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Report of Policy Lab on
Bridging Gaps in Implementation of Industrial & Economic Development Strategies in Pakistan
پاکستان میں اقتصادی اور صنعتی ترقی کے عمل میں حائل رکاوٹوں کا خاتمہ

Policy Analysis & Recommendations- Part-11 of 11

Bridging Gaps in Energy, POL, Gas/LNG Policies and Strategies for Reducing Cost for Industrial Development

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Bridging Gaps in Energy, POL, Gas/LNG Policies and Strategies: Supporting Industrial Development in Pakistan

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PREFACE

Public policy design, implementation, and evaluation are intricate processes that require a holistic approach to address the multi-faceted challenges of governance, economic development, and industrial transformation. The interplay of theoretical understanding, political economy dynamics, stakeholder engagement, and evidence-based decision-making is essential for crafting impactful policies. The concept of the Policy Lab emerges as a vital tool to address these complexities. Globally, renowned universities and government entities, particularly in the EU and North America, have adopted Policy Labs as platforms for analyzing public policies, their implementation mechanisms, and resultant impacts.

Policy Labs aim to bridge the critical gaps in communication, collaboration, and coordination among academia, policy practitioners, and stakeholders. They serve as incubators for innovative ideas, allowing for rigorous pre-policy analysis, mid-term critical reviews, and post-policy evaluations. By simulating real-world challenges in a controlled environment, Policy Labs foster evidence-based policy-making processes that are both practical and adaptable to dynamic socio-economic contexts.

The National School of Public Policy (NSPP) in Pakistan, through its Policy Simulation Exercises (PSE) at its training units such as the National Institute of Management (NIM), has embraced the concept of Policy Labs. These exercises are designed to mimic the global trends of Policy Labs, creating a focused research environment where government officers from diverse academic and professional backgrounds engage with ground realities. The outcomes of these simulations offer actionable insights and policy recommendations for government entities, enhancing their operational effectiveness and societal impact.

In January 2025, NIPA, Peshawar organized a comprehensive Policy Lab designed and supervised by Dr. Muqeem Islam Soharwardy, Chief Instructor, NIPA Peshawar, addressing 11 critical dimensions of policy design, implementation, and facilitation to support economic and industrial development in Pakistan. These dimensions included:

1. Bridging Gaps in Industrial Policy Design and Facilitation at the National Level
2. Bridging Gaps in SEZ Policies and Implementation: A Case Study of Rashakai SEZ
3. Bridging Gaps in TVET Policies and Practices: Evaluating Their Impact on Employment and Industry in Pakistan
4. Bridging Gaps in IT Export and Freelancing Policies: Analyzing Economic Impacts on Pakistan
5. Bridging Gaps in Automobiles and Transportation Industry Policies: A Critical Evaluation for Industrial Development in Pakistan
6. Bridging Gaps in Labour Policies, Regulations, and Welfare Practices: Implications for Industrial Development and Social Protection in Pakistan
7. Bridging Gaps in Mechanized Agriculture and Smart Agricultural Techniques: Exploring Their Potential for Industrial Development in Pakistan
8. Bridging Gaps in Policies for High-Tech and Innovative Industries: Lessons from China's Reverse Engineering Strategies for Pakistan
9. Bridging Gaps in the Textile Sector of Pakistan: A Critical Analysis and Way Forward

10. Bridging Gaps in Policies and Practices for the Export Sector of Pakistan: An Evaluation for Enhanced Global Competitiveness
11. Bridging Gaps in Energy, POL, Gas/LNG Policies and Strategies: Supporting Industrial Development in Pakistan

The Policy Lab highlighted the urgent need to address fragmentation in policy design and implementation, emphasizing the critical role of integrated planning, stakeholder collaboration, and the use of advanced tools like Input-Output Models. For example, the session on high-tech industries demonstrated how Pakistan could benefit from reverse engineering strategies, as successfully implemented by China, to develop its industrial base. Similarly, the focus on SEZ policies and Rashakai SEZ showcased the potential of targeted interventions to optimize economic zones for industrial growth.

This initiative underscores the importance of fostering collaboration between academia and policy practitioners. Universities in Pakistan are encouraged to establish Policy Labs to complement government efforts and contribute to evidence-based policy research. Such partnerships can pave the way for a prosperous and industrially developed Pakistan, where robust policies drive sustainable economic growth and social progress.

The lessons drawn from these exercises are not only relevant for Pakistan but also hold universal applicability for nations seeking to bridge gaps in policy design, implementation, and facilitation. The NSPP's Policy Simulation Exercise sets a precedent for how structured, collaborative efforts can generate innovative solutions to complex developmental challenges, making it a cornerstone for future policy reforms.

This report in your hands addresses only the first topic: Bridging Gaps in Energy, POL, Gas/LNG Policies and Strategies: Supporting Industrial Development in Pakistan. The remaining topics have been analyzed and documented in separate reports, crafted individually to provide in-depth insights and actionable recommendations specific to each area.

It is hoped that this document will serve as a significant milestone in the design, implementation, and facilitation of policies, paving the way for broader economic and industrial transformation in Pakistan, انشاءالله .

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January 30, 2025

CONTENTS

Executive Summary

Pakistan's energy sector, encompassing electric energy, petroleum, natural gas, coal, and renewable sources like wind and solar, is a cornerstone of national development. It directly influences industrial growth, economic progress, and socio-economic advancement. However, the sector faces persistent challenges, including institutional inefficiencies, fragmented legislative frameworks, capacity constraints, and policy gaps. These issues hinder its ability to support sustainable industrial growth and economic stability. Rising fossil fuel costs and supply uncertainties have further emphasized the need for renewable energy sources to reshape industrial practices, enhance energy efficiency, and reduce environmental impact.

This research critically evaluates Pakistan's energy sector, focusing on its alignment with industrial development goals. It examines the sector's capacity, preparedness, outputs, and governance frameworks, while identifying strengths, weaknesses, opportunities, and threats through SWOT, EETH, and BETH analyses. The study also employs the Oxford Index of Public Administration (OIPA) to assess governance and service delivery mechanisms. A comparative GAP analysis with India and Bangladesh highlights deficiencies and offers actionable lessons from their policy actions.

Situational Analysis

Installed Capacity and Energy Mix
Pakistan's total installed electricity capacity stands at 42,131 MW, with thermal sources (59.4%) dominating the energy mix, followed by hydel (25.4%), nuclear (8.4%), and renewables (6.8%). Despite this capacity, peak demand hovers around 27,000 MW, indicating a significant surplus. This excess capacity leads to higher per-unit electricity costs due to capacity payments for unused power, exacerbating financial strains on the sector.

The energy mix is heavily reliant on imported fossil fuels, with petroleum, LNG, and coal imports costing billions annually. Thermal energy, the most expensive source, contributes nearly 60% of total production, perpetuating high energy prices and inflation. Limited investment in renewables and hydel energy further exacerbates this dependency.

Challenges in the Energy Sector

1. **High Energy Costs**: Electricity prices have risen by 116% over the past eight years, making Pakistan's industrial sector less competitive compared to regional peers like India and Bangladesh.

2. **Transmission and Distribution Losses**: Transmission losses stand at 18.31%, far exceeding NEPRA's target of 11.77%, resulting in annual losses of Rs. 591 billion. Aging infrastructure requires significant investment for upgrades.
3. **Circular Debt**: The power sector's circular debt reached Rs. 2.393 trillion in 2024, while the gas sector's debt stands at Rs. 2.89 trillion. This debt exacerbates fiscal deficits, deters investment, and leads to higher tariffs.
4. **Capacity Payments to IPPs**: Capacity payments to Independent Power Producers (IPPs) are estimated to reach Rs. 2.1 trillion by 2025, significantly inflating electricity costs.
5. **Gas Sector Challenges**: The gas sector faces monopolistic practices, high tariffs, and reliance on expensive LNG imports. Circular debt, unaccounted-for gas (UFG) losses, and stagnant exploration activities further strain the sector.
6. **Solarization Trend**: Rising electricity tariffs and supply uncertainties have driven domestic and industrial consumers toward solar energy, reducing demand from the national grid and threatening the financial viability of IPPs.

Consequences of Energy Sector Challenges

1. **Higher Inflation**: Energy costs constitute 36.61% of the Consumer Price Index (CPI), directly impacting the cost of living and industrial production costs.
2. **Industrial Decline**: Over 8,000 businesses have closed operations in recent years, with many relocating to countries like Dubai. The textile sector, a key export contributor, has been particularly hard-hit.
3. **Fertilizer Production Crisis**: Gas shortages have disrupted fertilizer production, leading to increased imports and further strain on foreign exchange reserves.
4. **Economic Competitiveness**: High energy costs and inefficiencies have eroded Pakistan's industrial competitiveness, contributing to stagnant exports and economic growth.

Legal, Institutional, and Policy Analysis

Pakistan's energy sector is governed by a complex regulatory framework involving federal and provincial ministries, with key bodies like NEPRA, OGRA, and PPIB overseeing generation, distribution, and tariff fixation. However, overlapping mandates, inter-governmental conflicts, and inefficiencies hinder effective governance.

1. **Private Power and Infrastructure Board (PPIB)**: While PPIB facilitates private sector investment, its role overlaps with provincial energy departments, creating administrative inefficiencies.
2. **NEPRA**: Despite its role in tariff setting, NEPRA has weak control over distribution companies (DISCOS) and has failed to introduce competitive market mechanisms.
3. **OGRA**: OGRA's centralized decision-making has led to disputes over gas allocation and infrastructure development. Its failure to engage private companies in gas distribution has perpetuated inefficiencies.

4. **Integrated Generation Capacity Expansion Plan (IGCEP)**: The IGCEP 2024-34 reduces the share of renewable energy, contradicting national policy targets and increasing reliance on costly hydropower projects.

Propositions & Recommendation

1. **Enhance Renewable Energy Integration**: Increase the share of solar and wind energy in the energy mix to reduce reliance on expensive thermal and hydropower sources.
2. **Reform Regulatory Frameworks**: Streamline the roles of NEPRA, OGRA, and PPIB to reduce overlaps and improve governance.
3. **Address Circular Debt**: Implement measures to reduce transmission losses, improve bill recovery, and renegotiate IPP contracts to alleviate financial strains.
4. **Upgrade Infrastructure**: Invest in modernizing transmission and distribution networks to reduce losses and improve efficiency.
5. **Promote Private Sector Participation**: Encourage private investment in renewable energy projects and gas distribution to foster competition and efficiency.
6. **Focus on Domestic Exploration**: Prioritize local oil and gas exploration to reduce reliance on expensive imports and enhance energy security.
7. **Development of Independent Electricity Market**
   Implement the Competitive Trading Bilateral Contracts Market (CTBCM) framework to allow private sector power generators and buyers to trade electricity independently. This will encourage private investment in coal and wind energy, ensure competitive pricing, and enhance revenue predictability.
8. **Renegotiation of Power Purchase Agreements (PPAs) with IPPs**
   Expand renegotiations with remaining IPPs, including Chinese IPPs, to delink capacity payments from USD to PKR and reduce fixed rates of return. This will lower capacity payment charges, reduce electricity tariffs, and boost industrialization.
9. **Introduction of Smart Metering**
   NEPRA should mandate smart metering across DISCOs to curb theft, improve recovery rates, and reduce line losses. This will enhance operational efficiency and financial health of DISCOs.
10. **Privatization of DISCO Feeders**
    Privatize DISCO feeders in a phased manner to improve recovery rates, reduce theft, and enhance operational efficiency. This will also help reduce circular debt.
11. **Independent Boards for DISCOs**
    Introduce market-based specialist management for DISCO boards under the State-Owned Enterprise (Governance and Operations) Act, 2023, to improve governance and efficiency.
12. **Removal of GST on Capacity Payments**
    Exempt capacity payments from GST, as per Supreme Court orders, to reduce electricity tariffs, lower circular debt, and promote industrialization.

13. **Reduction of Taxes in Electricity Tariffs**
    Eliminate or reduce federal excise duty, sales tax, withholding tax, and income tax on electricity tariffs. Offer surplus energy to industrial consumers at cost rates during off-peak seasons to boost industrial activity.
14. **Implementation of WACOG Law 2022**
    Enforce the Weighted Average Cost of Gas (WACOG) law to include local and imported gas costs in pricing. This will stabilize gas prices, reduce circular debt, and encourage the use of surplus RLNG.
15. **Private Sector Ownership in New Gas Discoveries**
    Allow private sector ownership in unallocated gas fields to attract FDI, reduce gas circular debt, and increase local production, leading to lower electricity tariffs and enhanced industrialization.
16. **Gradual Shift of Gas from CPPs to Efficient Gas Plants**
    Phase out gas supply to captive power plants (CPPs) gradually, shifting it to more efficient gas-based generation plants. This will ensure industrial continuity while increasing reliance on the national grid.
17. **Operationalization of Special Economic Zones (SEZs)**
    Accelerate the development of SEZs and provide necessary infrastructure to attract industrial activity, increasing electricity demand and reducing tariffs.
18. **Upgradation of Transmission Lines Under PPP Mode**
    Upgrade transmission lines in phases, prioritizing peak demand gaps and industrial zones. This will reduce transmission and distribution losses and control circular debt.
19. **Promotion of Electric Vehicle (EV) Policy**
    Provide recharging infrastructure, subsidies, and tax exemptions for EVs to reduce oil imports and increase electricity demand, leading to lower tariffs.
20. **Reduction of Management Fee on LNG/RLNG Imports**
    Lower the 2.5% management fee on LNG/RLNG imports to make it more affordable for domestic and industrial use, enhancing its utilization for power generation.
21. **Promotion of Energy Conservation and Efficiency**
    Launch energy efficiency programs, such as subsidizing LED bulbs, to promote clean and efficient energy use.
22. **Resolution of Federal-Provincial Disputes**
    Utilize the Council of Common Interests (CCI) to resolve disputes between federal and provincial governments over power generation and transmission.
23. **Revision of IGCEP 2024-34 to Promote Renewable Energy**
    Align the Integrated Generation Capacity Expansion Plan (IGCEP) with the Alternative & Renewable Energy (ARE) Policy 2019 by increasing renewable energy targets to 30% and reducing reliance on costly hydropower projects.
24. **Revival of Oil & Gas Exploration Sector**
    Rationalize the Windfall Oil Levy and provide security to exploration companies in KPK and Baluchistan to attract investment, reduce oil imports, and lower electricity tariffs.

25. **App-Based Theft Reporting System for UFG Reduction**
    Introduce an app-based theft reporting mechanism and deploy smart meters to reduce Unaccounted for Gas (UFG) losses and improve consumption monitoring.

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ACRONYMS

CASA	Central Asia-South Asia Power Energy Transmission Line
CPI	Consumer Price Index
E&T	Excise and Taxation Department
ESP	Economic Survey of Pakistan
FDI	Foreign direct investment
FDP	Federal Devisable Pool
GDP	Gross Domestic Product
GNP	Gross National Product
IP	Iran-Pakistan Gas Pipeline
IPPs	Independent Power Producers
ITA	International Trade Administration
KPRA	Khyber Pakhtunkhwa Revenue Authority
LNG	Liquified Natural Gas
NTDC	National Transmission and Dispatch Company
OIPA	Oxford Index of Public Administration
POL	Petroleum, Oil, and Lubricants
POR	Provincial own receipts
PSGP	Pakistan Stream Gas Pipeline
RLNG	Re-gasified Liquified Natural Gas
SNGPL	Sui Northern Gas Pipelines Limited
SSGCL	Sui Southern Gas Company Limited
TAPI	Tajikistan, Afghanistan, Pakistan and India gas pipeline

INTRODUCTION

An efficient energy sector, which mainly encompasses electric energy, petroleum (POL), Natural Gas/LNG, RLNG, Coal, Wind, Solar etc. plays a pivotal role in national development, directly influencing industrial growth, economic development, and socio-economic development. The symbiotic relationship between cost-efficient and uninterrupted supply of energy and industrial development is inevitable. In Pakistan, the complex interplay of policies, strategies, and practices within this sector, and policies indirectly influencing it have significant implications for the industrial development of Pakistan. The energy sector faces persistent challenges, including institutional inefficiencies, fragmentation of legislative frameworks, capacity constraints, and policy gaps, hindering its ability to support sustainable industrial growth. Rising costs and tumbling supplies of fossil fuels have a greater push for sustainable and renewable energy sources to reshape industrial practices, promote energy efficiency, and reduce environmental impact.

This research paper critically evaluates Pakistan's energy sector, with a prime focus on country's industrial development goals. It examines the sector's capacity, preparedness, outputs, and processes, along with the legal and institutional frameworks that govern it. The study also identifies key strengths, weaknesses, opportunities, and threats by conducting SWOT, EETH and BETH analysis to uncover growth potential and enhance sectoral efficiency.

Furthermore, the paper employs the Blavatnik School of Government's Oxford Index of Public Administration (OIPA) to evaluate the governance, public administration, and service delivery mechanisms within Pakistan's energy sector. A GAP analysis has been conducted with India and Bangladesh to highlight deficiencies and identify actionable lessons from policy actions implemented in these countries to address similar challenges.

In addition, the role of Pakistan's energy sector in driving industrial development is explored through a comparative analysis of global best practices. This evaluation identifies effective strategies adopted by other nations to leverage their energy sectors for industrial growth and assesses their relevance and applicability to Pakistan. The

findings underscore critical areas where reforms are necessary to enhance sectoral performance and foster industrial expansion.

The research concludes with pragmatic recommendations to address the issues and challenges identified in the analysis. These recommendations are structured within a log frame matrix, outlining specific actions, timelines, and measurable outcomes to ensure effective implementation and long-term sustainability. By bridging gaps and incorporating global best practices, this paper aims to contribute to the transformation of Pakistan's energy sector into a robust driver of industrial and economic growth.

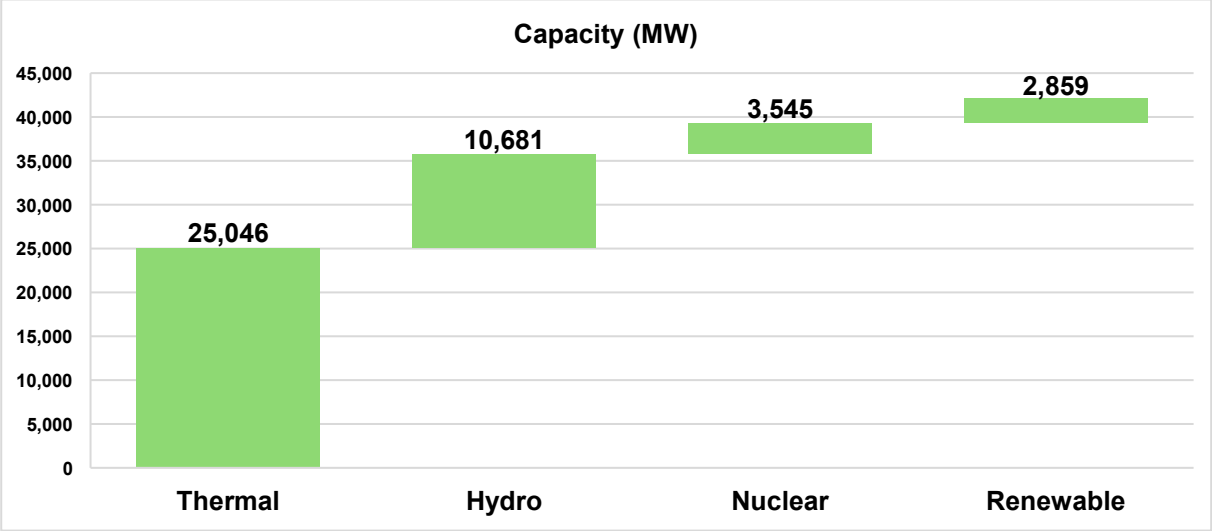
SITUATIONAL ANALYSIS

INSTALLED CAPACITY – PREVAILING SITUATION OF ELECTRICITY

Currently 42,131 MW is the total installed capacity with percentage shares of Hydel, Nuclear, Renewable, and Thermal at 25.4 percent, 8.4 percent, 6.8 percent, and 59.4 percent, respectively (ESP, 2025).

S. NO.	TYPE	SOURCE	INSTALLED CAPACITY (MW)	PRODUCTION MW	TRANSMISSION CAPACITY MW
1.	**Electricity**	**Thermal Power Plants (**gas, coal, and oil)	25,046	14,517	22,000
2.		**Hydro**	10,681		
3.		**Nuclear** (KANUP, CHASHNUP)	3,545		
4.		**Renewable Energy** (Wind, Solar, Biogas)	2,859		
Total			42,131		

Installed capacity of the electricity is far above the actual need, or in other words, from actual consumption of the country which in peak periods stood around 27000 megawatts.



THE ENERGY MIX

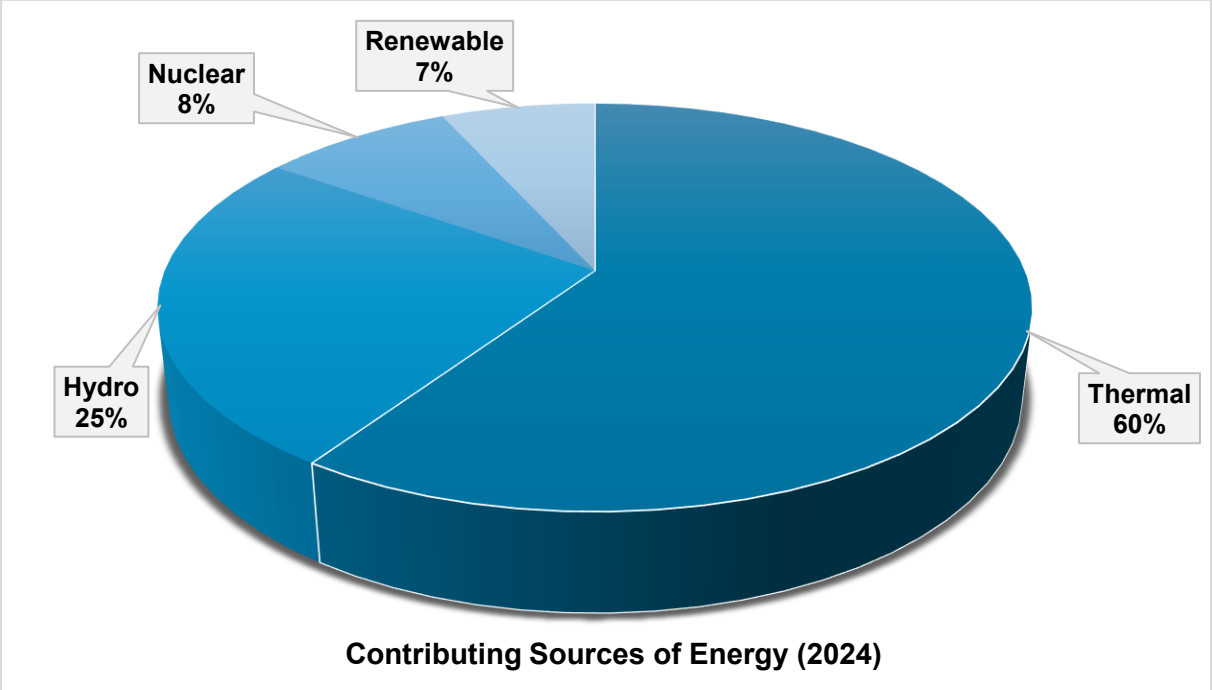
Most of the energy Pakistan presently producing comes from thermal resources. During the year 2023-24, Pakistan spent huge amounts of foreign reserves on import of petroleum products, LNG and coal to meet its energy needs.

S. NO.	TYPE	PRODUCTION/IMPORT	CONSUMPTION	IMPORT BILL
1.	**Petroleum**	Local: 2.75 MN Ton Imported: 11.0 MN tons	12.3 MN Ton	**$15.16 billion**
2.	**Gas**	3,116 MMCFD/Day	3,207 MN cubic feet per day	Local Production
3.	**LNG**	Local: 0 Imported: 7.15 MN tons		**$4.05 billion**
4.	**Coal**	Imported: 23.9 MN tons Local:17.06 MN Tons		**$2.7 billion**

Source (ESP, 2025); Self-prepared.

Thermal energy dominates Pakistan's energy production, contributing nearly 60% (Ghumman, 2024) of the total energy production mix. Limited investment in renewable sources as well as hydel energy perpetuates this dependency. Since the electricity

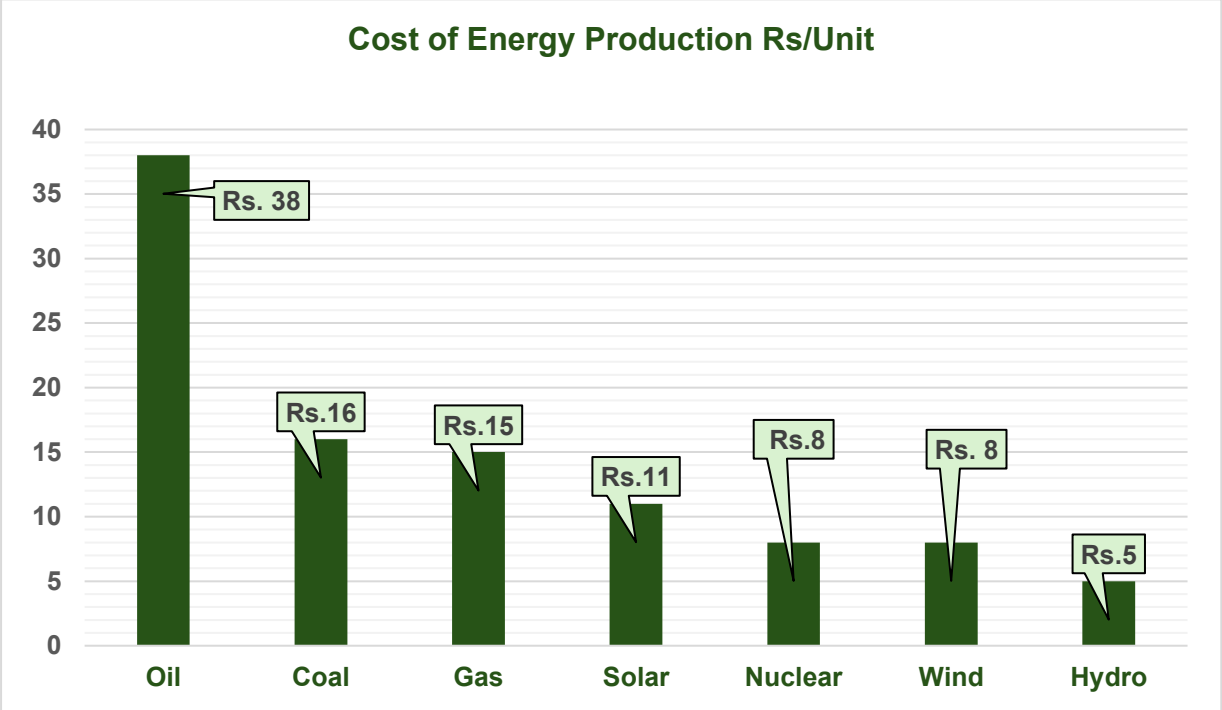
produced through thermal sources is most expensive leading to higher energy prices in Pakistan.



Source (ESP, 2025); Self-prepared.

RELIANCE ON IMPORTED OIL FOR THERMAL ENERGY

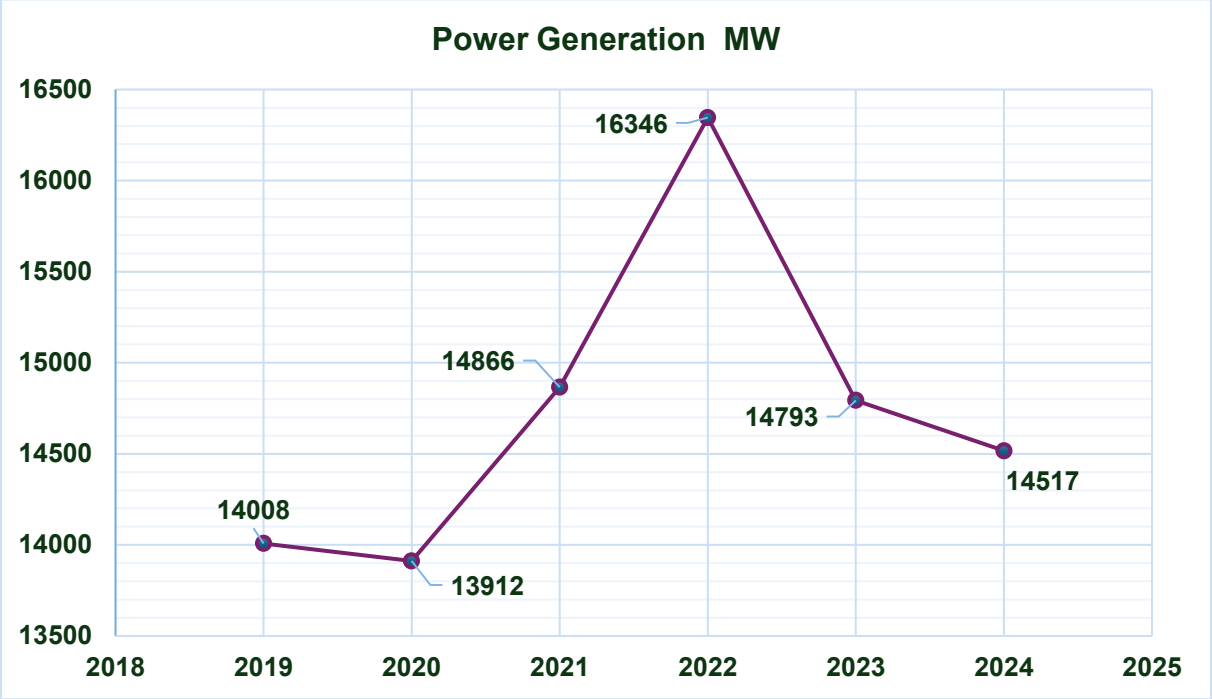
Thermal production requires crude oil as input fuel. Pakistan us highly dependent on imported oil and any increase in global oil prices directly escalates overall electricity production cost of the electricity. This not only increases the inflation in the economy but also increases the cost of production for businesses.



Source (Finance Division, 2025); Self-prepared.

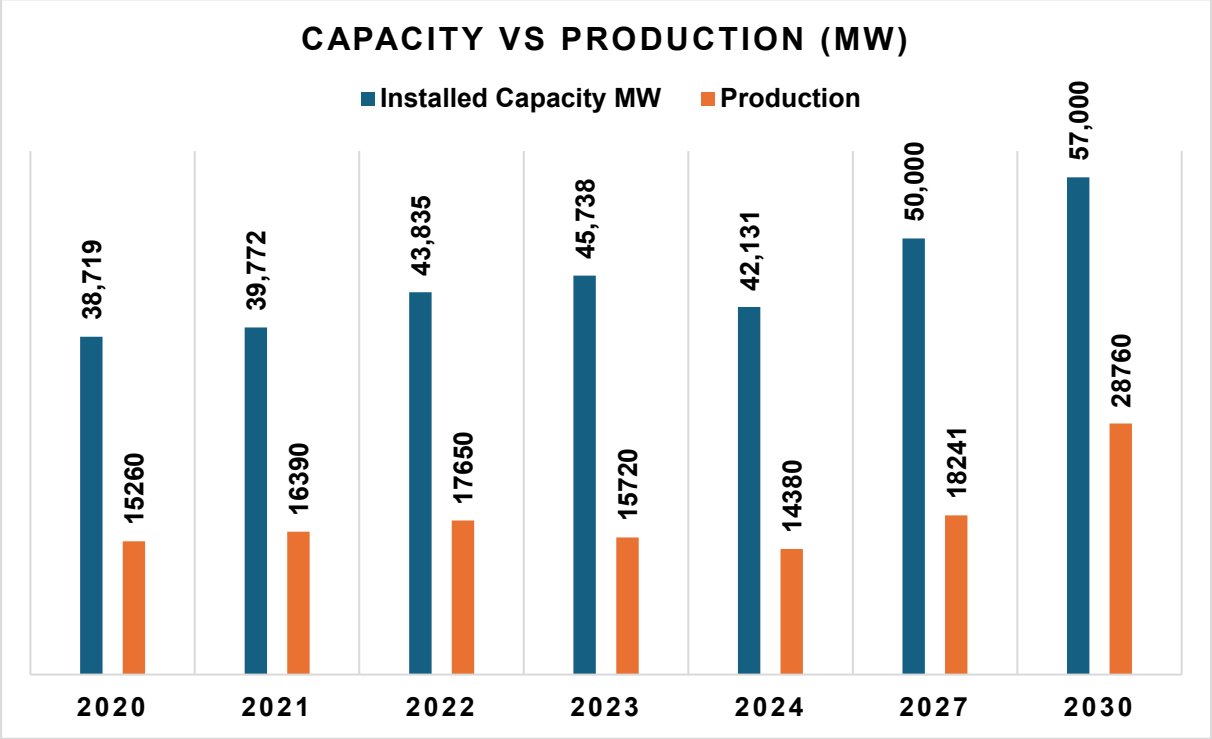
EXCESS OF INSTALLED ELECTRICITY CAPACITY OVER DEMAND

It's astonishing to note that Pakistan has witnessed a significant decrease in power production during the past couple of years, which attributes to low demand for the energy. In the year 2022, Pakistan touched its peak production of 16,346 megawatts of electricity which dropped to 14,517 megawatts in 2024.



Source (ESP, 2025); Self-prepared.

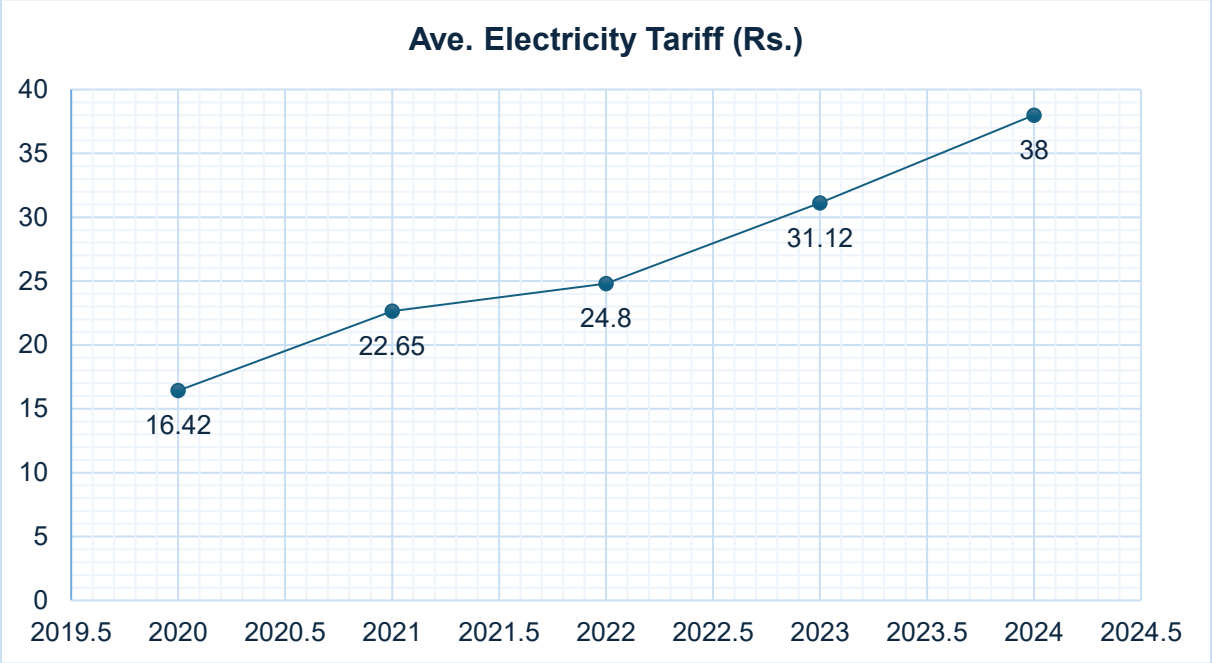
The following graph shows a comparison between installed and produced energy for the last few years. It is evident that the installed capacity has witnessed a steady increase, and it is anticipated to reach 57,000 MW and next 5 years, but the demand has been significantly decreasing. Though the estimation of production and consumption is also anticipated to double but still it will remain half of the production. This surplus capacity leads to higher per-unit electricity costs due to capacity payments for unused power, exacerbating financial strains in the energy sector. Additionally, the excess capacity, coupled with reduced demand, has resulted in increased capacity charges in monthly bills of consumers, making electricity more expensive for end-users.



Source (Malik & Ahmad, 2022; ESP, 2025); Self-prepared.

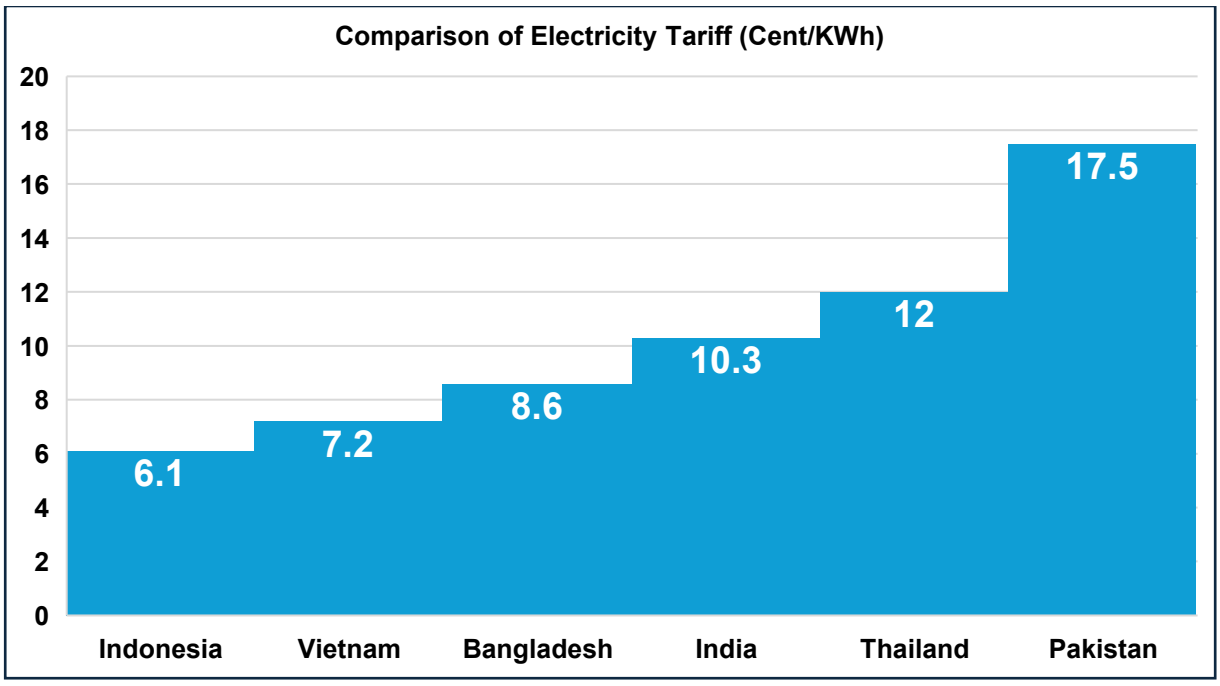
HIGHT COST OF THE ENERGY

One of the factors in the declining trend of use of electricity is its higher cost. The high cost of energy in Pakistan significantly hampers its industrial competitiveness and difficult for domestic and commercial users. It is worth noting that the cost of the electricity in Pakistan has risen by 116% in last 08 years (Salik, 2024).



Source (ESP, 2025); Self-prepared.

This rising trend in energy costs puts extra pressure on the overall strained economic condition of the country. Particularly when it is compared to regional peers, most importantly India and Bangladesh, Pakistan industrial sectors losses the competitiveness.



Source (EnerData, 2025); Self-prepared.

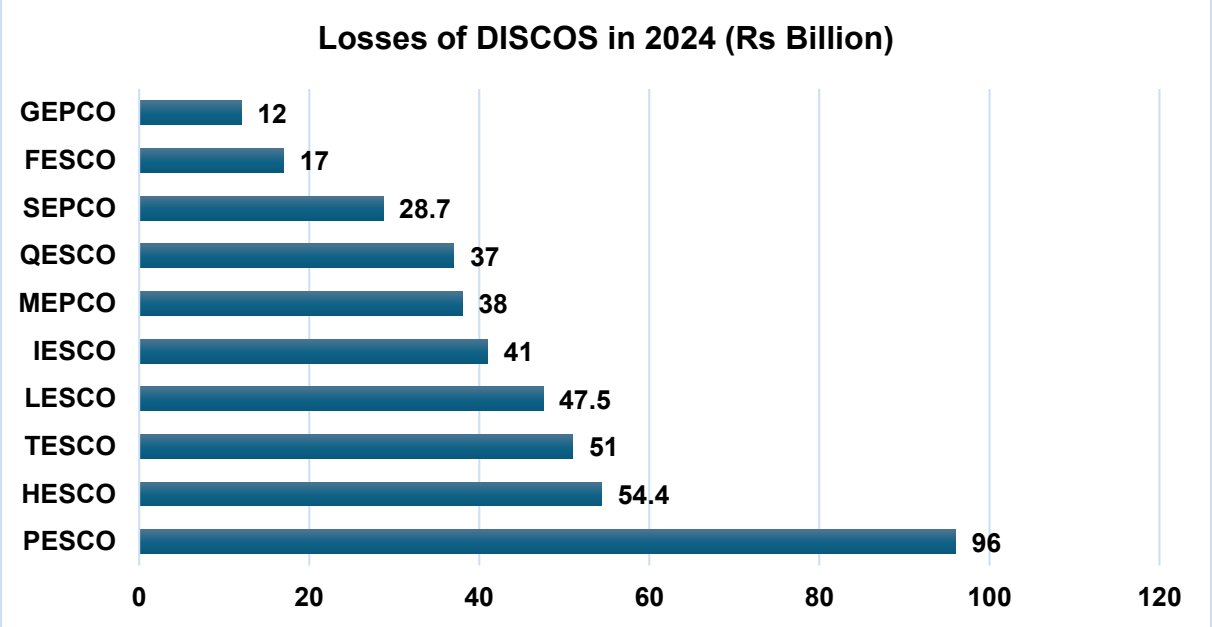
It ultimately inflates production costs, reduces export competitiveness and profitability of the country's industrial sector.

HUGE LOSSES OF TRANSMISSION AND DISPATCH

18.31% of the transmission losses against NEPRA's target of 11.77%, which in term of amount makes Rs. 591 billion during 2024, is yet another challenge for the energy sector governance of the country (Ahmed, 2024). The major network of 220kV, 132kV and 500kV is almost 40 years old and requires an approximate $3 billion annually for upgradation (Business Recorder, 2025).

POLITICALLY DRIVEN UNIFORM TARIFF SYSTEM

Over a dozen electricity distribution companies and two separate gas distribution companies are operating in the county but a uniform tariff structure has been enforced nationwide. This practice undermines the efficiency of the performing companies and hides the inefficiencies of non-performing companies.



Source: (Rana, 2024; Ghumman,2024); Self-prepared

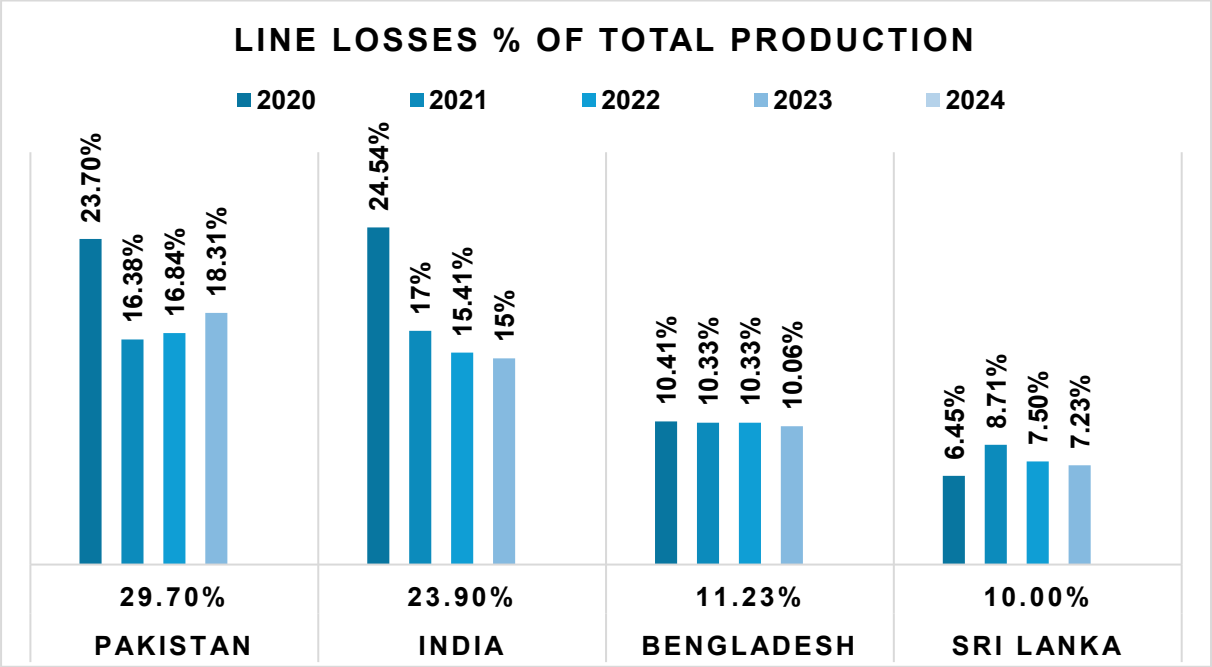
Ideally, each company should calculate, and charge tariffs based on its specific delivery costs, consumption patterns, and line losses. However, for decades, the uniform tariff system has remained in place, forcing the federal government to adjust an annual

subsidy of approximately Rs. 450 billion to PESCOs alone for stolen or unlawfully sold power for maintaining uniform power rates/slabs across the country.

The same principle applies to gas distribution companies, further exacerbating financial inefficiencies.

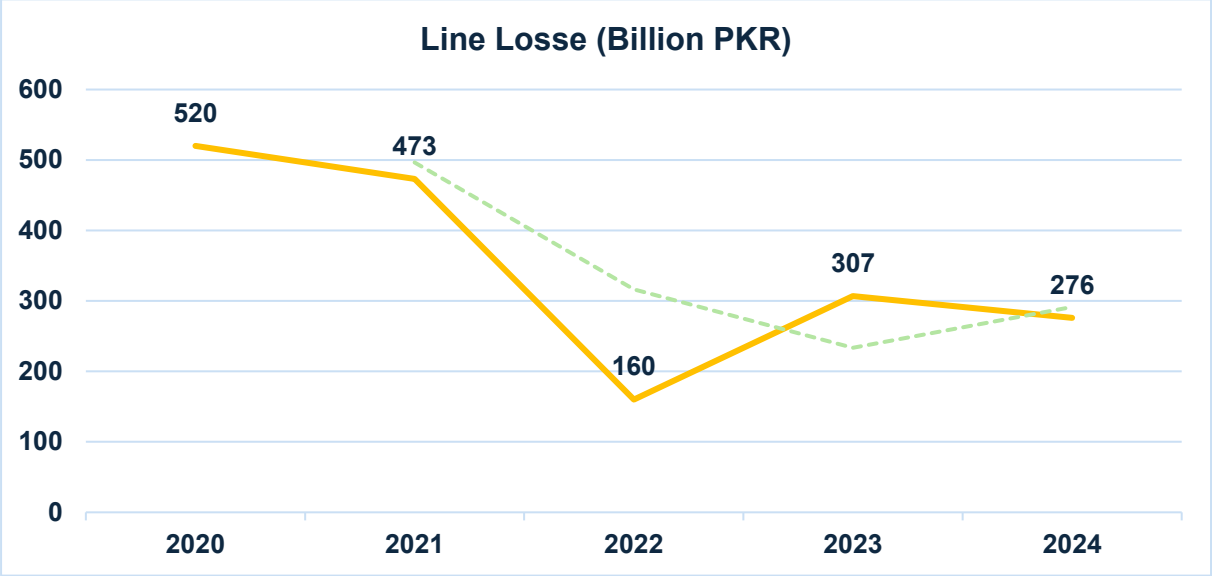
CAPACITY GAP:

The Government has planned to increase the capacity to 57000+ megawatts by 2030 (SOP, 2025). However, the existing transmission lines and the grid system is capable of transmitting only 22000 megawatts of the energy, which can be forced to increase to 27000 megawatts maximum for shorter periods of time (Jaffer, 2024; Kugelman, 2015).



Source (ESP, 2025); Self-prepared.

This ultimately increases financial strain on consumers, elevates production costs, and deteriorates their competitiveness. In terms of money, accumulative line losses are in billions of rupees.



Source (ESP, 2025); Self-prepared.

INCREASING TREND OF SOLARIZATION

Due to higher electricity tariffs and uncertainty of electricity supply, domestic consumers and industrial units are switching towards solarization, thus lowering the energy demand from the national grid. 1718 megawatts of solar energy have already entered the national grid, solar panels of 7000+ megawatts capacity have been imported, and 4742 net metering applications are pending for approval at NEPRA (Khan, 2024). This trend is being seen as a threat to ability of the government to handle IPPs.

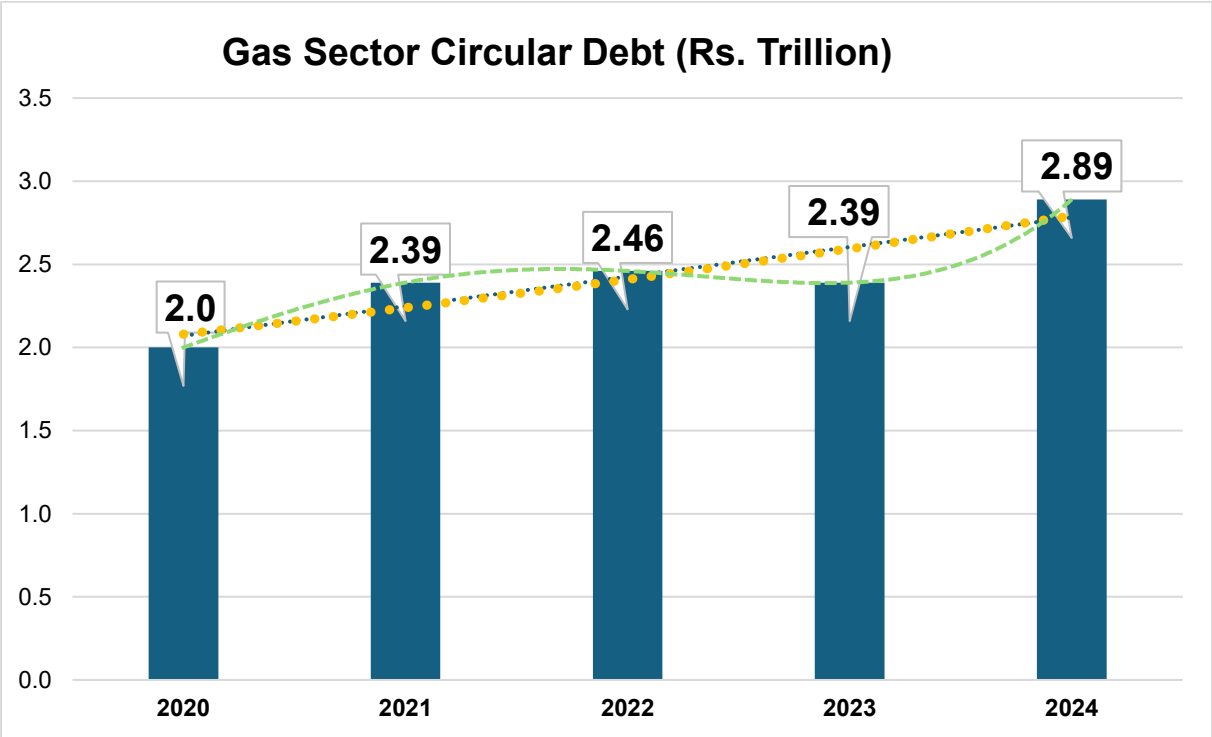
GAS SECTOR CHALLENGES

MONOPOLY OF SNGPL AND SSGCL

OGRA Ordinance 2002 envisioned the introduction of private companies into the distribution domain to create an efficient and competitive gas distribution framework. However, over time, the two state-owned companies not only solidified their financial standing as profit-generating entities listed on the stock market but also established a dominant influence over OGRA. As a result, even after an additional 14 years, no private entity has been permitted to enter the domain, effectively stalling the intended reform.

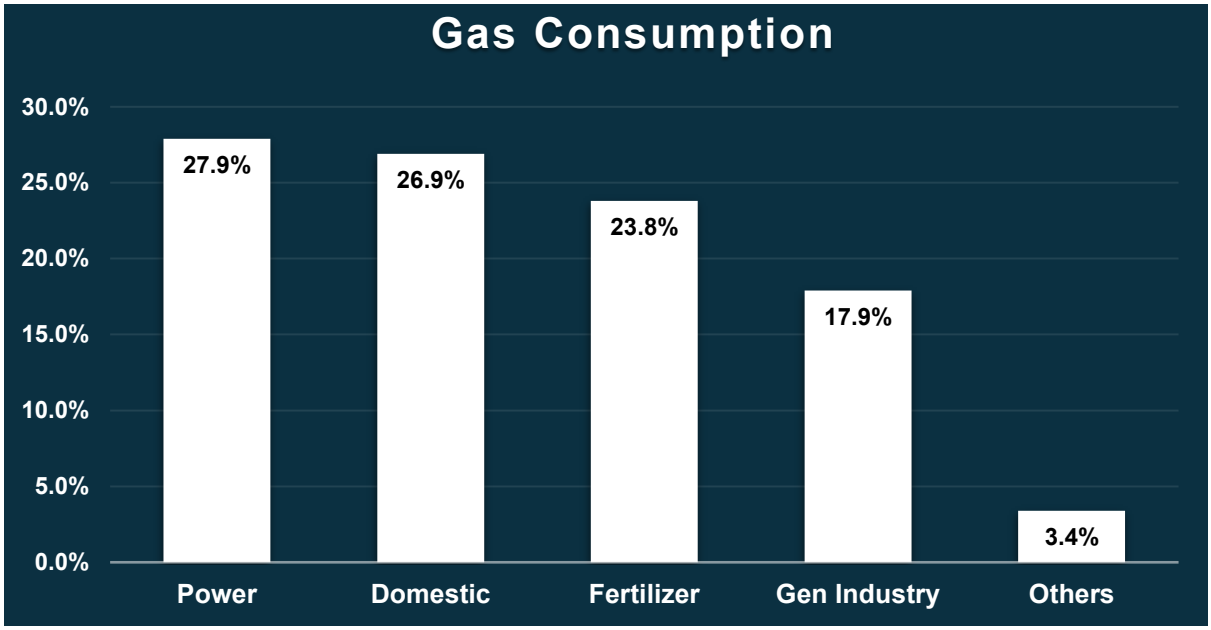
CIRCULAR DEBT OF GAS SECTOR

Accumulated circular debt of gas sector is Rs 2.8 trillion (Kiyani, 2024). Maintaining low prices of gas for a long period, line losses, thefts, and non-inclusion of RLNG in Gas Basket has disrupted the financial stability of the whole supply chain of gas sector.



Source (Finance Division, 2025); Self-prepared.

The industrial sector is one of the largest consumers of gas. 24% of the total production of gas is utilized for the production of fertilizers while 27% is utilized for power production in the industrial sector.



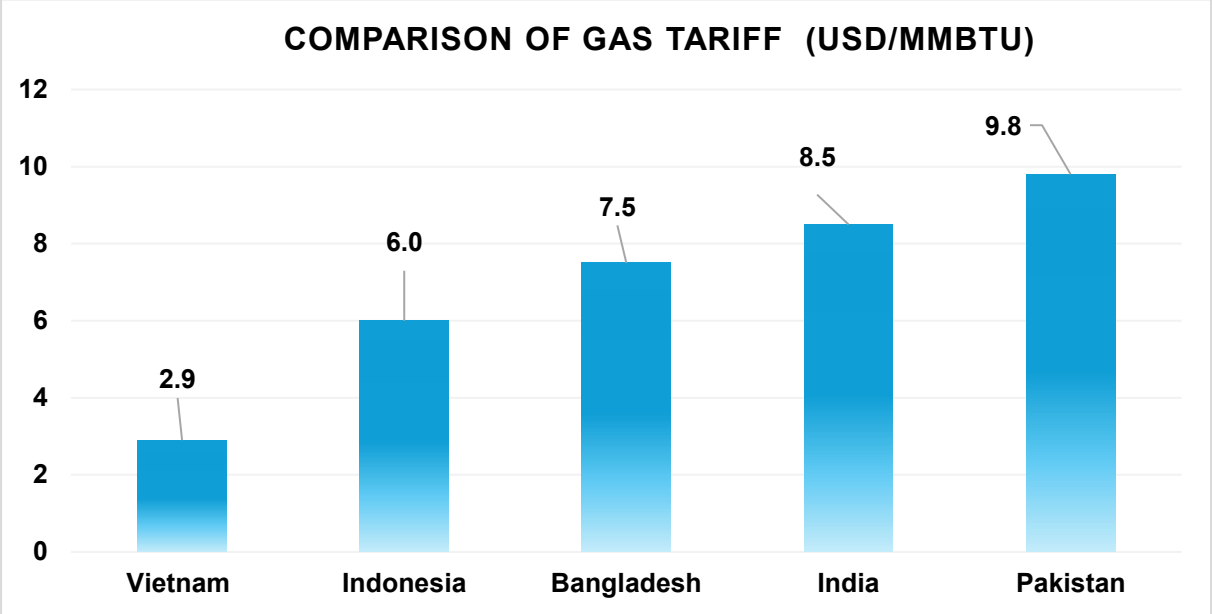
Source (ESP, 2025); Self-prepared.

IMPORT OF EXPENSIVE LNG/RLNG

Pakistan's reliance on imported LNG/RLNG strains foreign exchange reserves and worsens the trade deficit, especially with rising global prices. Currency depreciation further inflates LNG costs, while limited infrastructure restricts efficient distribution. Over-reliance on imports reduces focus on domestic exploration, increases debt burden, and exposes the country to geopolitical risks. Additionally, environmental concerns arise as LNG contributes to greenhouse gas emissions.

HIGH TARIFFS OF GAS

Pakistan is having highest gas tariffs among the competing economies, most importantly India and Bangladesh. During the recent past, gas prices have significantly increased in the country which has not only affected the domestic users but also hampered the industrial use of gas.



Source: (EnerData, 2025); Self-Prepared

The rising trend of prices and the availability challenges also negatively impacting the industrial sector of the country.

Since 2015, Pakistan prioritized imported LNG over local exploration. However, rising global energy prices led to cancelation of shipments, which has further aggravated the energy crisis.

STAGNANCY IN OIL & GAS EXPLORATION:

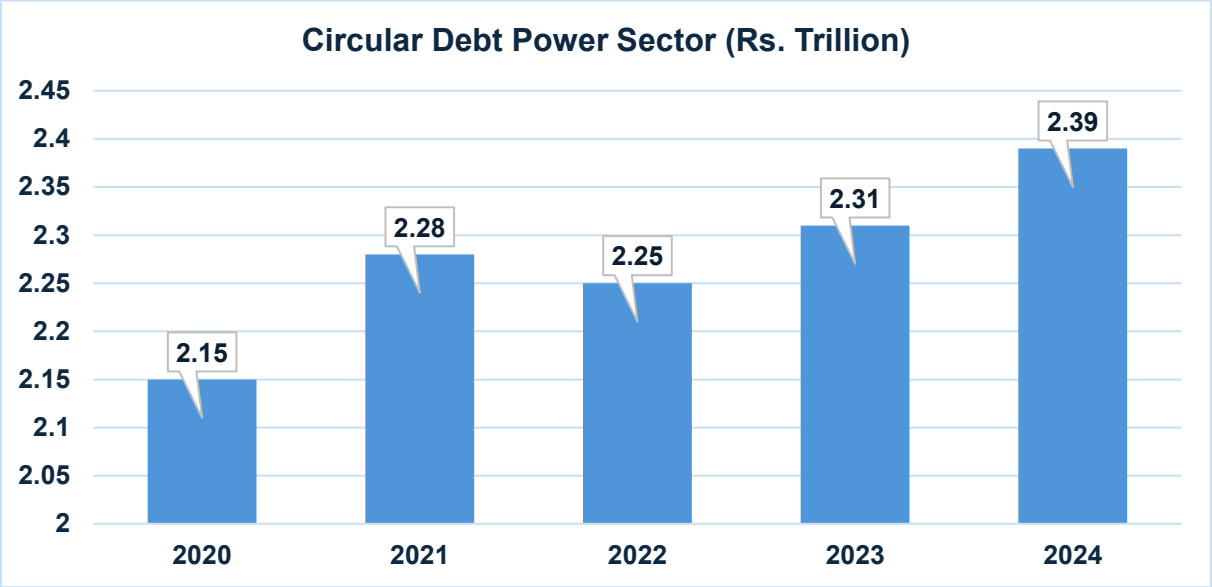
Rising security threats, bureaucratic hurdles, huge circular debt, inconsistent policies and wrangling of provincial and federal governments on mineral exploration rights are among the reasons which have hindered the exploration activities. Gas reserves have been depleting at 9% per annum. (Bhutta, 2024) deteriorating the situation further.

UFG

Since November 2023, gas tariffs have seen a staggering hike of approximately 1100%. Provision of gas to huge number of consumers (over 700,000) in Karachi and likewise other places of the country is a major reason for gas pilferage and inclusion of unaccounted for gas component in the bills (Arif, 2025).

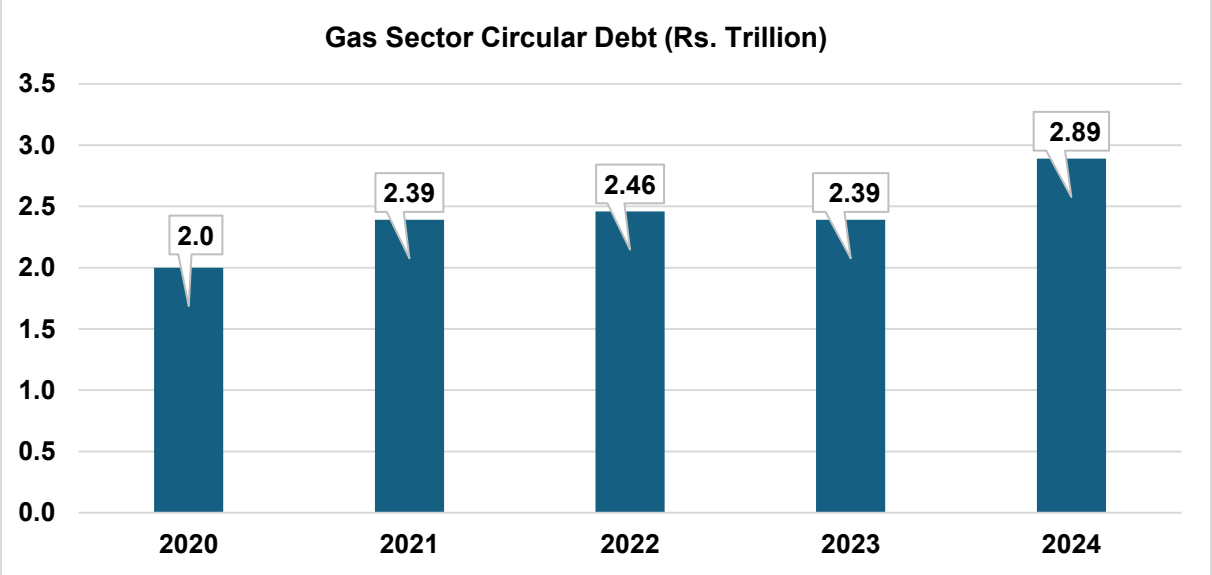
CIRCULAR DEBT

As of June 30, 2024, Pakistan's power sector circular debt reached a record high of Rs 2.393 trillion, increasing by Rs. 83 billion during FY 2023-24 (Jawad, 2024).



Source (Finance Division, 2025); Self-prepared.

The gas sector circular debt also stands at Rs. 2.89 trillion.



Source (Finance Division, 2025); Self-prepared.

These escalating debts exacerbates the fiscal deficit, diverts funds from essential public services, and deters investment in the energy sector. Consequently, it leads to higher

electricity tariffs, increasing production costs for industries and contributing to inflation, thereby hindering economic growth.

HUGE CAPACITY PAYMENTS TO IPPS

Independent Power Producers (IPPs), particularly those set up under the 1994 and 2002 energy policies, are considered as one of the main reasons for escalated electricity costs and rising circular debt. By FY 2025, capacity payments are estimated to reach Rs 2.1 trillion, equivalent to a charge of Rs 17.31 per kilowatt-hour (kWh). Moreover, the terms of recently concluded IPP agreements under CPEC are even more challenging than those of the earlier contracts. IPPs under CPEC are guaranteed a return on equity (ROE) of up to 20% in dollar terms which is significantly higher than the 12%-15% offered to other IPPs in Pakistan. Chinese government made the capacity payments to their companies compulsory to ensure that Pakistani authorities do make sincere progress towards materialization of industrial development part of CPEC, which could not happen. This guaranteed return adds to the tariff structure making the issue more complex. In the wake of public agitation against the IPPs, the government has negotiated and revised contracts with 28 IPPs while contracts of few have been terminated. This may result in saving of Rs. 137 billion annually (APP, 2025). However, the issue is still a huge challenge for the government.

INACTION AGAINST IMPORT OF IRANIAN OIL

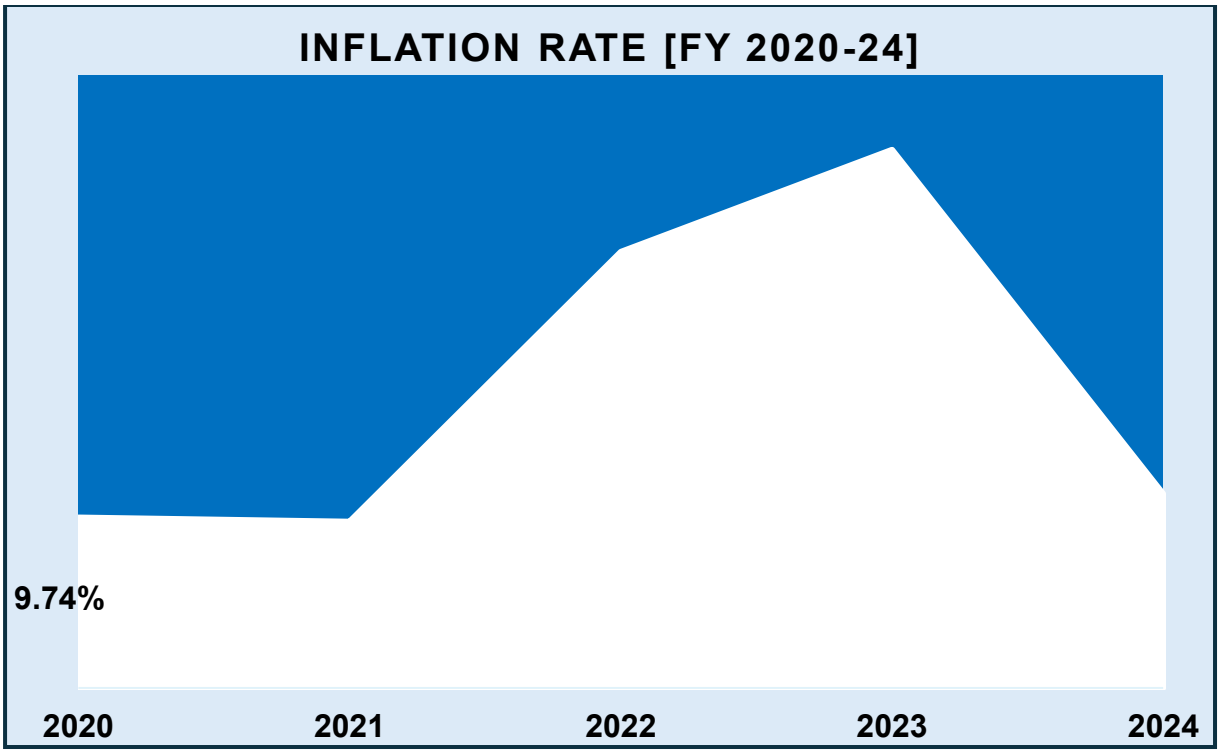
Another alarming issue is increasing scale of smuggled Iranian oil which has disrupted the local oil industry and causing Rs. 227 billion losses to the national exchequer annual (Kiyani, 2024).

CONSEQUENCES

Consequences of energy sector challenges are highly damaging to industrial development, social and economic development and overall living conditions of general public in the country.

HIGHER INFLATION

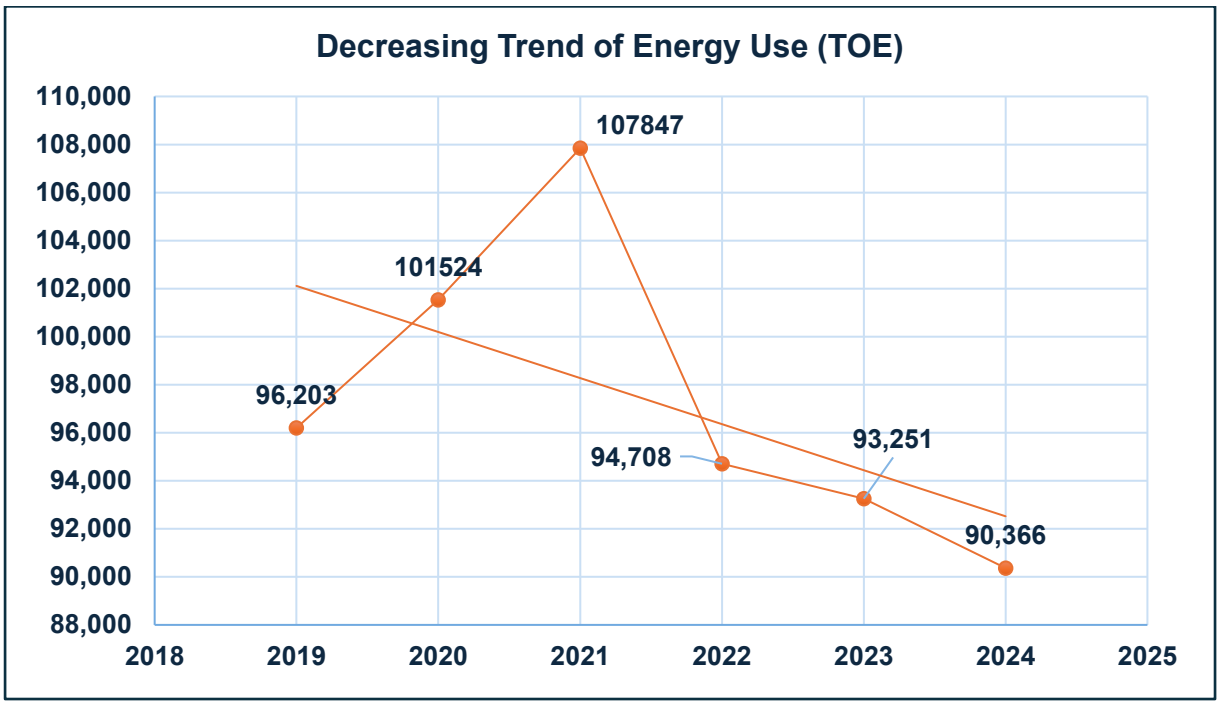
The rising inflation is one of the core consequences of energy sector inadequacies, adversely affecting the economy. Since the energy component is 36.61% in overall basket of CPI (CEICDATA, 2024), any hike in energy tariffs directly impacted the cost of living and increases production costs for goods and services.



Source (Finance Division, 2025); Self-prepared.

Though inflation has seen a drop during the last year but the adverse effects of higher inflation on purchasing power of common people at still visible. The industrial sector also witnessed a substantial decrease in energy consumption in the past few years. A sharp decrease of almost 20,000 TOE[1] shows negative impacts of price hike and inflation.

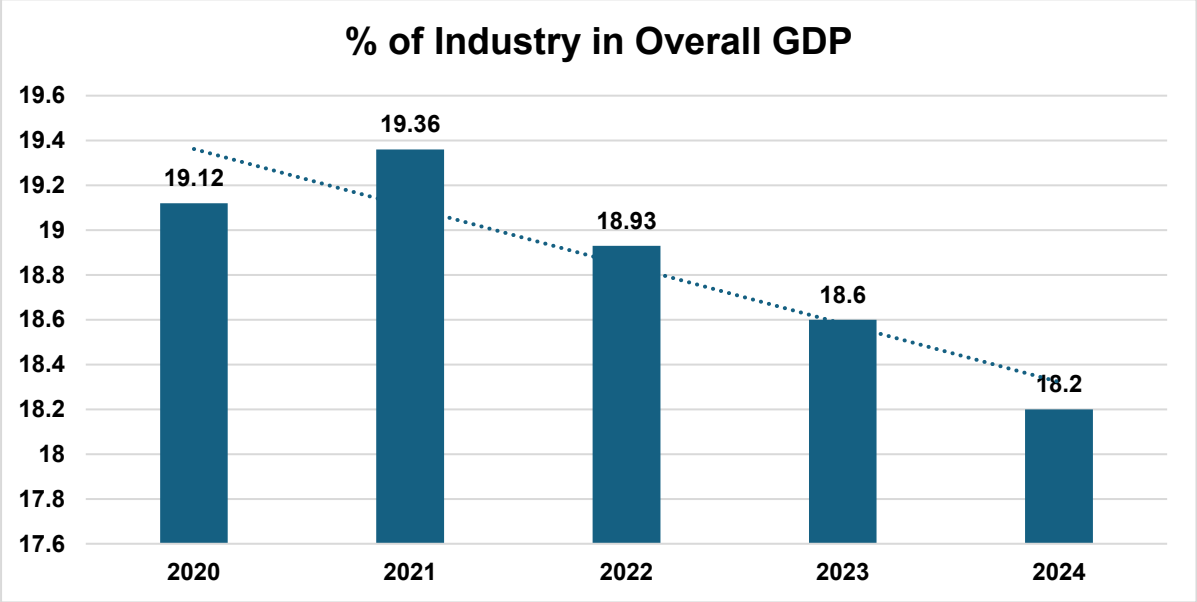
[1] a unit of energy measurement that represents the amount of energy in a ton of crude oil.



Source (ESP, 2025); Self-prepared.

SHUTTING DOWN TREND IN INDUSTRIAL SECTOR

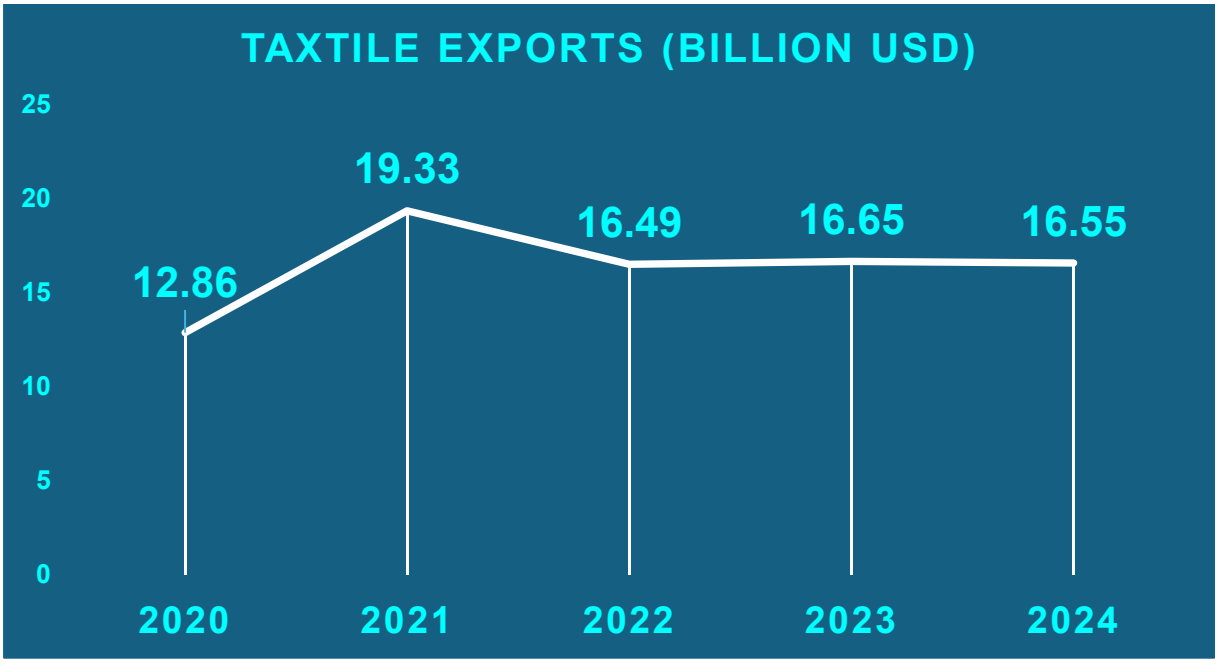
The surge in electricity tariffs in Pakistan has significantly impacted industries, leading to closures and production cuts. Approximately more than 8,000 businesses have closed operations in Pakistan and got themselves registered at Dubai Chamber of Commerce (Hussain, 2025). Around 81 industrial units, including 10 textile mills and five sugar mills, had been closed during the past five years due to the electricity crisis in the province (Siddiqui, 2024). Resultantly, the contribution of the industrial sector in overall GDP has been substantially decreased.



Source (ESP, 2025); Self-prepared.

STAGNANCY IN TEXTILE EXPORT

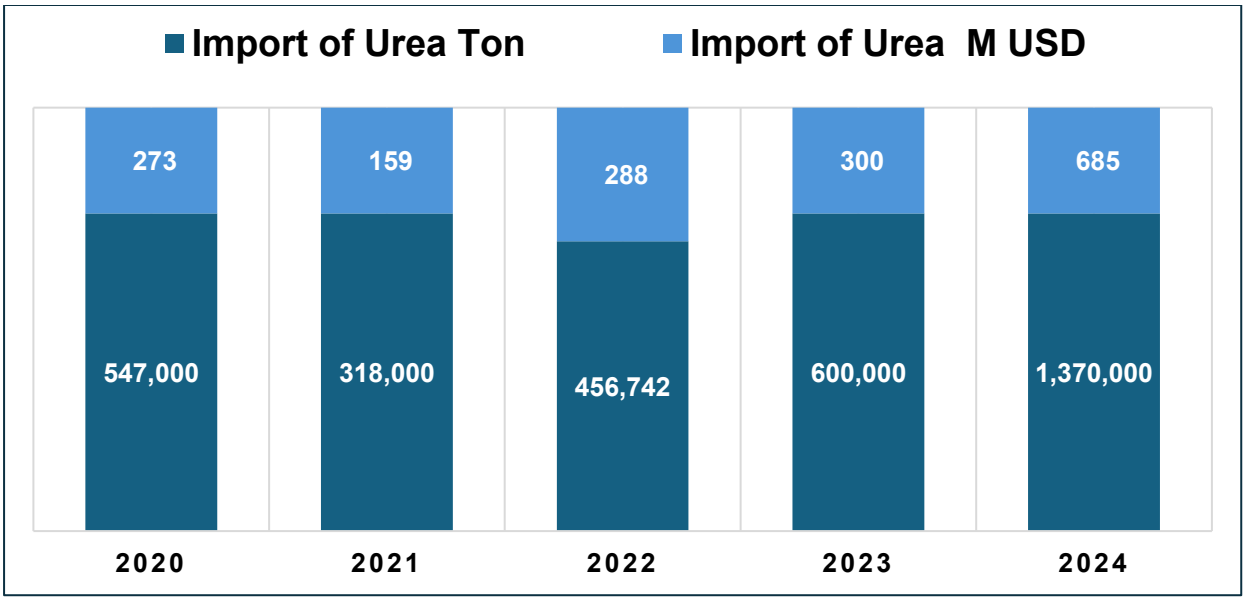
The textile sector is the backbone of our economy's exports. Due to high energy tariffs, textile exports have been hit hard, and many textile units have been closed as they are unable to operate due to higher energy costs.



Source: (Sattar & Majeed, 2022; Profit, 2024); Self-prepared

DECLINE IN FERTILIZER PRODUCTION

The fertilizer sector is confronting a crisis due to shortage of gas and not been able to cope up with fertilizer demand in the country. This has led to imports of urea on an annual basis not only affecting the agriculture sector but also depleting foreign exchange reserves.



Source: (Argus, 2025); Self-Prepared

LEGAL, INSTITUTIONAL AND POLICY ANALYSIS

The energy sector of Pakistan is regulated by both federal and provincial power ministries, with key regulatory bodies such as OGRA, NEPRA, and PPIB overseeing generation and tariff fixation for domestic and industrial consumers. Distribution and transmission are managed by companies like NTDC, PESCO, SNGPL, and SSGC, which operate nationwide. However, the sector is burdened by a complex, multi-layered regulatory framework, inter-governmental conflicts over mandates and powers, delayed bill payments, power theft, transmission losses leading to mounting circular debt, persistent supply shortages, and rising power tariffs.

INSTITUTIONAL FRAMEWORK ANALYSIS

Private Power and Infrastructure Board

The Private Power and Infrastructure Board (PPIB) Act 2012 established the PPIB as a statutory organization to facilitate private sector investment in Pakistan's power sector.

Strengths

Serving as a single point of contact for investors in the power sector. Encourages private sector participation in power generation and infrastructure along with execution of government policies related to private sector power projects and assists in the development of private power projects and facilitates investors in necessary approvals.

Weaknesses

The PPIB's role often overlaps with provincial energy departments and other federal agencies thus creating administrative inefficiencies due to concurrent mandates.

Area for improvement

PPIB’s role should be expanded to prioritize renewable energy projects for a more balanced energy mix, while streamlining processes and clarifying roles with provincial energy departments and relevant agencies to reduce inefficiencies.

NEPRA

The National Electric Power Regulatory Authority (NEPRA) is responsible for regulating Pakistan's power sector, including setting electricity tariffs, promoting competition, and safeguarding consumer interests.

Strengths

NEPRA has contributed to tariff-setting process, aligning consumer costs and operational expenses.

Weaknesses

NEPRA has weak control over DISCOS and has failed to introduce a competitive market mechanism by privatizing public sector DISCOS or allowing private sector involvement in the distribution network.

Area for improvement

NEPRA needs to rationalize its regulatory functions to address provincial concerns and foster greater collaboration and reduce friction.

OGRA

The Oil and Gas Regulatory Authority (OGRA) is a key regulatory body in Pakistan, tasked with overseeing the oil and gas sectors. Its primary responsibilities include setting tariffs for gas distribution, ensuring fair competition, regulating the exploration, production, and transportation of oil and gas, and protecting consumer interests. OGRA also monitors the performance of oil and gas companies, ensuring compliance with safety and environmental standards.

Strengths

OGRA provides oversight of the oil and gas sector, ensuring consumer protection and investor confidence.

OGRA has facilitated private sector investments in LNG terminals and related infrastructure.

Weaknesses

OGRA's centralized decision-making has led to disputes over natural gas allocation, royalties, and infrastructure development. Additionally, its lack of focus on security issues affecting oil exploration companies has contributed to the exit of multinational companies (MNCs) from the country perpetuating deficiency of indigenous energy resources.

Despite the clear vision outlined in the OGRA Act to involve the private sector by 2010, OGRA has failed to establish a competitive process by engaging private companies in gas distribution.

OGRA should endeavor to get powers regarding LNG/natural gas mixing in gas supply from distribution companies, address high levels of Unaccounted for Gas (UFG) added in bills @ 6-15%, and push for construction of Russia-backed gas pipeline.

Integrated Generation Capacity Expansion Plan 2024-34

In the light of Energy policy, NTDC has developed an Indicative Generation Capacity Expansion Plan (IGCEP) 2024-34. NEPRA has also approved this plan. The IGCEP is

a revolving plan to be updated yearly to account for any change in generation technologies trends, governmental policies, progress/priorities of different projects etc. To provide a roadmap for the addition of new power generation capacities based on projected demand, ensuring reliability and cost-effectiveness.

Strengths

Analyses future electricity demand based on economic and demographic factors. Evaluates available energy resources, including fossil fuels and renewables to determine optimal generation mix.

Weaknesses

The new IGCEP (2024-34) has reduced the share of variable renewable energy (VRE) **from 30% to 12.9%** contradicting local policy targets, while relying heavily on hydropower, which has been proposed to account for over 10,000 MW as 'strategic capacity' despite likely construction delays. This could exacerbate cost overruns and delays, reducing the share of cheaper renewable energy sources like wind and solar.

Area for improvement

NTDC needs to revise the IGCEP to align it with the Alternative & Renewable Energy (ARE) Policy 2019 by increasing the share of renewable energy such as solar and wind, while reducing the reliance on costly and delayed hydropower projects. Integrating more RE will help lower costs and reduce dependence on large-scale, high-risk hydropower investments.

NTDC needs to introduce a rigorous evaluation process by engaging private field experts, to assess their real cost impacts and avoid unnecessary commitment to expensive projects.

National Electricity Policy 2021

The National Electricity policy addresses various sectors, including generation, transmission, distribution, and market operations, providing directions for integrated planning and development.

Strength

The Policy envisions to ensure access to electricity through a sustainable power sector, emphasizing optimal utilization of indigenous resources, integrated planning, efficiency, competitive market, affordability, and environmental friendliness.

It also focuses on cost-reflective tariffs, competitive wholesale market, transmission-distribution efficiency, uniform regulatory applicability, elimination of circular debt and reducing greenhouse gas emissions.

Weaknesses

The policy lacks implementation roadmap and respective timelines. Further, it does not outline any plan for activating cheaper energy import projects like IP, Pakistan Stream Gas Pipeline (PSGP), TAPI, CASA 1000 etc.), and Thar Coal.

The Policy also lacks a concrete plan to resolve circular debt.

Area for improvement

The policy should spell out mechanism for enhancing institutional coordination between Federal and Provincial authorities, fostering public-private partnerships (PPPs) to attract investment, incorporating energy efficiency and demand-side management strategies.

Alternative & Renewable Energy (ARE) Policy 2019

Covers a wide range of renewable energy sources, including biogas, biomass, waste-to-energy, geothermal, hydrogen, solar, and wind.

Strengths

Aims to harness Pakistan's renewable green energy potential through affordable energy solutions with aim to enhance renewable energy generation to 30% of total by 2030 (which currently stands at 6.8%) and to replace expensive fossil fuels.

Weaknesses

The policy emphasizes off-grid solutions, however, lacks in providing strategy for these initiatives in rural and remote areas.

Area for improvement

A single national platform, having representation of all provinces and federal stakeholders should be established to streamline bureaucratic processes to expedite project approvals.

Introducing financial incentives such as tax breaks/subsidies to attract large-scale investments in renewable energy projects.

Upgrade grid infrastructure to accommodate renewable energy, and foster public-private partnerships (PPPs) for off-grid solutions and renewable energy projects in rural areas.

NATIONAL ENERGY EFFICIENCY AND CONSERVATION POLICY (NEEC) 2023

The National Energy Efficiency and Conservation Policy (NEEC) 2023 outlines a range of measures aimed at enhancing energy efficiency in Pakistan's industrial sector which consumes 37.1% of the nation's energy. The policy has set target to save 2.3 million tons of oil equivalent (MTOE) and reduce carbon dioxide emissions of 9 million tons by 2030.

Strengths

The policy has been announced well before 2026, the year when E.U has announced to impose Carbon Adjustment Mechanism (CBAM) Tax on imports of carbon-intensive goods (mainly cement, electricity, fertilizers, iron and steel, aluminum, and hydrogen) into the EU .

Weaknesses

Weak enforcement mechanisms, fragmented governance between federal and provincial authorities, and insufficient institutional capacity at both levels could hinder the policy implementation.

Area for improvement

The government may promote use of Electric vehicles (EV) by granting 100% tax waver on EVs and impose ban on import of fuel charged automobile for a couple of years like Ethiopia.

The government must also provide clear financial subsidies/tax rebates especially to SMEs to promote energy-efficient technologies.

18th constitutional amendment

The 18th Constitutional Amendment has granted provinces a 50:50 share in the royalty from natural and mineral resources. However, the powers to set tariffs and make decisions regarding revenue collection in this context still remain with the federal government.

Strengths

The 18th Constitutional Amendment granted provinces the right to share mineral royalties with the federal government and allowed them to generate their own power.

Weaknesses

The federal government has failed to consult provinces on oil and gas matters as required, leading to discord over legislative control of mineral exploration rights and causing legal ambiguities. Provinces are now moving forward with their independent power generation system, transmission networks alongside establishing 'provincial power tariff determining authorities' to bypass the federal transmission systems

Area for improvement

The ambiguities regarding mineral exploration rights and power generation should be removed by the federal government through effective utilization of CCI.

SWOT-EETH ANALYSIS

Strengths of Energy Sector

As per Alternative Energy Development Board (AEDB), Pakistan has vast potential of Solar (2.9 million MW), Wind Energy (50,000 MW), Hydel Potential (60,000 MW). Similarly, Pakistan has 186 bn tons of coal Reserves with potential to generate 100,00 MW. Similarly, Pakistan can act as potential energy transient hub due to its strategic location. Projects like TAPI and IPI highlight this potential.

Enhancement of Strengths

Pakistan must launch Competitive Trading Bilateral Contract Market (CTBCM) framework according to which Electricity Buyers (Industries etc.) and Power producers to directly negotiate and trade power through bilateral contracts. This would end the monopoly of Government and open up the opportunities for private sector generators to compete and supply electricity. As the CTBCM framework ensures competitive pricing and revenue predictability, it would encourage private sector to invest in Coal, Wind and Solar sector for utilizing un-tapped potential.

Weaknesses of Energy Sector and their Elimination Strategies

High Electricity Tariffs and solution

Industrial tariffs range between Rs. 55-60 per unit, causing industries to close and unemployment to rise. These tariffs include Energy Price and Capacity Payments, both of which are subject to GST. The Supreme Court has ruled that GST should not apply to Capacity Payments. Exempting them from GST would lower tariffs and help curb circular debt. (Kaleem, A. Personal Communication, 17.01.2025)

Massive Power Circular Debt and solutions

Currently the Power sector circular debt stands at Rs. 2.39 trillion. It has deterred the investment in Energy sector and disrupted the whole supply chain with cash shortage. Pakistan should enhance its reliance on cheaper energy like Wind and coal. Pakistan should also invest in existing Grid infrastructure to reduce line losses and renegotiate IPP contracts.

Inefficient Discos and Solutions

Transmission and Dispatch losses alone in FY 24 were 591 billion. This increases Circular debt of power sector. It is proposed that instead of Privatizing Discos, we may introduce Independent Boards of by bringing specialist management from Market as per provisions of State-Owned Enterprise (Governance and Operation) Act, 2023. It is further proposed that instead of privatizing whole Discos we should Privatize the Feeders for efficient distribution and recovery.

Issues of Gas Circular Debt & Expensive RLNG and solutions

During FY 24, the Gas sector Circular Debt has reached up to Rs. 2.8 trillion leading to disruption in Gas sector supply chain and Cash Shortage. Similarly, the expensive imported RLNG is being treated as separate fuel rather than being included in Gas basket. This resulted in non-recovery of cost of RLNG thus further increasing Circular debt. The proposed solution is implementation of Weighted Average Cost of Gas (WACOG) Law in true letter and spirit. As per this law, there would be a balanced price mechanism that would reflect the true cost of GAS including RLNG. Implementing WACOG would mean that the higher cost of imported LNG would be averaged with

the lower cost of locally produced gas, resulting in a fairer price for consumers and Circular Debt would not increase as it will ensure full recovery of Cost of Gas.

IPPS, Capacity Payments and Solutions

Contracts with IPPs have resulted in huge Capacity payments leading to circular debt and high electricity tariffs. The proposed solution is renegotiating the Purchase Power Agreements with IPPs to reduce the capacity payments. Another strategy to mitigate the impact of capacity payments is increased demand of electricity through industry expansion.

Stagnant Oil & Gas Exploration and Solutions:

Opportunities of Energy Sector and Taking Advantages of them

Independent Electricity Market

The government has plans to launch Independent Electricity market from March 2025. This is an opportunity for Private sector power buyer and sellers to take part in directly in power trade without Government. Now it's the responsibility of the NEPRA to develop clear and transparent rules to govern trading, pricing and dispute resolution.

Renegotiation of PPAs with IPPs

Recently, the Cabinet has given approval of revised agreements with 14 IPPs with expected savings of Rs. 10 to 11 per unit of electricity tariff. This is a positive development as it would reduce the financial burden of Capacity Payments and would not allow Power Circular debt to escalate. The Government/Ministry of Energy Power Division should exploit this opportunity and further expand the negotiations with Others IPPs for revision of PPAs for reducing Capacity Payments.

Exploration of Thar Coal indigenous Reserves

Pakistan has the largest coal Reserves equivalent to almost 176 billion tons. Already Sindh Engro Coal Mining Company under PPP model is working with Sindh Government. PPIB can further identify opportunities with foreign investors on PPP mode to exploit these reserves through sharing resource, expertise and Risk and technology transfer.

Private Sector Ownership of New Gas Discoveries

Like Independent Electricity model, OGRA/SIFC should also work on this model to transfer ownership of certain percentage of new Gas discoveries to private sector. This decision will encourage investment in Oil and Gas exploration and will provide much needed liquidity in supply chain. Now it's the responsibility of the OGRA/SIFC to develop clear and transparent rules to govern trading, pricing and dispute resolution.

Threats of Energy Sector and Strategies to Hedge against them

Installed Capacity Exceeding Demand

This is the biggest threat right now Pakistan Energy Sector is facing that out of total installed capacity of almost 42,000 MW our average consumption is around 14,000 MW. This factor is the main cause of circular debt and high electricity tariffs. Capacity once installed cannot be reversed in short term, Therefore Pakistan should revive Industrial sector to enhance electricity demand.

Thermal Production Dependent upon Imported Oil

Due to stagnant Oil and Gas exploration sector, Pakistan's Thermal Production is highly dependent upon imported oil. Last year, Pakistan imported $ 17 billion oil in FY 2024. (PBS, 2025). Any increase in global oil prices directly increases our energy tariffs. Similarly, any disruption in supply chain routes of oil supply due to the law-and-order situation will halt our thermal production. In order to hedge this threat, Pakistan should revive Oil exploration sector to increase local exploration of oil.

GAP ANALYSIS UTILIZING OXFORD INDEX OF PUBLIC ADMINISTRATION

The study has chosen India and Malaysia for comparison in the light of Oxford Index of Public Administration. India and Malaysia are at 50th and 40th position of the said index while Pakistan's is at 90th position. Both India and Malaysia are relevant case studies for Pakistan as Malaysia has recently emerged as a middle income and industrialized country in the wake of shifting of Japan to hi-tech industry while India is a close neighbor having identical governance and political structures.

PAKISTAN ENERGY SECTOR COMPARISON WITH INDIA.

Renewable Energy:

India ranks 3rd largest producer for renewable energy in the world, with over 125 GW of installed renewable capacity and having an ambitious target for 500 GW of renewables by 2030 (Singh, Ratn, & Jha. 2024). On the Other hand, Renewable energy accounts for less than 6.8% of Pakistan's energy mix. India's policy initiatives, such as the National Solar Mission, provide a robust framework for transitioning to clean energy.

Energy Efficiency Initiatives:

As per Bureau of Efficiency India, India has implemented comprehensive energy efficiency programs. India has launched Ujala Scheme in 2015 distributing energy-efficient LED bulbs to consumers at significantly reduced prices.

Energy Security and Diversification:

The energy mix in India is reasonably diversified including large investments in renewables, nuclear power, and domestic coal. Unlike Pakistan, 49% of Indian energy comes from Coal. Coal prices are much more stable than oil prices. Pakistan's is heavily relying on thermal resources, oil among the top, making energy security highly vulnerable and dependent upon price fluctuations in international market.

Foreign Investment and Partnerships:

India is among the most favored destination for energy investments, including renewable energy, nuclear energy, and grid modernization. India attracted $13 billion in renewable energy investments in 2022 alone, with strong private-sector involvement (Myers, 2022) while Pakistan struggling to attract foreign investments due to political instability and security challenges.

Electric Vehicle (EV) and Charging Infrastructure:

India is witnessing significant growth in the electric vehicle (EV) sector, with government policies supporting EV manufacturing, charging infrastructure development, and incentives for consumers and manufacturers (Wagh, 2024). The FAME II scheme aims to promote electric vehicles and charging stations across the

country. Pakistan is only beginning to develop its electric vehicle market and charging infrastructure, with limited government initiatives and a slower pace of adoption.

PAKISTAN ENERGY SECTOR COMPARISON WITH MALAYSIA

Energy Supply Reliability and Electrification:

Malaysia boasts nearly 100% electrification, ensuring reliable energy supply across urban and rural areas. The country has modernized its grid infrastructure, reducing transmission and distribution losses to around 6% (Merdekawati, Suryadi, Pangestika, & Zafira, 2024). Pakistan struggles with frequent power outages, and electrification rates in rural areas remain below 75% with an approximate accum $5 billion annually losses due to unreliable power supply (Kugelman, 2015).

Energy Mix and Renewable Energy:

According to Malaysia Renewable Energy Roadmap Malaysia has a diverse energy mix, with a strong emphasis on renewable energy sources such as hydropower, solar, and biomass. Renewables contribute over 20% to the energy mix which is anticipated to be 31% by the end of this year and 70% by 2050 (ITA, 2024; Yahoo., Salleh., Chatri., & Huixin. 2024). While in Pakistan, the renewable energy accounts for approximately only 6%.

Energy Pricing and Affordability:

Malaysia provides subsidies and maintains regulated energy tariffs for consumers and industries to ensure affordability. For example, industrial electricity tariffs in Malaysia range between $0.06–$0.10 per kWh (Nadhila., & Setyawati., 2024). The Corporate Renewable Energy Supply Scheme (CRESS) Policy allows producers to directly negotiate electricity tariff rates with corporate customers, making the market more liberal (ITA, 2024). Energy prices in Pakistan are volatile and significantly higher due to dependence on imported fuels and inefficiencies in the energy supply chain. Industrial tariffs exceed $0.19 per kWh, making production costs higher and the government maintains strict controls on the system.

Policy Framework and Investment Climate:

Malaysia's government has established clear policies, such as the Sarawak Corridor of Renewable Energy (SCORE), to attract investment in energy-intensive industries. The country attracted over $13 billion in energy investments in 2022 alone (Teow, 2024) while Pakistan received only Rs. 800 million FDI in Power sector in FY 2024.

Grid Resilience and Disaster Management:

Malaysia has invested in modernizing its energy grid to make it resilient to natural disasters and climate-related risks. Advanced grid management systems and infrastructure upgrades ensure minimal disruptions which are at an average only 10 hours per year. Pakistan's grid infrastructure is outdated and highly vulnerable to disruptions caused by extreme weather, such as floods and heatwaves.

COMPARISON WITH BEST PRACTICES – CHINA A CASE STUDY

Massive Investment in Energy Infrastructure by China: China's energy infrastructure considered world's best which includes large-scale hydropower dams e.g., Three Gorges Dam 22500 MW, proposed Yarlung Hydroelectric Project (60,000 MW). It has also developed ultra-high voltage (UHV) transmission lines to efficiently transport electricity across long distances thus supporting industrialization. Pakistan should also Invest in large-scale infrastructure like hydropower (e.g., Diamer-Bhasha Dam) and modernize transmission and distribution systems to reduce losses and ensure a stable supply for industrial zones.

Diversification of Energy Mix: China has Reduced its reliance on coal by aggressively expanding renewable energy, now producing 308 GW of solar and 400 GW of wind power as of 2024 as per International Renewable Energy Agency. Pakistan can also learn from China that Pakistan should also invest in Solar, Wind and Hydro Power Projects in resource-rich region like Sindh and Baluchistan. Pakistan should also exploit its natural coal & gas reserves.

Integration of Energy and Industrial Policies: China has Created Energy-Industrial Zones, aligning energy production with industrial development, such as in the Yangtze

River Economic Belt and Greater Bay Area as per World Bank Report on China Economic Zones. China has leveraged energy subsidies and stable energy pricing to support energy-intensive industries like steel, chemicals, and electronics. Due to this China's cost of production is reasonably low as compared to other countries. Pakistan should also align CPEC Special Economic Zones (SEZs) with dedicated energy resources to ensure uninterrupted industrial operations. Stabilize energy pricing to make Pakistani industries globally competitive.

Strategic Energy Cooperation and Financing: China has Secured international partnerships and financing for energy infrastructure projects, such as investments through the Belt and Road Initiative (BRI). It has also Partnered with global leaders for technology transfer in renewable energy and grid modernization. Pakistan should Strengthen energy collaborations under CPEC, focusing on technology transfer and financing for renewable and grid projects. Pakistan should Seek diversified foreign partnerships to reduce dependency on a single country and improve access to advanced energy solutions.

ACTIONABLE LESSONS FOR PAKISTAN'S ENERGY SECTOR DEVELOPMENT

Diversification of Energy Mix:

Both India and Malaysia have significantly diversified their energy portfolios. India focuses on solar and wind energy, while Malaysia invests in hydropower, solar, and biomass. Invest in Renewable energy sources like solar, wind, and hydropower to reduce dependency on imported fossil fuels. Encourage private sector participation in renewable energy development through incentives and simplified regulations. Diversification can improve energy security, reduce costs, and make the sector more resilient to global price shocks.

Improve Grid Infrastructure:

Malaysia has modernized its grid, reducing transmission and distribution losses to under 6%, compared to Pakistan's 17-19%. Pakistan should upgrade its Grid Infrastructure to reduce Transmission and Dispatch losses and improve efficiency and

reliability. Modernized grid infrastructure would enhance supply reliability, reduce outages, and support industrial growth.

Align Energy Policies with Industrial Growth:

India has launched Integrated energy reforms with "Make in India" to support energy-intensive manufacturing industries. While Malaysia has Created industrial zones like the Sarawak Corridor of Renewable Energy (SCORE), offering affordable energy to attract global investors. Pakistan should also prioritize Energy access to its key industries like Textiles, leather and Fertilizer.

Development of Electrical Vehicle Market and Infrastructure:

Pakistan should Introduce a comprehensive EV policy with tax incentives, subsidies, and reduced GST, similar to India's Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme. Pakistan needs to develop an extensive network of public and private EV charging stations, prioritizing urban areas and highways. Pakistan should facilitate affordable financing and leasing options to make EVs accessible to the wider population.

POLICY GAP ANALYSIS

Desired State:

The desired state of Pakistan's energy sector for industrial development should aim to provide reliable, cost-competitive electricity to boost productivity and competitiveness. Similarly, the electricity demand should be enhanced to utilize excess capacity of National Grid. This requires reducing electricity tariffs through renegotiation of capacity payments and improved efficiency in power generation and distribution. Diversifying the energy mix towards renewable and indigenous resources can lower costs and ensure sustainability. Revitalizing the exploration sector to reduce reliance on imports and addressing circular debt are critical. Finally, fostering industrial growth through tailored energy policies, such as special tariffs and uninterrupted supply for industries, can drive economic development.

Current State:

The current state of Pakistan's energy sector is marked by high electricity costs, surplus installed capacity, and a stagnant exploration sector, with an energy mix heavily reliant on expensive thermal power. This has resulted in a significant circular debt burden and massive capacity payments, straining fiscal resources. High tariffs and unreliable supply have reduced industrial competitiveness, discouraging investment and hampering growth. The exodus of consumers from the national grid further exacerbates financial pressures, while the lack of affordable energy access undermines industrial productivity and development potential.

Policy Gap Analysis:

Government should Review and renegotiate IPP contracts to reduce capacity payments for bringing down the electricity tariffs and Prioritize investments in renewable energy sources like wind and coal to reduce dependence on expensive thermal energy. Government should Incentivize local exploration of oil, gas, and coal reserves to reduce dependence on imported oil. Government should upgrade the Grid for reducing line losses and reduce theft and improve recovery to control Circular debt. Government needs to promote Electrical Vehicle usage.

Conclusion:

Pakistan energy sector is trapped in vicious cycle where Electricity Tariff is too much high for domestic and industrial consumers which has hampered the Industrial development and forcing Industrial and Domestic consumers to switch to alternate energy options by leaving National Grid as observed through Solarization Boom. This is further reducing the electricity consumption of National Grid thus further increasing electricity tariffs for remaining consumers of National Grid due to fixed capacity payments charges under IPPs agreements. Lack of focus and investment in Renewable Energy Infrastructure has made Thermal Production the dominant contributor in Energy Mix. Oil and Gas exploration activities are minimal despite the fact that Pakistan’s power production heavily dependent upon imported oil. The Findings of research calls for policy action in the form of practical recommendations through Tailored energy

polices for ensuring that the Energy Sector may play its role in Industrial development of Pakistan.

RECOMMENDATIONS

DEVELOPMENT OF INDEPENDENT ELECTRICITY MARKET

Government should Implement Competitive Trading Bilateral Contracts Market (CTBCM) framework to allow private sector power generators and buyers to trade electricity independently of government following the footsteps of Malaysia. It would encourage the private sector to invest in Coal and Wind energy. This would ensure competitive pricing and revenue predictability

RENEGOTIATIONS OF PPAS WITH THE IPPS

After the successful negotiations with 28 IPPs, government should expand the exercise to remaining IPPs including the Chinese IPPs. Negotiations should focus on delinking Capacity Payments from $ based to Rupee based. Similarly, the Government should also negotiate to reduce the Fixed Rate of return. This would reduce the Capacity payment charges and electricity tariff leading to enhanced Industrialization and use of National Grid/Electricity demand

INTRODUCTION OF SMART METERING

NEPRA should introduce Smart Metering across Discos to control theft and improve Recovery rate. This would also reduce line losses and encourage real time monitoring and billing. All this would increase the efficiency of Discos and will improve the financial health of Discos.

PRIVATIZATION OF DISCOs FEEDERS

Ideally Discos should be Privatized in phased manner, however, keeping the political considerations in view, as a first step, Government should privatize the Feeders of the Discos. This would enhance the recovery rate, reduce electricity theft, improve the operational efficiency and reduce the Circular Debt.

INDEPENDENT BOARDS OF THE DISCOS.

The government may bring market-based specialist management into the boards of DISCOS under the provisions of State-Owned Enterprise (Governance and Operations) Act, 2023. This would enhance the efficiency of Discos.

REMOVAL OF GST FROM CAPACITY PAYMENT

Currently, the GST is being charged from the consumers in the electricity bill on Energy Price (30%) as well as Capacity Payment (70%). As per orders of the Apex Court, GST should be applicable on energy price only. Delinking capacity payment component from GST would reduce electricity tariff, circular debt and promote industrialization and increase electricity demand/National Grid.

REDUCTION OF TAXES IN ELECTRICITY TARIFF

Currently the electricity tariff includes Federal Excise Duty, 17% Sales Tax, withholding tax and Income Tax etc. increasing unit price to Rs. 60. During the off seasons (winter), surplus energy should be provided to Industrial consumers at the cost rate to promote industrial activities.

IMPLEMENT THE WACOG LAW 2022

The Weighted Average Cost of Gas law should be implemented in letter and spirit to include all the cost of local gas production and imported LNG/RLNG to ensure that gas prices determined by OGRA include the cost of local and imported gas. This will stop the circular debt from further escalation. This step would also enhance the use of expensive surplus RLNG.

INTRODUCTION OF PRIVATE SECTOR OWNERSHIP OF NEW GAS DISCOVERIES

Like CTBCM Framework in Power Sector, OGRA and SIFC should also introduce a certain percentage of private sector ownership in newly but unallocated gas fields. This policy will alleviate liquidity crisis of exploration and production companies, attract FDI in Gas sector, reduce Gas circular debt, increase local gas production leading to reduced electricity tariff and enhanced industrialization and enhanced electricity demand/National Grid.

GRADUAL SHIFT OF GAS FROM CPPs TO EFFICIENT GAS BASED GENERATION PLANTS

Government has decided under IMF conditions to stop the Gas provision to Captive power plants. This would lead to immediate closure of Industry and unemployment. We should implement this measure in phase wise so that industry may continue, and gas may be shifted to more efficient plants and Industry start using National Grid leading to enhanced electricity demand and reduction in electricity tariff.

OPERATIONALIZATION OF SEZS FOR INDUSTRY REVIVAL

Board of Investment should put maximum efforts to operationalize existing SEZs. There are currently 13 SEZs under Provincial governments at various stages of approval. (Abdul Haq, S. Personal Communication. 17.01.2025). BOI should also provide necessary infrastructure to CPEC based Chinese IPPs. This step would enhance the Industrial activities leading to higher electricity demand.

UPGRADATION OF TRANSMISSION LINES UNDER PPP MODE

Under National Electric Policy 2021, NEPRA should undertake the project of upgrading existing transmission lines in phased manner. First upgrades should be undertaken to the extent that the gap between peak summer demand and transmission capacity can be bridged. As a second priority, necessary upgrades to transmission/distribution lines to SEZs, industrial states, and units should be made. This would reduce T&D losses and control circular debt.

PROMOTE ELECTRIC VEHICLE POLICY

Under National Electric Vehicle Policy, Government should provide necessary recharging infrastructure, provide subsidies and tax exemptions on EV procurement. Government needs to provide incentives to local and international manufacturers to establish EV production facilities in Pakistan. This would reduce the Pakistan's dependence upon imported oil and will increase electricity demand resulting into reduction of electricity tariff.

REDUCTION OF MANAGEMENT FEE ON IMPORT OF LNG/RLNG

Currently, PSO is charging 2.5% Management Fee on import of LNG/RLNG which makes it further expensive for local domestic and Industrial consumption. OGRA may take the matter with PSO and other LNG/RLNG importing companies to reduce the management fee for reduction in its local price for enhancing its use as Fuel for power generation.

PROMOTE ENERGY CONSERVATION AND EFFICIENCY

Under National Energy Efficiency and Conservation Policy 2023, The Government should encourage energy efficiency and conservation by launching programs like UJALA 2015 in India. Such programs should subsidize the use of LED bulbs for promotion of clean and efficient energy

RESOLUTION OF DISPUTES BETWEEN FEDERAL AND PROVINCIAL GOVERNMENTS

The 18th Amendment has allowed provinces to generate their own power. Provinces are now moving forward with their independent power generation system, transmission networks alongside establishing 'provincial power tariff determining authorities' to bypass the federal transmission systems. Such disputes should be resolved through effective utilization of CCI.

REVISION OF IGCEP 2024-34 TO PROMOTE RENEWABLE ENERGY

Under Alternative and Renewable Energy Policy 2019, Government plans to enhance Renewable Energy up to 30% in Energy mix. However, Integrated Generation Capacity Expansion Plan 2024-34 has proposed Renewable Energy target from 30% to 12.9%. NTDC needs to revise the IGCEP to align it with the Alternative & Renewable Energy (ARE) Policy 2019 by increasing the share of renewable energy such as solar and wind, while reducing the reliance on costly and delayed Hydropower projects.

REVIVAL OF OIL & GAS EXPLORATION SECTOR

Federal Govt should reduce/rationalize Windfall Oil Levy imposed upon Oil & Gas Exploration companies to enhance their profit margins for encouraging investment in this sector. Similarly, Exploration companies should also be provided adequate security specially in KPK and Baluchistan regions. This would reduce dependence on imported oil and will reduce electricity tariff due to low-cost indigenous Gas and Oils.

APP BASED THEFT REPORTING SYSTEM FOR REDUCTION OF UFG LOSSES

To mitigate Unaccounted for Gas losses, an App based Theft Reporting Mechanism with credit points for Whistle Blowers may be introduced to check UFG losses followed by deploying smart meters enabling accurate consumption monitoring and theft detection.

LOG FRAME

Action	Lead Implementer	Time
DEVELOPMENT OF INDEPENDENT ELECTRICITY MARKET	**Ministry of Power, NEPRA**	**3-5 years**
RENEGOTIATIONS OF PPAS WITH THE IPPS	**Ministry of Power**	**Immediate**
INTRODUCTION OF SMART METERING	**NEPRA**	**1-2 Years**
PRIVATIZATION OF DISCOs FEEDERS	**Ministry of Power, NEPRA**	**1-2 Years**
INDEPENDENT BOARDS OF THE DISCOS.	**NEPRA**	**Immediate**
REMOVAL OF GST FROM CAPACITY PAYMENT	**Ministry of Power, FBR**	**Immediate**

REDUCTION OF TAXES IN ELECTRICITY TARIFF	**Ministry of Power, FBR**	**Immediate**
IMPLEMENT THE WACOG LAW 2022	**OGRA, Ministry of Petroleum**	**Immediate**
INTRODUCTION OF PRIVATE SECTOR OWNERSHIP OF NEW GAS DISCOVERIES	**OGRA, Ministry of Petroleum**	**2-3 years**
GRADUAL SHIFT OF GAS FROM CPPs TO EFFICIENT GAS BASED GENERATION PLANTS	**NEPRA, OGRA, Ministry of Petroleum & Power**	**2-3 Years**
Operationalization of SEZs for Industry Revival	**BOI**	**2-5 years**
Upgradation of Transmission Lines Under PPP Mode	**NEPRA**	**2-3 years**
Promote Electric Vehicle Policy	**Ministry of Power, NEPRA**	**2-5 years**
Reduction of Management Fee on Import of LNG/RLNG	**OGRA**	**Immediate**

Promote Energy Conservation and Efficiency	**Ministry of Power**	**2-5 Years**
Resolution of Disputes between Federal and Provincial Governments	**CCI, Cabinet**	**Immediate**
Revision of IGCEP 2024-34 to Promote Renewable Energy	**Ministry of Power & Petroleum**	**Immediate**
Revival of Oil & Gas Exploration Sector	**OGRA, Ministry of Petroleum**	**2-5 Years**
App Based Theft Reporting System for Reduction of UFG Losses	**OGRA, SNGPL, SSGPL**	**Immediate**

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