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PAKISTAN ELECTRICITY REVIEW 2025

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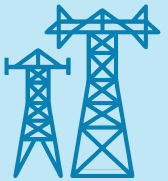

Analytics Team

Rabia Babar

Huma Naveed

Reviewer

Muhammad Mustafa Amjad

Designer

Sana Shahid

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Disclaimer

All the information and analysis provided in this document are accurate and to the best of our knowledge and understanding. In case you identify any error, feel free to reach out to us at: info@renewablesfirst.org

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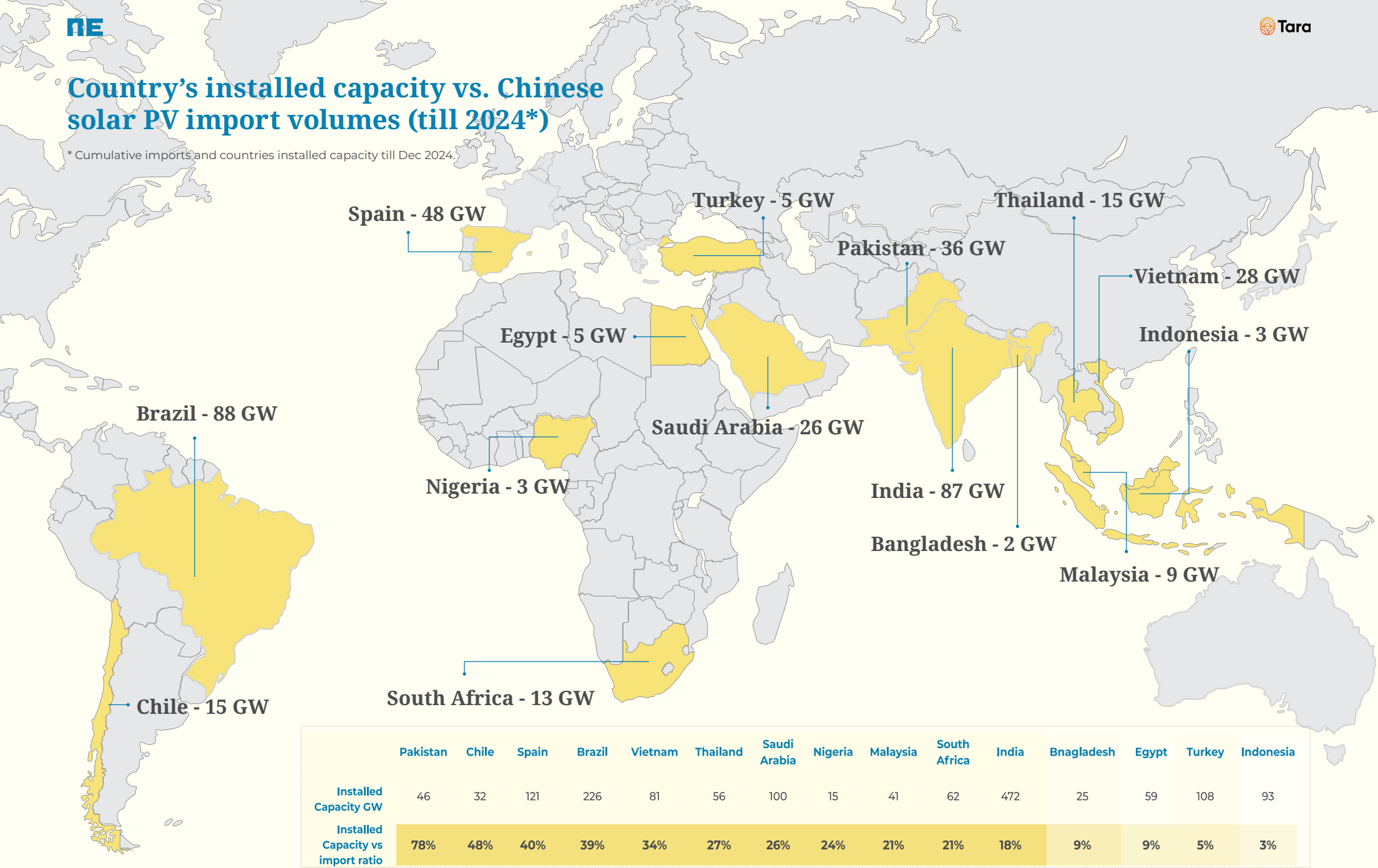
Country's installed capacity vs. Chinese solar PV import volumes (till 2024*)

* Cumulative imports and countries installed capacity till Dec 2024.



	Pakistan	Chile	Spain	Brazil	Vietnam	Thailand	Saudi Arabia	Nigeria	Malaysia	South Africa	India	Bnagladesh	Egypt	Turkey	Indonesia
Installed Capacity GW	46	32	121	226	81	56	100	15	41	62	472	25	59	108	93
Installed Capacity vs import ratio	78%	48%	40%	39%	34%	27%	26%	24%	21%	21%	18%	9%	9%	5%	3%

Data Source: Ember and RF calculations

Key highlights of Pakistan's power sector FY24.

- Pakistan's power generation capacity grew to 46.2 GW with the addition of three new solar plants, increasing the share of utility-scale renewables in the country's installed capacity from 6% to 7%.
- Distributed energy resources (DERs) saw significant growth, with net-metering installed capacity nearly doubling from 1.3 GW in FY23 to 2.5 GW in FY24 and reaching 4.9 GW by March, 2025.
- With 137 TWh of electricity generated, the share of renewable energy sources (wind, solar, and bagasse) remained at 5%, falling short of projected targets and also not on track to meet the 2030 target of achieving a 30% renewable energy share in the energy mix.
- Transmission bottlenecks and overloaded lines hindered the efficient transfer of power from the south to the north of the country, forcing the operator to reduce the use of cost-efficient plants and rely on rather costlier RLNG plants.
- Heavy reliance on RLNG plants significantly increased the energy purchase price (EPP), with RLNG alone accounting for PKR 568 billion (B) which is approximately 51% of the total energy purchase bill, making it the largest single contributor.
- Electricity sales dropped 2.8% year-on-year (YoY), marking a second consecutive year of decline, despite the GDP growth of 2.4% in FY24.
- Capacity payments also saw a sharp rise, increasing by 46% YoY to PKR 1.9 trillion (T), with coal and nuclear plants accounting for the highest share in this increase.
- FY24 witnessed circular debt reach PKR 2.4 T, increasing 3.6% YoY despite the timely fuel cost adjustments (FCAs) and quarterly tariff adjustments (QTAs). This marks an addition of PKR 83 B, compared to a 2.6% increase (PKR 58 B) in FY23.

Note: FY24 covers the period from July 2023 to June 2024

Installed Capacity

46.2 GW
0.6% YoY

Electricity Generated

137 TWh
-0.1% YoY

Electricity Transmitted

134 TWh
1.4% YoY

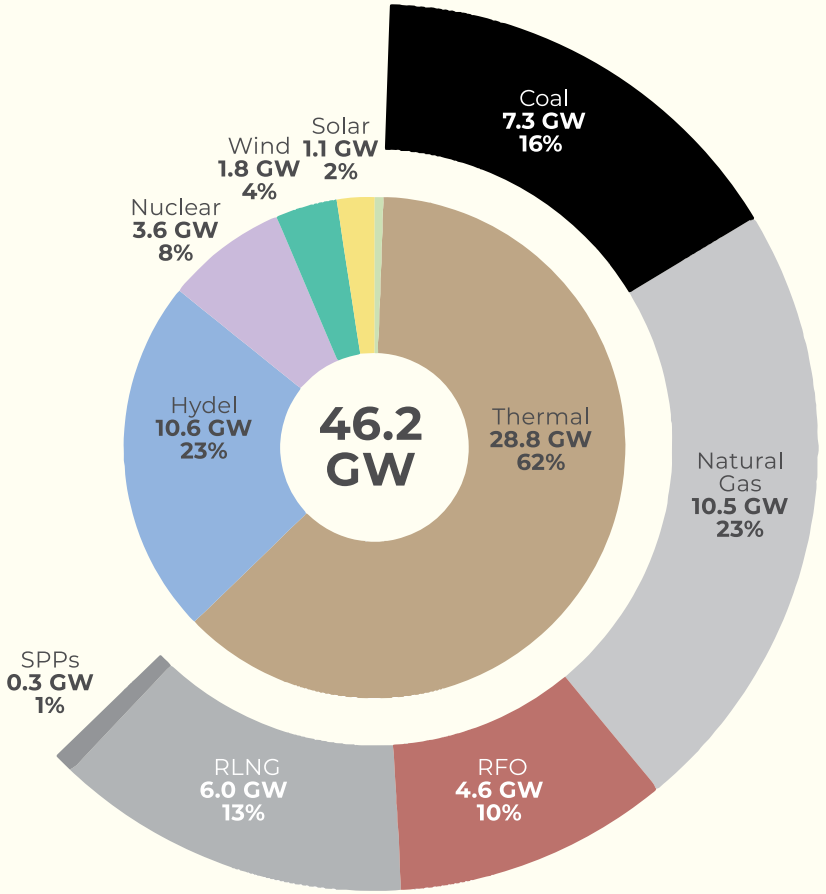
Electricity Sold

110 TWh
-2.8% YoY

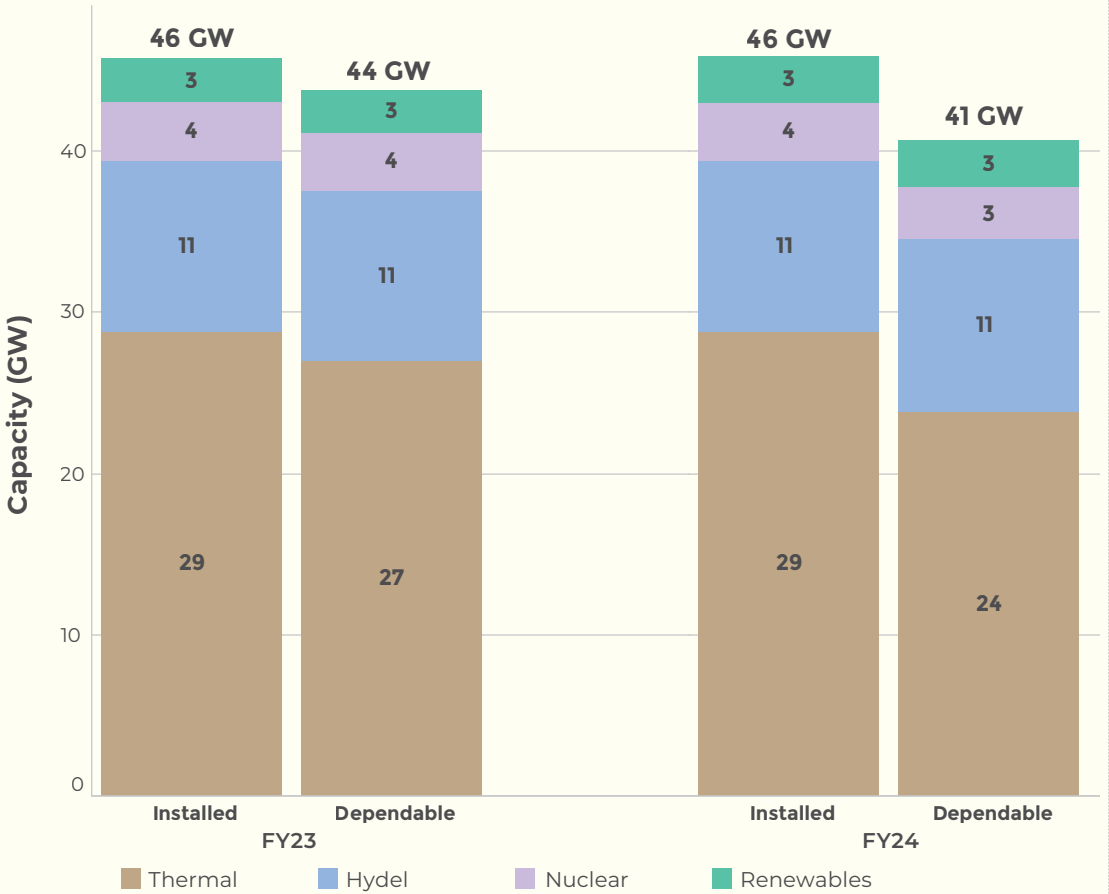
Generation

In FY24, the country's installed capacity rose to 46.2 GW with the addition of three new utility-scale solar plants.

During FY24, three new 50 MW solar power plants were commissioned, increasing utility-scale solar capacity to 1.1 GW. As a result, the share of utility-scale renewables in the country's installed capacity grew from 6% to 7%. Meanwhile, the available dependable capacity declined from 44GW in FY23 to 41GW in FY24 reflecting the impact of aging equipment, capacity degradation and lower available capacity in FY24.



Pakistan's installed electricity generation capacity in FY24

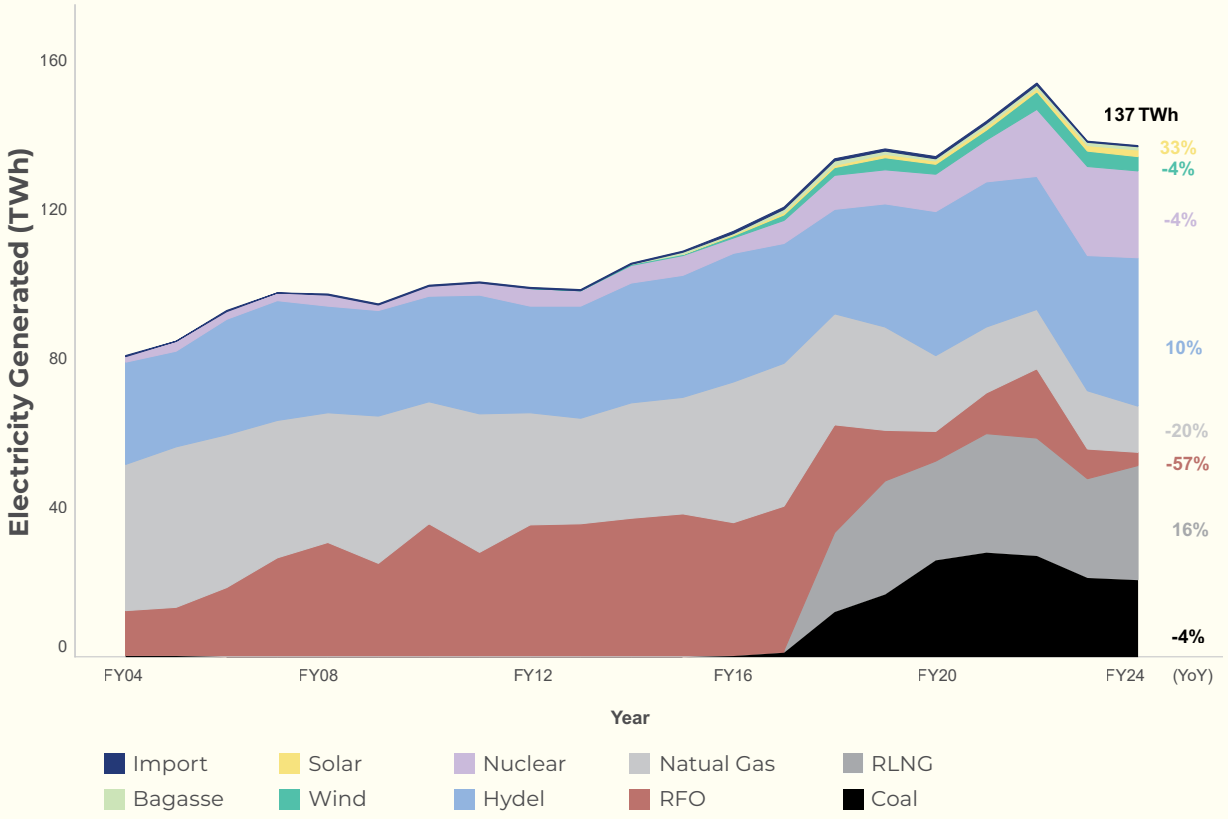


Installed and dependable capacity, FY23 – FY24

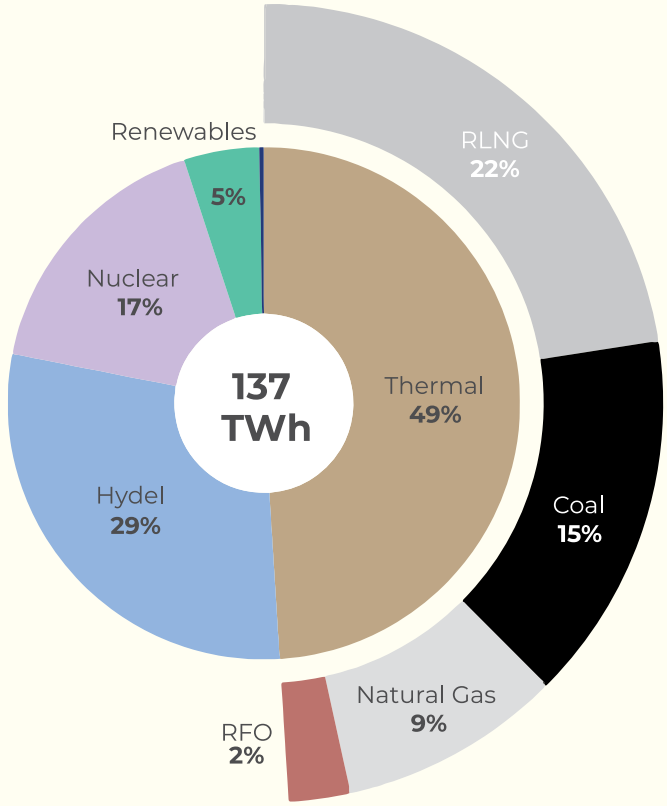
Data Source: NEPRA State of Industry Report, RF Calculations

In FY24, hydel led the generation mix with 40 TWh, followed by RLNG at 31 TWh.

With increased generation from Tarbela and Mangla, hydropower dominated the generation mix with 29% share. With natural gas reserves depleting in the country, natural gas-based plants are transitioning to RLNG, raising its share from 19% in FY23 to 22% in FY24. Generation from oil-based plants fell from 8 TWh in FY23 to 3 TWh in FY24, as these plants rank lower in the merit order, this reduced their role amid declining electricity demand.



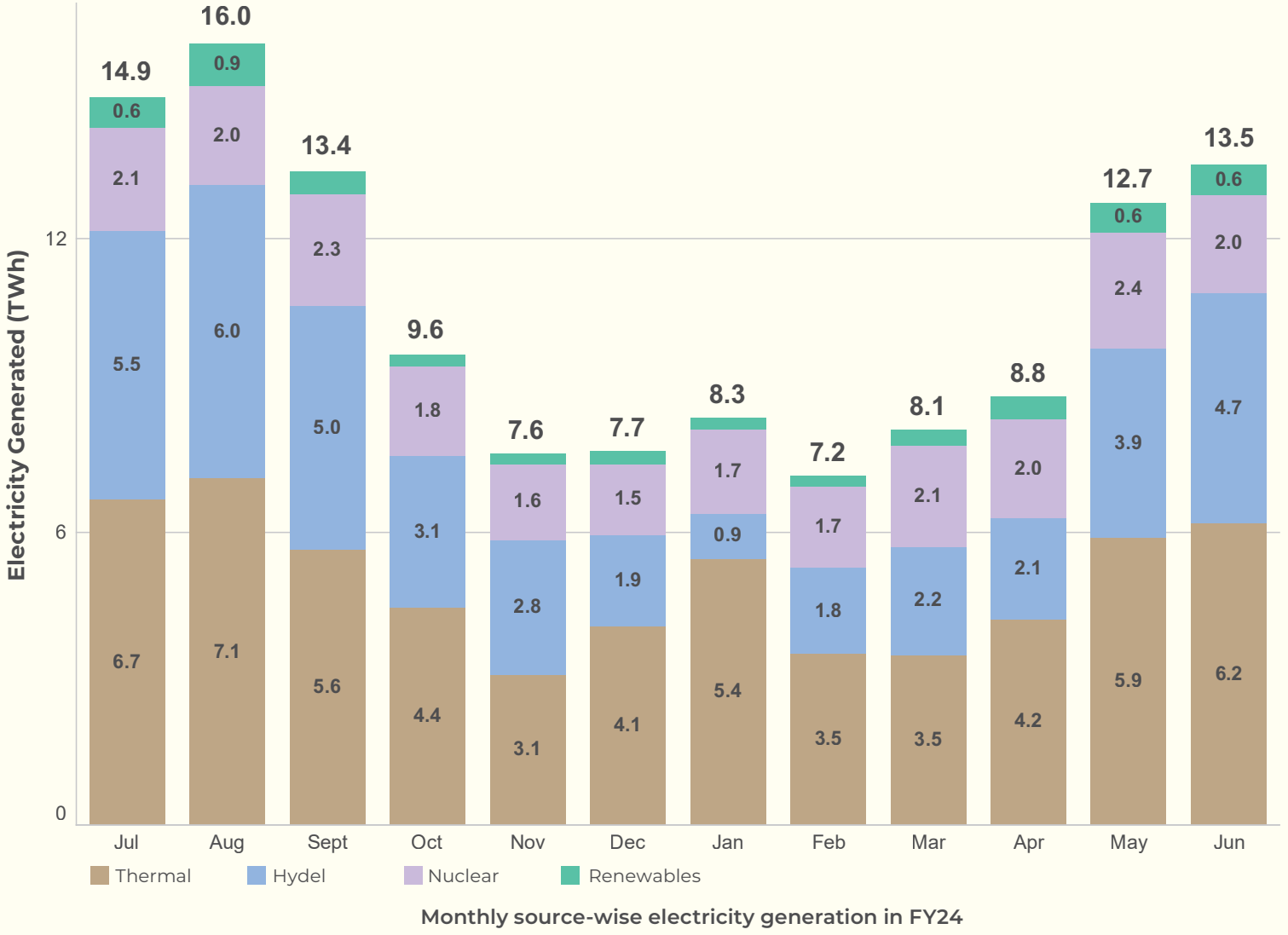
Electricity generation by energy source, FY04 - FY24



Electricity generated by energy sources in FY24

Data Source: NEPRA State of Industry Report, RF Calculations

Thermal share dropped from 62 TWh in FY23 to 58 TWh in FY24, with hydel bridging the gap.

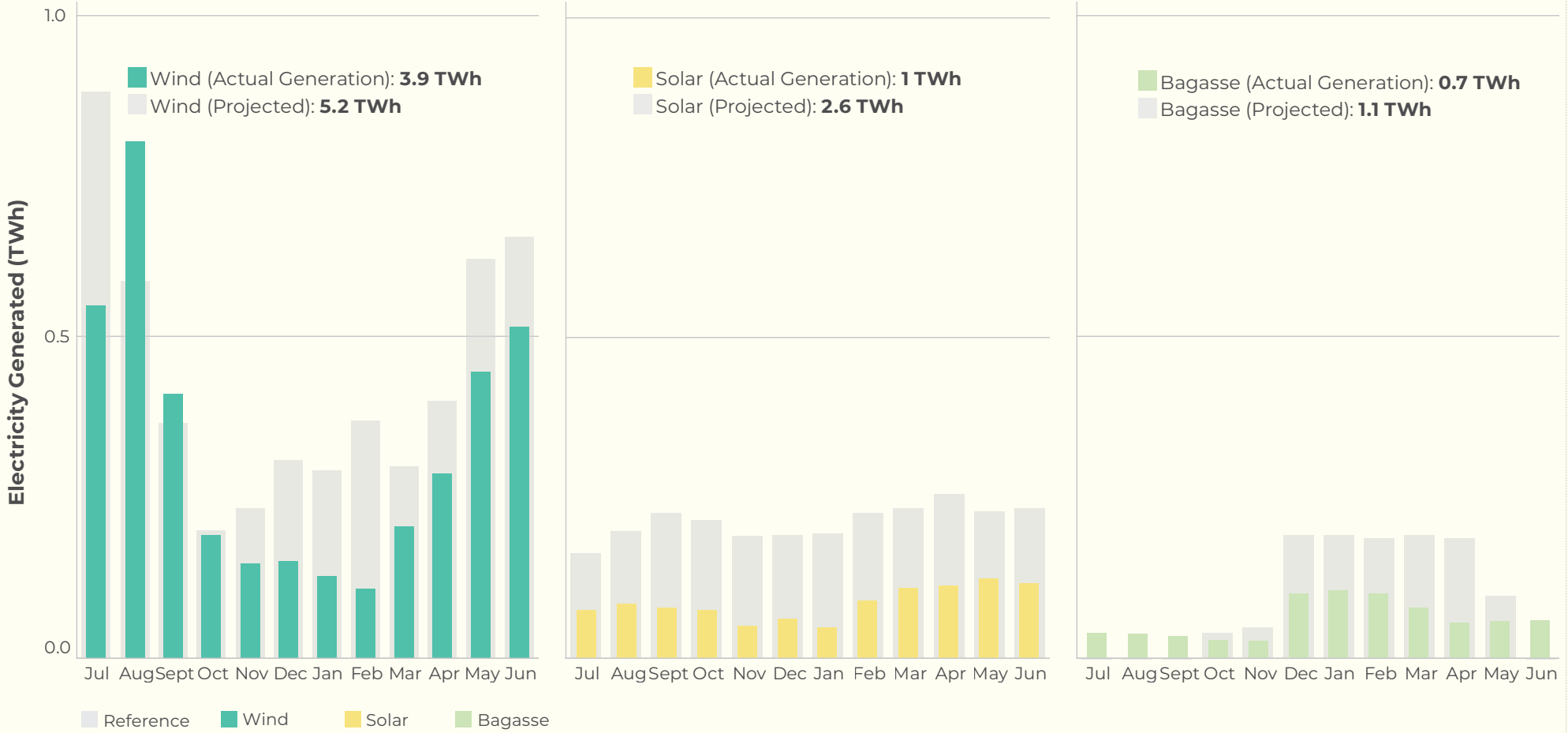


Increased hydel generation during the summer and shoulder months raised its share in the generation mix from 26% in FY23 to 29% in FY24. Shoulder months (March – April) and (October – November) are transitional periods between peak summer and winter seasons, marked by moderate electricity demand. This growth in hydel output in summer and shoulder months helped reduce reliance on thermal generation, which declined from 52% in FY23 to 49% in FY24.

Data Source: NEPRA State of Industry Report, RF Calculations

The renewables share in the generation mix lags behind FY24 projections.

The solar generation was overestimated in the projections for FY24, resulting in the actual generation falling short of targets at just 1 TWh. This prompts a downward revision in FY25 to a more realistic projection of 1.1 TWh.



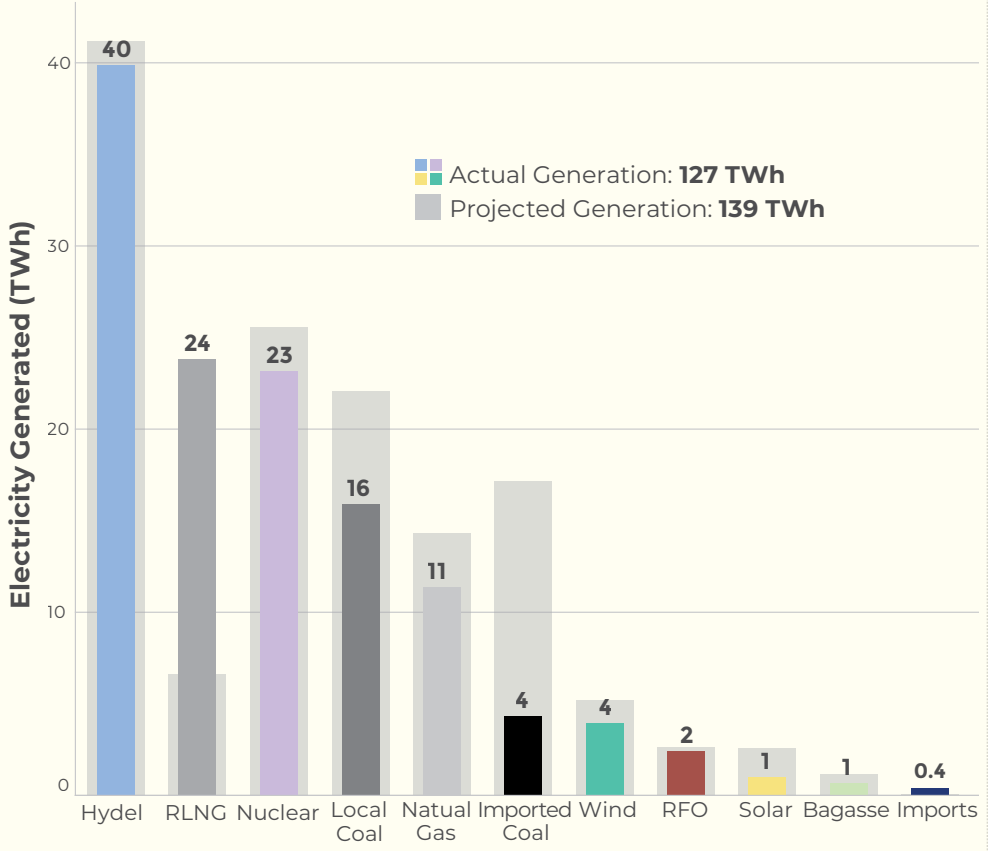
Note: K-Electric numbers are not included

Projected vs actual generation in renewable energy sources, FY24

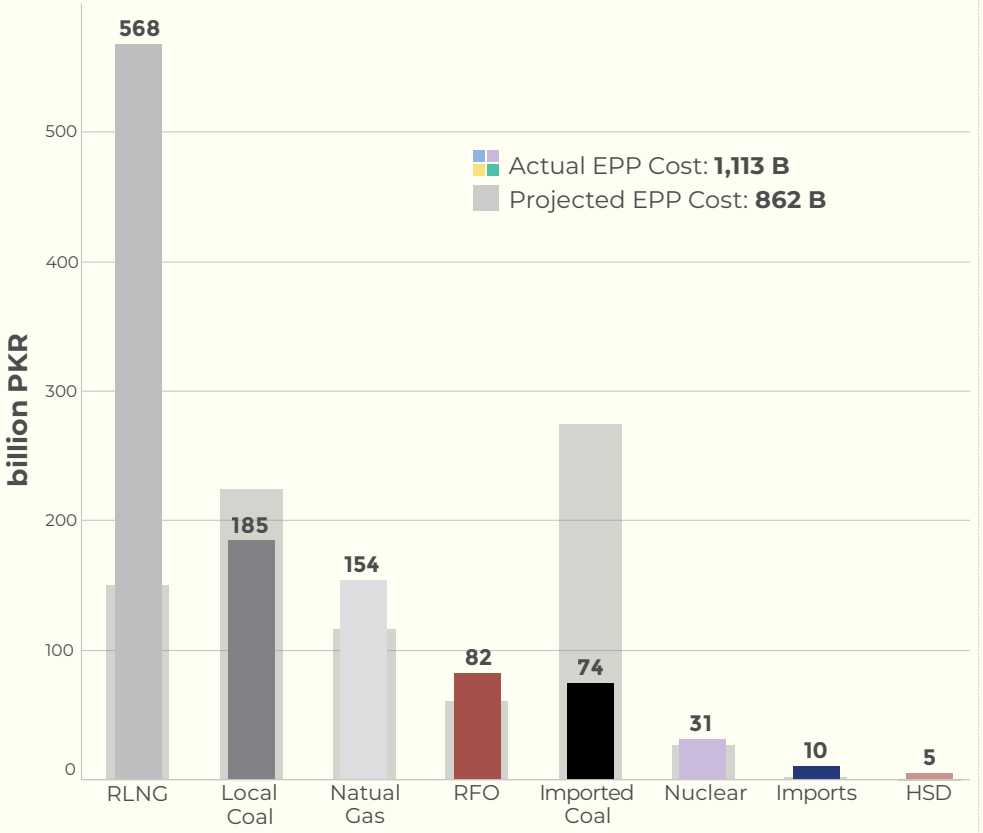
Data Source: NEPRA State of Industry Report, RF Calculations

In FY24, RLNG-based power generation surged from a projected 7 TWh to 24 TWh, becoming the second-largest source after hydel.

With the increased generation from RLNG, EPP of PKR 568 B was added to the pool, making RLNG the largest contributor to energy bills.



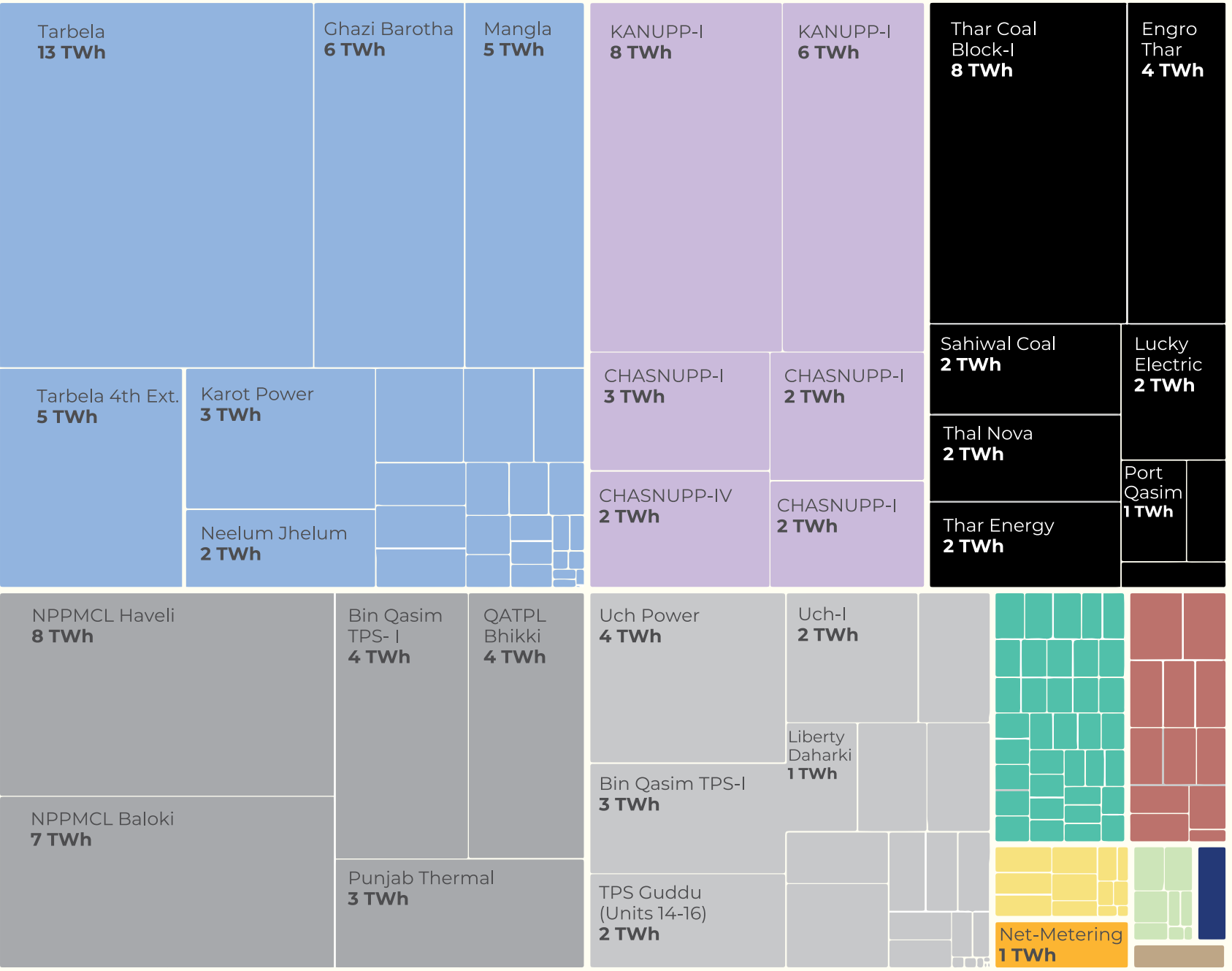
Energy source-wise projected and actual electricity generation, FY24



Energy source-wise projected and actual EPP, FY24

Note: K-Electric numbers are not included in the above graphs

Data Source: NEPRA State of Industry Report, RF Calculations



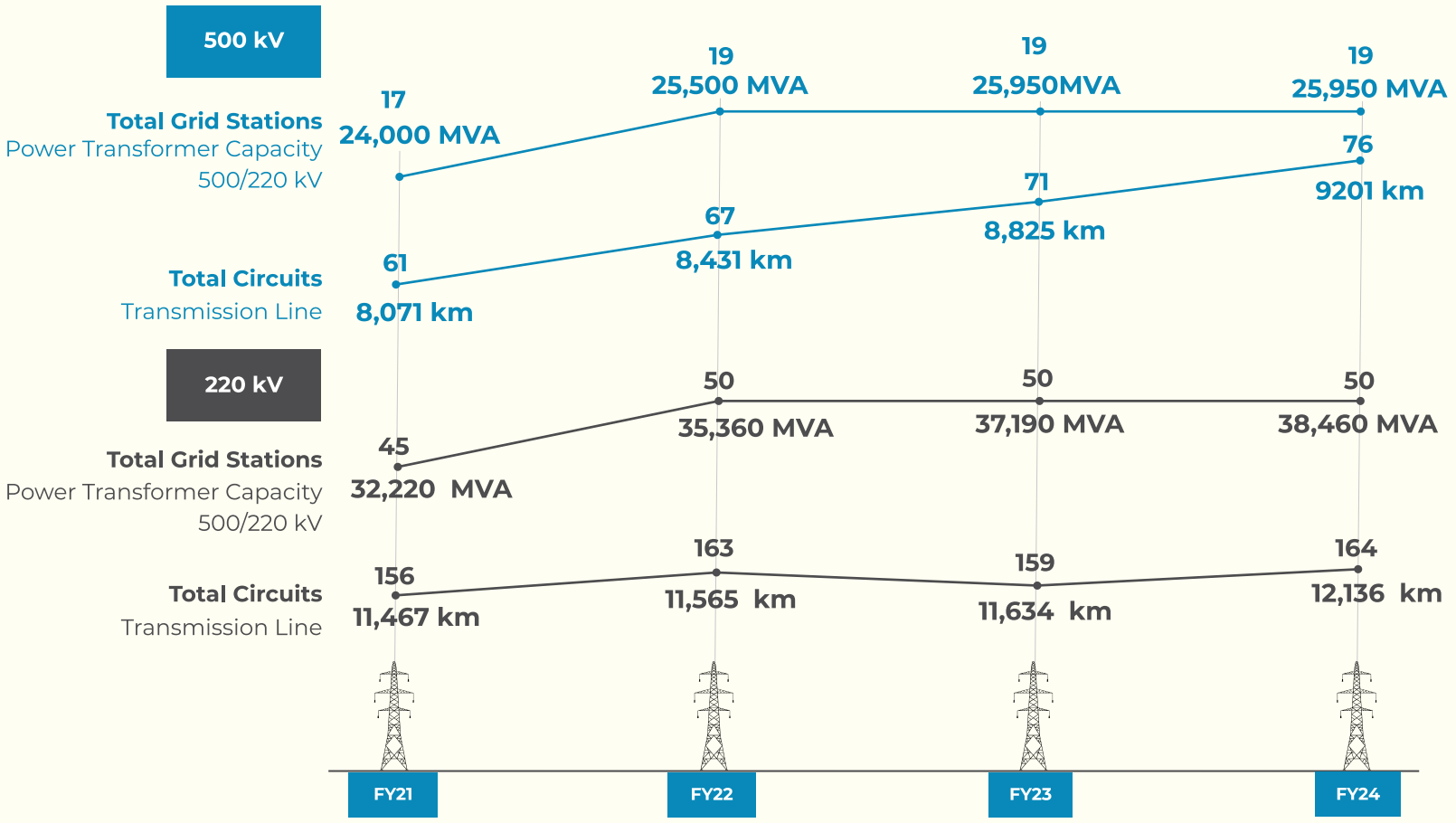
A quick look at where our electricity came from in FY24

Sources	Electricity Generated TWh	% Share
Hydel	39.9	29.0
RLNG	30.7	22.3
Nuclear	23.2	16.9
Coal	20.5	15.0
Gas	12.7	9.2
Wind	3.9	2.9
RFO	3.0	2.2
Solar	1.2	0.9
Net-Metering	0.8	0.6
Bagasse	0.7	0.5
Import	0.4	0.3
SPPs/CPPs	0.3	0.2

Data Source: NEPRA State of Industry Report, RF Calculations

Transmission

In FY24, 878 km of transmission lines and 1,270 MVA of transformation capacity were added that enhanced power distribution and load management.



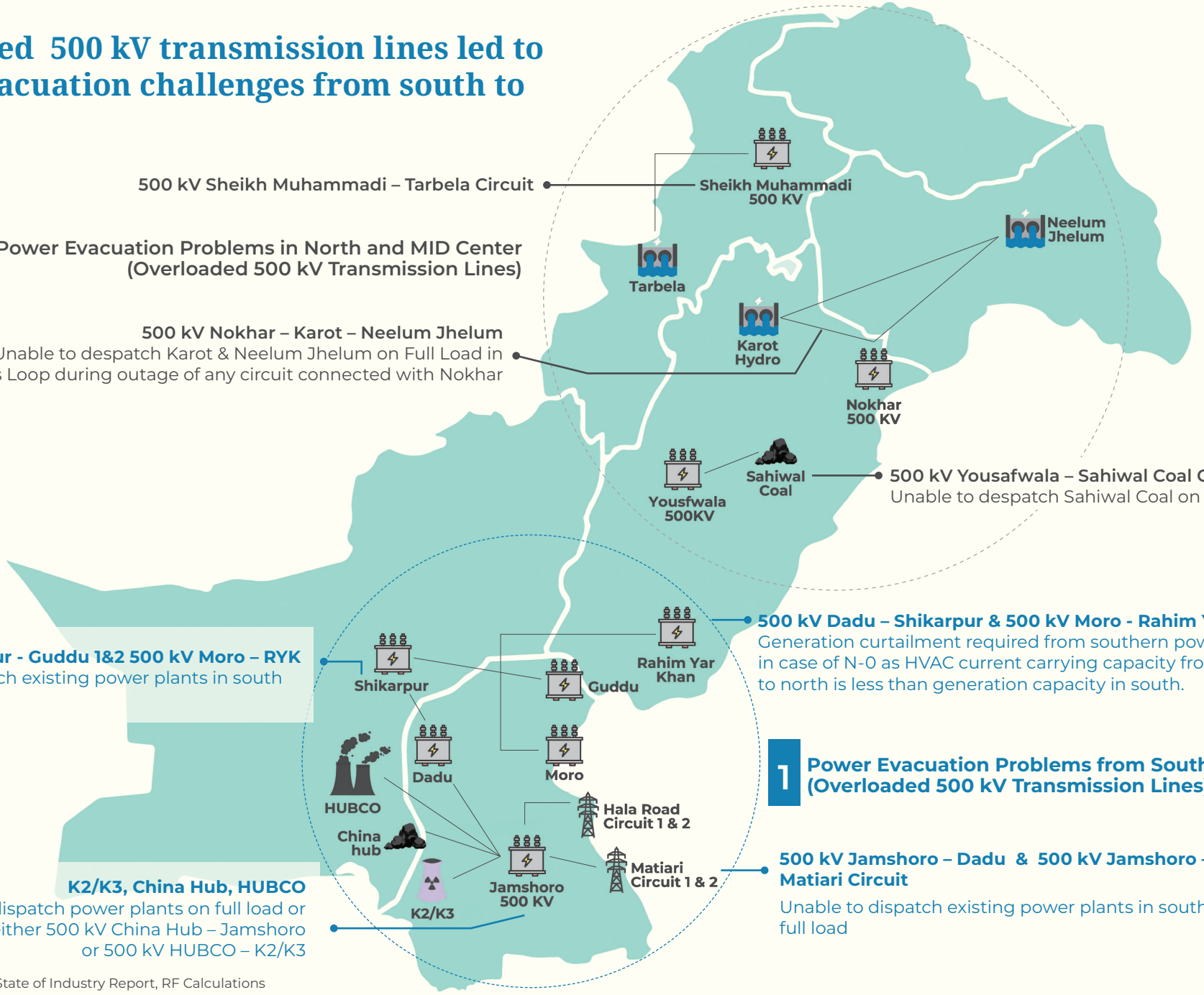
Year-wise expansion of NTDC network, FY21 - FY24

Three 500 kV double-circuit transmission lines (Suki Kinari - 75 km, Lahore North to Nokar - 45 km, and Lahore North to Lahore HVDC - 45 km) were added to the network, enhancing power distribution in IESCO, GEPCO, and LESCO regions.

The transformation capacity of 770 MVA in the north and 500 MVA in the south were added to 220 kV grid stations to meet load demand and enhance system reliability.

Data Source: NEPRA State of Industry Report, RF Calculations

Overloaded 500 kV transmission lines led to power evacuation challenges from south to north.



2 Power Evacuation Problems in North and MID Center (Overloaded 500 kV Transmission Lines)

500 kV Nokhar – Karot – Neelum Jhelum
Unable to despatch Karot & Neelum Jhelum on Full Load in this Loop during outage of any circuit connected with Nokhar

500 kV Yousafwala – Sahiwal Coal CFPP
Unable to despatch Sahiwal Coal on Full Load

500 kV Dadu – Shikarpur & 500 kV Moro - Rahim Yar Khan
Generation curtailment required from southern power plants in case of N-0 as HVAC current carrying capacity from south to north is less than generation capacity in south.

500 kV Shikarpur - Guddu 1&2 500 kV Moro – RYK
Unable to dispatch existing power plants in south on full load

1 Power Evacuation Problems from South to North (Overloaded 500 kV Transmission Lines)

500 kV Jamshoro – Dadu & 500 kV Jamshoro – Matiari Circuit
Unable to dispatch existing power plants in south on full load

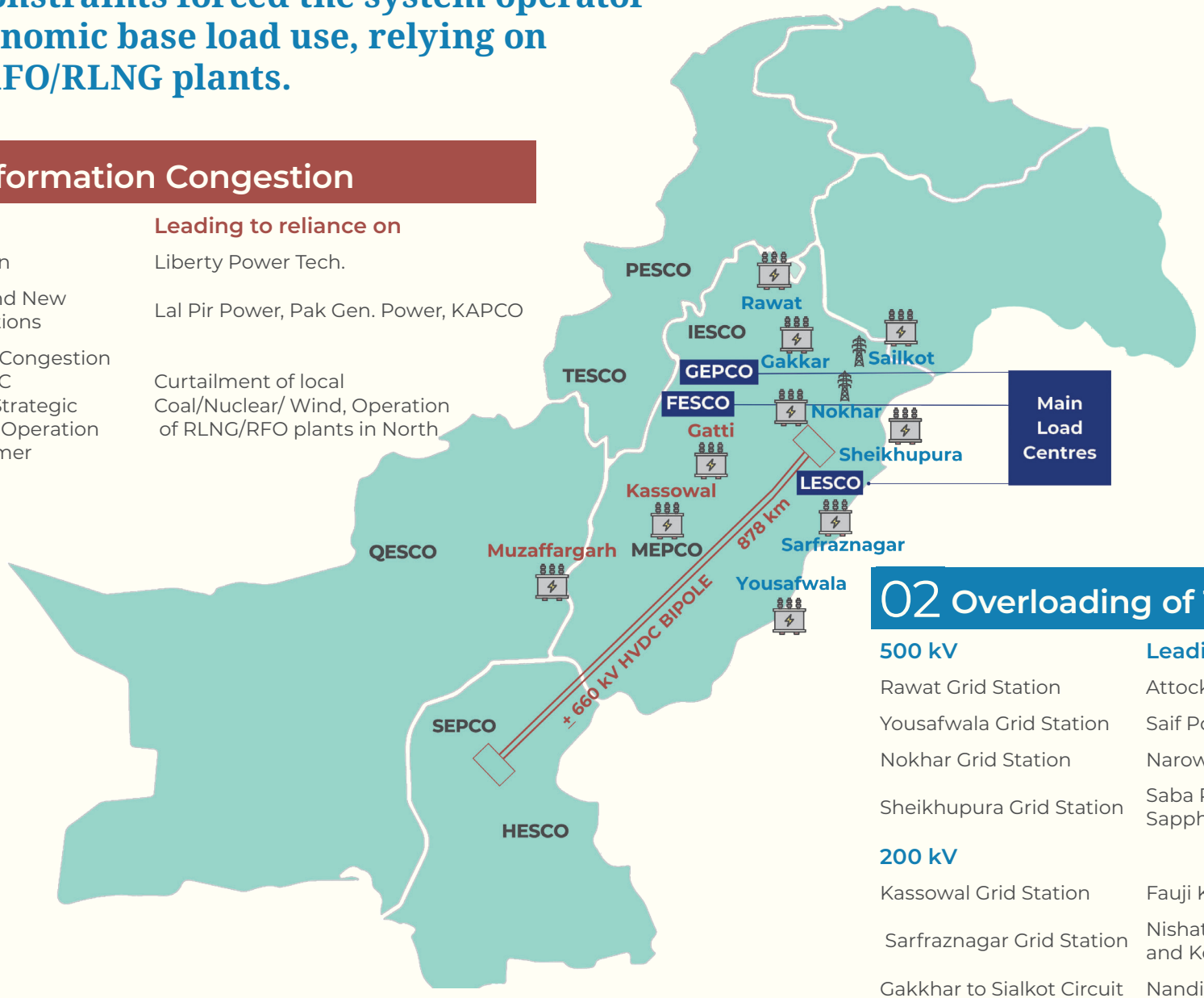
K2/K3, China Hub, HUBCO
Unable to dispatch power plants on full load or outage of of either 500 kV China Hub – Jamshoro or 500 kV HUBCO – K2/K3

Data Source: NEPRA State of Industry Report, RF Calculations

System constraints forced the system operator to cut economic base load use, relying on costlier RFO/RLNG plants.

01 Transformation Congestion

500 kV	Leading to reliance on
Gatti Grid Station	Liberty Power Tech.
Muzaffargarh and New Multan Grid Stations	Lal Pir Power, Pak Gen. Power, KAPCO
South to North Congestion HVDC and HVAC Limitation and Strategic Table for HVDC Operation for Winter/Summer	Curtailment of local Coal/Nuclear/ Wind, Operation of RLNG/RFO plants in North



02 Overloading of Transformers

500 kV	Leading to reliance on
Rawat Grid Station	Attock Gen.
Yousafwala Grid Station	Saif Power
Nokhar Grid Station	Narowal Energy and Nandipur
Sheikhupura Grid Station	Saba Power, Halmore Power, Sapphire Electric Power
200 kV	
Kassowal Grid Station	Fauji Kabirwala Power
Sarfraznagar Grid Station	Nishat Power, Nishat Chunian and Kohinoor Energy
Gakkhar to Sialkot Circuit	Nandipur and Narowal Energy

Data Source: NEPRA State of Industry Report, RF Calculations

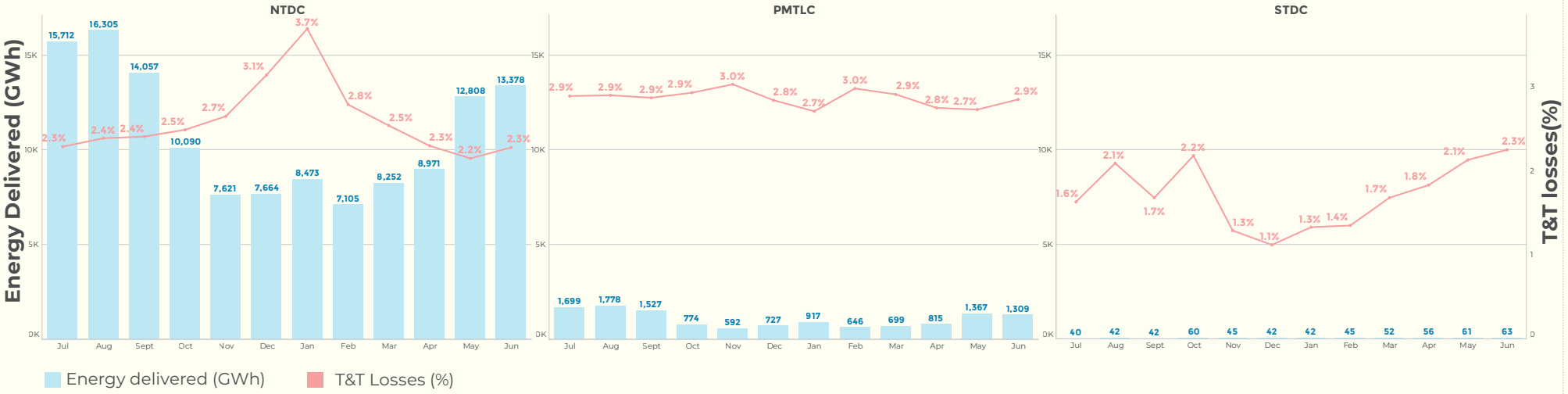
Throughout FY24, transmission and transformation (T&T) losses stayed within permissible limits overall, though the winter months told a different story, with slightly higher losses.

During winter, reduced hydel generation turns the central and northern regions into net load zones, while the southern region remains the only generation surplus area. This shift contributes to higher T&T losses in winter.

NTDC reported T&T losses of 2.52%, remaining within the permissible limit of 2.64%.

PMLTC operated at 38% capacity, incurring losses of 2.86%, which remained within the permissible limit of 4.30%.

STDC maintained an average transmission loss of 1.7%, staying well within permitted benchmark of 2.0%

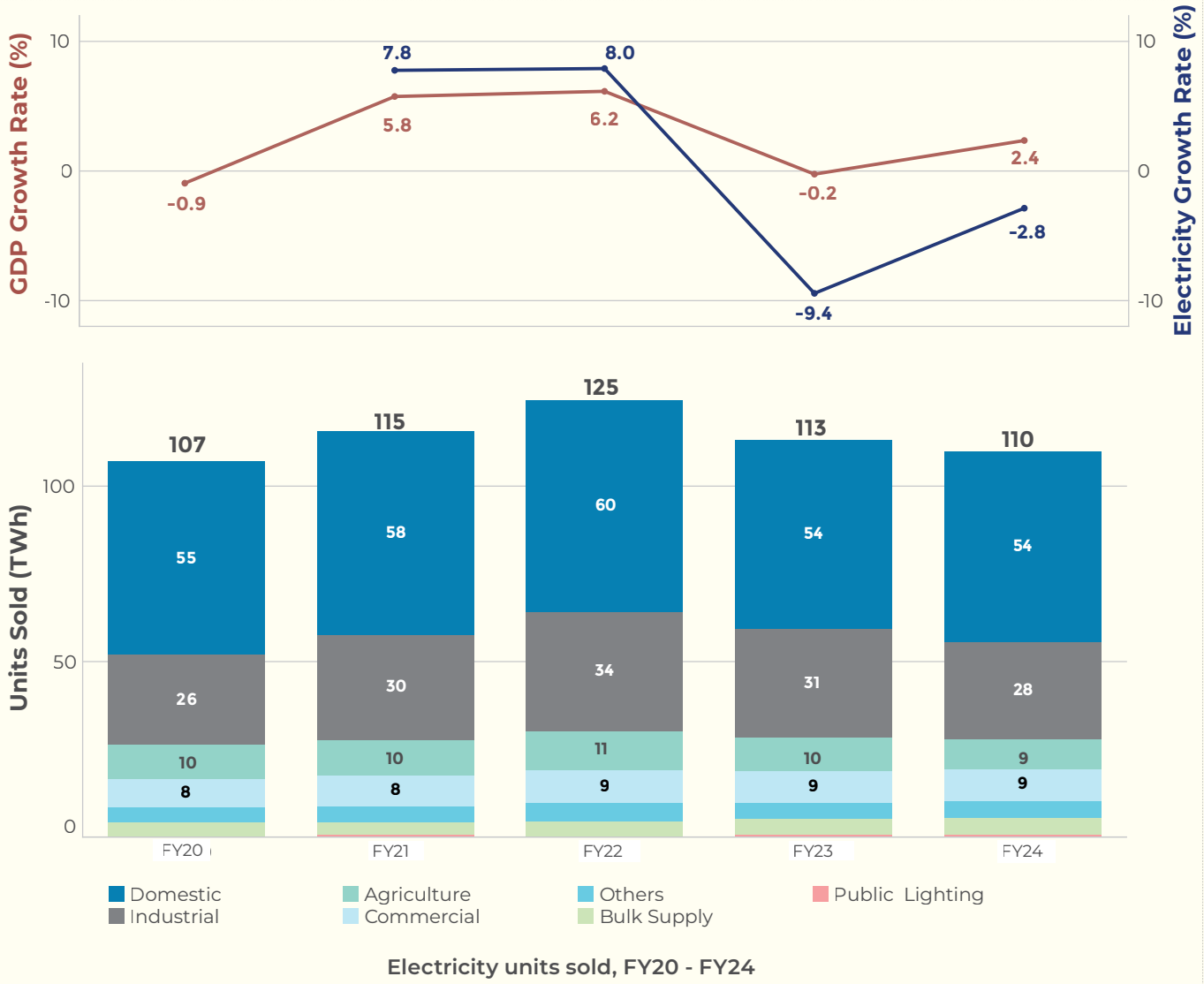


Energy delivered and T&T losses in FY24 - NTDC, PMLTC and STDC

Data Source: NEPRA State of Industry Report, RF Calculations

Distribution

Electricity sales continued to struggle, depicting a 3% drop in FY24, marking the second consecutive year of decline.



Electricity units sold, FY20 - FY24

Despite a modest improvement in GDP, which stood at 2.4% in FY24, electricity sales continued to struggle, failing to drive growth in electricity demand across the country.

Domestic: With a 6% YoY increase in the number of domestic consumers, electricity sales grew by only 1% YoY. In FY24, more households adopted rooftop solar contributing to the decline in overall electricity usage.

Industry: Electricity sales in the industrial sector declined from 31 TWh in FY23 to 28 TWh in FY24, reflecting a significant 11% YoY drop. This decrease highlights both economic challenges and the industry's transition toward more competitive energy sources.

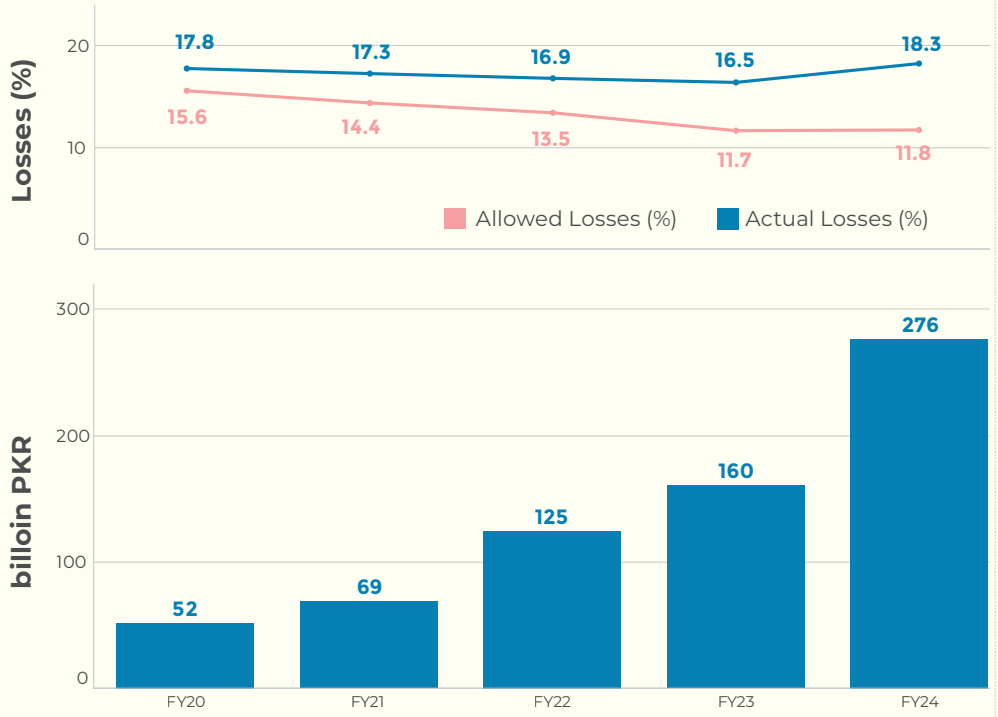
Agriculture: Electricity sales in the agriculture sector declined by 11% YoY, dropping from 10 TWh in FY23 to 9 TWh. This decline also indicates a growing shift toward solar adoption in the sector.

Commercial: With consumer growth of 3%, commercial sector saw a positive increase of 2.04% YoY increase in electricity sales.

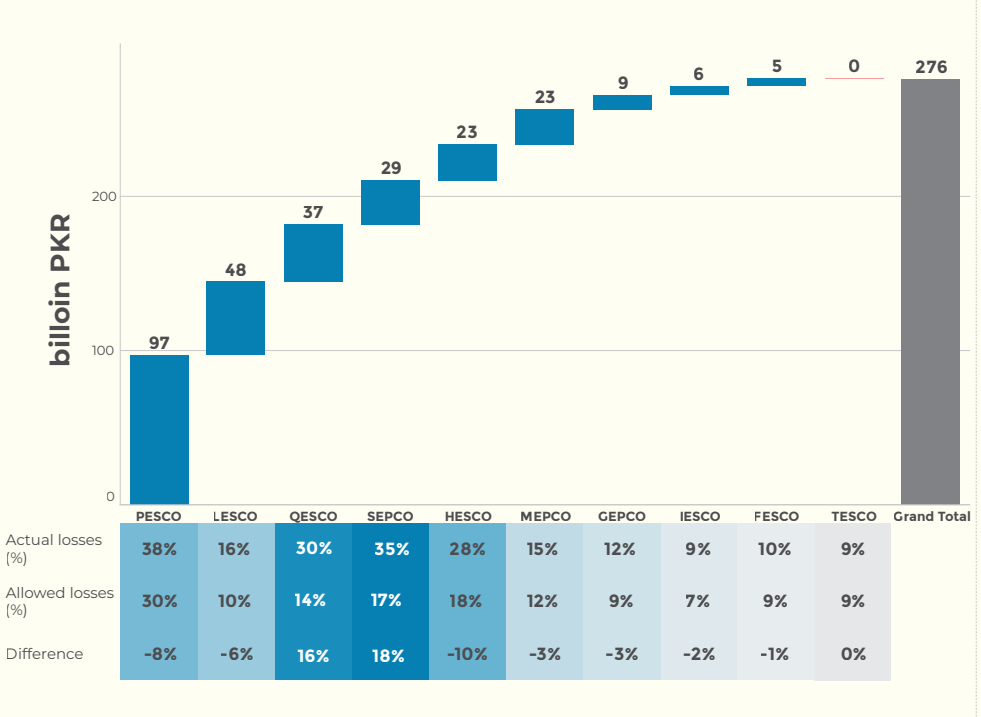
Data Source: NEPRA State of Industry Report, RF Calculations

Transmission and distribution (T&D) losses escalated, contributing PKR 276 B to the circular debt in FY24.

In FY24, T&D losses are largely due to inefficiencies in distribution lines and transformers- exceeded regulatory limits by 6.5 percentage points. This deviation alone added PKR 276 B to the circular debt, deepening the financial stress across the power sector.



T&D losses and financial impact, FY20 - FY24



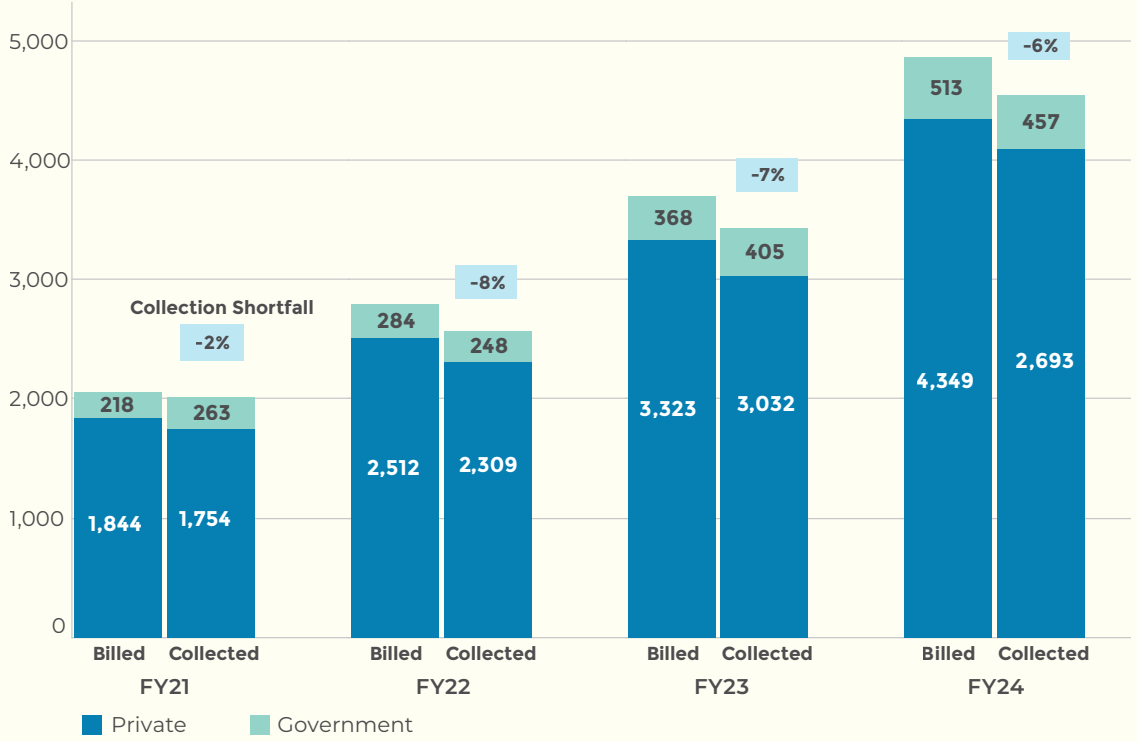
Disco wise T&D losses and financial impact, FY24

Data Source: NEPRA State of Industry Report, RF Calculations

DISCOs' shortfall in electricity bill collection led to a significant financial hit of PKR 312 B in FY24.

In FY24, DISCOs' collection shortfall improved slightly, easing from negative 7% in FY23 to negative 6%. However, these collection shortfalls added PKR 312 B to the circular debt.

QESCO's collection rate remained at 37%, similar to last year, adding PKR 110 B to the circular debt — the highest share again this year. Similarly, TESCO lacks proper metering and billing arrangements and relies heavily on government subsidies. In FY24 alone, it received PKR 22 B to bridge the gap between its revenue requirement and actual collections



Note: above graph includes both DISCOs and K-Electric numbers

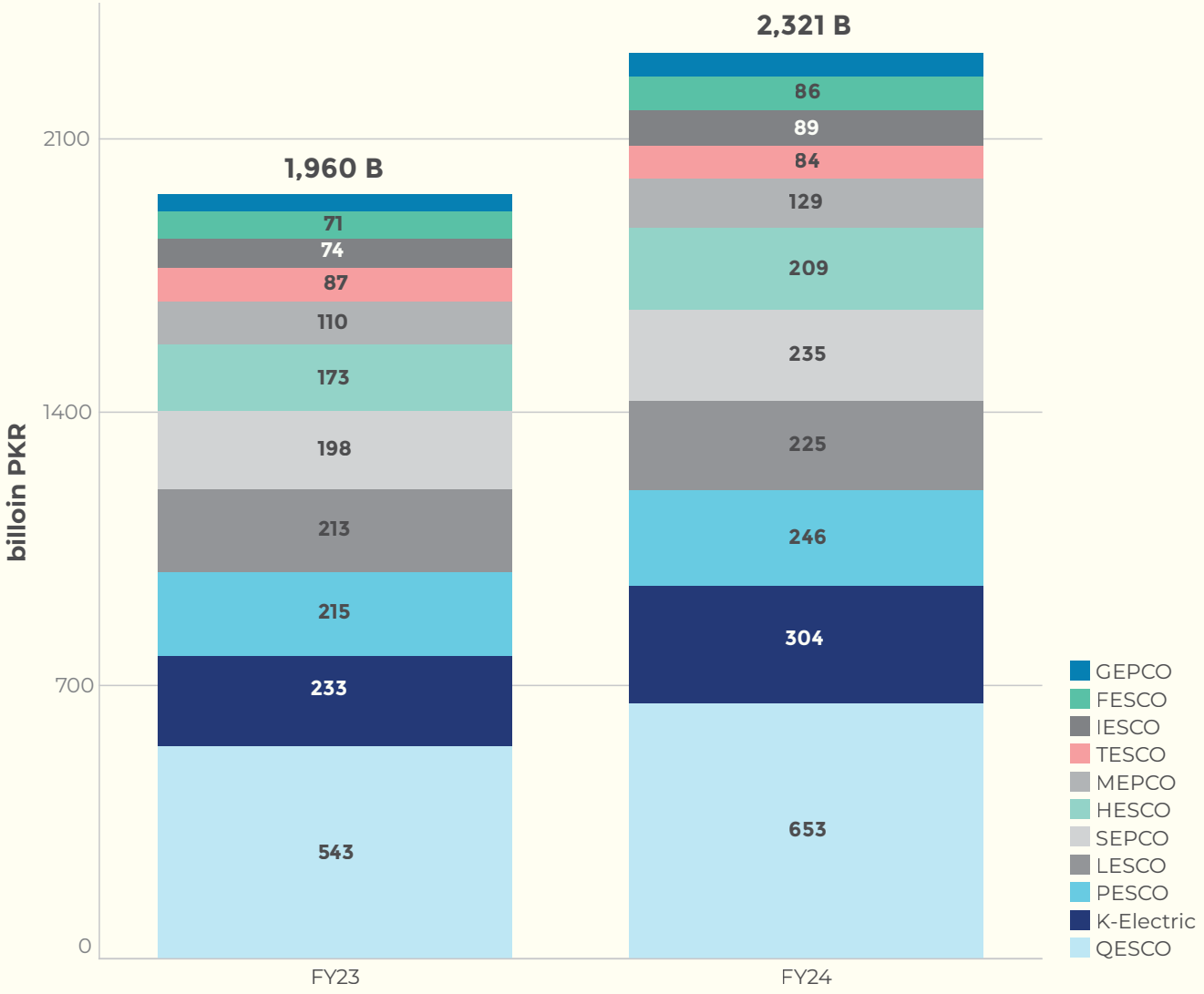
Billing and collection trend , FY21 – FY24

	Collection Shortfall (PKR B)	Collection Rate (%)
QESCO	110	37%
K-Electric	64	92%
SEPCO	35	67%
HESCO	34	78%
PESCO	30	92%
IESCO	15	97%
LESCO	11	99%
MEPCO	9	99%
GEPCO	4	99%
FESCO	2	100%
TESCO	-3	108%
	312	

DISCO wise collection shortfall in FY24

Data Source: NEPRA State of Industry Report, RF Calculations

DISCOs including K-Electric receivables rose from PKR 1,960 B in FY23 to PKR 2,321 B in FY24, reflecting an increase of PKR 361 B.



Comparison of DISCOs & K-Electric receivables, FY23 vs FY24

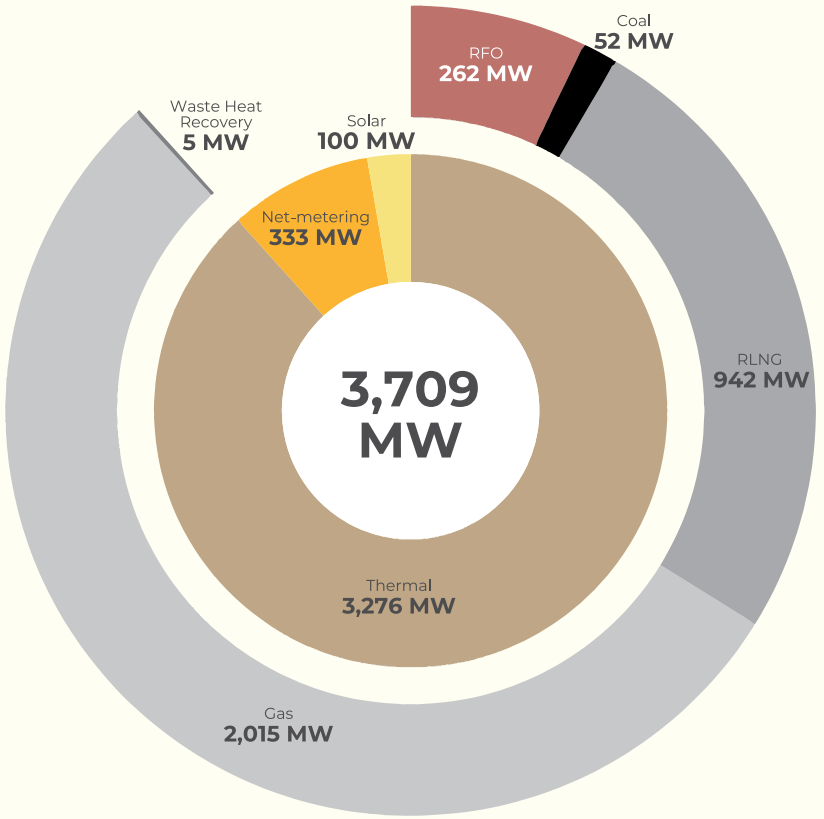
DISCOs are struggling with a growing backlog of unpaid electricity bills, mainly due to governance issues and billing inefficiencies. This rise in unpaid bills is putting pressure on the financial health of the power sector. To fix this, there is a need for a clear and effective recovery plan that focuses on collecting payments on time, improving how bills are calculated, and carrying out regular, independent audits. These audits are important to check the accuracy of the amounts owed and to make the billing and collection process more transparent.

Data Source: NEPRA State of Industry Report, RF Calculations

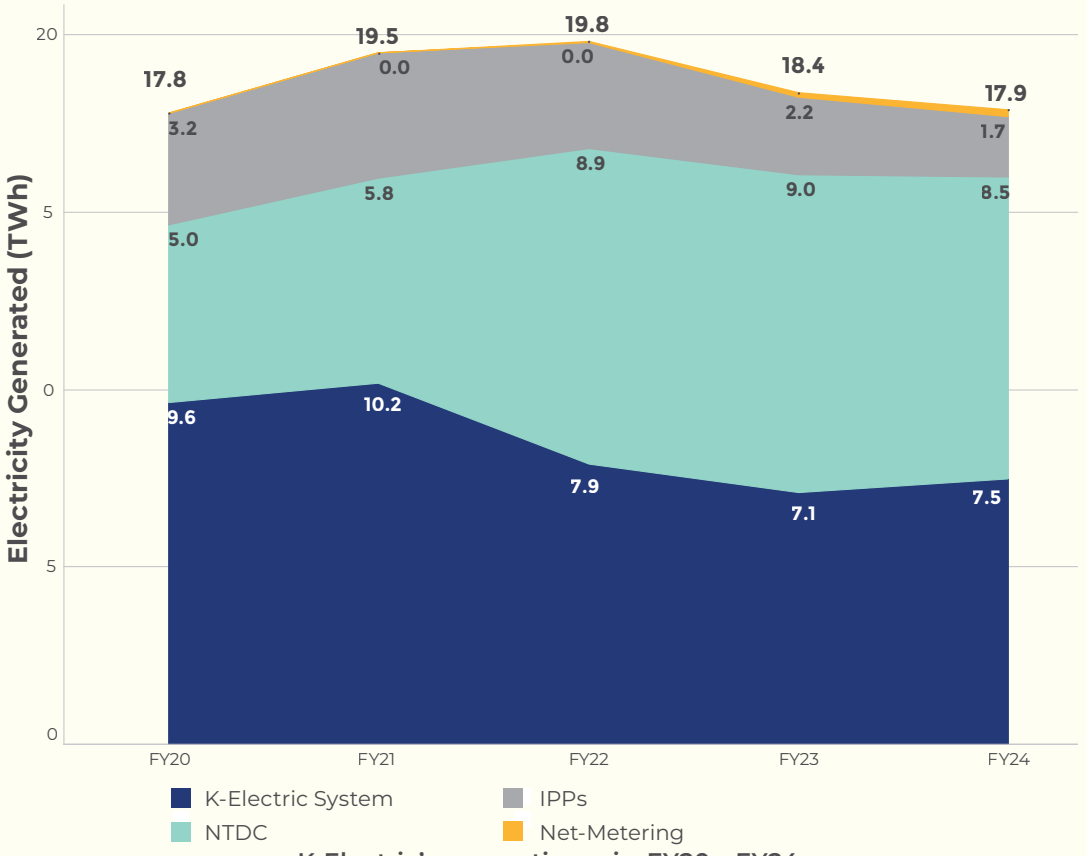
K-Electric

The decline of 3% YoY in K-Electric's gross power supply was observed for the second year in a row.

In FY24, K-Electric's net metering capacity rose from 202 MW in FY23 to 333 MW, boosting the share of renewables in its generation fleet. With the commissioning of Bin Qasim Power Station (BQPS) Unit-2, K-Electric's own generation increased from 7.1 TWh in FY23 to 7.5 TWh in FY24, reducing reliance on electricity imports from the National Transmission and Despatch Company (NTDC).



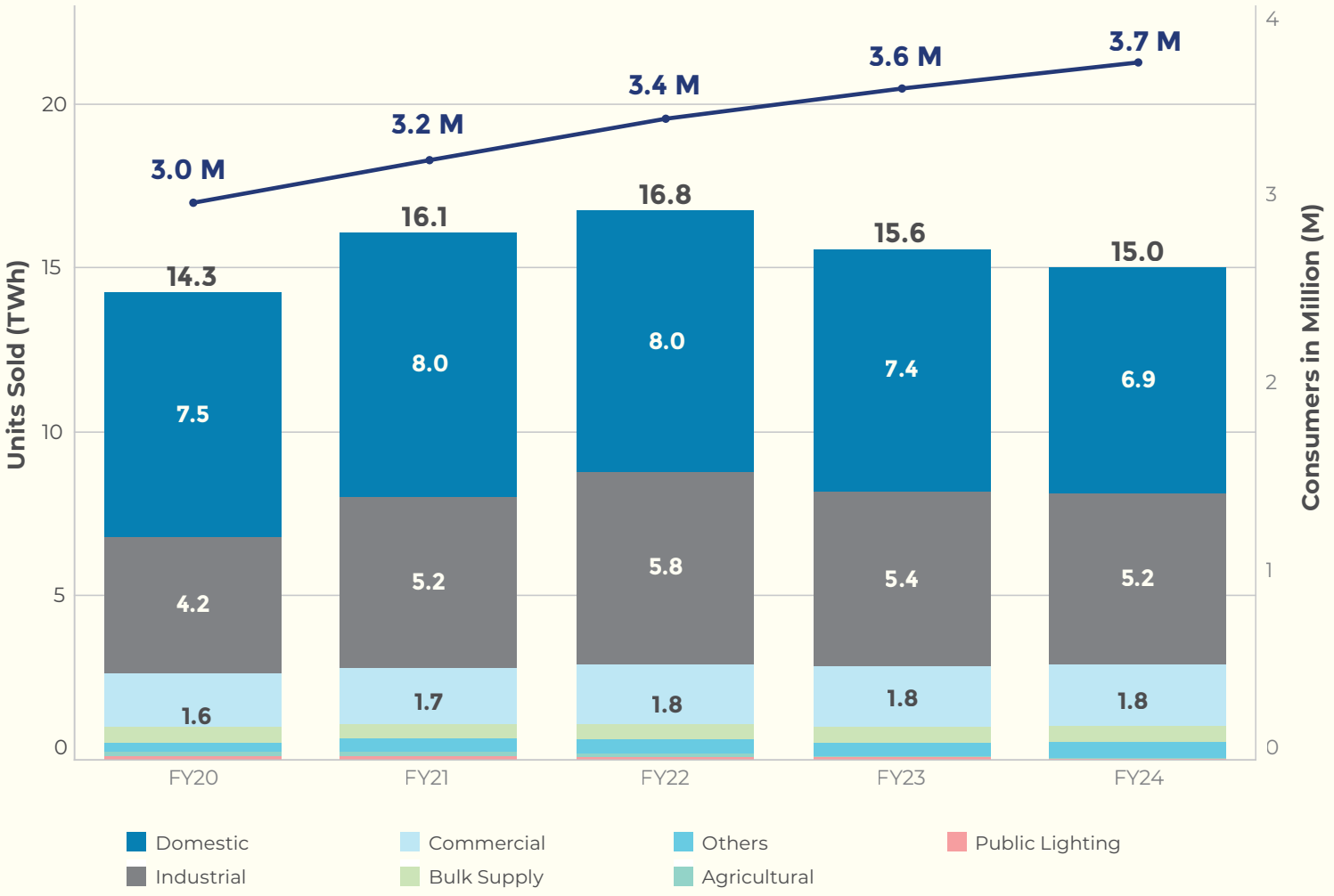
Energy source-wise K-Electric installed capacity, FY24



K-Electric's generation mix, FY20 – FY24

Data Source: NEPRA State of Industry Report, RF Calculations

The electricity sales at K-Electric dropped by 3.8% YoY, for the second consecutive year.



Electricity units sold and consumer growth in K-Electric, FY20 - FY24

Electricity sales to domestic consumers recorded the largest YoY decline at 6.4%. Sales to industrial consumers also declined by 2% YoY, accompanied by a 0.8% decrease in the number of industrial users, approximately 188 fewer connections. This marks the second consecutive year of decline, following a reduction of 88 industrial users in FY23. The continued drop suggests an ongoing shift within the industrial sector toward captive solar power generation or possibly the closure of certain industries.

Data Source: NEPRA State of Industry Report, RF Calculations

K-Electric improved its network transformation capacity by 1,130 MVA in FY24, enhancing grid reliability and efficiency.

In FY24, K-Electric expanded its network with the addition of three new grid stations, one 220 kV and the other two 132 kV. Additionally, 39 km of transmission lines were installed, and the transformation capacity increased by 1,130 MVA. The length of 132 kV transmission lines in K-Electric decreased during FY24 due to the dismantling and conversion of old circuits.

	Grid Station	Transmission Lines	Transformation Capacity
220 kV	10	364 km	4,500 MVA
132 kV	58	838 km	6,986 MVA
66 kV	3	153 km	79 MVA
	71	**1,355 km**	**11,565 MVA**

K-Electric's transmission Infrastructure, FY23

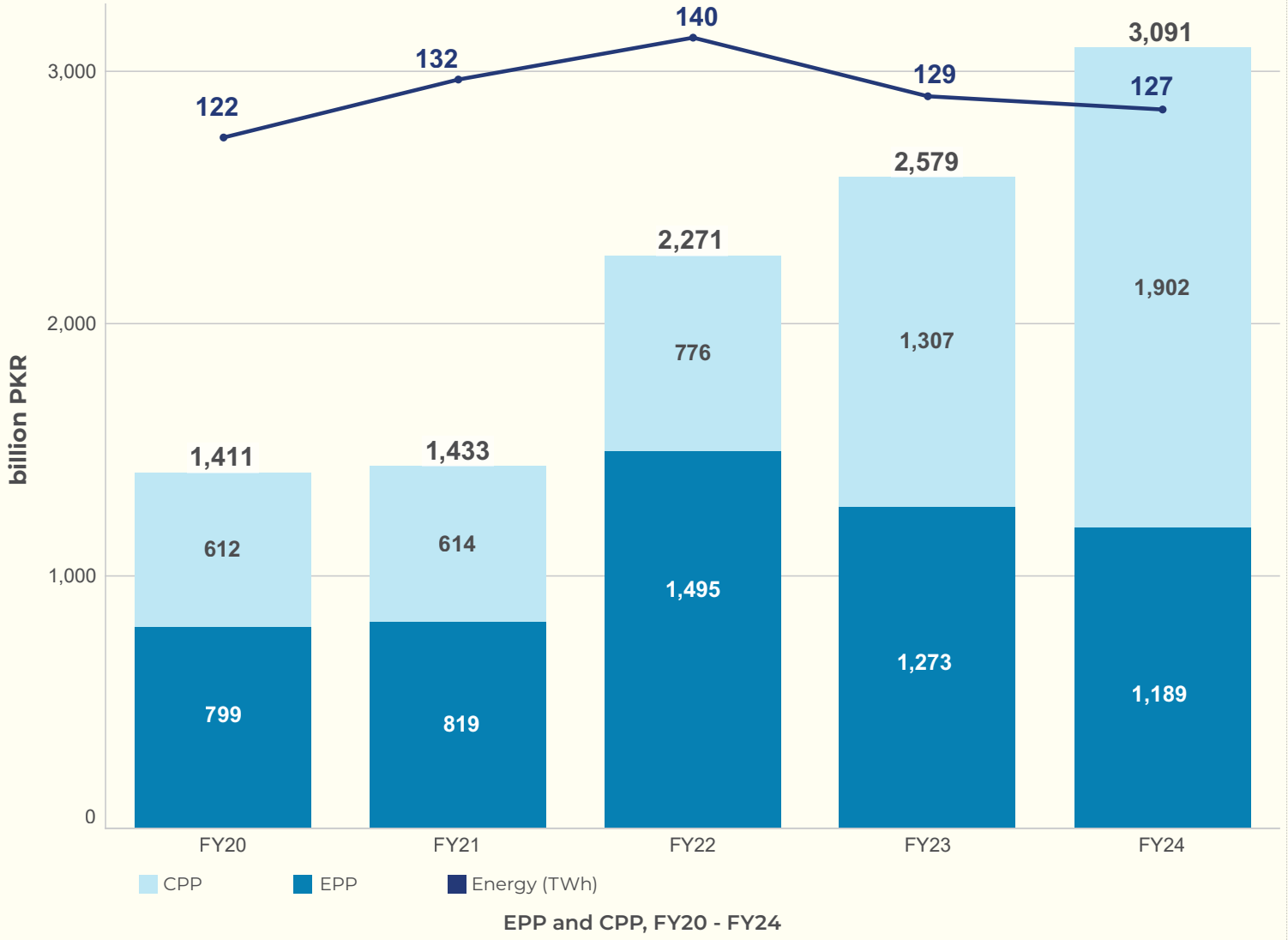
	Grid Station	Transmission Lines	Transformation Capacity
220 kV	11	436 km	5,500 MVA
132 kV	60	805 km	7,116 MVA
66 kV	3	153 km	79 MVA
	74	**1,394 km**	**12,695 MVA**

K-Electric's transmission Infrastructure, FY24

Data Source: NEPRA State of Industry Report, RF Calculations

Financial Overview

Capacity purchase price (CPP) increased by 46% YoY, with the share of thermal and nuclear capacity payments almost doubled in FY24.



EPP and CPP, FY20 - FY24

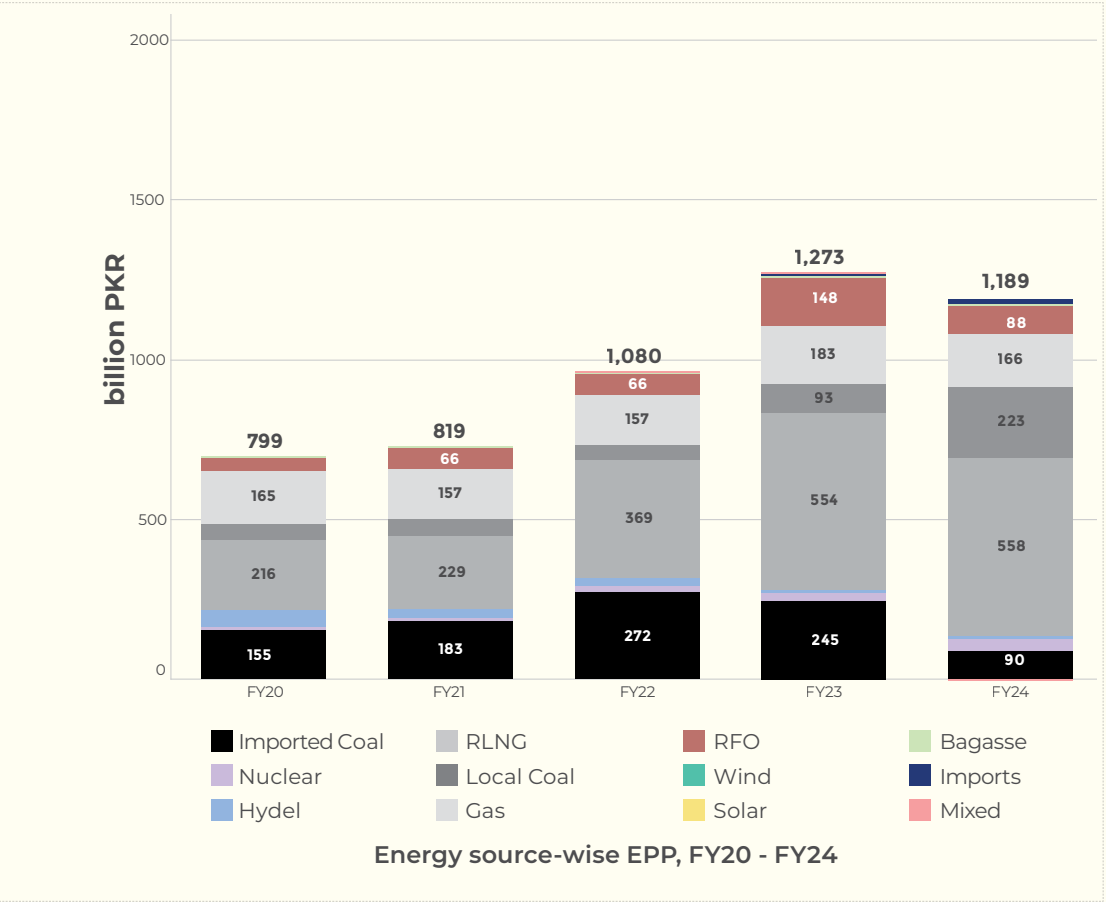
With the addition of new coal and RLNG plants in FY23, capacity payments saw an increase of 46% YoY in FY24. These projects usually require higher payments during their debt repayment period, putting pressure on the financial sustainability of the power sector. When such plants are underutilized, the unused capacity still adds to the cost, leading to higher electricity tariffs for consumers.

On the other hand, a drop in electricity generation during FY24 contributed to 7% YoY decline in EPP.

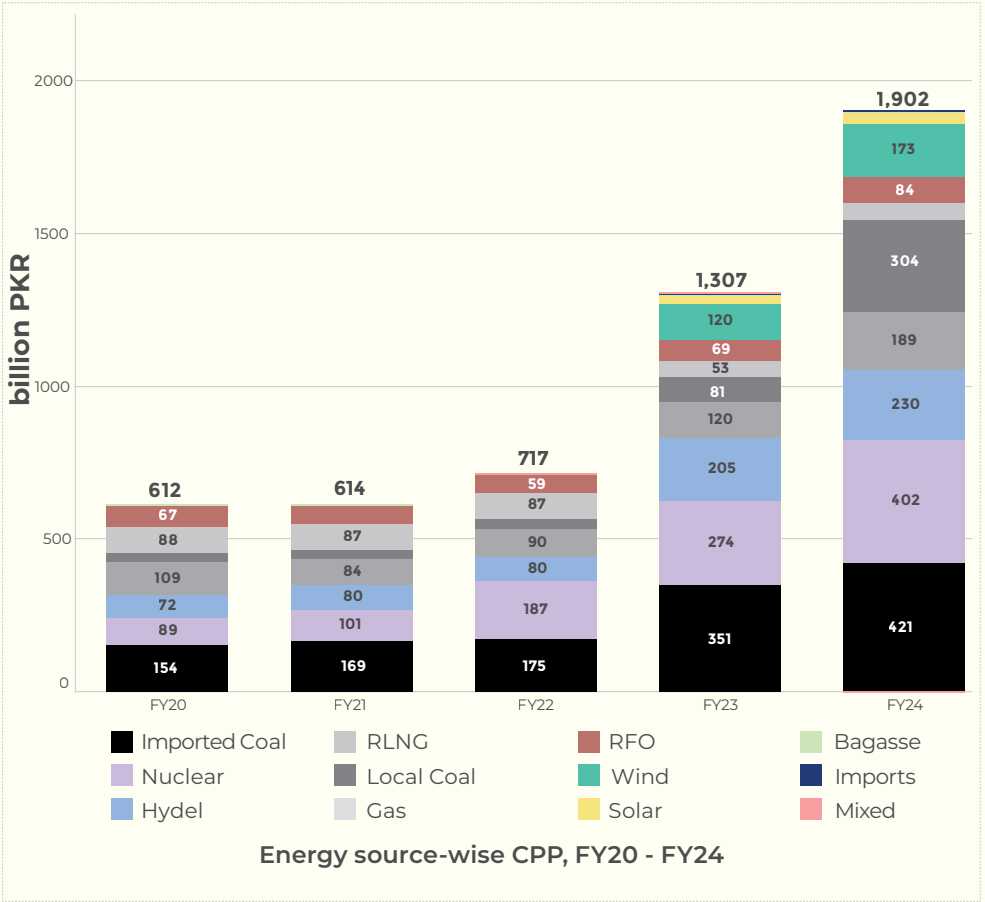
Data Source: NEPRA State of Industry Report, RF Calculations

With increased generation from RLNG plants, the RLNG share in EPP rose significantly, whereas nuclear and coal projects ranked high in CPP.

As the utilization factor of imported coal plants remained low in FY24, their share in EPP correspondingly decreased; however, they held the highest share in CPP.



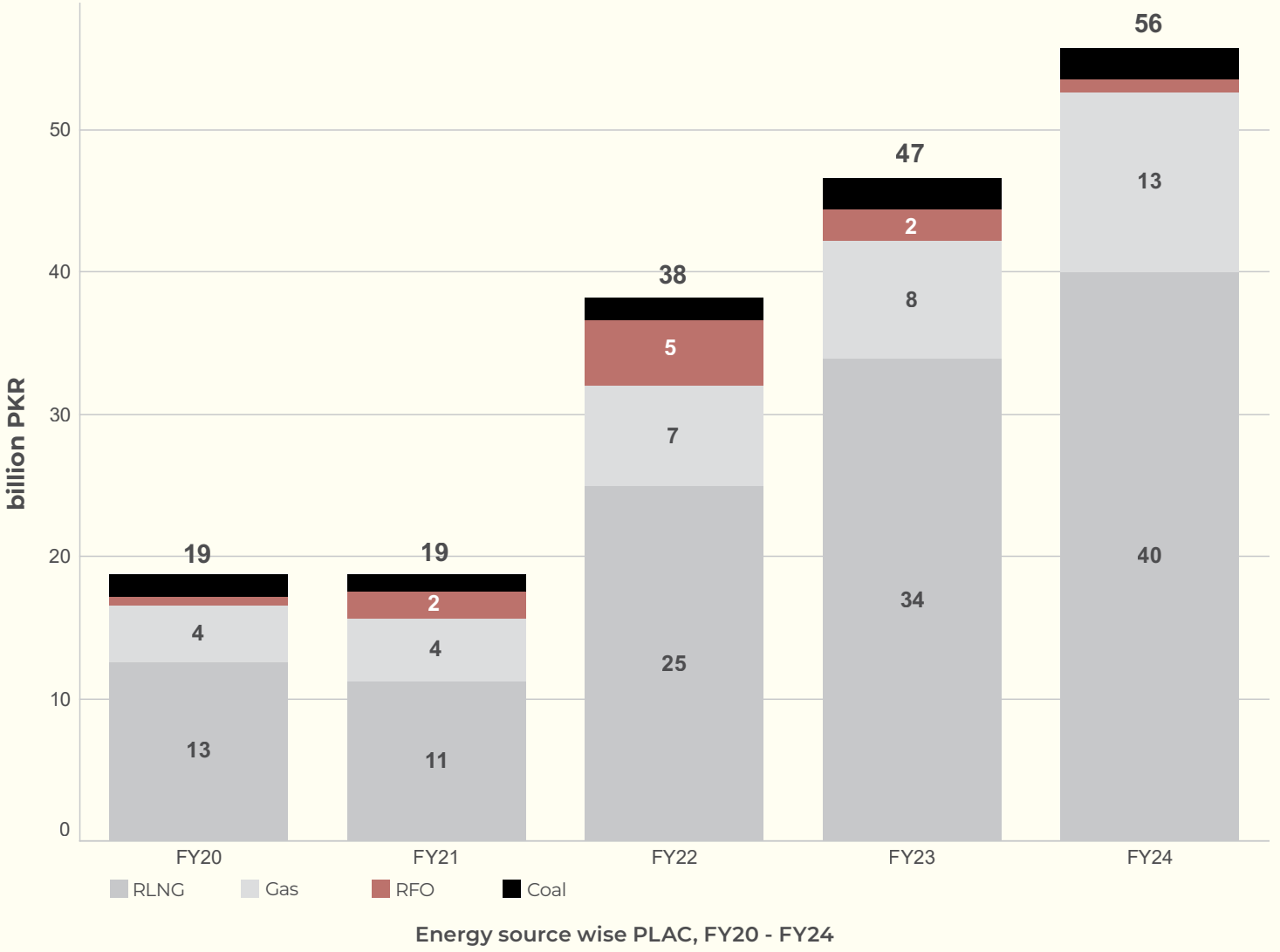
Energy source-wise EPP, FY20 - FY24



Energy source-wise CPP, FY20 - FY24

Data Source: NEPRA State of Industry Report, RF Calculations

In FY24, low plant outputs drove part load adjustment charges (PLAC) to PKR 56 B, marking a 19.5% YoY increase from PKR 46.6 B in FY23.



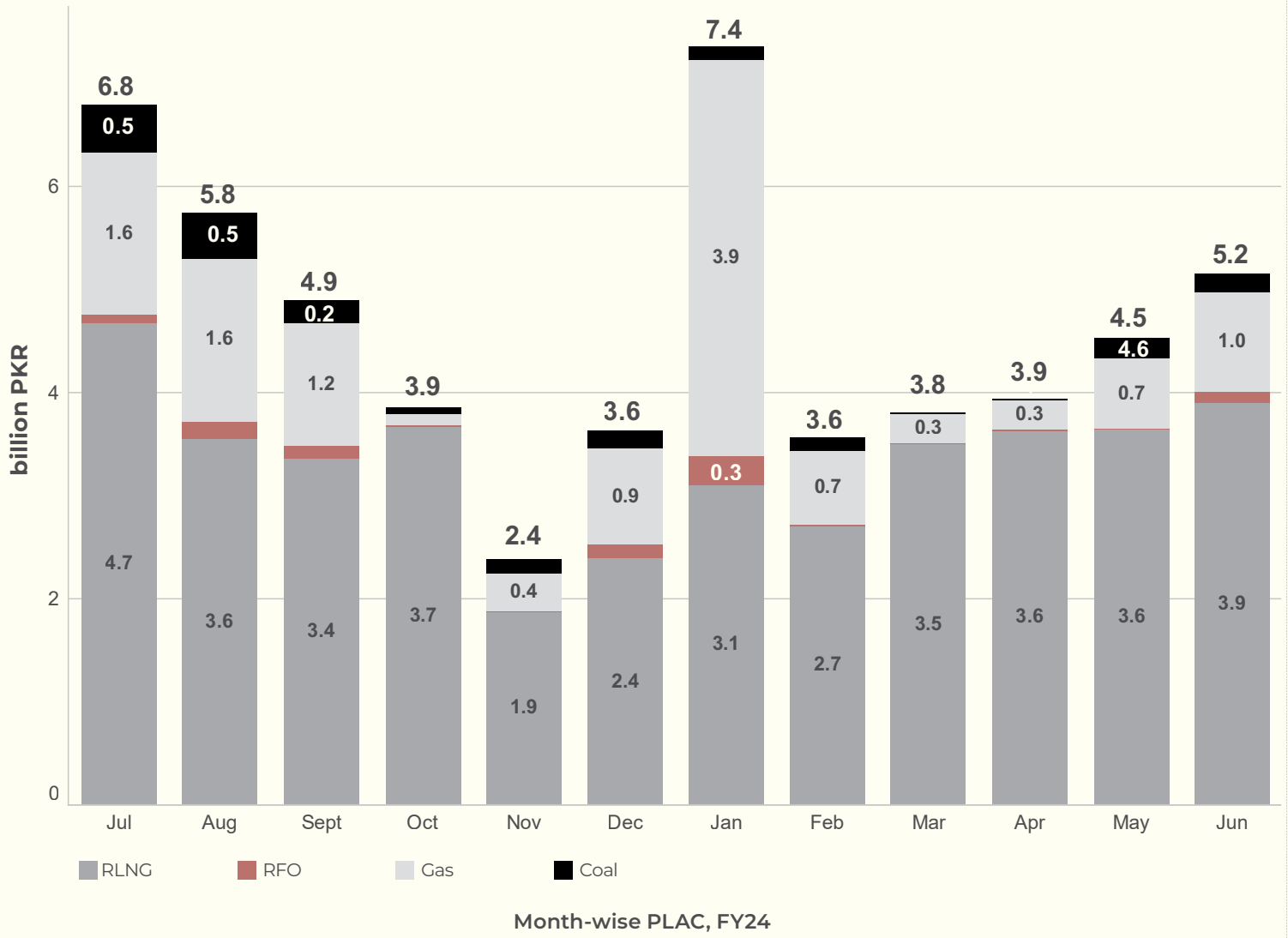
Energy source wise PLAC, FY20 - FY24

PLAC arise when thermal power plants run below full capacity, leading to inefficiencies and higher generation costs. These costs are transferred to consumers through monthly FCAs.

PLAC has seen a sharp increase, growing from PKR 19 B in FY20 to PKR 56 B in FY24, highlighting the underutilization of thermal power plants.

Data Source: NEPRA State of Industry Report, RF Calculations

Load demand variations drove higher PLAC charges in Jan 2024.



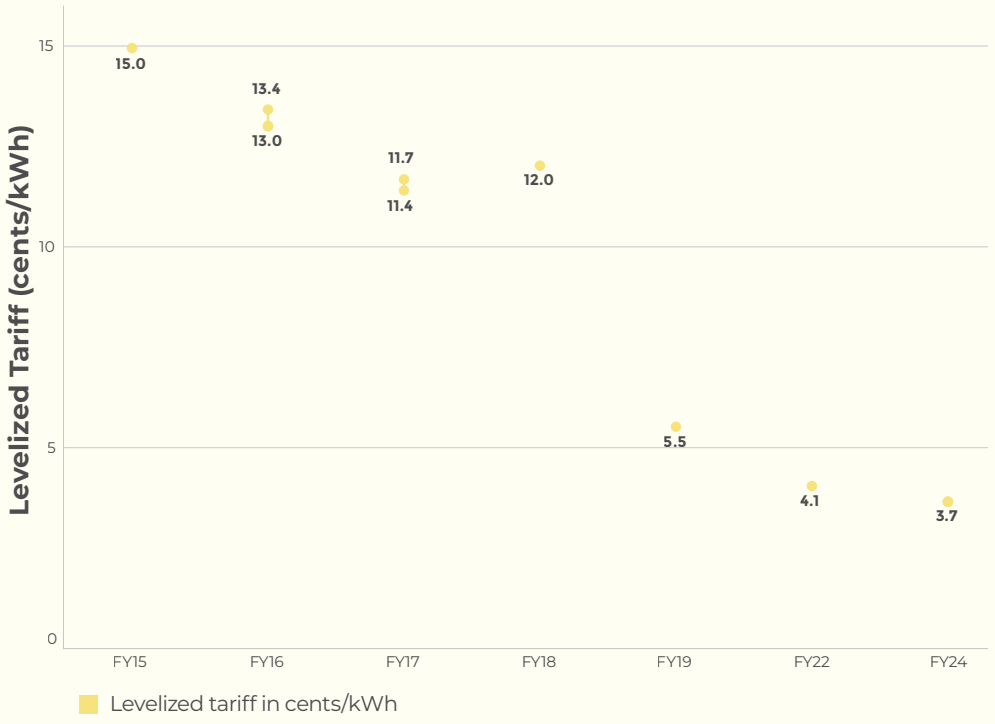
In Jan 2024, PLAC was significantly higher than usual. Throughout the month, the system experienced increased volatility in its load-demand profile, with peak demand occurring in the early morning, mid-day, and early evening, while demand dropped sharply during other periods. To maintain system reliability, power plants operated at minimal levels or remained in standby / warm-start mode, contributing to the higher PLAC.

Seasonal variations also have an impact on PLAC. In summer, electricity is primarily generated by must-run hydel plants, limiting the usage of thermal plants and increasing PLAC. On the contrary, during winter, reduced hydel generation leads to greater reliance on thermal plants, decreasing their PLAC.

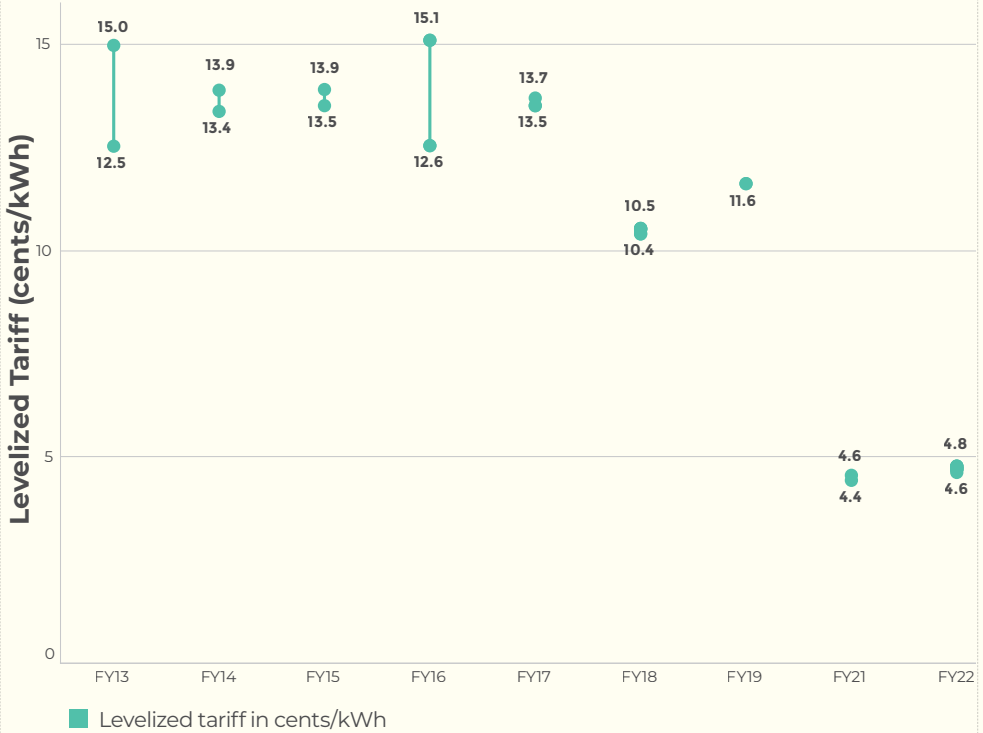
Data Source: NEPRA State of Industry Report, RF Calculations

Declining levelized tariffs are making electricity from newer solar and wind projects more cost effective.

Solar and wind plants that have achieved Commercial Operation Date (COD) in recent years, have lower levelized electricity tariffs compared to older plants. Advances in technology and economies of scale have significantly reduced the cost of renewable energy, making it more affordable while accelerating the transition to cleaner power sources.



Levelized tariffs for solar power plants



Levelized tariffs for wind power plants

Data Source: NEPRA State of Industry Report, RF Calculations

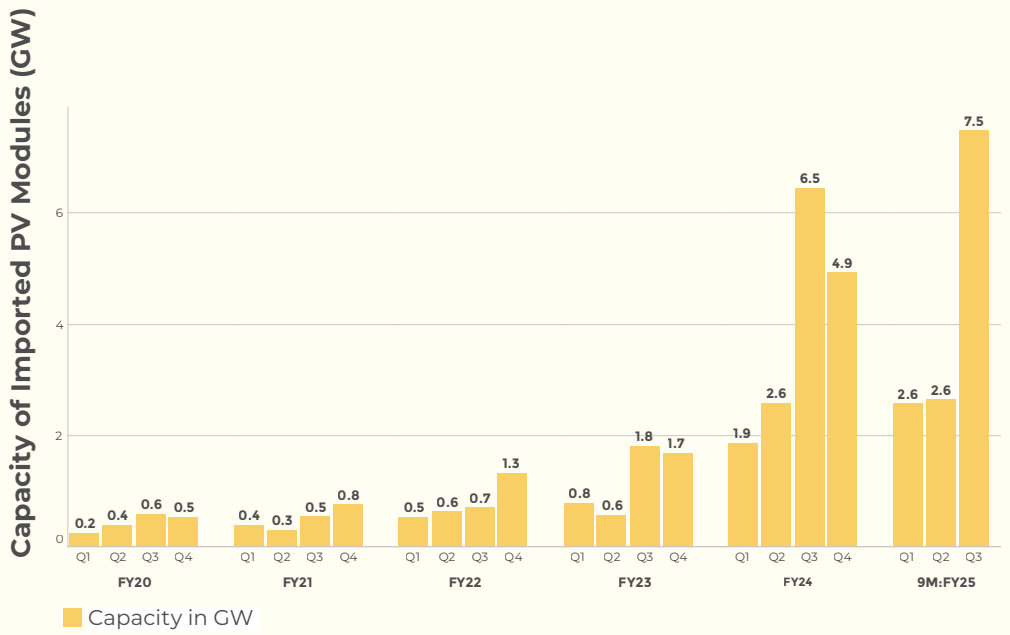
Pakistan’s Solar Rush

In recent years, Pakistan has imported a significant volume of solar panels, primarily from China. As a result, both on-grid and off-grid solar installations have experienced substantial growth over the past two years. With rooftop solar deployments expected to rise further across the country, notable shifts in electricity consumption patterns are expected.

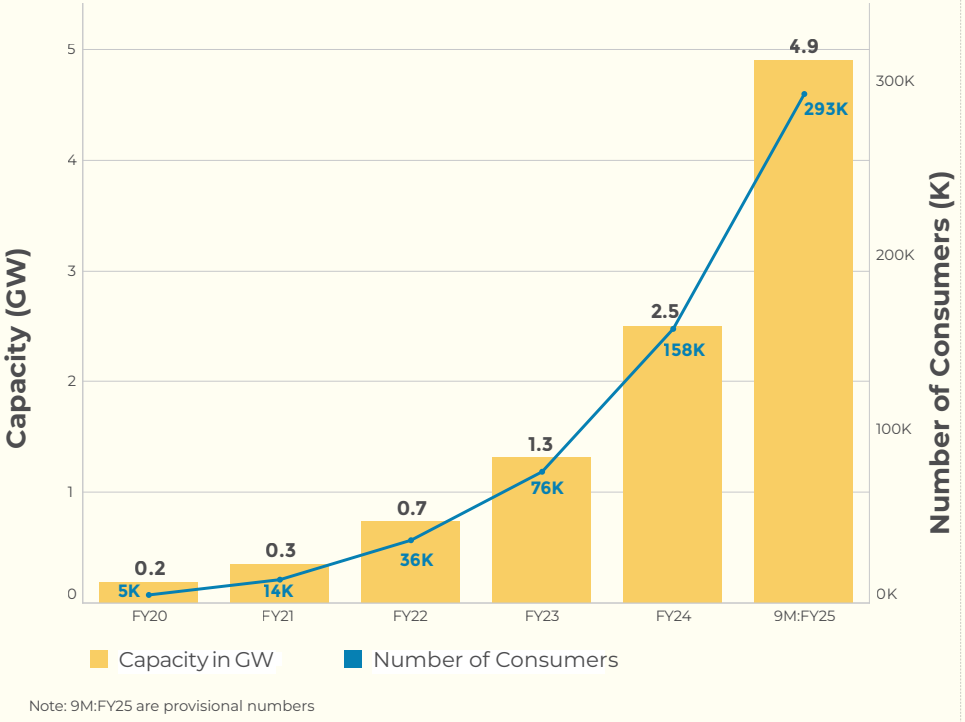
The recent rise in net-metered connections is examined alongside variations in electricity generation profiles during high solar output months over the past two years.

Pakistan witnessed a significant surge in solar adoption during 2024, marked by a record solar panel imports and net-metering capacity rising to 4.9 GW.

In FY24, solar panel imports surged to 16 GW, a 227% YoY jump from 4.9 GW in FY23, translating into a significant boost on roof-top solar installations. By the first nine months (9M) of FY25, net metering capacity has reached 4.9 GW, indicating continued growth in this transition.



Solar panels imports (GW), FY20 – 9M:FY25



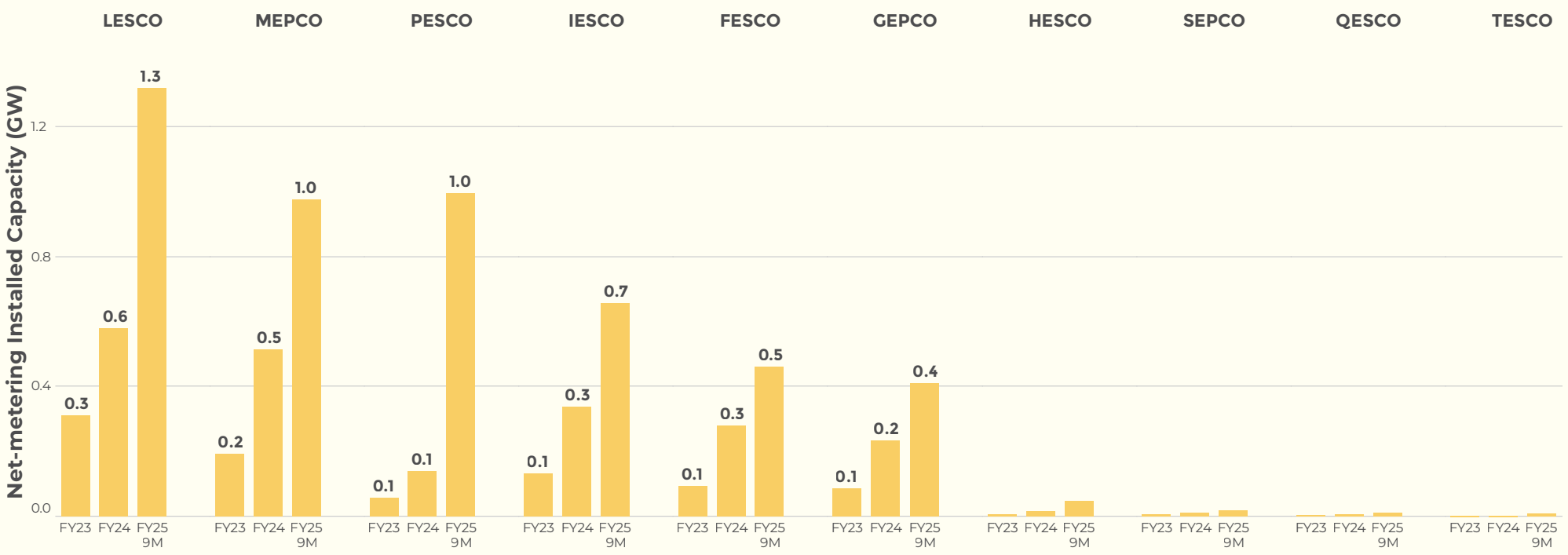
Note: 9M:FY25 are provisional numbers

Net-metering capacity addition, FY20 - 9M:FY25

Data Source: NEPRA State of Industry Report, RF Calculations

Net-metering connections see nationwide boom, led by LESCO's record 1.3 GW capacity by 9 months (9M) of FY25.

Around 95% of these connections fall under the category having distributed generation capacity below 25 kW, while the remaining 5% are those having generation capacity above 25kW. The record growth in rooftop solar installations particularly in load centres, indicates sustained momentum in solar adoption.

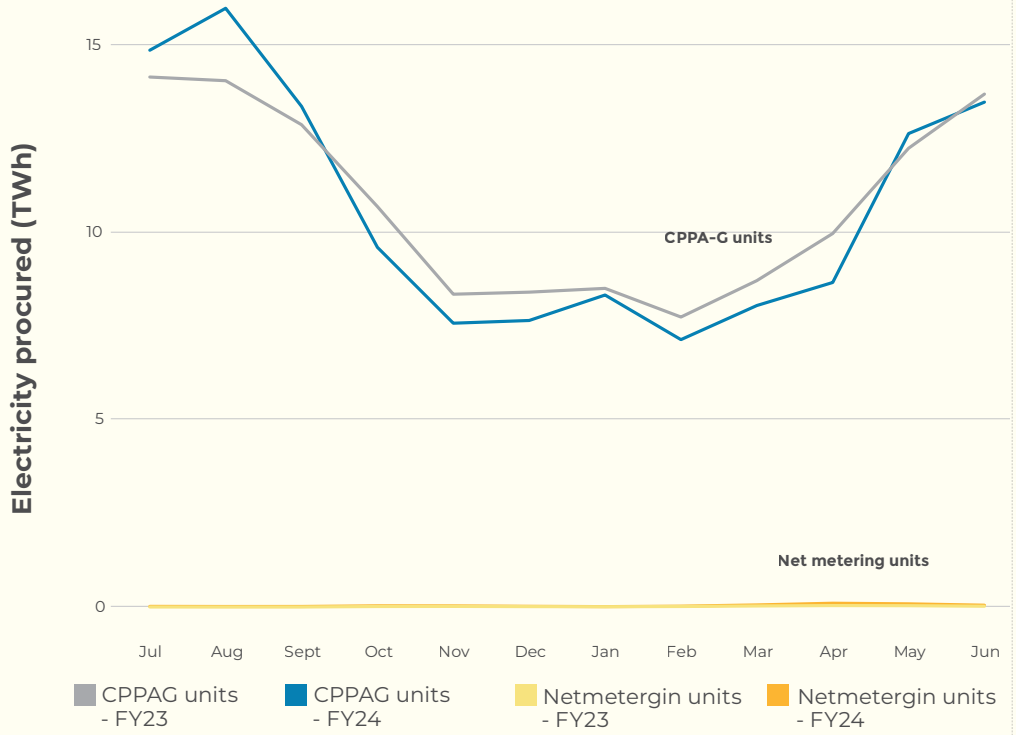


Note: 9MFY25 are provisional numbers

DISCO-wise cumulative net-metering capacity addition, FY23 – 9M:FY25

Data Source: NEPRA State of Industry Report, RF Calculations

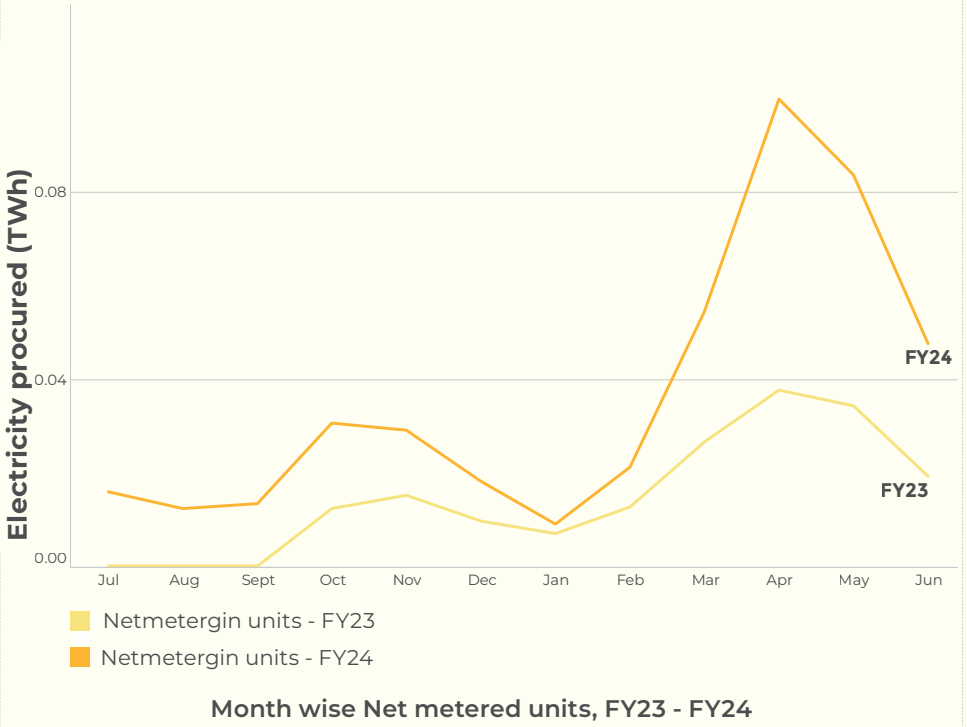
Net-metering connections boomed, but exports barely grazed 1% of CPPA-G's generation.



CPPA-G and Net metered units, FY23 - FY24

Units procured by DISCOs, FY23 - FY24

	FY23	FY24	% Share
Net-metering Units (GWh)	177	438	1%
CPPA-G Pool (GWh)	129,414	127,358	99%

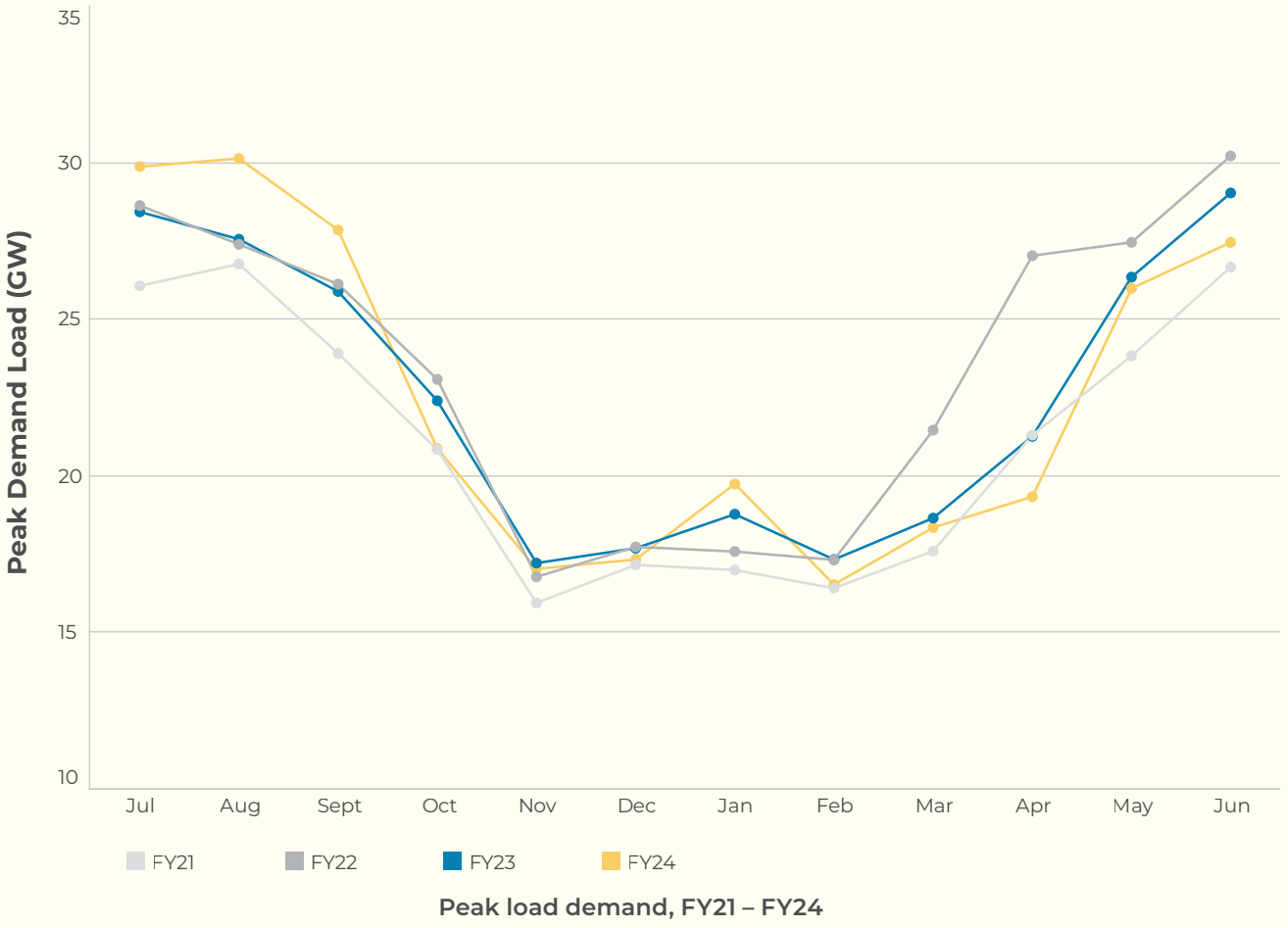


Month wise Net metered units, FY23 - FY24

Data Source: NEPRA State of Industry Report, RF Calculations

Peak demand patterns are shifting in Pakistan, with the highest demand recorded in August 2024, at 30.15 GW.

In Pakistan, peak electricity demand traditionally occurred in June every year. However, changing weather patterns and the growing uptake of rooftop solar (both net-metered and non-net-metered) are potentially altering this trend. In FY24, the system's peak demand fell from 29 GW in June 2023 to 27.4 GW in June 2024, signalling a notable shift in peak demand dynamics.

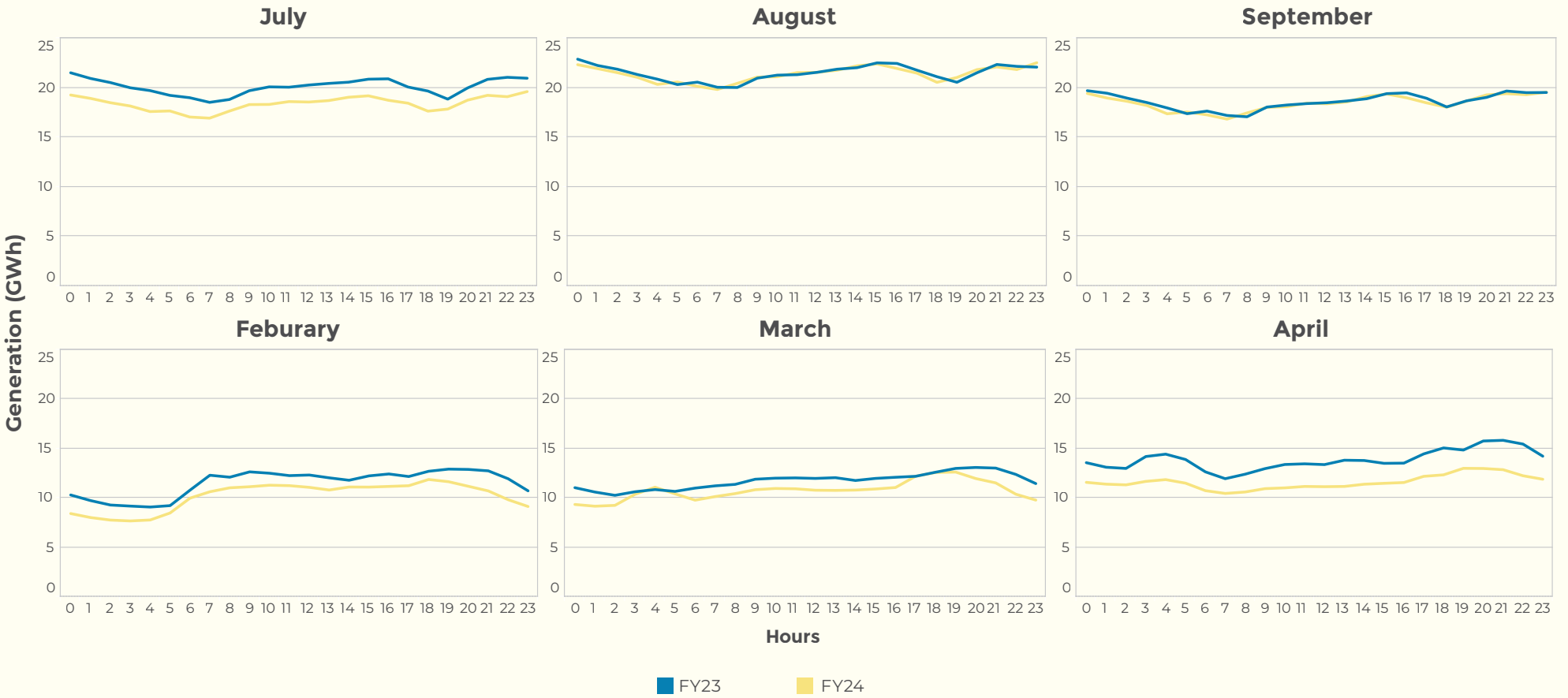


Peak load demand, FY21 – FY24

Data Source: NEPRA State of Industry Report, RF Calculations

FY24 saw reduced grid electricity demand during peak solar months compared to FY23.

Over the past two years, multiple factors such as rising electricity tariffs, energy conservation, and increased solar adoption have been influencing demand patterns. During August and September, the humid weather combined with lower solar generation kept electricity demand consistently high, resulting in less variation in hourly generation profiles for these months. In contrast, during April, when solar generation is strong and electricity demand is relatively lower compared to the summer months , a significant variance is observed between FY23 and FY24, particularly during daylight hours.



Average hourly generation profiles comparison, FY23 vs FY24

Data Source: NEPRA State of Industry Report, RF Calculations

Circular Debt

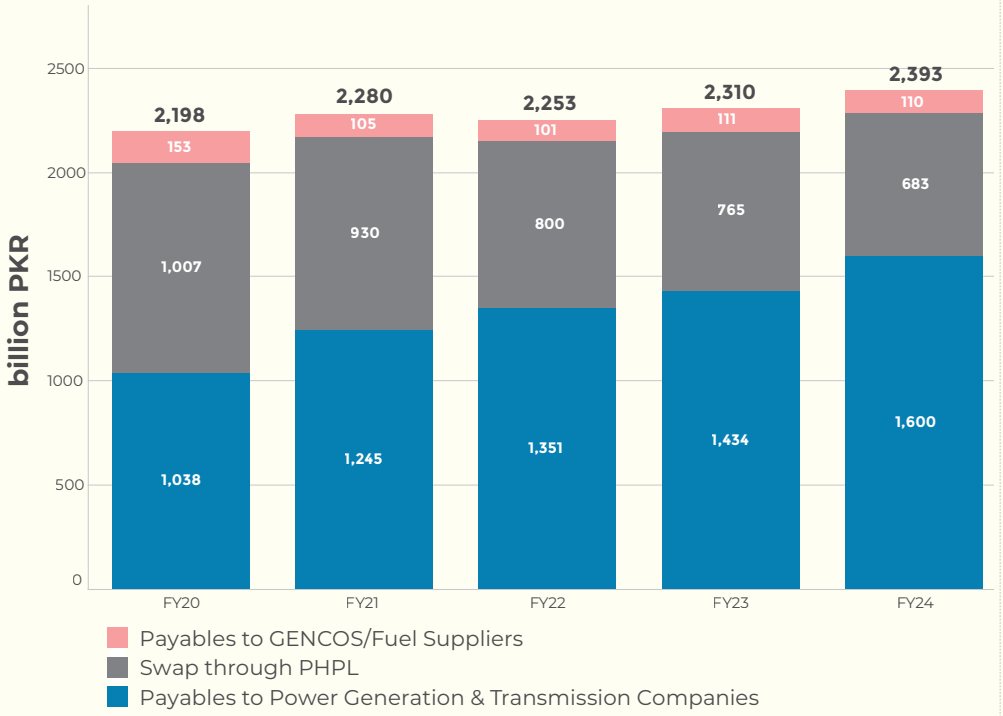
Pakistan's power sector has long struggled with circular debt, a persistent financial challenge driven by inefficiencies, poor recoveries, and structural weaknesses in the energy supply chain.

The circular debt management plan (CDMP) for FY25 focuses on timely subsidy disbursement, tariff rebasing, efficiency improvements, and governance reforms to contain circular debt and enhance the sector's financial sustainability.

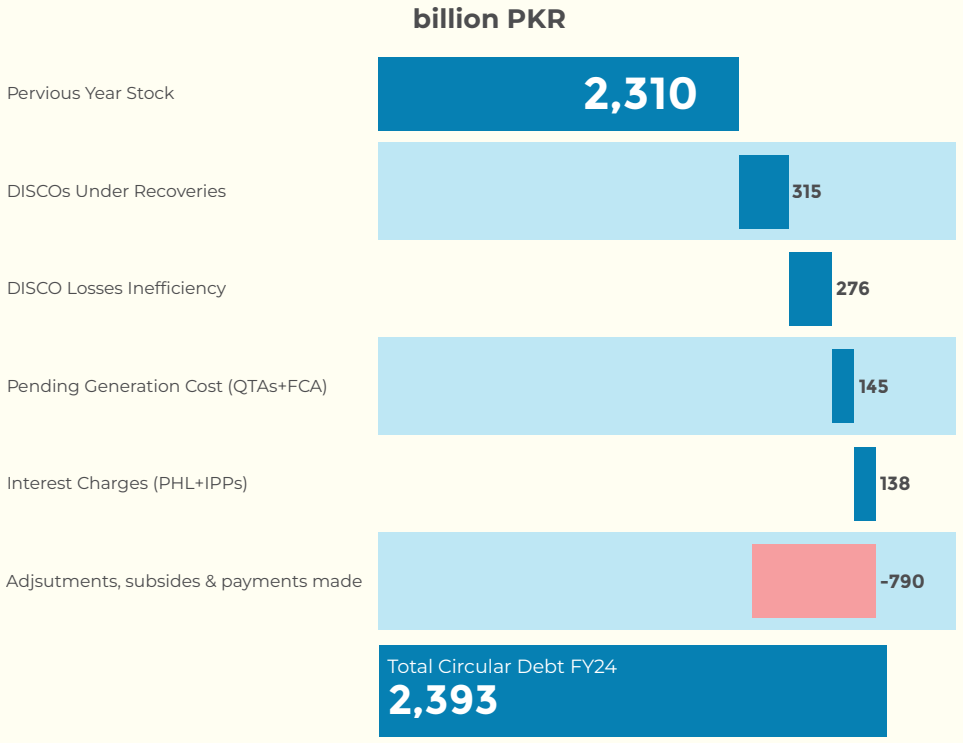
Various mitigation measures outlined in the CDMP – FY25 are examined, along with their potential impact on curbing the rising volume of circular debt in FY25.

In FY24 circular debt reached 2.4 T making 24% of the country's total tax revenue.

As of June 2024, the power sector's circular debt rose by 3.6% YoY, increasing from PKR 2.31 T in FY23 to PKR 2.39 T in FY24. The payable amount to generation companies surged by 12% YoY, reaching PKR 1.6 T from PKR 1.4 T in FY23, now comprising 67% of the total debt. The PHPL debt alone constituted around 20% of the government of Pakistan's guarantee stock.



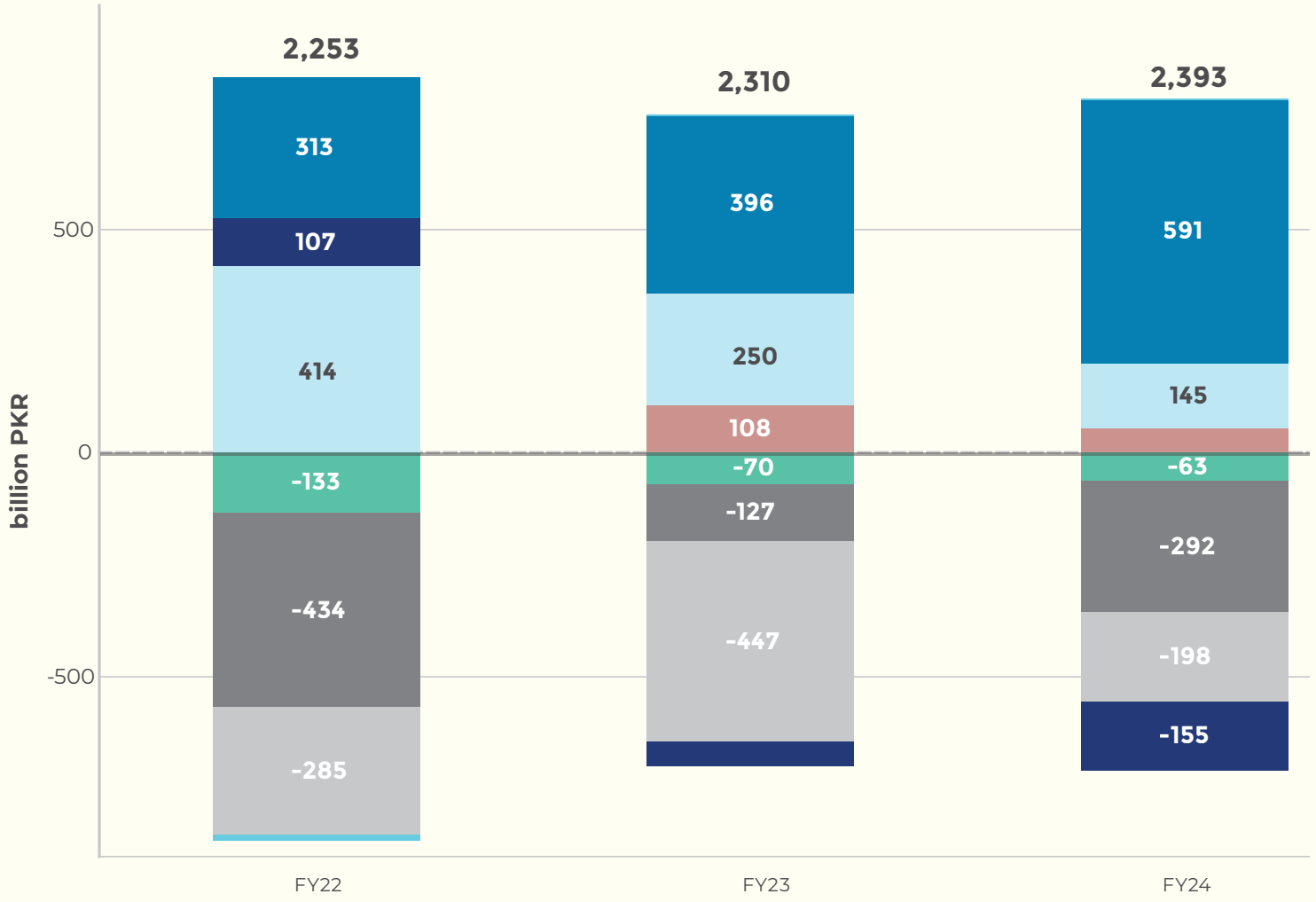
Power sector circular debt, FY21 – FY24



Breakdown of power sector circular debt, FY24

Data Source: NEPRA State of Industry Report, RF Calculations

Timely adjustments of FCA and QTAs in FY24 helped control the expansion of circular debt, keeping its YoY increase at 3.6%.



Circular debt composition, FY22 – FY24

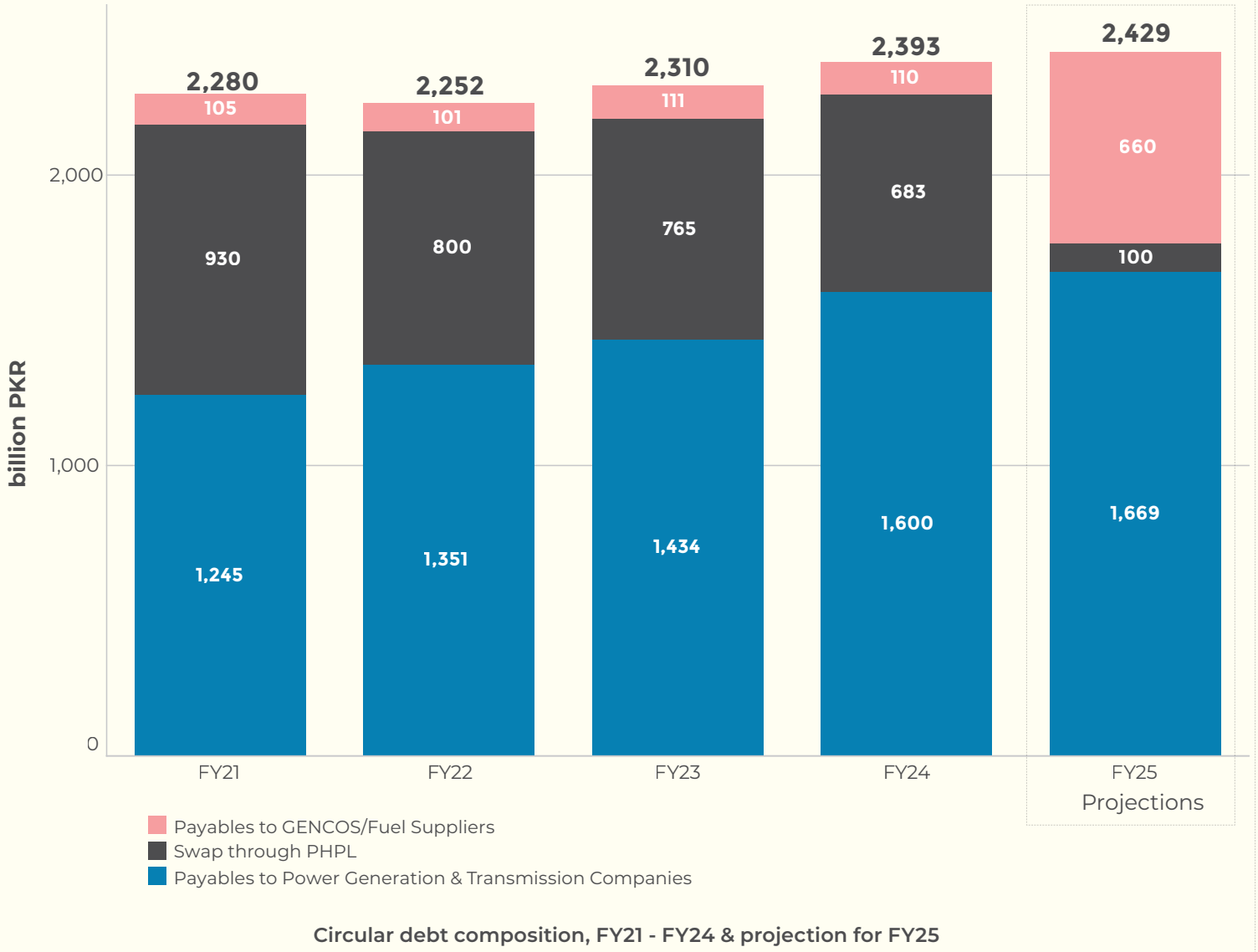
Pending Generation Cost: Pending generation costs (QTA + FCA) stood at PKR 145 B, down from PKR 250 B in FY23, a 42% YoY decrease indicating timely adjustments of FCA and QTAs in FY24

Payment by K-electric: In FY24, payments made by K-Electric stood at 155 B clearing its pervious stock of payments.

Fiscal Constraints: The government's limited fiscal space in FY24, driven by a primary deficit of PKR 7.21 T and high markup payments, restricted its ability to allocate resources for controlling the accumulation of circular debt.

Data Source: NEPRA State of Industry Report, RF Calculations

Under CDMP, an addition of PKR 36 B is projected for FY25.



Circular debt composition, FY21 - FY24 & projection for FY25

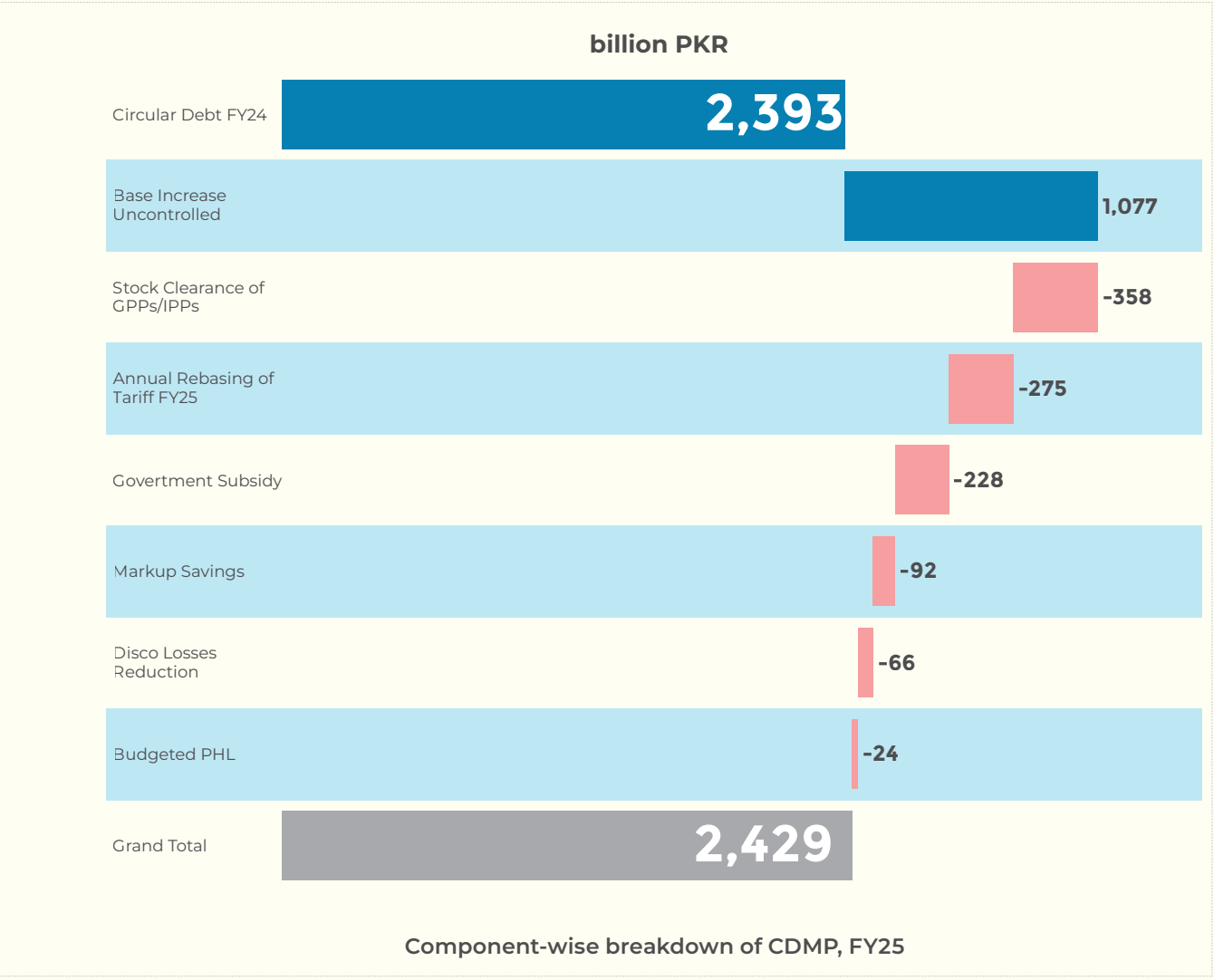
By FY24, circular debt reached PKR 2,393 B, i.e. 2.3% of GDP . Without intervention, FY25 projections show a 45% YoY increase, pushing it to PKR 3,470 B.

CDMP targets debt containment at PKR 2,429 B, limiting the increase to just PKR 36 B.

With mitigation efforts underway, circular debt rose by only PKR 2 B in the first nine months of FY25, reaching a total of PKR 2.396 T. Notably, payables to GENCOs decreased from PKR 110 B in FY24 to PKR 79 B during 9M-FY25, indicating some progress in managing liabilities.

Data Source: NEPRA State of Industry Report, RF Calculations

To cap circular debt at PKR 2.4 T in FY25, stock clearance of power producers, fuel suppliers, and PHL debt must be managed proactively.



Component-wise breakdown of CDMP, FY25

PKR 358 B has been allocated for clearing overdue payments to Independent Power Producers (IPPs) and government power plants (GPPs).

Timely QTAs, FCAs, and annual rebasing will raise tariffs from PKR 28.44 per unit in FY24 to PKR 32.99 per unit in FY25.

Ensuring proper budgeting and timely subsidy disbursement, including PKR 621 B (already accounted in the federal budget) in allocations and an additional PKR 228 B, to curb circular debt.

A strategic combination of factors, including enhanced cash flows to DISCOs and structured payments to IPPs, is projected to reduce the late payment surcharge burden by PKR 92 B.

CMDP-25 targets reducing DISCO losses to 17.3% through infrastructure improvements and an increase in grid transformers.

PKR 2.84 per unit surcharge in FY25 will cover PHL markup, lowering interest costs, while PKR 24B is allocated for gradual PHL debt transfer to the national budget.

Data Source: NEPRA State of Industry Report, RF Calculations

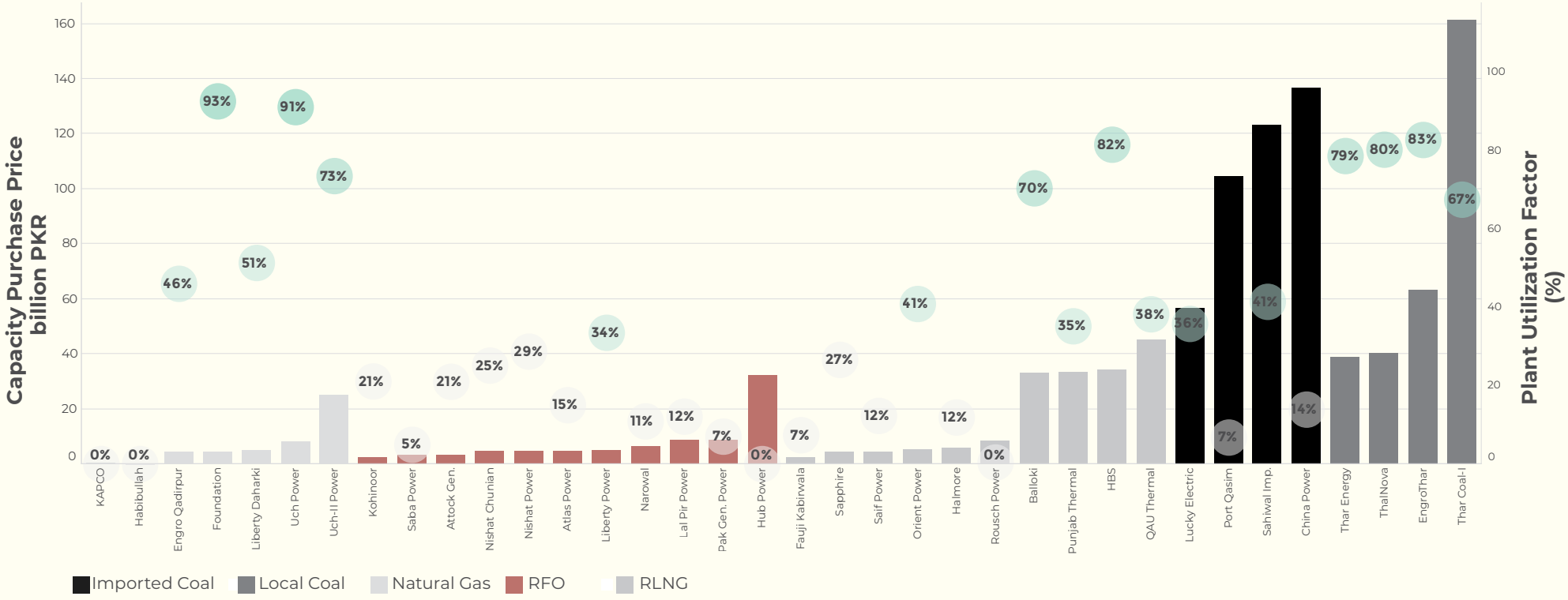
Capacity payments & plant utilization factors

Utilization factors play a critical role in determining the efficiency and cost-effectiveness of independent power producers (IPPs). Low plant utilization leads to higher per-unit electricity costs due to capacity payments, which must be made regardless of actual generation. Many IPPs operate below optimal levels, increasing financial strain on the power sector.

Addressing these inefficiencies through contract renegotiations can help optimize capacity payments burden and improve overall energy affordability. This case study evaluates the utilization factors and capacity payments of thermal IPPs to assess their impact on the power sector.

To address idle capacity, the government is renegotiating contracts with IPPs, focusing on plants with high capacity payments and low utilization factors.

Capacity payments exceeding PKR 1.9 T in FY24 significantly contributed to rising electricity prices and limited the government's ability to reduce circular debt. In response, the government initiated different measures, including terminating or renegotiating contracts with IPPs, and explored changes to the operation & maintenance (O&M) indexation mechanism, working capital rebasing, profit-sharing adjustments along with other measures to reduce the overall burden of capacity payments.

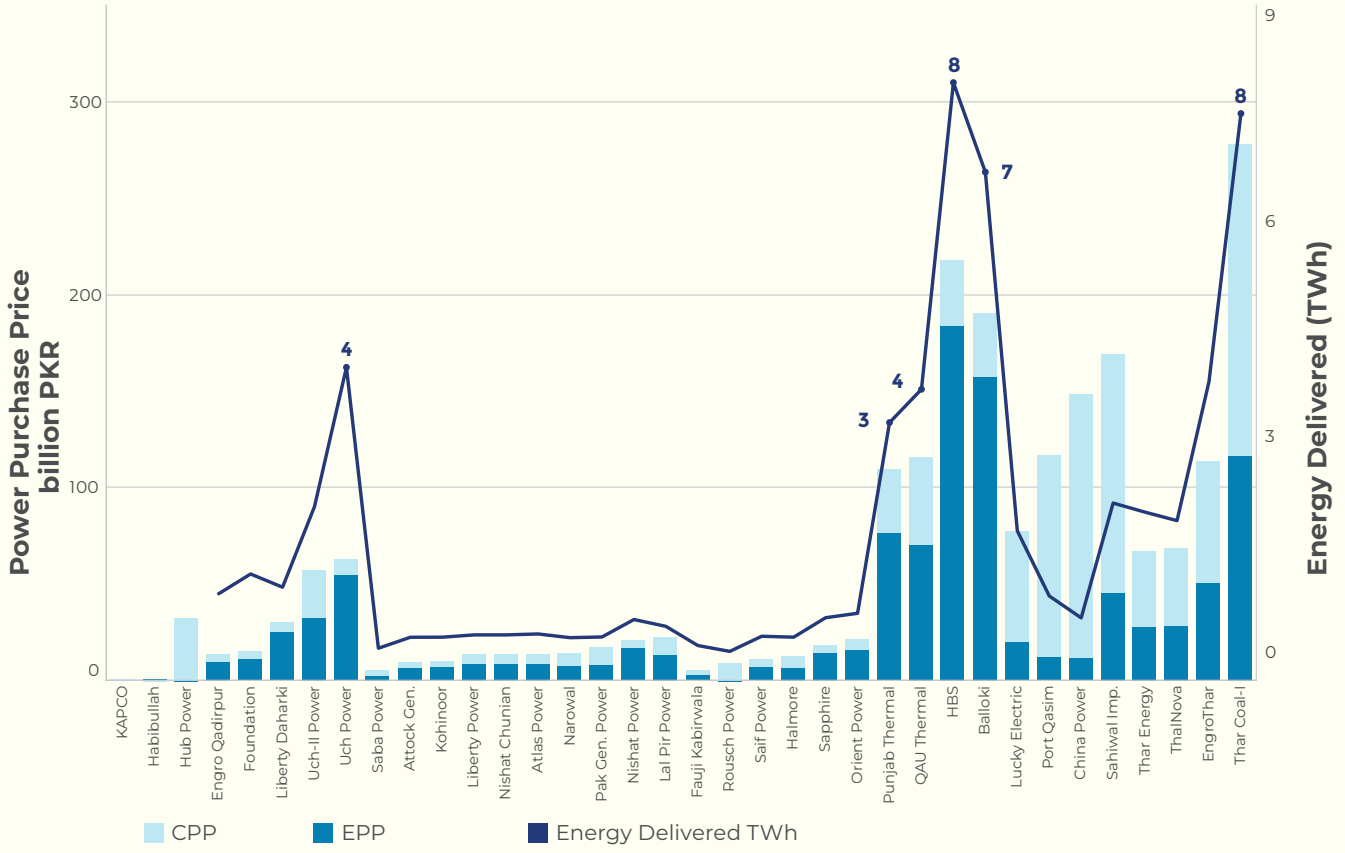


Capacity purchase price of thermal IPPs and their utilization factor, FY24

Data Source: NEPRA State of Industry Report, RF Calculations

Achieving reform goals in the power sector requires multi prolonged approach like plant retirements, debt management, and contract restructuring.

The plants currently under renegotiation are mainly fuelled by imported energy, leading to high generation costs and low dispatch rates. Retiring power plants that supply limited electricity to the grid and have less than five years left on their contracts could reduce costs. However, this may not be practical, as many of these plants provide critical ancillary services such as frequency control and reactive power support. Additionally, the majority of savings from the government's power sector reforms will only be realized with debt reprofiling of coal IPPs under CPEC projects along with the successful renegotiation of contracts for government-owned power plants, are also carried out.



Power purchase price of IPPs and energy delivered, FY24

Data Source: NEPRA State of Industry Report, RF Calculations

Recent contract terminations and renegotiations with IPPs had limited impact on consumer-end tariff reduction.

The recent contract terminations and renegotiations have not provided the expected tariff relief for consumers. The tariff cuts announced by the government in April 2025 primarily stem from FCA and QTA adjustments, as well as the reallocation of the incremental petroleum development levy to the tariff differential subsidy. The benefits of sectoral reforms have yet to materialize in a meaningful way for electricity consumers.

Power Plant	Fuel Type	Energy Policy	License Expiry	COD	Utilization Factor (%)	Power Purchase Price (B)	Contract Status
Atlas Power	RFO	2002	2034	2009	15%	14	Terminated
LalPir	RFO	1994	2027	1997	12%	22	
Saba	RFO	1994	2029	1999	5%	5	
Rousch	RLNG	1994	2026	1999	0%	9	
Hub Power	RFO	1994	2029	1997	0%	32	
Attock Gen.	RFO	2002	2033	2009	21%	10	Ongoing Negotiations
Foundation	Natural Gas	2002	2036	2011	93%	15	
Halmore	RLNG	2002	2039	2011	12%	12	
Kabirwala	RLNG	1994	2029	1999	7%	5	
Kohinoor	RFO	1994	2029	1997	21%	10	
Liberty Daharki	Natural Gas	1994	2026	2001	51%	30	
Orient	RLNG	2002	2032	2010	41%	21	
PakGen	RFO	1994	2027	1998	7%	17	
Uch-I	Natural Gas	1994	2023	2000	91%	63	
Uch-II Power	Natural Gas	2002	2036	2014	73%	57	
EngroQadirpur	Natural Gas	2002	2034	2010	46%	13	Hybrid Take and Pay
Liberty Power	RFO	2002	2035	2011	34%	13	
Narowal	RFO	2002	2035	2011	11%	14	
Nishat Power	RFO	2002	2034	2010	29%	21	
Nishat Chunian	RFO	2002	2035	2010	25%	13	
Sapphire	RLNG	2002	2039	2010	27%	18	
Saif Power	RLNG	2002	2038	2010	12%	11	

RLNG RFO Natural Gas EPP CPP

Utilization factors, power purchase price, and fuel types of thermal IPPs

In October 2024, agreements were reached to terminate Power Purchase Agreements (PPAs) with five IPPs, projected to reduce tariffs by PKR 0.57/kWh. According to the government estimates, the termination is expected to result in savings of PKR 411 B..

The government has also negotiated to convert contracts with 18 IPPs from a “take or pay” model to a hybrid “take and pay” structure, with government estimates of potentially lowering tariffs by PKR 0.67/kWh.

Data Source: NEPRA State of Industry Report, RF Calculations

9M	Nine Months
B	Billion
BQPS	Bin Qasim Power Station
CDMP	Circular Debt Management Plan
CHASNUPP	Chashma Nuclear Power Plant
CPP	Capacity Purchase Price
COD	Commercial Operational Date
CPPs	Captive Power Plants
CPPA	Central Power Purchasing Agency
DISCOS	Distribution Companies
DERS	Distributed Energy Resources
EPC	Engineering, Procurement, and Construction costs
EPP	Energy Purchase Price
FCA	Fuel Cost Adjustment
FESCO	Faisalabad Electric Supply Company Limited
FY	Fiscal Year
GENCO	Generation Company
GEPCO	Gujranwala Electric Power Company Limited
GDP	Gross Domestic Product
GW	Giga Watt
HAVC	High Voltage Alternating Current
HESCO	Hyderabad Electric Supply Company Limited
HSD	High-Speed Diesel
HVDC	High Voltage Direct Current
HUBCO	Hub Power Company
IPPs	Independent Power Producers
IESCO	Islamabad Electric Supply Company Limited
KE	K-Electric Limited
kV	Kilo-Volt
km	Kilometer
kWh	Kilo-Watt Hour
K2	Karachi Nuclear Power Plant 2
K3	Karachi Nuclear Power Plant 3
KANUPP	Karachi Nuclear Power Plant
LESCO	Lahore Electric Supply Company Limited
LPG	Liquefied Petroleum Gas
M	Million
NEPRA	National Electric Power Regulatory Authority
NPPMCL	National Power Parks Management Company
NTDC	National Transmission and Despatch Company Limited
PESCO	Peshawar Electric Supply Company Limited
PHPL	Power Holding Private Limited
PHL	Power Holding Limited
PKR	Pakistani Rupees
PMTLC	Pak Matiari-Lahore Transmission Company Limited
PV	Photovoltaic
QAPTL	Quaid e Azam Thermal Power (Pvt) Limited
QESCO	Quetta Electric Supply Company Limited
QTA	Quarterly Adjustments
RE	Renewable Energy
RF	Renewables First
RFO	Residual Fuel Oil
RLNG	Re-Gasified Liquid Natural Gas
SEPCO	Sukkur Electric Power Company Limited
SPP	Small Power Producer
STDC	Sindh Transmission & Dispatch Company
T	Trillion
TESCO	Tribal Area Electricity Supply Company Limited
T&T	Transmission and Transformation
T&D	Transmission and Distribution
TWh	Tera-watt Hour
USD	United States Dollar
VRE	Variable Renewable Energy
YoY	Year on Year

Abbreviations

Renewables First (RF) is a think tank for energy and environment. Our work addresses critical energy and natural resource issues with the aim to make energy and climate transitions fair and inclusive.

RENEWABLES FIRST

10 - 11, 3rd Floor,
Executive Complex,
G-8 Markaz,
Islamabad
+9251 - 8773676
info@renewablesfirst.org

Tara

65 Chulia Street
Singapore 049513
info@taraclimate.org