

Empowering Pakistan's Power Sector

A Policy Framework for Investments and Digitization

Policy Brief

The power sector in Pakistan has long been grappling with numerous challenges, including electricity shortages, technical and commercial losses, governance issues, and procedural delays. These problems have adversely affected the reliability and affordability of electricity supply, leading to significant economic and social implications. This policy brief addresses these issues and proposes recommendations to overcome them through investments oriented toward digitization in the power sector.

Executive Summary

Pakistan's power sector faces a multitude of challenges with profound implications for the nation's economic growth, social development, and energy security. The sector's role in meeting the energy demands of a growing population and supporting industrial and commercial activities is critical, but interrelated difficulties hinder its efficiency, reliability, and sustainability.

The primary challenge stems from issues related to management, corruption, electricity theft, and transmission losses, resulting in an alarming power crisis and a burdensome circular debt. Moreover, the number of electricity crises consumers face despite a surplus of electricity production impedes reliable power supply and hampers economic growth. To overcome these issues, policymakers must formulate a new energy policy that considers the deregulation of power distribution companies as it would curb corruption and electricity theft, enhance bill collection, and reduce circular debt, fostering a more stable and prosperous energy landscape.

Effective solutions for reliable and sustainable electricity supply demand timely attention to reducing technical and commercial losses, which can be done by implementing advanced metering infrastructure (AMI), investing in digitization, and theft detection and prevention. Capacity-building, consumer awareness, and private stakeholder involvement are

paramount to reducing loss and enhancing overall power sector performance. Integrating renewable energy is vital to minimizing losses and improving system efficiency. Pakistan can foster a resilient and efficient power sector by creating a more sustainable energy mix.

The brief concludes with comprehensive recommendations emphasizing transparency, accountability, and private sector participation in a holistic reform plan and investments in renewable energy sources. By implementing these and fostering collaborative efforts among stakeholders, Pakistan's power sector can surmount its challenges, driving progress toward reliable, efficient, and sustainable electricity supply.

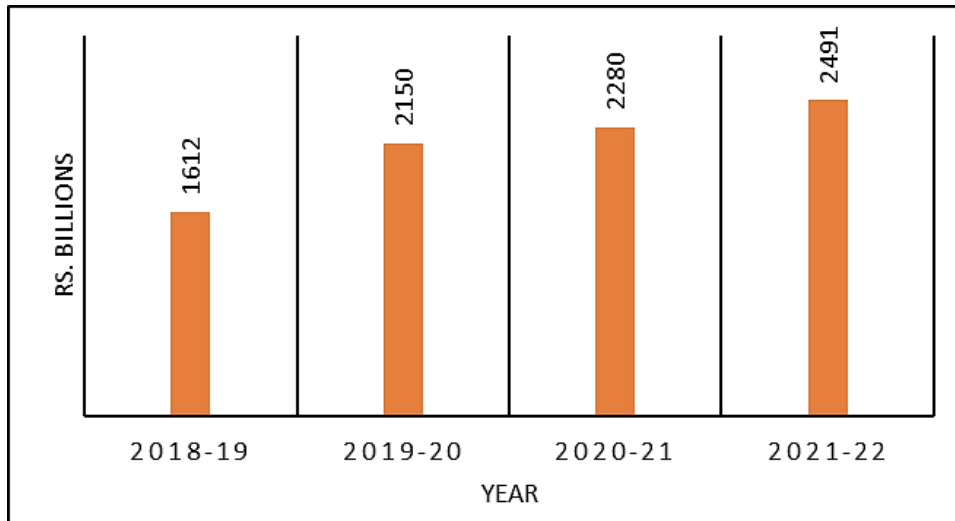
Background and Context of Pakistan's Power Sector Challenges

Pakistan's power sector faces numerous challenges that have significant implications for economic growth, social development, and overall energy security. The power sector plays a critical role in meeting the energy demands of a growing population and supporting industrial and commercial activities. However, several interrelated difficulties hinder the sector's efficiency, reliability, and sustainability. The primary challenge in Pakistan's energy sector stems from issues related to management, corruption, electricity theft, and transmission losses.

The power crisis has reached alarming levels, and the circular debt has accumulated billions of dollars. Pakistani policymakers must formulate a new energy policy that considers the deregulation of distribution companies; deregulation would help curb corruption and electricity theft, enhance electricity bill collection, and reduce circular debt.

It is crucial to recognize that problems in the energy sector have far-reaching implications for a country's economic stability, national security, foreign policy, job market, and climate policy. Stakeholders in the sector must work together to find comprehensive and sustainable solutions that can drive Pakistan toward a prosperous future.

Figure 1: Rise in Circular Debt from 2018 to 2022¹



Addressing Electricity Crisis Faced by Consumers

The electricity crisis in Pakistan has led to several issues for consumers in the power sector. Despite a surplus of electricity production, consumers continue to experience power outages, creating a paradoxical situation where they pay higher rates for electricity but still face disruptions. This crisis is primarily attributed to an outdated and deficient transmission and distribution infrastructure that fails to deliver electricity to consumers effectively, resulting in an unreliable power supply. The impact of this issue on citizens' daily lives is significant, and it hampers economic growth.

Reducing Technical and Commercial Losses

Technical and commercial losses present significant challenges for Pakistan's power sector, which demands timely and effective solutions for a reliable and sustainable electricity supply. In this regard, it is essential to implement AMI, and invest in digitization, theft detection and prevention. Moreover, the focus should be on capacity-building, training, and consumer awareness and engagement initiatives. The significance and role of renewable energy should be of primary concern, and above all, the investment and involvement of private stakeholders are paramount. These strategies can help reduce technical and commercial losses, improve efficiency, and enhance the overall performance of the power sector.

¹ Muhammad Hamza Naeem and Lubna Riaz, "Pitfalls in Power Sector of Pakistan: Accumulation of Circular Debt – Causes, Consequences and Way Forward," April 2023, 10.13140/RG.2.2.26751.18088.

Table 1: T&D Losses of State-owned DISCOs in Year 2021-22²

	Units Purchased (GWh)	Units Sold (GWh)	Units Lost (GWh)	Target as Determined by NEPRA (%)	T&D Losses (%)	Impact of T&D Losses (Rs. Billions)
PESCO	16560	10355	6205	20.73	37.47	153.8
TESCO	2284	2071	213	9.31	9.33	3.7
IESCO	13027	11961	1066	8.15	8.18	21.9
GEPCO	12678	11528	1150	9.2	9.07	24.7
LESCO	28334	25070	3264	9.08	11.52	72.7
FESCO	17512	15918	1594	9.34	9.1	33.4
MEPCO	22548	19202	3346	12.79	14.84	75.1
HESCO	6010	4034	1976	19.07	32.88	45
SEPCO	4489	2890	1599	17.41	35.62	43.7
QESCO	6716	4831	1885	14.49	28.07	46.3
Total	130158	107860	22298	13%	17.13%	520.3

Several measures can be implemented with the involvement of private investors and stakeholders and required policy interventions to reduce technical and commercial losses. These include:

- i. **Implementation of Advanced Metering Infrastructure (AMI):** By installing advanced meters and leveraging technology, AMI enables more accurate measurement of electricity consumption, detects theft or tampering, and facilitates real-time data monitoring. Empirical evidence suggests that implementing AMI in feeders can lead to a significant reduction in losses.
- ii. **Investments in Digitization:** The Planning Department of the National Transmission and Despatch Company (NTDC) is making efforts to enhance transmission and distribution efficiency through digitization. By leveraging technology and digital solutions, the power sector can optimize its processes, improve overall efficiency, and minimize losses. Digitization enables better monitoring, control, and maintenance of the infrastructure, leading to improved reliability.
- iii. **Focus on Asset Management System:** The NTDC can play a significant role by prioritizing

and enhancing its focus on the asset management system to minimize occurrences of transformer failures. Transformer failures can substantially impact the stability and reliability of the power sector. Proactive measures, such as regular maintenance, condition monitoring, and timely replacements, can help minimize failures and ensure a reliable power supply.

- iv. **Theft Detection and Prevention:** Implementing measures to detect and prevent electricity theft is crucial in reducing commercial losses. This can involve deploying advanced metering systems, conducting regular inspections, and enforcing strict penalties for illegal connections and tampering.
- v. **Capacity-Building and Training:** Providing training and capacity-building programs for power sector personnel can enhance technical expertise and skills in areas such as maintenance, loss reduction techniques, and efficient operations. This can contribute to better power system management and reduce losses.
- vi. **Consumer Awareness and Engagement:** Educating consumers about energy

² "State of Industry Report 2022," National Electric Power Regulatory Authority (NEPRA), <https://nepra.org.pk/publications/State%20of%20Industry%20Reports/State%20of%20Industry%20Report%202022.pdf>

conservation, proper electricity usage, and reporting theft or malpractices can help reduce technical and commercial losses. Promoting energy-efficient practices and encouraging consumer participation in energy conservation efforts can reduce overall loss.

- vii. **Grid Modernization and Automation:** Implementing advanced technologies such as smart grids and automation can improve the power system's monitoring, control, and management. Smart grid technologies enable real-time monitoring, fault detection, and load balancing, which help reduce technical losses and improve overall system efficiency.
- viii. **Regulatory Reforms:** Implementing effective regulatory frameworks and policies that address issues related to technical and commercial losses can create an enabling environment for loss reduction. This can involve establishing performance benchmarks, setting targets for loss reduction, and providing incentives for utilities that achieve significant improvements.

These measures can improve the power supply's overall efficiency, reliability, and sustainability, thus benefiting the industry and consumers.

Emphasizing Renewable Energy and Digitization

Renewable energy can play a significant role in reducing both technical and commercial losses in the power sector. Integrating renewable energy in the power sector can improve system efficiency, reduce technical losses, and minimize commercial losses. Embracing renewable energy as a sustainable and reliable power source contributes to a more resilient and efficient power sector.³ A robust interventional framework is required to be developed, considering the different potential applicability mechanisms of renewable energy sources. Some of them are described below:

- a. **Distributed Generation:** Renewable energy sources, such as solar and wind power, can be deployed in distributed generation systems closer to the point of consumption. This reduces the need for long-distance transmission, thus minimizing technical losses associated with transmission line inefficiencies.
- b. **Reduced Transmission Losses:** When strategically located near demand centers,

renewable energy projects can help reduce transmission losses by minimizing the distance over which electricity has to be transported. This can result in lower technical losses during long-distance transmission.

- c. **Modular and Scalable Design:** Renewable energy systems, particularly solar and wind, can be modular and scalable, allowing for flexible installation based on demand and load requirements. This adaptability helps match electricity generation with consumption, reducing technical and commercial losses associated with over-generation or under-utilization.
- d. **Localized Generation:** By generating electricity at or near the point of consumption, renewable energy sources can help reduce commercial losses caused by theft or non-payment. Additionally, decentralized renewable energy systems enable communities to become more self-reliant, reducing dependence on centralized grids and minimizing losses associated with distribution and billing.
- e. **Improved Grid Stability:** When integrated with advanced grid management systems, renewable energy sources can contribute to grid stability and efficiency. Technologies such as smart grids, energy storage, and demand response systems can help manage intermittent renewable generation and reduce technical losses caused by grid instability.
- f. **Cost Competitiveness:** With technological advancements and economies of scale, renewable energy sources have become increasingly cost-competitive compared to traditional fossil fuel-based generation. Lower electricity costs can help reduce commercial losses by making energy more affordable and reducing the financial burden on consumers.

Challenges in Decision-making, Quality Control, and Procedural Delays

- a. **Governance Challenges and Reforms:** The power sector in Pakistan has faced several governance challenges over the years, which have had significant implications for the country's energy infrastructure and ability to meet the growing demands of its population. These challenges include circular debt, policy

³ Muhammad Hamza Naeem and Lubna Riaz, "Renewable Energy-Based Distributed Generation in Pakistan," Policy Perspectives 19, no. 1 (June 2022): 65-84. DOI: 10.13169/polipers.19.1.ra3

inconsistencies, and lack of transparency and accountability. These governance issues have jeopardized the evolution towards technological advancements.

- b. **Difficulties in Implementing Digitization:** DISCOs (distribution companies) encounter obstacles in executing digitization projects because of the overall regularized power sector. This bureaucratic process can delay and impede the advancement of digitization efforts.
- c. **Procedural Delays:** Obtaining approval for AMI projects can face procedural delays, further impeding the implementation of digital solutions. These delays can hinder the timely deployment of AMI, which is crucial for reducing technical and commercial losses.
- d. **Lack of Skilled Human Resources:** The lack of skilled human resources can lead to project mismanagement and the failure to achieve desired results in digitization initiatives.

These challenges emphasize the need for streamlining approval processes, addressing skill gaps, and implementing governance reforms to overcome obstacles and effectively implement digitization initiatives in the power sector of Pakistan.

Conclusion

Overcoming the challenges in Pakistan’s power sector and driving progress demands a comprehensive and strategic approach. The power sector can chart a path

toward positive transformation by addressing issues such as electricity shortages, technical and commercial losses, governance problems, and procedural delays through a combination of investments and digitization efforts.

This policy brief emphasizes a set of crucial recommendations and policy reforms that, along with the adoption of renewable energy sources, are a promising avenue to reduce technical and commercial losses and enhance the sector’s resilience and efficiency. This can play a vital role in the envisioned progress of the overall power sector of Pakistan.

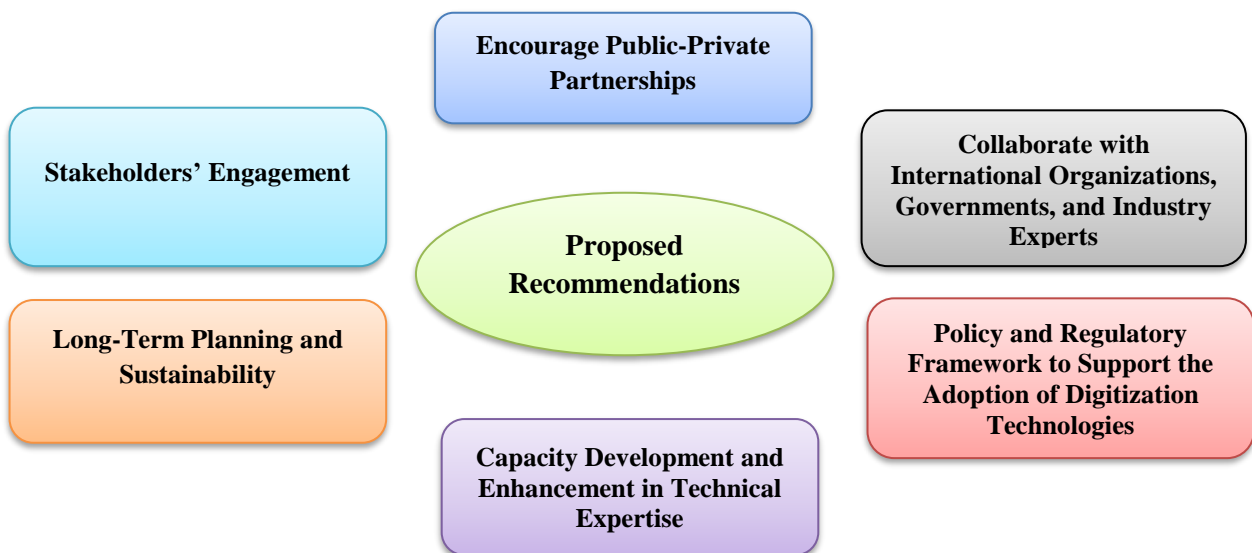
With a resolute commitment to these recommendations and a concerted effort to surmount the challenges, Pakistan’s power sector can advance towards a future characterized by a more reliable, efficient, and sustainable electricity supply, ultimately benefitting both industry and consumers.

Proposed Recommendations

A holistic and comprehensive reform plan is needed to tackle the inefficiencies in the power sector, along with the promotion of digitization initiatives to pave the way for sustainable progress. Transparency, accountability, and sound governance structures must be integrated into the reform process to ensure effective decision-making and implementation.⁴

Below are some of the suggested recommendations:

Figure 2: Proposed Recommendations to Overcome Pakistan’s Power Sector Challenges



⁴ Muhammad Hamza Naeem and Lubna Riaz, “Pitfalls in Power Sector of Pakistan: Accumulation of Circular Debt – Causes, Consequences and Way Forward,” April 2023, 10.13140/RG.2.2.26751.18088.



i. Encourage Public-Private Partnerships

Foster collaboration between government bodies and private enterprises to enhance Pakistan's power sector. This approach can expedite infrastructure development, improve operational efficiency, and attract much-needed investments by leveraging private sector resources, expertise, and innovation. Public-private partnerships can play a pivotal role in addressing Pakistan's power sector challenges by combining strengths for a more resilient and sustainable energy future.

ii. Collaborate with International Organizations, Governments, and Industry Experts

Enlisting the expertise and global perspectives of international organizations and governmental entities and seeking guidance from experienced industry leaders is crucial to address the power sector challenges. By harnessing a nexus of cross-border insights and leveraging external best practices, this collaboration provides a hopeful path for untangling challenges and setting a determined direction toward a renewed and lasting energy future.

iii. Capacity Development and Enhancement in Technical Expertise

Elevating capacity and technical skills are vital to overcoming the power sector challenges. Investing in skill development and knowledge enhancement, and empowering professionals to tackle complex issues,

and innovate solutions, will steer the energy sector toward efficiency, sustainability, and growth.

iv. Policy and Regulatory Framework to Support the Adoption of Digitization Technologies

Developing a favorable policy and regulatory environment is essential to promote the adoption of digitization technologies in the power sector. By setting guidelines that encourage the use of digital innovations, the sector can advance efficiency, reliability, and overall modernization, ushering in an era of cutting-edge energy management and distribution.

v. Long-Term Planning and Sustainability

Mapping out well-considered long-term strategies is vital to guarantee the sustainability of Pakistan's power sector. By designing and executing plans that incorporate renewable energy sources, energy efficiency measures, and robust infrastructure, the sector can lay the foundation for a greener, more resilient energy landscape.

By implementing these suggested measures, Pakistan can take significant strides toward powering progress and overcoming the challenges in its power sector. With collective efforts by the government, private sector, and civil society, Pakistan can achieve its energy goals and ensure a brighter and more prosperous future for its citizens.

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