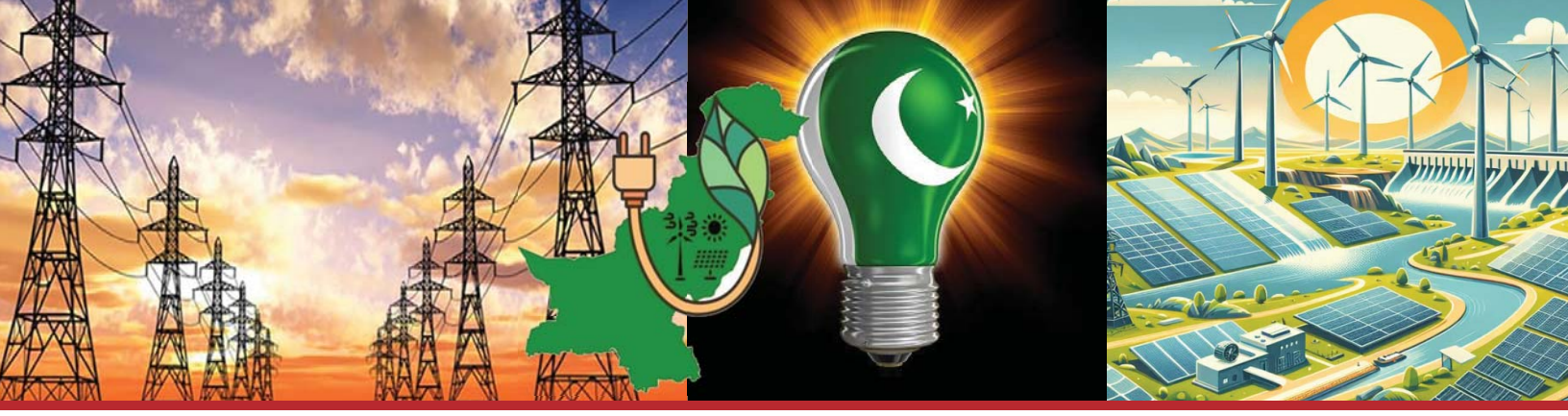

Energy Uncertainty and Pakistan's Power Crisis: An In-depth Analysis

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Pakistan's energy sector faces ongoing uncertainty, reflected in the Energy-Related Uncertainty Index (EUI), which has shown significant fluctuations between 2020 and 2022. These shifts, driven by the surge in European and Asian gas prices following Russia's invasion of Ukraine, have exposed the vulnerabilities of Pakistan's power sector which is heavily dependent on imported energy. Peaks in the EUI, particularly in May and September 2022, highlight a worsening crisis characterized by frequent load shedding, rising electricity tariffs, and a circular debt exceeding PKR 2.6 trillion by 2024. Addressing these challenges requires urgent reforms, increased investment in renewable energy, and a transition to sustainable energy solutions to stabilize the sector and rebuild investor confidence. The subsequent sections of this article examine the key contributors to this uncertainty, including volatile investments, fluctuating energy prices, policy inconsistencies, and supply chain disruptions, which have deepened Pakistan's power sector crisis.

Pakistan's Energy-related uncertainty Index

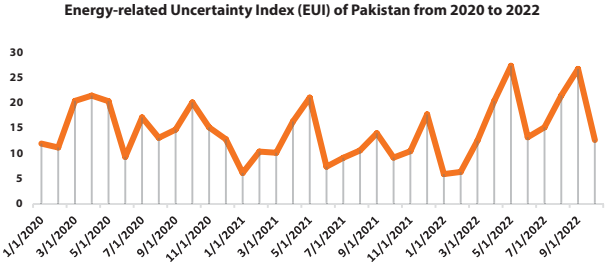


Figure 1: Energy-related Uncertainty Index of Pakistan
Source: Economic Policy Uncertainty https://www.policyuncertainty.com/energy_uncertainty.html

The data in **Figure-1** highlights notable fluctuations in Pakistan's Energy-Related Uncertainty Index (EUI) from 2020 to 2022, underscoring the persistent challenges in the power sector. Peaks in uncertainty, such as May 2022 (27.31) and September 2022 (26.70), coincide with global energy crises driven by the Russia-Ukraine war and surging LNG prices, which disrupted Pakistan's energy supply chain. Brief periods of stability, like January 2021 (6.11) and January 2022 (5.89), were short-lived, with seasonal trends showing heightened uncertainty during March-May 2022, likely linked to fiscal planning and energy demand cycles.

These high levels of uncertainty highlight Pakistan's heavy reliance on imported energy, making it vulnerable to external shocks, compounded by insufficient domestic energy production. The ongoing power sector crisis is evident in frequent load shedding, rising electricity tariffs, and a circular debt exceeding PKR 2.6 trillion in 2024. The failure to stabilize the energy landscape further intensifies financial strain, deters investment, and emphasizes the urgent need for structural reforms and a diversified energy portfolio to ensure long-term stability.

Investment in Power Sector

Investment in Pakistan's power sector has experienced notable volatility from FY2021 to FY2025, characterized by fluctuating inflows and outflows. Although investments in renewable energy, particularly hydropower, have grown, the decline in coal and thermal power investments raises concerns about energy security. These trends underscore broader instability, as reflected in the Energy-Related Uncertainty Index (EUI).

Table-1: Investment in Power Sector (USD in Million)

Sector	FY2021		FY 2022		FY2023		FY2024		FY 2025 (Jul-Oct)	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Power	1168.8	257.1	784.6	23.8	987.2	88.7	998	348.3	542.5	128
Thermal	205.2	8.7	159.1	19	142.6	77.4	143.7	17.7	45.7	8.5
Hydel	205	1.9	180.1	0.8	397.1	2.4	432.1	4	404.7	48.8
Coal	758.6	246.5	445.3	4	447.5	8.8	422.2	326.6	92.2	70.7

Source: State Bank of Pakistan (SBP)

The data in ***Table-1*** reveals significant fluctuations in investment inflows and outflows in Pakistan's power sector from FY2021 to FY2025, underscoring the sector's persistent challenges and its connection to the Energy-Related Uncertainty Index (EUI). Total inflows peaked at $1,168.8 million in FY2021 but sharply declined to $784.6 million in FY2022, with a partial recovery in FY2024 ($998 million) before falling again to $542.5 million in FY2025 (July-October). Outflows, though generally lower, spiked in FY2021 ($257.1 million) and FY2024 ($348.3 million), reflecting rising operational and project costs.

Sector-specific trends reveal a decline in coal power investments, from $758.6 million in FY2021 to $92.2 million in FY2025 (Jul-Oct), while hydropower inflows have increased, peaking at $432.1 million in FY2024, signaling a shift toward renewable energy. However, the ongoing decline in thermal power investments undermines the country's base-load capacity. These inconsistent investment patterns exacerbate the power sector crisis, contributing to inadequate generation, frequent load shedding, rising tariffs, and increasing circular debt, which exceeded Rs. 2.6 trillion in 2024. This volatility is mirrored in Pakistan's EUI, which peaked at 27.31 in May 2022, driven by global energy price shocks, fiscal mismanagement, and policy instability. Together, these trends highlight how fluctuating investments and operational inefficiencies directly contribute to energy-related uncertainty and deepening crisis in Pakistan's power sector.

Energy Price Volatility

Energy price volatility in Pakistan's power sector, marked by significant tariff hikes in FY2025, worsens the ongoing power crisis. The sharp increase in residential and commercial tariffs, along with seasonal adjustments, creates uncertainty for consumers and businesses, further adding to their financial strain.

The data in ***Table-2*** illustrates the energy price volatility in Pakistan's power sector and its contribution to the ongoing power crisis. The NEPRA (National Electric Power Regulatory Authority) average tariff shows a significant rise in FY2025, with the overall average tariff increasing from Rs. 29.78/kWh in FY2024 to Rs. 35.50/kWh in FY2025, reflecting a hike of Rs. 5.72/kWh. Residential consumers face the steepest increase, with tariffs rising by Rs. 9.18/kWh, followed closely by commercial users at Rs. 8.96/kWh. Industrial tariffs are the only category to experience a slight decrease (Rs. -0.68/kWh), likely due to subsidies or sector-specific interventions.

The Government's average tariffs for FY2024-25 further highlight disparities. For the July-September period, the average tariff is Rs. 3.29/kWh, while for October-June 25, it rises to Rs. 4.55/kWh, reflecting additional seasonal adjustments or cost pass-throughs. Notably, agricultural tariffs increase by Rs. 6.53/kWh, placing additional strain on a sector critical to Pakistan's economy, while tariffs for "Others" decrease by Rs. 2.24/kWh, indicating uneven pricing policies.

The frequent fluctuations in tariffs create an environment of uncertainty, making it difficult for consumers and industries to predict future energy costs. This ongoing volatility highlights the urgent need for systemic reforms, including reducing inefficiencies, diversifying the energy mix, and ensuring fiscal sustainability. If these issues remain unaddressed, the power sector crisis will deepen, with severe implications for Pakistan's economic stability and long-term growth. Additionally, this energy price instability worsens investor concerns, further intensifying the country's energy-related uncertainty and hindering efforts to attract sustainable investments.

Table-2: Tariff passed to Electricity Consumers

Category	NEPRA Average Tariff			GoP Average Tariff Including FY2024-25	
	FY2024	FY2025	Increase/ (Decrease)	Jul-Sep 24	Oct-Jun 25
	Rs. /kWh	Rs. /kWh	Rs. /kWh	Rs. /kWh	Rs. /kWh
Residential	26.06	35.24	9.18	3.63	6.27
Commercial	36.54	45.5	8.96	8.04	8.04
General Services	38.09	44.29	6.2	6.98	6.98
Industrial	32.45	31.77	-0.68	-	-
Bulk Supply	34.95	40.82	5.87	5.51	5.51
Agriculture	27.7	34.23	6.53	6.62	6.62
Others	32.13	34.13	2	-2.24	-2.24
Total	**29.78**	**35.5**	**5.72**	**3.29**	**4.55**

Source: NEPRA notification, SRO-1035-dated July-12-2024

Table-3: T&D Losses for FY 2022-23								
DISCOs	Units			Losses (%)			Implications	
	Purchased	Sold	Lost	Target	Actual	%	Units	Rs. In Billion
PESCO	15254.53	9548.86	5705.67	20.24	37.4	17.17	2614.61	77.35
TESCO	1719.83	1564.66	155.18	9.39	9.02	-0.37	-6.48	-0.16
IESCO	11723.84	10778.52	945.32	7.8	8.06	0.26	30.13	0.28
GEPCO	11440.06	10454.8	985.26	9.13	8.61	-0.51	-60.02	-1.86
LESCO	26032.44	23092.37	2940.07	8.07	11.29	3.22	832.69	21.79
FESCO	16040.95	14662.68	1378.27	8.87	8.59	-0.28	-46.82	-1.45
MEPCO	19505.56	16732.37	2773.19	12.51	14.22	1.71	323.33	7.94
HESCO	4916.84	3565.3	1351.54	18.63	27.49	8.86	435.04	15
SEPCO	3868.5	2538.19	1330.32	17.12	34.39	17.27	667.16	20.38
QESCO	6004.55	4399.85	1604.7	14.46	26.72	12.27	735.98	21.21
Total	116507.11	97337.6	19169.51	11.81	16.45	4.64	5525.63	160.49

Source: NEPRA, State of the Industry Report 2023

Supply Chain Disruptions

The power sector in Pakistan has faced ongoing challenges, including high transmission and distribution (T&D) losses shown in **Table-3** and inadequate bill recovery by various DISCOs. Governance issues have played a major role in the escalating circular debt, which reached a staggering Rs. 2.6 trillion by 2024, with no signs of improvement. High losses in entities like SEPCO (34.39%), QESCO (26.72%), and HESCO (27.49%) reflect problems such as low bill recovery and theft, further deepening the crisis. These inefficiencies, combined with poor governance, have added an additional Rs. 160.49 billion to the circular debt. This instability has led to higher energy prices and volatility, significantly contributing to Pakistan's rising energy-related uncertainty index (EUI), which disrupts economic planning and prolongs the power sector crisis.

Circular Debt Crisis

The data in ***Table-4*** reveals a consistent rise in circular debt within Pakistan's power sector from FY2018-19 to FY2022-23. Outstanding payments to power generation companies have steadily increased, from Rs. 694.26 billion in FY2018-19 to Rs. 1,434.22 billion in FY2022-23, reflecting growing financial pressure. Payables to GENCOs also show significant fluctuations, particularly in FY2021-22 and FY2022-23, indicating mounting financial strain. Meanwhile, payables to fuel suppliers remained stable until FY2020-21 but have been absent in the subsequent years, possibly due to structural adjustments. The government's energy payable swap, involving loans from commercial banks, declined slightly over the years, suggesting a reduction in borrowing. However, total circular debt continued to rise, reaching Rs. 2,310 billion by FY2022-23, highlighting the sector's worsening financial instability and the government's unsustainable reliance on loans to manage this growing debt.

This increasing circular debt is a key driver of the ongoing crisis in Pakistan's power sector. Financial instability, inefficiencies, and delays in clearing payments to power producers have intensified the situation. The growing debt load disrupts the power sector's ability to operate efficiently, raising energy costs for consumers and businesses. This uncertainty, caused by rising costs and delayed payments, contributes to an elevated energy-related uncertainty index (EUI), reflecting the broader instability in Pakistan's energy market and exacerbating the challenges faced by the economy.

Policy Instability related to DISCOs and IPPs

Since its establishment in 1994, the Private Power and Infrastructure Board (PPIB) has successfully attracted around $23 billion in investments, leading to the development of 40 Independent Power Producers (IPPs) with a combined capacity of 18,211 MW, alongside a major High-Voltage Direct Current (HVDC) transmission line project. These initiatives contribute to nearly 50% of the country's installed power generation capacity.

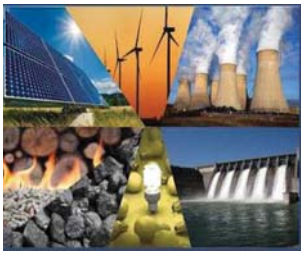
As of 2023, PPIB has commissioned 46 IPPs with a total gross capacity of 22,174 MW. These IPPs utilize various energy sources: Oil (4,443 MW, 20%), Gas/RLNG (4,896 MW, 22%), Thar Coal (4,522 MW, 20%), Imported Coal (3,300 MW, 15%), Hydel (3,960 MW, 18%), and others (1,053 MW, 5%).

Table-4: Year-wise Details of the Circular Debt (Rs. In Billion)

Sr.	Description	FY2018-19	FY2019-20	FY2020-21	FY2021-22	FY2022-23
1	Due for payments against verified invoices of Power Generation Companies	694.26	1,038.12	1,244.84	1,351.02	1,434.22
2	Payables of GENCOs (Invoices based)	17.46	48.04	-	101.47	110.53
3	Payables to Fuel Suppliers by GENCOs	100.68	105.09	105.31	-	-
4	Total (Payables to IPP's/GENCOs)	812.40	1,191.25	1,350.15	1,452.50	1,544.75
5	Energy Payable Swap by GOP through Loan from Commercial Banks by Power Holding (Pvt.) Ltd.	805.79	1,007.22	930.00	800.25	765.25
	Total Circular Debt [4 + 5]	**1,618.19**	**2,198.47**	**2,280.15**	**2,252.75**	**2,310.00**

Source: CPPA-G

In 2024, the government began renegotiating the financial models of 18 IPPs to reduce capacity payments—previously fixed costs paid regardless of electricity sold—and recover excess profits from these plants. This shift involves transitioning from a 'take-or-pay' to a 'take-and-pay' model for the remaining lifespan of these plants, ranging from 3 to 17 years. The government has already terminated contracts with some IPPs and revised terms with others, such as eight bagasse-fired IPPs, which is expected to save Rs. 85–100 billion. The ongoing negotiations focus on reducing capacity payments to 70–75% of the average annual fixed costs over the past five years and delinking fuel costs from international coal prices to reduce tariffs.



However, frequent policy changes and repeated renegotiations of sovereign contracts have led to significant policy instability in the power sector, eroding investor confidence and worsening the energy crisis. Independent Power Producers have criticized the government's approach as coercive, arguing that inefficiencies in transmission, heavy taxation, and exchange rate depreciation—not capacity payments—are the main drivers of high electricity tariffs. The lack of consistent policy direction has hindered long-term planning and investment, further exacerbating challenges in the power sector. Although the government insists that the revised terms will maintain plant viability and ensure grid stability, policy volatility continues to jeopardize the sector's sustainability.

Additionally, policy instability within Distribution Companies (DISCOs) stems from poor governance, a lack of technical and managerial skills, and excessive government control. The centralized structure under the Ministry of Energy (Power Division) hampers performance improvements due to a lack of penalties for poor performance and no incentives for better management. The absence of transparency in investment decisions, along with ineffective staff evaluations, highlights the ongoing policy instability. Government intervention in financial, employment, and pricing decisions further exacerbates inefficiencies, undermining DISCOs' potential to operate effectively and independently.

Conclusion

In conclusion, Pakistan's power sector continues to face significant financial instability, inefficiencies, and growing uncertainty, fueled by global energy price volatility, policy inconsistencies, and rising circular debt. Issues such as transmission losses, delayed payments, and insufficient generation capacity further hinder the sector's ability to meet demand, resulting in frequent load shedding and slowing economic growth. To achieve long-term stability, urgent reforms, increased investment in renewable energy, and improved governance are essential, along with efforts to reduce uncertainty in the energy sector and restore confidence.

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