POWER SECTOR UPDATE

Outlook: Stable

Drivers to the outlook:

Generation

- Energy Sector is the backbone of an economy, while Power is one of the most significant segments of the Energy Sector. Among the three verticals of the Power Value Chain, i.e., Generation, Transmission and Distribution, Generation is the upstream sector which sets the direction of the country's power production and its fuel composition.
- Power generation in Pakistan stood at ~153,874GWh in FY22, up ~7% YoY. Generation capacity, on the other hand, stood at ~43,775MW up ~10% YoY.
- Average utilization factor of the Power Generation Sector stands around 40%, with a major share of the Thermal Generation Power plants, which now account for ~61% share in the Installed Capacity and Generation Mix of the country.
- With a rise in thermal generation mix, Pakistan's dependency on imported fuel has sharply grown over the years, which reduces its control over the variable component of the base cost in power tariffs. Energy price hikes often lead to a disproportionate increase in the cost of generation from imported thermal sources, aggravating the impact of existing deficiencies of the sector.
- The causes of power sector deficiencies are deep-rooted, long-hauled and intermingled. Short-term policy decisions, dependence on imported fuels, capacity charges, inefficiencies of the transmission and distribution networks, non-recovery from consumers and inappropriate subsidy mechanisms have all plagued the sector with inevitable predicaments – the biggest of all being the circular debt deadlock.

As is well-known, "Power Sector Reforms" have always been of the key agenda points of the IMF Reviews. Policy directives from the IMF in its upcoming review are aimed at tackling some major aspects of the power sector deficiencies by:

- Removing blanket subsidies for domestic consumers in favor of targeted subsidies
- Removing subsidies of export-oriented sector
- Increasing tariff to bridge the subsidy gap along with timely adjustments

Synopsis

	FY18	FY19	FY20	FY21	FY22	% Share
Installed Capacity by Technology (MW)	**35,979**	**38,995**	**38,719**	**39,772**	**43,775**	**100%**
Thermal	24,020	25,670	25,244	25,098	26,683	61%
Hydel	8,713	9,761	9,861	9,915	10,635	24%
Nuclear	1,467	1,467	1,467	2,612	3,620	8%
Renewable Energy	1,779	2,097	2,147	2,147	2,837	6%
Generation by Technology (GWh)	**133,033**	**136,519**	**133,728**	**143,090**	**153,360**	**100%**
Thermal	92,006	89,390	80,826	88,678	93,088	61%
Hydel	28,069	33,096	38,699	38,801	35,546	23%
Nuclear	9,051	9,136	9,898	11,090	18,294	12%
Renewable Energy	3,907	4,898	4,305	4,522	6,432	4%

	FY18	FY19	FY20	FY21	FY22	% Share
Import from Iran	555	487	514	498	514	0%
Capacity Utilization by Technology (%)	**42%**	**40%**	**40%**	**42%**	**40%**	
Thermal	44%	40%	37%	42%	40%	
Hydel	37%	39%	45%	45%	38%	
Nuclear	70%	71%	77%	48%	58%	
Renewable Energy	25%	27%	24%	24%	25%	
Thermal Power Capacity by Fuel (MW)	**23,413**	**25,063**	**24,637**	**24,491**	**26,313**	**100%**
Gas	11,237	11,237	10,481	10,335	10,565	40%
RLNG	3,784	3,784	3,784	3,784	5,047	19%
RFO	5,550	5,550	5,550	5,550	5,369	20%
Coal	2,842	4,492	4,822	4,822	5,332	20%
Thermal Power Capacity Utilization by Fuel (%)	**44%**	**40%**	**37%**	**42%**	**40%**	
Gas	47%	42%	32%	33%	31%	
RLNG	26%	56%	55%	63%	47%	
RFO	50%	26%	15%	20%	34%	
Coal	49%	43%	61%	70%	54%	
Thermal Power Generation Mix (%)						
RLNG	27%	37%	35%	35%	33%	
Coal	15%	21%	37%	36%	32%	
Gas	28%	29%	22%	19%	18%	
RFO	28%	12%	6%	8%	16%	
HSD	1%	0%	0%	1%	1%	
Mixed	1%	1%	0%	1%	0%	

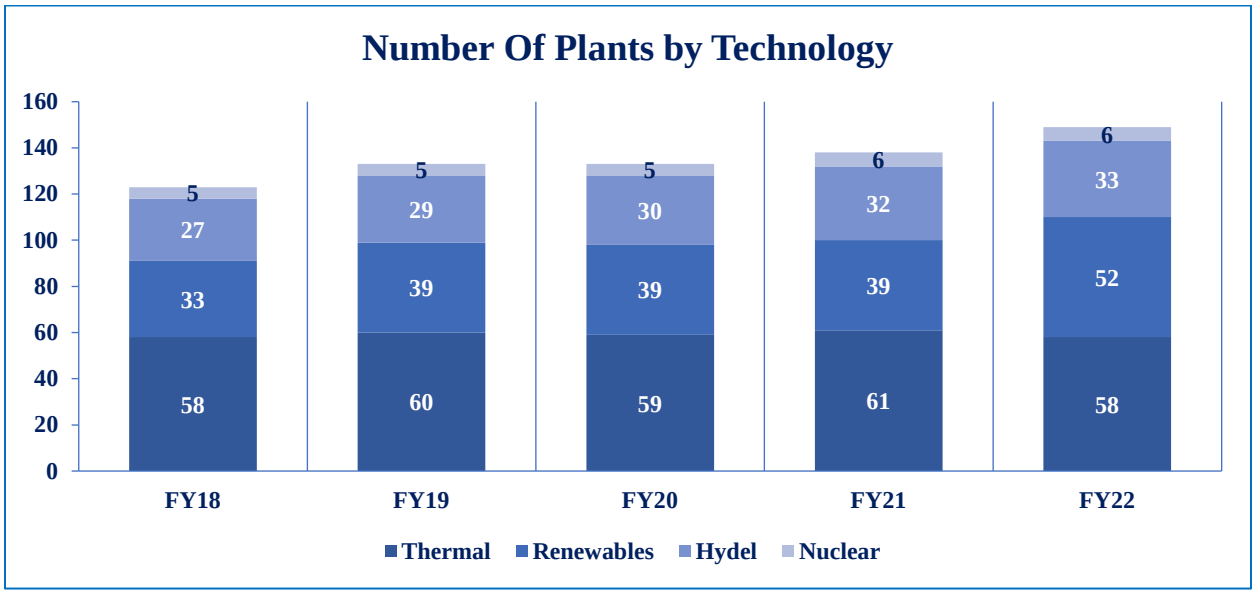
Generation Mix: With ~61% share in FY22, Pakistan's power generation capacity mix is highly concentrated in thermal technology.

However, it has been transitioning towards nuclear and renewables, albeit slowly (i.e., FY18 mix: 66.4% Thermal, 24.5% Hydel, 5% Renewable and 4.1% Nuclear V/S FY22 mix: 60.6% Thermal, 24.5% Hydel, 8.3% Nuclear and 6.5% Renewable).

Thermal Mix Composition: Within thermal power generation, developments have been less than ideal; as significant capacity additions have been made in power plants that use imported fuel.

Surges in the global energy commodity prices and multiple bouts PKR devaluations have disproportionately affected the generation cost from such plants. In FY22 among such additions; RLNG based generation held ~33% share in the thermal generation mix, compared to ~27% in FY18; while Coal based generation (mostly imported) held ~32% share against ~15% in FY18.

Installed Capacity

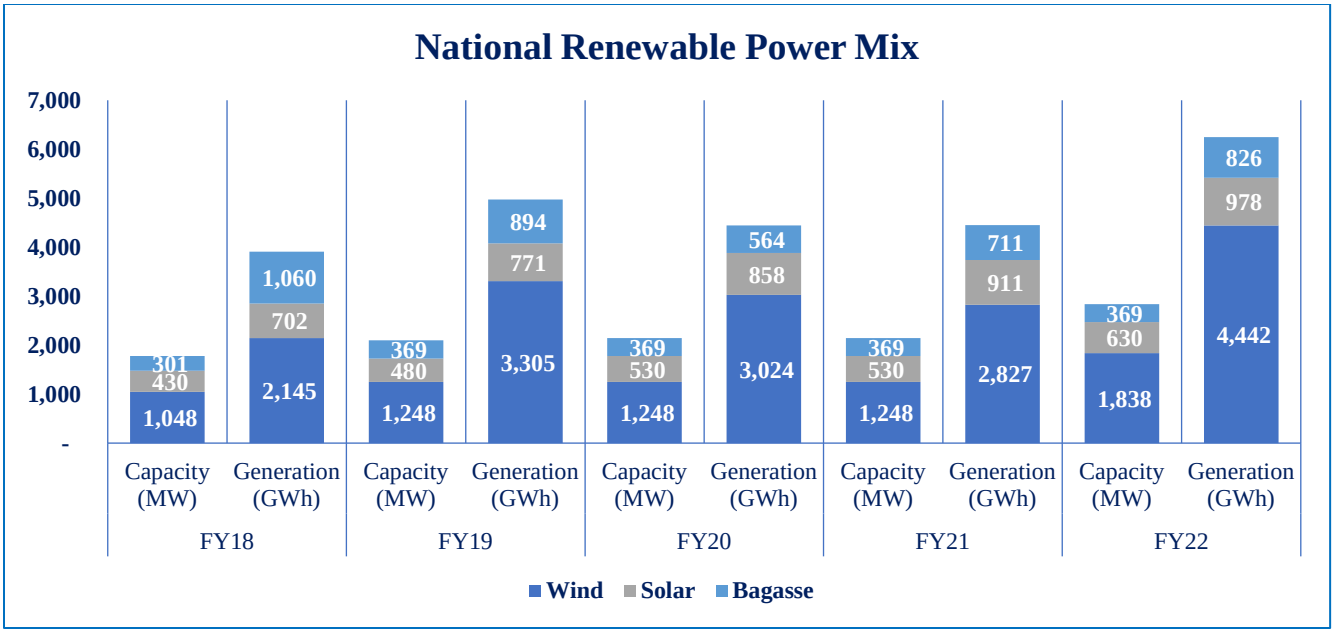


No. of Plants by Technology: As of FY22 end, there were 149 power plants installed in Pakistan based on all major technologies i.e., Thermal, Renewable, Hydel and Nuclear. There has been an addition of 19 renewable technology-based power plants over the previous 4 years, while 6 additional Hydel power plants (2 IPPs and 4 WAPDA), 3 coal based power plants and 1 Nuclear power plant have also been added.

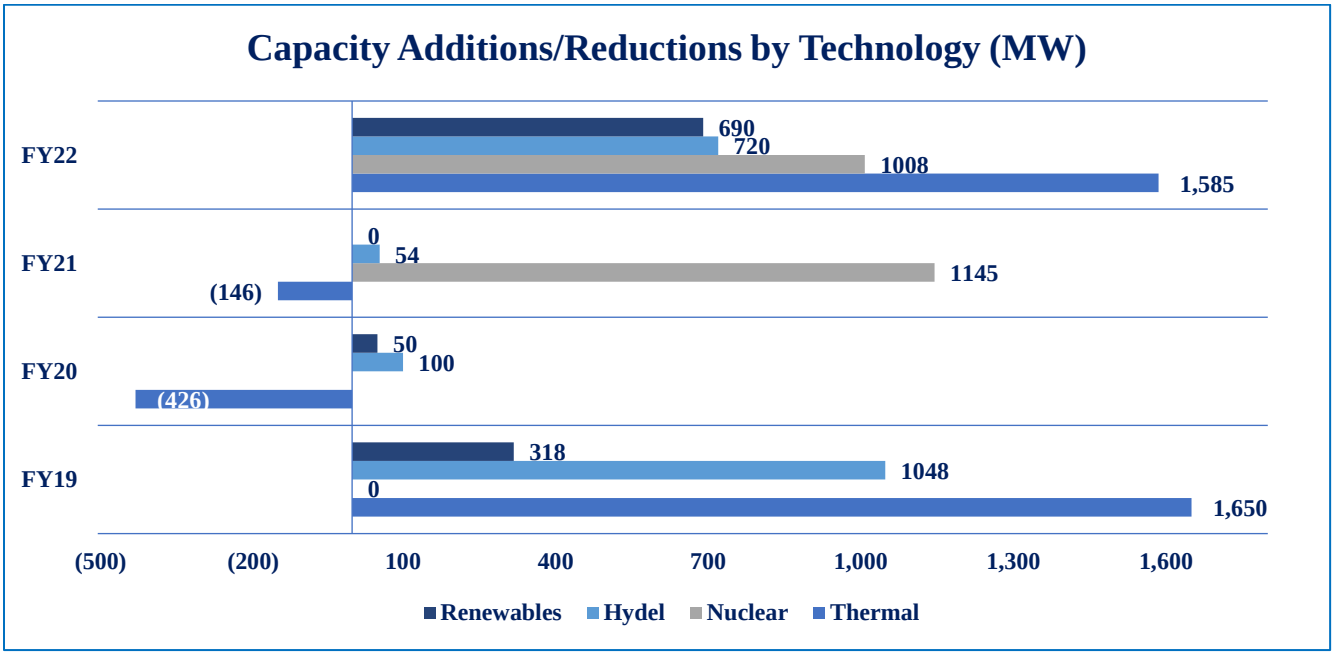
Thermal Power Plants: Of the 58 Thermal power plants 8 are operated by GENCOs, 34 by IPPs linked to CPPA-G system, 6 are directly operated by KE, 4 are operated by IPPs linked to KE's system and the remaining 6 are captive power plants linked with KE's system.

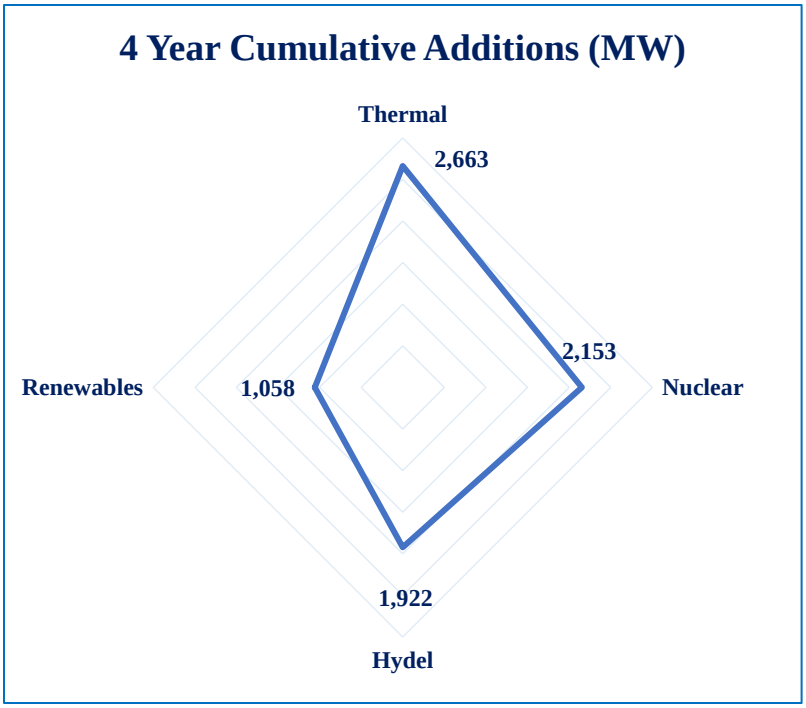
Hydel Power Plants: Of the 33 Hydel power plants 24 are operated by WAPDA and 9 by IPPs.

Renewable & Nuclear Power Plants: All renewables-based plants are operated by IPPs and all nuclear plants are operated by PAEC (Pakistan Atomic Energy Commission).



Capacity Additions by Technology:





Over the previous 4 years (FY19 – FY22), largest additions in terms of capacity were made in Thermal at ~2,633 MW with a 5-year CAGR of ~2%.

This is followed by Nuclear and Hydel with capacity increase of ~2,153 MW and ~1,922 MW respectively.

Although the number of renewable technology-based power plants saw significant increase, the generation capacity of renewables increased by ~1,058 MW; the lowest among all technologies, as most of the power plants have capacity of 50 MW on average.

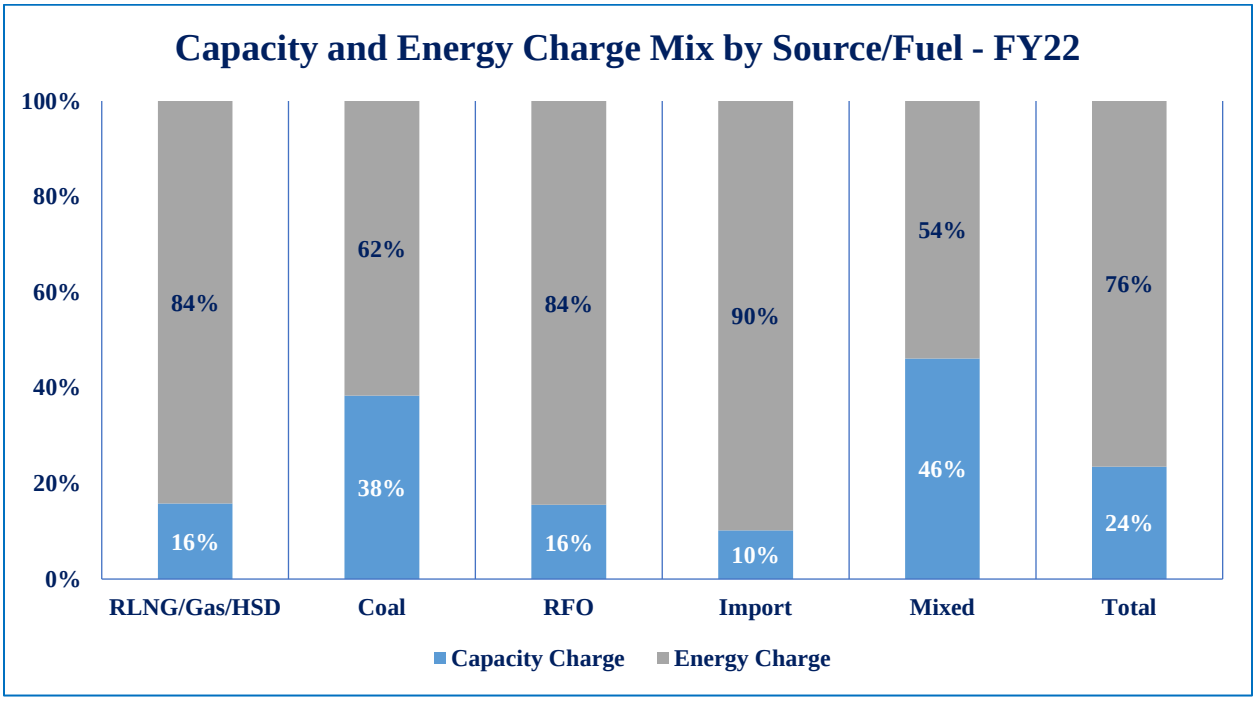
Capacity Additions in Renewable Power Plants:

There have been significant capacity additions in the renewable sector, with number of plants standing at 53 (FY21: 40), and cumulative capacities of ~2,725 MW (FY21: ~2,147 MW) up ~27% YoY in FY22.

Within the renewables, wind power projects saw the largest capacity additions, as 12 projects got installed bringing the tally to 36 and cumulative capacity to ~1,838 MW (~1,284 MW) up ~47% YoY.

In FY22 Among the renewables, wind-based power plants had the highest capacity utilization of ~28% (FY21: ~26%), followed by Bagasse with ~26% (FY21: ~22%) and solar with ~18% (FY21: ~22%).

Generation Cost

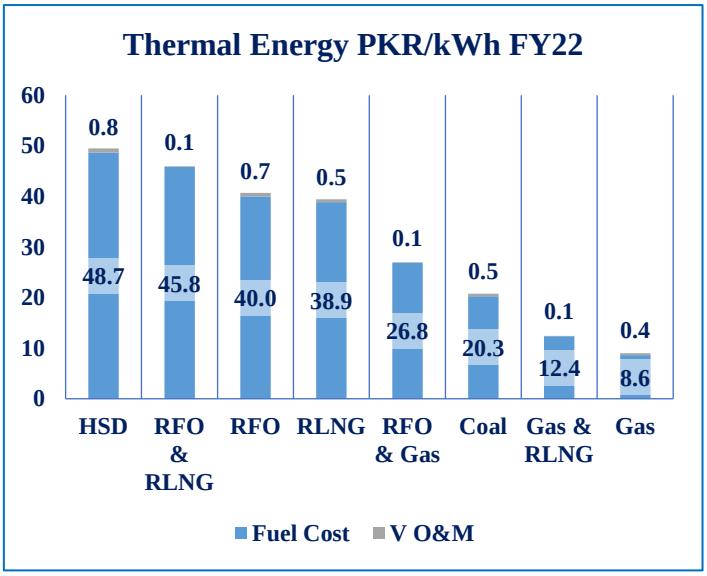


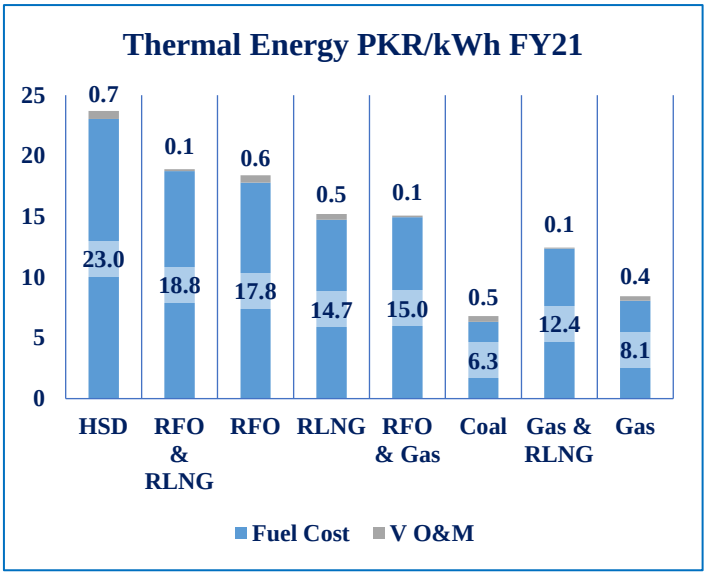
In FY22 power generators invoiced a total of PKR~2.4tln (FY21: PKR~1.5tln), of which energy charges stood at PKR ~1.4tln (FY21: ~0.7tln) and capacity charges stood at PKR~1tln (FY21: ~0.8tln). Driven by an increase of ~1.1x in energy charges the over-all charges grew by ~62% YoY.

In FY22, Hydropower remained among the cheapest source of electricity, followed by indigenous gas and coal.

Hydel PKR/kWh	Variable Energy Charge	Capacity Charge	Water Use/NHP Charges	IRSA Charge	GST @ 17%	Cost Per Unit
FY20	0.07	1.38	0.99	0.01	0.01	2.46
FY21	0.07	1.43	0.35	0.01	0.01	1.85
FY22	0.07	2.53	0.94	0.00	0.01	3.56

Note: Data based on weighted average of 3 big dams

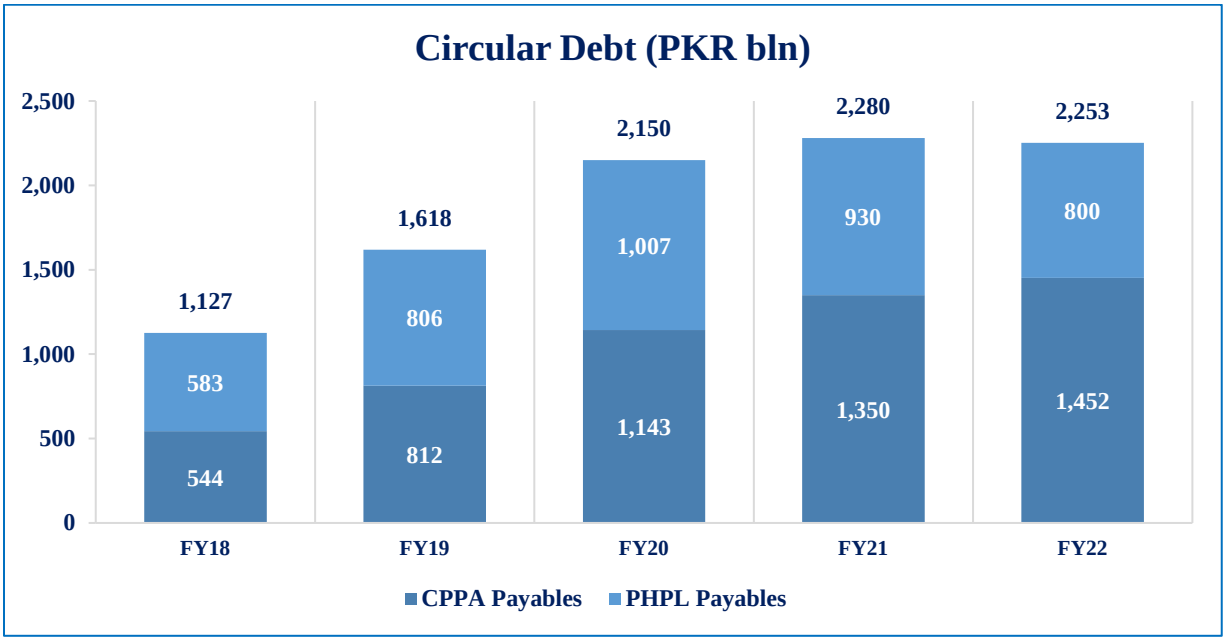




International Energy Prices: By FY22 end, international energy commodity prices increased by ~85% YoY following the start of Russia-Ukraine war in Feburary'22, pushing power generation cost from imported thermal sources up by ~1.4x YoY on average. Pakistan's dependence on power generation via imports is expected to remain high as indigenous natural gas reserves are drying up; keeping the cost of generation exposed to both international energy commodity price volatility and exchange rate movements.

There is a massive cost delta between power generation from indigenous and imported fuel. As of FY22 the cost per unit disparity between imported and local gas stood at ~2.1x; while the differential between imported and local coal stood at ~8.1x.

Circular Debt and IMF Review



Causes: Long standing deficiencies in terms of delayed tariff adjustments on the regulator's part, poor operational and administration controls in general, line losses in excess of ~16% and bill collection losses in excess of ~4.6% on distribution network's part; have led to unsustainable levels of circular debt in the power sector.

In FY22 circular debt stock stood at PKR~2.25tln after decreasing PKR~27bln due payments of PKR~564bln via budget versus the accumulation of PKR~536bln. High and volatile international energy commodity prices are reasonably expected to further aggravate the situation.

IMF in its latest review has mandated stringent power sector reforms, aimed at mitigating the power sector deficiencies by:

- Replacing blanket subsidies with targeted ones through Benazir Income Support Program
- Completely removing subsidy to the export-oriented sector
- Bridge the power sector gap of PKR~950-1000bln via increased base tariffs and quarterly tariff adjustments.

The IMF in its previous review (i.e., 8th) also recommended medium term cost reducing structural reform, these include:

- Renegotiation of PPAs in return for clearing up-to PKR180bln unguaranteed CPPA-G payables via 10-year floating PIBs and 5-year sukuks
- Converting PHPL government guaranteed debt to public debt.

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