243,025mln (PKR~190,630mln Nov'20). Working Capital component is 42% of the total borrowing and stood at PKR~243,025mln as on 30th Nov'21.

- The SBP has introduced several concessionary schemes for prospective sponsors, desirous of setting up renewable energy power projects in the country with mark up rate ranging up to 6%.

- The total outstanding loans in the renewable power sector (excluding Hydel) stood at PKR~73,818mln as at 30th Nov'21. This is 13% of the total outstanding loan in the power sector.





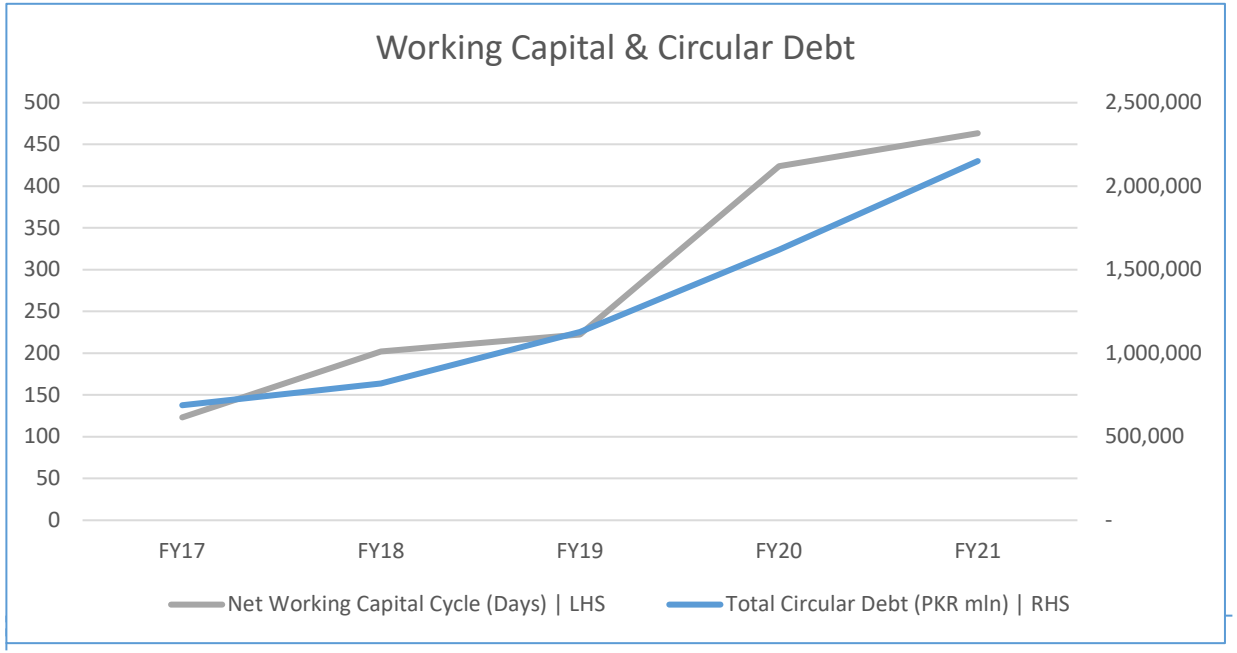


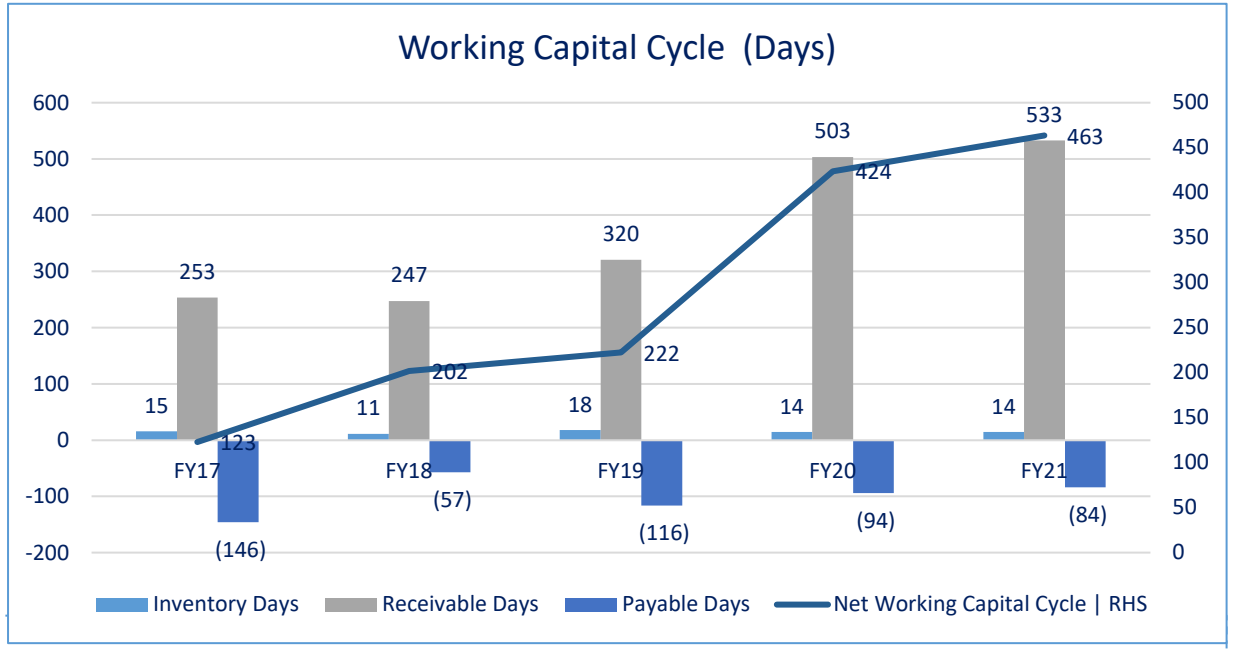
*Other includes borrowing by Transmission & Distribution Companies

Source: SBP, PACRA Database

POWER GENERATION

Financial Risk – Working Capital Management





The Working Capital Cycle of IPPs is largely a function of their receivables which is one component of the Circular Debt, that has grown enormously in the past few years. As witnessed in the first chart, the annual increase in Circular Debt has a direct correlation with the Sector's Net Working Capital days.

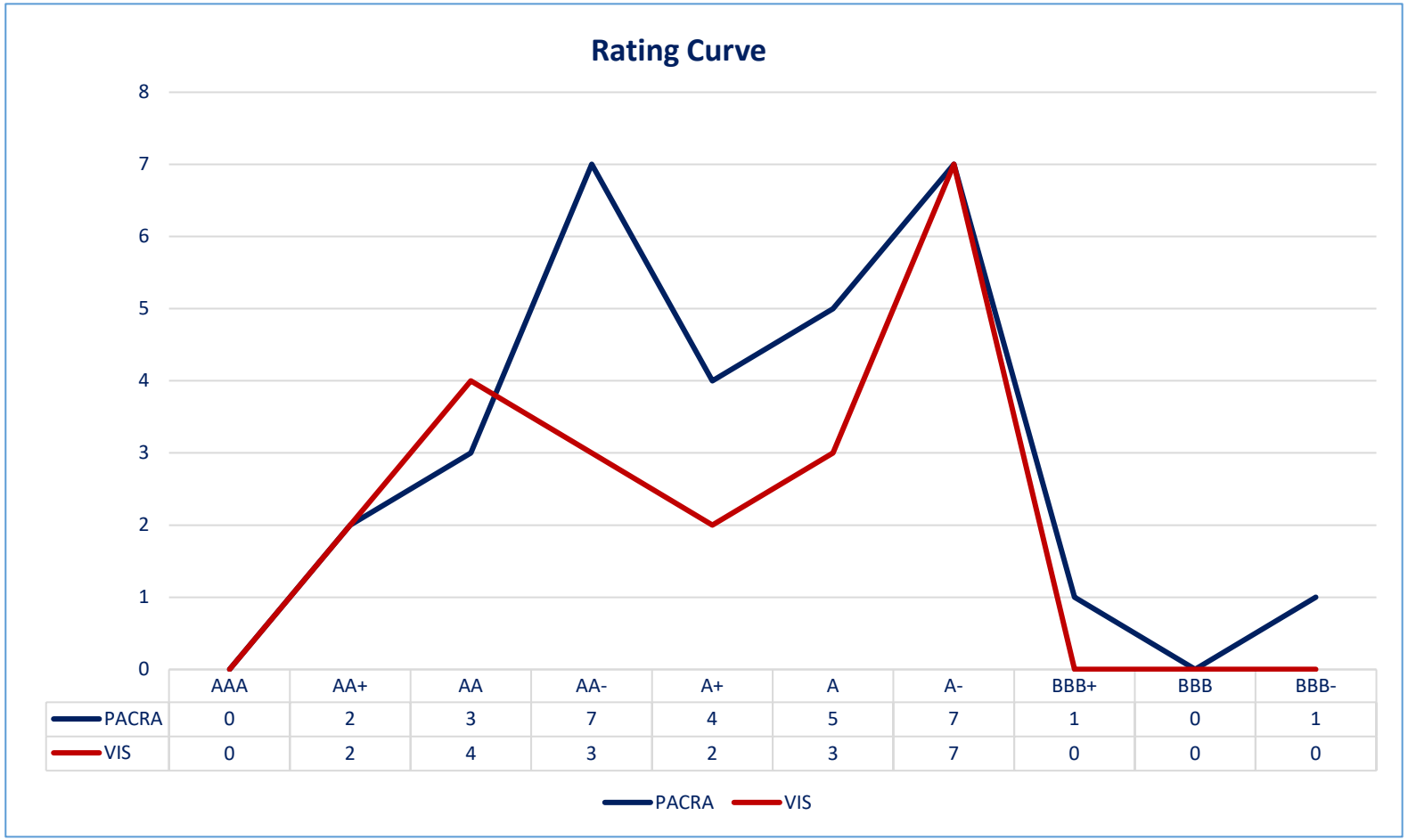
The power sector's average receivable days have almost doubled from 253 days in FY17 to 533 days in FY21. Meanwhile, the average payable days have declined from 146 days in FY17 to 84 days in FY21.

Working Capital are based on average of 30 entities in Power Sector rated by PACRA.

Source: SBP, PACRA Database

POWER GENERATION

Rating Curve



	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-
PACRA	0	2	3	7	4	5	7	1	0	1
VIS	0	2	4	3	2	3	7	0	0	0

- PACRA rates 30 entities in Pakistan's Power Sector.
- Rating bandwidth of the sector ranges from AA+ to BBB-.

POWER GENERATION

SWOT Analysis

- Backbone of the Economy
- Players operate in a regulated environment.
- Low Business Risk due to Risk Mitigants such as Sovereign Guarantees on payment by purchaser and Performance Guarantees by the Contractors.

- Single Buyer Market with two generation baskets, creating inefficiency in the generation system.
- Under-utilization of efficient plants: GENCOs efficiency scale has deteriorated over the years.
- Low Available Capacity Factor.
- Use of High Cost fuels (RFO) results in increased cost of generation.

- Rising Circular Debt
- Increased T&D Losses weakening the financial discipline of power supply chain (Power Purchase Price accounts for only ~65% of the end-consumer tariff).
- 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 Industrial Activity resulting in increased demand.
- Amendment to PPAs in process to revise 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.

POWER GENERATION

Outlook: Stable

- Pakistan's Power Sector is confronting deep-routed issues since long. The key risks being weak financial discipline and inefficiencies in all three verticals of the System. The Sector is, however, considered the backbone of economy and the GoP is keen on developing long term sustainable solutions to the ingrained power issues. Apart from the rising circular debt, some positive developments have surfaced on the economic and power sector level in the recent times including development of first long term National Electricity Policy and the subsequent National Electricity Plan.
- Recently, Industrial activity has picked up in various sectors with the Large Scale Manufacturing Industries output increasing by ~5.2% during 1QFY22. The sectors which have contributed to this growth are textiles, food & beverages, pharmaceuticals and chemicals.
- All IPPs which signed the MoUs in Aug'20 have agreed to enter into the legally binding contracts with the GoP, according to which the government would pay dues worth PKR 450bln, owed to the IPPs in two installments. Payment of circular debt related dues under this agreement has already started, which will improve liquidity position of IPPs and subsequent profitability due to reduced finance cost as reliance on external borrowing to finance the gap in working capital will be decreased.
- The decision taken by the State Bank of Pakistan (SBP) to lower the policy rate by 625bps to 7% in the last quarter of FY20 lowered the finance costs incurred by power producers for financing availed to bridge liquidity gap in FY21. However, State Bank of Pakistan (SBP) has since revised the policy rate by 275 basis points to counter growing inflation and to preserve stability with growth, thereby taking the policy rate to 9.75%.
- The average inflation rate during FY21 stood at ~8.9% as compared to an average inflation rate of ~10.7% during FY20. Till December 2021, the inflation level in the country has risen to 12.3%. Moreover, the PKR has depreciated by 12.8% during the ongoing fiscal year FY22 till December 2021.
- Although Pakistan's generation capability is now sufficient to meet its demand, it is very much essential to strengthen and expand the T&D network of the country in order to achieve optimal utilization of the generation capacity. Creating demand generation is another need. 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.

POWER GENERATION | BIBLIOGRAPHY

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