

# THE FUTURE OF NATURAL GAS IN PAKISTAN: A REVIEW OF POLICY FRAMEWORK

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## **ABSTRACT**

Pakistan relies heavily on natural gas for its energy needs, accounting for nearly half of its primary energy supplies. The production of natural gas in Pakistan matched consumption until 2010, and domestic reserves provided the entire gas supply. Later, excessive reliance on gas led to gas shortages, which began to affect the economy. Pakistan began importing RLNG in 2016 to meet rising demand. The imports initially relieved the economy from gas shortages, but soon, looming sectoral debt surfaced, crossing Rs. 2.6 trillion within a few years. This study examines Pakistan's natural gas sector to identify key policy bottlenecks affecting its performance. In a highly regulated environment, the policy framework is pivotal in shaping investment decisions. The study focuses on the upstream and downstream gas sectors and involves both qualitative and quantitative analyses. The gas sector's situation analysis identifies key issues and uncovers policy inconsistencies. Later, the qualitative analysis finds stakeholders from across private companies and federal/provincial public agencies. We find that policy incoherence and flaws in demand projection have shaped the natural gas crisis in Pakistan. In view of the foregoing consumption trends post the mid-2010s, demand estimates ignored the gradual reduction in RLNG price impact on demand. To put it briefly, the findings suggest that adherence to market principles for gas allocation and pricing is essential for a vibrant gas sector and to phase out circular debt. More specifically, the sector's financial viability involves synchronized planning, accounting for the energy and economy, and developing wholesale gas and electricity markets.

**Key Words:** Natural Gas; Pakistan; Circular Debt; RLNG; Price.

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## ABBREVIATIONS

APTMA	All Pakistan Textile Mills Association
AT&C	Aggregate Technical and Commercial
cft	cubic feet
CHP	Combined Heat and Power
CNG	Compressor Natural Gas
CPPA-G	Central Power Purchasing Agency (Guarantee) Limited
CTBCM	Competitive Trading Bilateral Contract Market
DGPC	Directorate General Petroleum Concession
E&P	Exploration and Production
ENI	<i>Ente Nazionale Idrocarburi</i> (An Italian Multinational Energy Company)
ETPL	Elengy Terminal Pakistan Limited
EU	European Union
FY	Fiscal year
IEA	International Energy Agency
IP	Iran Pakistan (gas pipeline)
ISGS	Inter-State Gas System
KPOGCL	KP Oil and Gas Company Limited
LMKR	LMKR Tech. Company
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
mcf	million cubic feet per day
MMBTU	Million British Thermal Unit
MPCL	Mari Petroleum Company Limited
NDRC	National Development and Reform Commission
NTDC	National Transmission and Dispatch Company
OGDCL	Oil and Gas Development Company Limited
OGRA	Oil and Gas Regulatory Authority
PLL	Pakistan LNG Limited
PPIB	Private Power Infrastructure Board

PPL	Pakistan Petroleum Limited
PSO	Pakistan State Oil
RLNG	Re-Liquified Natural Gas
SNGPL	Sui-Northern Gas Pipeline Limited
SPA	Sale and Purchase Agreement
SSGC	Sui-Southern Gas Company
TAPI	Turkmenistan Afghanistan Pakistan India (gas pipeline)
TDS	Tariff Determination Subsidy
UEPL	United Energy Pakistan Limited
UFG	Unaccounted for Gas
VECM	Vector Error Correction Model
WACOG	Weighted Average Cost of Gas

## INTRODUCTION

Natural gas is a relatively less-polluting fossil fuel and a preferred energy source for most economies worldwide. Pakistan has relied extensively on natural gas to meet its energy needs for many decades. The country's natural gas sector is regulated upstream and managed downstream by the public utilities. These utilities distribute gas to consumers across different sectors in line with the government's allocation and pricing policy. The domestic natural gas sector is facing severe supply-side challenges due to various policy issues, including cross-subsidization, high gas utility returns, political interference, and bureaucratic hurdles, which have led to financial unsustainability and the accumulation of circular debt.

There are significant interlinkages between the electricity and natural gas sectors, as both are substitutes. Similarly, the upstream and downstream sectors are closely linked, so that planning lapses in one sector affect the overall performance of both. Economic literature often overlooks economies with resource-poor upstream sectors and tends to focus on resource-abundant ones. Economies have adopted different models of public-private contracting in exploration and production (E&P) operations, including tax-royalty systems, production-sharing contracts, service contracts, and joint ventures. The choice of models depends on a country's resource base, domestic market size, regulatory setup, and political and economic status.

Pakistan is considered an energy-deficient country, with per capita energy consumption well below the global average. Energy demand is growing steadily, and the economy has shown an insatiable appetite for natural gas during the last two decades. Pakistan's petroleum policy, given by the Ministry of Energy (Petroleum Division), plays a crucial role in devising a pathway to energy security. The government adopted a growth plan based on natural gas amid the successful E&P operations during the 1990s and 2000s (GOP, 2005). Domestic reserves and production met the entire natural gas demand at that time. Pakistan faced a dual energy crisis around 2010: a power shortage and a global oil price hike that led to an excessive demand for natural gas. Therefore, natural gas reserves could not support the rising demand and depleted rapidly during this period. As a result, the government began importing re-liquefied natural gas (RLNG) in 2016. It helps overcome the gas shortage, but an expensive gas blended with the domestic, less expensive gas made the subsidized tariff structure a fiscal fiasco.

This study examines the entire value chain of the natural gas sector, from upstream production and RLNG imports to downstream distribution and pricing, covering policies across all aspects. The methods involve analyzing energy-sector data and conducting key informant interviews with energy-sector experts. The data analysis uncovers some discrepancies in policies and planning. The findings of qualitative analysis suggest developing the natural gas market and minimizing the government's regulatory role. The gas sector situation aggravated due to attempts to address issues on an ad hoc basis, resulting in a rising government debt burden. There are capacity issues in the ministry, the regulator, and the gas utilities, posing serious challenges due to inadequate demand and growth projections. There seems to be a push in the public sector to conduct most market operations within government. Furthermore, the decisions seem incoherent, highlighting the importance of integrated energy planning.

## 1.1. Background and Problem Statement

Pakistan has been striving to increase domestic natural gas production through a comprehensive incentives package that encompasses E&P policy guidelines for petroleum, tight gas, and offshore resources for the last few decades. These incentives paid off largely for onshore exploration and production. Natural gas became consumers' favorite energy source in Pakistan because it was heavily subsidized and offered lower prices than substitutes. To distribute gas, utilities established an extensive downstream infrastructure spanning thousands of kilometers of pipeline. Pakistan is one of the few countries where piped natural gas supply to households covers more than 1/5 of households.

During the 2000s, domestic gas was considered a potential substitute for oil imports, particularly in response to the oil price hike. The Gas Allocation and Management Policy 2005 prioritizes households and Commercial sectors, followed by Fertilizer, manufacturing Industries, power generation, and transport (CNG).<sup>2</sup> Hence, successive regimes expanded natural gas connections to households, industries, and the transportation sector by expanding downstream infrastructure. Natural gas demand steadily rises across all sectors, while reserves gradually decline as new gas discoveries are unable to sustain production rates. Therefore, the country confronted frequent gas supply shortages, and utilities took immediate actions, including gas load shedding for households, curtailing compressed natural gas (CNG) supply to the transport sector, and denying gas supplies to certain industries, such as the cement industry.

Facing a decline in domestic gas production, the government began exploring alternative import options to address the shortage in the 2010s through various projects, including Liquefied Natural Gas (LNG) imports and pipeline projects such as the Turkmenistan-Afghanistan-Pakistan-India (TAPI) and Iran-Pakistan (IP) pipelines. The pipeline projects could not materialize due to geopolitical challenges; therefore, the government introduced the LNG Policy 2011, which provided guidelines for initiating LNG imports in 2016 to address the natural gas demand-supply gap. The private sector invested significantly in establishing two regasification terminals at Port Qasim, Karachi, and the government started importing RLNG to generate electricity. Pakistan State Oil (PSO) and a public sector agency, namely, Pakistan LNG Limited (PLL), incorporated under the Pakistan Companies Ordinance 1984, manage the LNG import for the Ministry of Energy (Petroleum Division).

Public utilities cross-subsidize gas-consuming categories downstream, meaning that some consumers (e.g., industry and commercial users) subsidize others (e.g., low usage households, power, and the fertilizer industry). Table 2 shows how gas consumption shares become unfavorable for the utilities to recover the cost of gas supply. Cross-subsidization worked well prior to 2020. LNG imports escalated the gas tariffs, and consumers' solar adoption enables them to avoid expensive gas, which eventually widens the demand-supply gap to excess supply in the system. To wit, because of access

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<sup>2</sup> Natural gas use for transportation sector was most widely accepted public decision and 4 million vehicles installed CNG kits in cars while more than 3000 filling stations were established in the private sector over a period of one decade.

to solar technology, high-tariff consumers switch from natural gas to electricity. The contemporary issues with the natural gas sector can be summarized as follows.

- i. Domestic gas wells are getting dry rapidly
- ii. An abrupt shift to imported RLNG raises the cost of supplying gas as the government has made long-term contracts to import 12 cargoes of RLNG annually for the next 15 years.
- iii. Public utilities are inefficient and do not recover the cost of RLNG.
- iv. The government has to sell gas to consumer categories with subsidized tariffs.
- v. Public utilities have laid massive pipeline infrastructure with waning indigenous gas reserves, which implies, *ipso facto*, that relying on natural gas is a plausible option for Pakistan's economy in the near to medium-term.
- vi. The 18<sup>th</sup> Amendment poses challenges for the utilities to implement WACOG tariffs.

Overall, Pakistan's upstream sector is characterized by onshore E&P activities with insufficient investment and few large discoveries, resulting in a decline in natural gas reserves (Appendix I). Various studies have identified probable unconventional natural gas and oil reserves that can be tapped by investing substantial sums, as the conventional gas reserves are depleting rapidly (see Table 1). Waning reserves indicate declining gas production rates expected to be 2,300 mcf/d by 2030, compared with above 4,000 mcf/d in most years of the 2010s (GOP, 2023). Some studies suggest that public policies related to petroleum exploration and production have a substantial impact on upstream sector output, including reserve additions and fossil fuel extraction. Drilling exploration wells and rigs require significant investments contingent on economic incentives and financial terms, such as tax and royalty rates, as well as other oil and gas production and price regulations (Jamil, 2024). Therefore, all previous petroleum policy documents sought to attract investment in the indigenous upstream sector by offering more favorable economic terms.

The first petroleum policy of Pakistan, introduced in 1991, was based on fuel oil pricing and included procedural advancements and incentives-oriented regulation. Later, the Petroleum Policy of 1993 linked the wellhead prices of domestically produced oil and gas to crude oil, rather than fuel oil, a practice that remains in effect. The 1994 policy was the most comprehensive and successful in reviving Pakistan's upstream sector. This policy included green area mapping and divided the upstream sector into three zones based on potential resources and associated geological risks (Ghouri, 1996; Jamil, 2012). However, the federal government agency awarding the blocks did not require any clearance from provincial governments or security agencies within the green areas, as resolved in the 18<sup>th</sup> amendment.

The Petroleum Policy of 1994 opened new avenues for investment in Pakistan's E&P sector, making it attractive to large E&P companies. Moreover, the policy introduced a mechanism for expeditious disposal of applications for the grant of exploration licenses, which became part of all subsequent policies. The income tax rate set in the 1994 policy was 50–55%, and the 12.5% royalty rate was quite regressive, leaving too much for the investor, especially when producing gas from a high-yield field. Overall, the 1994 Petroleum Policy was successful in attracting foreign E&P companies and in providing the government with a guaranteed revenue stream during the early stages of production. However, it was realized that the policy discouraged the development of marginal fields.

Table 1: Province-wise Natural Gas Reserves in 2012 and 2024 (Billion Cubic Feet)

Province	Total Recoverable Reserves		Cumulative Production		Remaining Reserves	
	2012	2024	2012	2024	2012	2024
Balochistan	19,670	15,508	12,527	13,037	7,143	2,471
Khyber Pakhtunkhwa	2,637	2,274	411	1,505	2,227	769
Punjab	2,432	3,424	1,010	1,900	1,422	1,524
Sindh	31,280	42,104	15,421	25,917	15,859	16,187
Pakistan	57,378	63,311	30,465	42,360	26,912	20,951

Source: HDIP (various issues) Pakistan Energy Yearbook.

Table 2: Sector-wise Natural Gas Consumption Patterns in 2012 and 2024 (Percent)

Consumer Category	2012	2024
Residential	24	25
Power Generation	20	32
Manufacturing Industry and Captive Power	27	14
Fertilizer	14	23
Commercial Sector	4	1
Transport Fuel (CNG)	11	2

Source: GOP (2023).

The wellhead gas price in Pakistan is comparable to that in India, where the gas producer price is \$4.2/MMBTU when the crude price is greater than or equal to \$60/barrel ceiling. A major source of energy in India is coal (67.7%), followed by petroleum products (25%) and natural gas (5%), as of 2010. On the contrary, Pakistan's primary energy source is natural gas. In the context of economic incentives, India offers a 7-year tax holiday for commercial discoveries, with no production bonus. In contrast, Pakistan's government takes approximately one-quarter of companies' revenue in the form of production bonuses, social benefits, and training. In the 2024 amendment to the 2012 Petroleum Policy, the Zone-0 remains an additional field open for offshore exploration activities. Pakistan's gas sector is more like that of Bangladesh. Both countries face the same issues, including declining domestic gas reserves and production, high losses, and widening supply imbalance.

Put simply, investors' incentive is to have their risk-taking rewarded. Hence, an analysis of different policy regimes helps identify the policy bottlenecks that hinder investment. One argument is that political and security conditions, as well as resource scarcity, are the primary drivers of declining investment in the upstream sector, leading to lower reserves and production rates. One can argue that petroleum policy has a significant impact on investment in Pakistan's upstream oil and gas sector. However, law and order, the overall business environment in the country, and political and economic instability do affect upstream activities (Jamil, 2024). Therefore, the study covers all relevant policies outlined in Table 4 to identify policy inconsistencies.

## 1.2. Objectives and Outline of the Study

This study highlights an overlooked and significant angle to the upstream gas sector: the interlinkages between upstream and downstream, and energy source substitution between solar electricity and natural gas. In particular, a deviation from market-based allocation and pricing in a resource-scarce scenario creates fiscal burdens. There is evidence of strong interlinkages between upstream and downstream output in Pakistan's gas sector. In the upstream sector, where private

operators are pursuing exploration and production, the financial motive is straightforward: E&P companies are incentivized to maximize net revenue and profits.

Therefore, the competition in the regulatory framework drives drilling operations and ultimately determines discoveries and production. However, it is less obvious that this will be a case of gas distribution, where a centrally managed system is in place, and the rate of return is not linked to output but rather to the existing infrastructure of grids and pipelines. The government is influenced by the political goals and elite capture in designing allocation and pricing decisions. The Oil and Gas Regulatory Authority (OGRA) cannot deliver its role due to limited mandate and capacity constraints. The government makes the ultimate allocation and tariff decisions.

In this background, our study examines the future of natural gas in Pakistan and identifies the ways to make the energy supply technically viable and financially sustainable. The following are the broader objectives of this research.

- ✓ To study the pattern of natural gas demand and supply
- ✓ To examine the role of policy incentives on upstream sector output
- ✓ To find the significant causes of circular debt in the gas sector
- ✓ To find the scope for substituting solar power for natural gas
- ✓ To evaluate the impact of rooftop solar adoption on the natural gas sector's performance

To achieve these objectives, we conducted quantitative analyses to identify core gas-sector issues across the upstream and downstream sectors. The findings of this analysis raise serious questions that can be addressed by consulting energy sector experts and practitioners in both the public and private sectors. For this purpose, we collected qualitative data through interviews with stakeholders from the government, industry, and regulator to identify issues and solutions for an economically sustainable future for the natural gas sector in Pakistan. These interviews were conducted using the unstructured questionnaire provided in the Appendix. The sampling strategy focuses on gathering perspectives from all relevant stakeholders, and a list of organizations and executives/managers is provided in the appendix. Wellhead gas price is found to be the most significant variable determining the E&P operations. Once policymakers understand the sensitivity of drilling activities to changes in wellhead prices and taxes, they can design more effective policies that optimize drilling efforts and resource development.

Pakistan has large and prospective basins, with a sedimentary area of 827,268 square kilometers. The Ministry of Energy (Petroleum Division) invites bids for blocks comprising specific areas and awards exploration licenses and production leases. The commercial and regulatory roles of the government are separated by establishing a government holding company and restructuring OGDCL. All import duties for exploration equipment were removed in the 1993 policy; however, subsequent policies imposed a 3% fee on imported equipment in the event of a commercial discovery. The 2012 policy set the royalty rate to 12.5% of the value of petroleum at the field gate. The income tax was set at 40% of the profit or gains. The Windfall Levy is calculated based on the net production and the market price of crude oil. Table 3 highlights the economic terms and liabilities for the E&P companies. Apart from the wellhead gas price, these terms remain unchanged in all subsequent petroleum policy documents.

The literature suggests that Pakistan's natural gas crisis stemmed primarily from price caps on natural gas. These caps lead to supply shortages and market inefficiencies. Pakistan's major discovery was in Sui in the 1960s, and the government has made the allocation and pricing decisions for gas. The tariffs for gas users were lower than those for substitute fuels. Various past studies find the demand elasticities of natural gas in Pakistan (Burney & Akhtar, 1990; Khan, 2015; Javid et al., 2022). Most of these studies find that natural gas demand remains income- and price-inelastic until the 1990s and becomes price-elastic, thereafter, suggesting that correcting price distortions can solve most of the gas sector's issues.

To strip the gas crisis in Pakistan to its barest essentials, this paper focuses on the natural gas market, covering both demand and supply sides. This study offers new perspectives on contemporary issues in Pakistan's gas sector. The study identifies policy anomalies in the downstream gas sector, limiting utilities' capacity to recover costs and accumulated circular debt, from which further analyses proceed. Therefore, we qualitatively study sectoral issues in an integrated way to examine the relationship between petroleum policy and gas production, accounting for downstream inconsistencies. It is hardly the case that research fails to identify policy flaws.

Table 3 Fiscal Terms in Subsequent Petroleum Policies 1994, 1997, 2001, 2007, 2012

Zone/Region	Income Tax	Royalty	Production Bonus		Trainings**	Social Welfare Program	
			Production MMBTU*	Amount (000, \$)	Onshore	Production (000, BOE/d)	Amount (000, \$)
<b>Zone I (High Risk, High Cost)</b>	40%	12.5%					
<b>Zone II (Medium risk, High Cost)</b>			01	500	Exploration: \$25,000	Less than 2	50
			30	1000	Production: \$50,000	2-5	100
<b>Zone III (Low risk, Low Cost)</b>			60	1500	<b>Offshore</b>	5-10	200
			80	3000	Exploration: \$25,000	10-50	400
			100	5000	Production: \$50,000	More than 50	700

\* On the commencement of commercial production.

\*\* Training should be provided to build the capacity of Pakistani officials from the Ministry of Energy.

Source: Policy Documents (Petroleum Policy 1994, 1997, 2001, 2012).

Table 4 Natural Gas Sector and Public Policy Framework

Sector	Key Operators	Regulator	Relevant Policy
<b>Upstream</b>	Exploration and Production (E&P) Companies <ul style="list-style-type: none"> <li>Public companies, e.g., OGDCL</li> <li>Private companies, e.g., PPL</li> </ul>	Directorate General Petroleum Concession (DGPC), Ministry of Energy (Petroleum Division)	Successive Petroleum Policy 1993, 1994, 1997, 2001, 2007, 2012
<b>Natural Gas Imports</b>	Pakistan LNG Limited (PLL) is responsible for importing, purchasing, supplying, distributing, and selling LNG to consumers. Inter State Gas Systems (ISGS)*	Oil and Gas Regulatory Authority (OGRA)	Liquefied Natural Gas (LNG) Policy, 2011
<b>Midstream Downstream</b>	<ul style="list-style-type: none"> <li>Sui-Northern Gas Pipeline Limited (SNGPL)</li> <li>Sui-Southern Gas Company (SSGC)</li> <li>Power Generators/ IPPs</li> <li>CPPA/NTDC</li> </ul>	Oil and Gas Regulatory Authority (OGRA)	Natural Gas Allocation and Management Policy, 2005  18 <sup>th</sup> Constitutional Amendment

\* The Iran-Pakistan (IP) Natural Gas Pipeline project is in progress. There have been no imports yet.

Source: Author's compilations.

## LITERATURE REVIEW

This study pragmatically reviews existing research on the economics and policy of natural gas, identifying several upstream and downstream aspects, with particular emphasis on pricing, tax structures, and institutional inefficiencies. It is imperative to understand the general determinants of public policy governing the provision of certain commodities through public utilities in many developing countries. Many studies highlight the relationship between resource management and economic policies, reiterating the need for optimal exploration rates and promoting deregulated wellhead prices. Policy regulations, pricing strategies, and technological advancements have a direct bearing on exploration and production.

According to resource allocation models, natural gas would be consumed until the marginal cost (MC) of additional use exceeds the MC of substitute resources, such as coal or solar. The research on gas sector distortions covers the price controls, subsidies, taxes, and discretionary allocations by the public utilities. This literature is informative, but unless one allows the market to function, it is of partial value as a basis for policy reforms. Natural gas prices are generally pegged to volatile crude oil prices, which are affected by geopolitical and economic events. Natural gas demand is mostly dependent on the upstream activity, gas availability, and prices. Over the past few years, utilities' decisions on allocation, pricing, and capacity choices have created uncertainty about natural gas demand (Hollas, 1994). Although the demand elasticity of natural gas prices is negative, there are wide variations in magnitudes across economies and are deemed less reliable, since demand is constrained by block-wise tariffs and by the extensive potential of cross-substitution between electricity and natural gas, especially after the rooftop solar revolution (Lavín et al., 2011).

Another issue with the supply from public utilities is their inefficiencies. Dal Bó & Rossi (2007) show that public utilities remain uneconomical, rely on public subsidies, and employ more inputs to produce a given level of output. The distortionary effect is huge, driven by scale effects and structural weaknesses that divert managerial effort away from factor coordination. These inefficiencies and misallocations downstream affect upstream operations in the long run, despite the short-term economic benefits of fossil fuel exploration and production. Many early studies highlight declining exploration rates as the main driver of energy shortages and price hikes and recommend deregulated wellhead prices to curb them (MacAvoy & Pindyck, 1973; Brown, 1985). These studies suggest that market-determined prices would incentivize companies to invest in exploration, leading to higher reserves and production levels. Many studies suggest that deregulating the E&P industry would increase production to meet market demand. E&P companies use futures prices rather than spot prices when planning their exploration rates and development; thereby, new rig productivity affects both drilling activity and energy prices (Brown, 1985; Ansari & Kaufmann, 2019). Consequently, there is a move to deregulate wellhead prices and diversify energy sources in the US to mitigate supply shortages by fostering investment and innovation (Lee, 2004; Chen & Xu, 2019).

Generally, economies either manage the petroleum sectors through public utilities or regulate the E&P companies through comprehensive policy documents or rules. Countries differ in their regulatory policies and economic decisions based on the abundance or scarcity of energy resources within their territories. Rising international oil prices have negatively impacted Pakistan's balance of

payments and budget, contributing to inflation (Malik, 2021). Ciarreta & Nasirov (2012) find that a stable legal framework is essential for E&P to attract foreign investment, boosting exploration and production. In general, the economics of the upstream sector, in conjunction with downstream inefficiencies, is a rarely studied topic in academic literature, especially for the purpose of comparing policy perspectives.

The debate on the role of market and regulatory structures in the upstream sector dates to the early 1970s, following the oil crisis. In a seminal study, Nordhaus (1973) emphasizes the role of markets in resource allocation. Some studies focus on the broader role of the market and government regulations. Many prior studies favor deregulating gas exploration in the US (MacAvoy, 1971; MacAvoy & Pindyck, 1973; Pindyck, 1978). MacAvoy (1971) shows that new reserves would be more than 40% greater if there were no wellhead gas price regulations. As recognized by Pierce (1983), the gas wellhead market is inherently competitive, and the introduction of regulation inevitably results in a substantial net reduction in social welfare.

Therefore, past literature emphasizes the importance of deregulation and reduced government influence in the market, which can contribute to public-sector inefficiencies. MacAvoy & Moshkin (1999) suggest that deregulation leads to long-term benefits, including improved production volume and reserves, and show that even without a deregulatory framework, factors such as natural gas prices, production volumes, and reserves tend to improve over time; however, the benefits are realized more quickly under a deregulated framework. Deregulation leads to price convergence in the long term, benefiting the consumers and enhancing industry efficiency (Klein & Sweeney, 1999; Asche et al., 2002; Arano & Velikova, 2010; Blake, 2012). For instance, the US shale gas boom, as discussed by Wang & Krupnick (2013), was fostered by government policies that promoted private entrepreneurship. Resource-rich countries, therefore, exercise greater control over their energy markets, effectively managing their abundant resources, enabling them to manipulate prices and supply to their advantage by expanding energy production and infrastructure to meet growing demand.

Even with this evidence, most countries regulate the energy industry, particularly the upstream sectors. The data suggest that in a regulated setting, pricing regimes can alter the incentives for private investment in the upstream sector by mitigating risk and increasing expected returns for E&P companies. To wit, price expectations adjust investment levels, and crude prices affect investment decisions to explore and produce from new fields (see MacAvoy and Pindyck, 1973; Iledare, 1995; Ghouri, 1996; Ringlund et al., 2008; Speitmann, 2023). Economic incentives, primarily the wellhead gas price, determine private investment in exploration activities, reserves expansion, and production. Natural gas that is unprofitable at \$3 per million British thermal units (MMBTU) would become profitable for an E&P company at \$6 per MMBTU. At a sufficiently high price, regions with poor prospects may also be considered by E&P companies for drilling test wells (Jamil, 2012).

Oil and gas exploration is a high-risk venture that involves uncertainties relating to sunk costs and the probability of discovering economically viable reservoirs. By allowing market-determined prices, companies have an incentive to invest in exploration, thereby increasing reserves and production levels. Deregulation improves resource efficiency and allocation, allowing processes to better reflect

supply-and-demand mechanisms. Moreover, higher potential returns from deregulated prices can accelerate technological advancements. Companies are more likely to invest in technologies that reduce costs and enhance efficiency, leading to the discovery of new reserves and alleviating supply shortages. Recently, Jamil (2024) examined drilling activities in Pakistan, investigating the impact of exogenous factors, including terrorism, LNG imports, and policy variables, and found that natural gas reserves respond positively to international crude oil prices and wellhead gas prices. The study finds that domestic gas reserves are elastic to wellhead gas prices. Various studies emphasize that addressing the challenges of security and terrorism remains pivotal to ensuring a stable and secure energy supply in the country (Jamil & Khan, 2021; GOP, 2023).

Most exploration wells end up as dry holes, whereas a few become tremendously successful. There may be other risk considerations, including global uncertainties regarding business cycles, geopolitics, and volatility in international energy prices, as the E&P sector is sensitive to these risks (Chorn & Shokhor, 2006). It signifies that lucrative economic terms are crucial to attract investment in the upstream sector. The existing literature points various important factors in determining the investment in upstream sector and gas production including; resource potential in the upstream, utilities' tariff and recovery in the downstream, tax structure, seasonal factors, law and order, and procedural aspects, but the foremost important is the wellhead price of the mined resource (see, for example, Iledare, 1995; Stern, 2005; Dismukes et al., 2006; Jain & Sen, 2011; Ciarreta & Nasirov, 2012). In most developing countries with moderate resource potential, downstream failures may affect the overall gas sector. However, we did not find much research on the downstream chaos that influences upstream activities.

## **POLICY FRAMEWORK AND SECTORAL PERFORMANCE**

Different countries adopt policy frameworks that best suit them. Many countries have concessionary agreements following the Tax-Royalty System. E&P companies obtain regulatory rights to explore and produce oil and gas in a specific area. If drilling becomes successful, the company will commercially manage the reserves and pay the agreed-upon taxes and royalties to the government based on production levels and revenue. Generally, policy covers tax and royalty rates, as well as other conditions related to upstream activities. Australia, the United States, Canada, and Pakistan adopted this model. Some other countries offer Production Sharing Contracts, in which the government retains ownership of petroleum resources and the E&P company is contracted to explore and produce them. Production is divided between the company and the government according to a pre-agreed formula after costs are deducted. Indonesia, Malaysia, and Nigeria adopt this model.

Some upstream sectors offer Service Contracts, under which companies are paid a fee for their services. The government retains ownership of the resources and the full revenue from production. The company may undertake exploration and development at its own risk and is reimbursed if minerals are discovered. Mexico and Iran adopt this model. Mexico is an interesting case that transitioned from production-sharing contracts to service contracts under its recent energy reforms. Many resource-rich economies, such as Norway, Brazil, and Russia, engage in joint ventures in which the government and the company form a partnership, often through a state-owned enterprise, and share the costs, risks, and profits of the project. These systems can include combinations of royalties, taxes, production sharing, and service elements tailored to the specific country context. The following are key considerations for selecting a regulatory system.

- a) Stability and Predictability
- b) Government Take
- c) Investment Climate
- d) Regulatory Framework

The decision to invest in drilling and other exploration activities is contingent on economic incentives offered by the states. These incentives include tax breaks, subsidies, and other financial tools that make upstream activities more attractive for investment. Taxation policies, including production taxes and royalty rates, play a crucial role in determining the profitability of exploration and gas operations. Public policies affecting exploration and production significantly affect the upstream sector's output. Resource prices can influence the timing of resource production (Jamil, 2012).

Pakistan's petroleum policy plays a crucial role in devising a pathway to energy security and securing the country's broader energy landscape. As Pakistan strives to increase its domestic natural gas production, challenges remain, including regulatory regimes, business cycles, technology constraints, governance, and climate change. Addressing these challenges remains pivotal to ensuring a stable and secure energy supply, given Pakistan's reliance on natural gas for nearly half of its energy needs (Yilmaz & Uslu, 2007). By promoting market-based allocation, private-sector investment, and technological innovation, we can navigate the complexities of the gas sector. In the lines below, we evaluate the evolution of the government's petroleum policies. In the 1960s, the producer price of

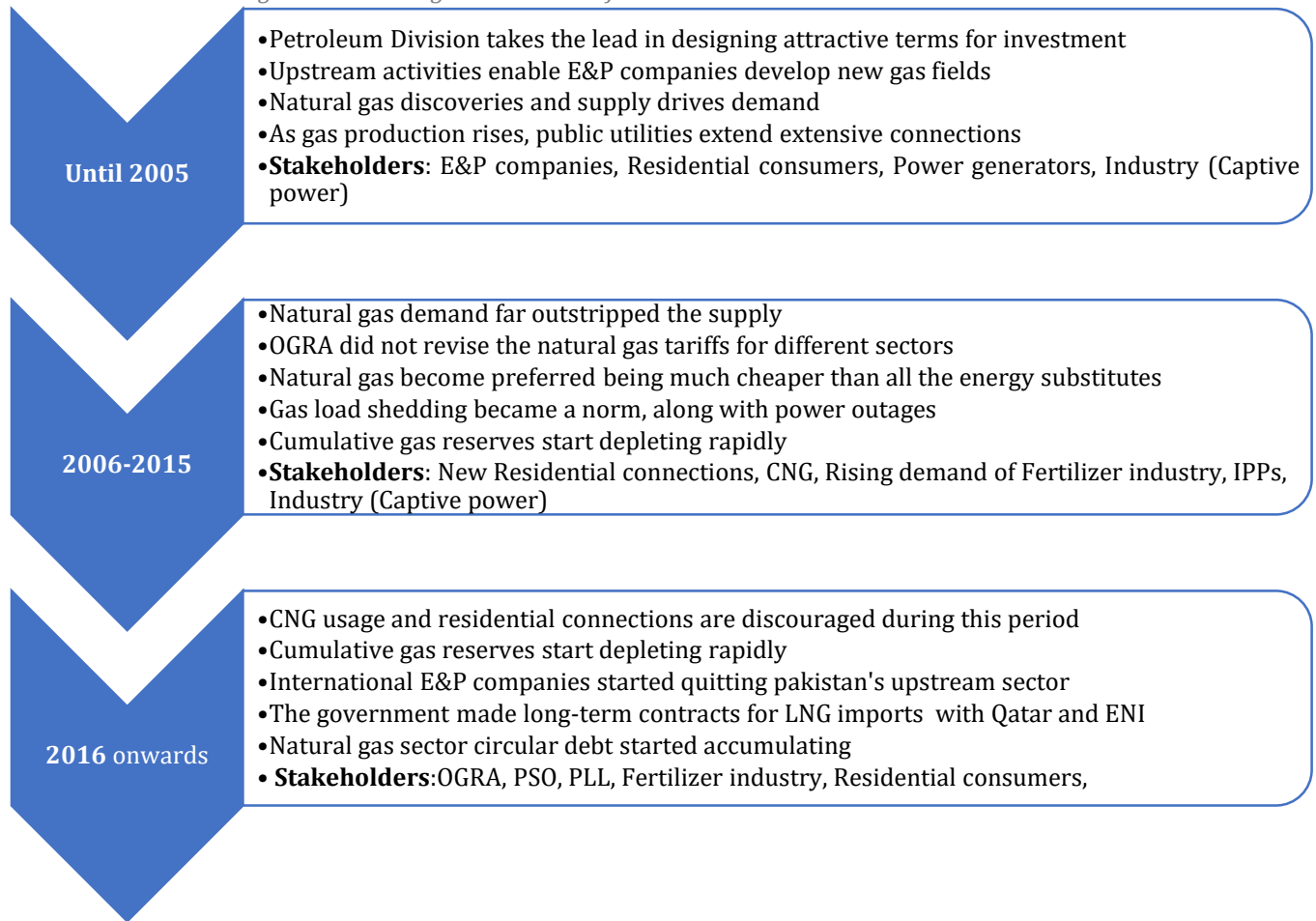
gas from the Sui and Mari gas fields was set on a cost-plus basis. The gas price agreement was signed between PPL and the Government of Pakistan for Sui gas in 1982 and for Mari gas in 1985. Historically, the gas price for private companies was revised as follows.

- **Post 1985:** 66% of the fuel oil price with a negotiated discount.
- **Post 1991:** 75% of the fuel oil price with a negotiated discount.
- **Post 1992:** 100% of the fuel oil price, less negotiated discount.
- **Post 1993:** 100% of fuel oil up to \$80/ton and 50% discount beyond \$80/ton.
- **Post 1994:** Zone I 77.5% of a basket of imported crude oil
- **Zone II:** 72.5% of a basket of imported crude oil
- **Zone III:** 67.5% of a basket of imported crude oil
- **1999–2000:** The cabinet approved a gas producer pricing package applicable to fields under the petroleum policies of 1994/1997. It sets a floor at \$10 and a ceiling at \$30.
- **Post-2001:** This policy revised the ceiling from \$30 to \$36, while keeping the floor intact at \$10.
- **Post-2009:** The ceiling was raised further to \$100, accompanied by higher discount rates. The 1994/1997 pricing method persuaded internationally reputed companies to invest in Pakistan. In doing so, indexation makes gas prices more inelastic than crude oil prices.
- **Post-2012:** The Petroleum Policy 2012 raises wellhead gas prices for discoveries. The gas price for new onshore discoveries increased to a maximum of \$6 to \$6.6 per MMBTU, which was a notable increase from the \$4.5 per MMBTU ceiling under the 2009 policy.

The policy framework for managing the energy sector comprises the Petroleum Policy 2012, which incentivizes upstream investment, and the Gas Allocation and Management Policy 2005, which prioritizes downstream sectors for natural gas consumption, including household, fertilizer, power, manufacturing, and transport. However, E&P decision-making, as well as downstream activities such as transmission and distribution, are controlled by federal agencies. The 18th Constitutional Amendment, passed in 2010, granted provincial governments powers over their natural resources. For instance, Article 172(3) reads, “*Any mineral oil and natural gas within a Province or the territorial waters adjacent thereto shall vest jointly and equally in that Province and the Federal Government*”.

In 2010, the 18th Constitutional Amendment introduced numerous reforms, transforming the modality of state functioning across various sectors by devolving powers and rights to the provinces. The Amendment is considered a landmark in the energy sector's decentralization. The upstream exploration and production sector and natural gas distribution were the most affected components. The overall energy sector was modified through the Articles [157], [161], and [172] of the Constitution of Pakistan (Jamil & Khan, 2021). This amendment enabled provincial governments to exercise greater regulatory control over the upstream oil and natural gas sector.

Figure 1 Chronological Overview of the Natural Gas Sector in Pakistan



Source: Author's compilations.

The Constitution of Pakistan allows the energy-producing provinces to prioritize their own energy requirements. The federal government would levy a federal excise duty [Article 158 of the Constitution of Pakistan].<sup>3</sup> Article [161/1(a)] entitled the province in which a wellhead is situated to take royalty on the produced volumes of natural gas. Article [172/3] is highly instrumental in determining resource ownership and states that the ownership vests jointly and equally between the concerned province and the federal government. This subsection led not only to equal sharing of revenues collected from oil and natural gas reserves located in the provinces, but also to equal representation of both parties on the Board of Directors. It implies that a province can influence the award of new exploration contracts. The upstream sector is regulated by the Directorate General of

<sup>3</sup> Article 158: Priority of requirements of natural gas: "The province in which a well-head of natural gas is situated shall have precedence over other parts of Pakistan in meeting the requirements from that well-head, subject to the commitments and obligations as on the commencing day."

Petroleum Concession (DGPC), which administers and regulates oil and natural gas production and wellhead prices. The downstream is regulated by the OGRA.

## METHODOLOGY AND DATA ANALYSIS

The primary objective of this study is to identify the core issues of Pakistan’s natural gas sector using a pragmatic approach. Therefore, the methodology for this research proposal involves a mixed method. Firstly, we review the scholarly literature and policy analyses, focusing on identifying investment in natural gas exploration and production. This approach involves a systematic review of policy papers, academic research, and government reports that provide information on investment in Pakistan's upstream sector. Secondly, we conducted 28 interviews with professionals and sector experts, including private E&P companies, DGPC, DG (Gas), OGRA, SNGPL, SSGC, Ministry of Energy (Petroleum Division), LMKR, OGDCL, PPL, APTMA, Pakistan LNG Limited, ISGS, Mari Petroleum Company Limited (MPCL), and Provincial energy departments of KP and Sindh. The interview data is used in qualitative analysis. We seek to identify the concerns and conflicting interests that collectively harm the sector.

### 4.1. Situational Analysis and Stakeholders’ Mapping

This analysis covers both sides of the gas market: demand and supply. As shown in Table 2 above, electric power and residential sectors are the largest consumers of natural gas, followed by the fertilizer industry. There are many inconsistencies in the natural gas allocation and pricing, driven by the political economy and elite capture, in which the regulator succumbs to the industry it regulates. On the supply side, significant challenges include security and law and order, limited exploration and development opportunities, a lack of scale economies, and governance issues that add to the cost of E&P companies (Jamil, 2024).

Currently, the upstream gas production is dominated by Government companies, namely MPCL, OGDCL, and PPL, while the responsibility for gas marketing, transportation, and distribution lies with partially government-owned gas utilities SSGC and SNGPL. In contrast to most gas distribution companies, which generate profits based on output, Pakistan’s SSGC and SNGPL derive returns from existing infrastructure. This practice presents a significant challenge. Table 5 shows that gas connections increased while gas delivered decreased across different sectors during 2018-19 and 2023-24. In particular, subsidies on gas prices to different downstream sectors put pressure on the upstream resource base. A pragmatic gas pricing policy can help the economy achieve various objectives, including incentivizing new investments to increase domestic gas reserves and ensuring infrastructure to minimize system losses (Jamil, 2024).

*Table 5 Gas Consumers and Consumption Trends in Pakistan*

Consumer Category	Number of Consumers (Thousand)		Natural Gas Consumption (Million Cu. Ft)	
	2018-19	2023-24	2018-19	2023-24
Domestic Sector	9,623.7	10,682.6	311,887	300,583
Commercial	84.5	87.8	31,205	16,232
Industry	10.9	11.1	245,958	171,851

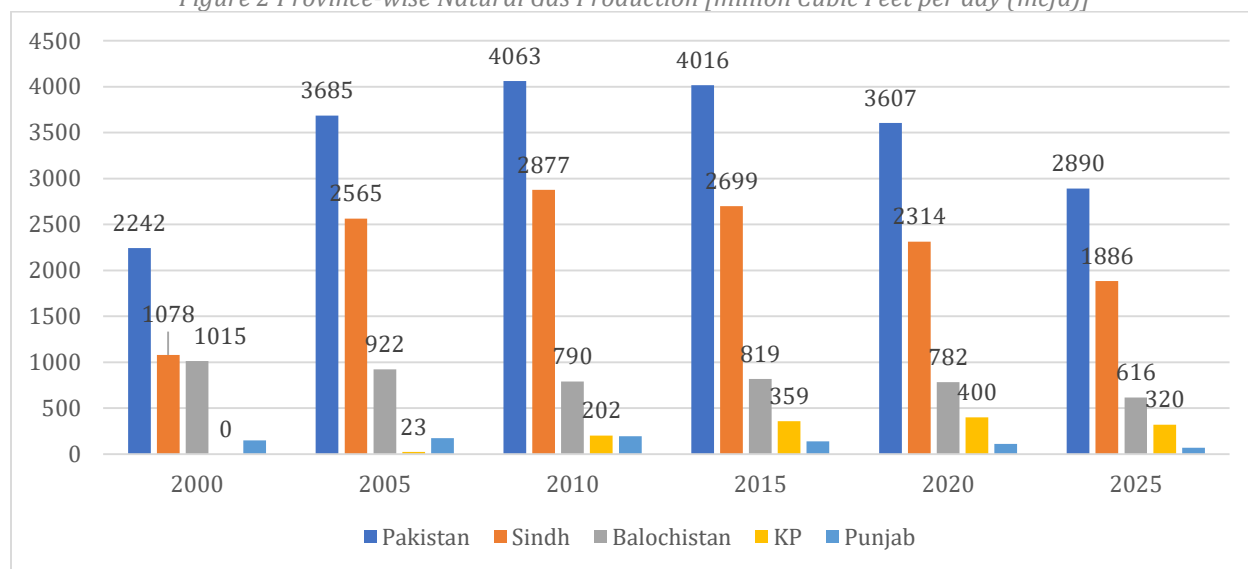
*Source: Pakistan Energy Yearbook (various issues), HDIP.*

Figure 2 highlights the looming shortages in gas production. A severe gas sector crisis has been brewing in the country, where demand is price-sensitive, and supply has been import-dependent for

the last decade. This is primarily due to declining reserves, falling production, and given demand, particularly for household cooking, heating, and urea production. Consequently, the government's provision of expensive liquefied natural gas (LNG) to domestic users at subsidized rates has exacerbated the circular debt, creating management challenges. High international LNG prices, particularly in winter, also pose a threat to the sector's financial stability. Table 6 shows Pakistan's RLNG imports and a significant import bill.

Pakistan's gas production peaked at 1,487 billion cubic feet in 2010 after a period of considerable growth driven by E&P activities and the Sui reserves. Since then, production has declined steadily. The reasons for this decline are multifaceted: a slowdown in E&P operations, a lower probability of discovering major new fields, law-and-order issues in gas-rich areas, and policies discouraging investment in exploration. Historically, most of the gas was produced in Sindh and Balochistan; however, these reserves are now largely depleted. Although production has recently begun in Khyber Pakhtunkhwa, it is currently insufficient to meet the country's demand.

Figure 2 Province-wise Natural Gas Production [million Cubic Feet per day (mcf/d)]



Source: Pakistan Energy Yearbook (various issues), HDIP.

Table 6 Annual LNG Import and Import Bill

Year	MMBTU	Billion USD
2018-19	373,410	3.392
2019-20	348,587	2.559
2020-21	415,638	2.659
2021-22	397,966	4.929
2022-23	337,314	3.767
2023-24	381,814	3.879

Source: Pakistan Energy Yearbook (various issues), HDIP.

The produced gas from dedicated fields is distributed to end users in two ways: (i) Sui Company's pipeline system, and (ii) dedicated gas directed from gas fields of MPCL, PPL, and OGDCL etc., to power and fertilizer plants. The production data for Pakistan's upstream sector reveal notable

structural shifts in the industry. Historically, major producers such as OGDCL and PPL dominated national output. However, their production volumes have declined considerably from peak levels, reflecting both natural field depletion and broader operational challenges (See Table 7). In contrast, certain operators—most prominently MPCL and the relatively recent entrant United Energy Pakistan Limited (UEPL)—have demonstrated sustained or accelerated growth, partially offsetting the reductions from legacy fields. Meanwhile, several companies, including BP, OMV, Petronas and Tullow, have quit Pakistan’s upstream sector during the last decade. Collectively, these trends underscore an ongoing transformation in Pakistan’s upstream sector, marked by shifting market shares, resource maturation, and evolving strategic priorities among industry participants.

*Table 7 Gas Production by Company (million cubic feet)*

<b>Company</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2024</b>
<b>BHP</b>		94,273	185,048	64,657		
<b>OPPL</b>					9,656	2,442
<b>Deewan</b>			6,411	5,491	1,915	984
<b>Prime (Pak.)</b>	21,433	142,140	161,099	158,405	69,640	30,353
<b>Hycarbex</b>		-	-	1,298		
<b>MPCL</b>	146,943	162,263	180,695	225,094	255,386	327,215
<b>UEP Beta</b>		202,298	161,086	102,638	37,157	30,405
<b>MOL</b>		4,927	65,350	96,679	110,562	89,005
<b>OGDCL</b>	200,666	312,298	314,181	426,472	376,611	322,422
<b>OPL</b>	2,693	23,882	3,504	2,734	575	535
<b>PEL</b>		6,352	10,489	6,842	9,728	3,652
<b>UEP Alpha</b>					9,425	4,417
<b>Petronas</b>		2,405	5,863			
<b>OMV Maurice</b>				12,481		
<b>POGC</b>				3,554	14,048	21,249
<b>POL</b>	14,078	15,162	8,894	4,408	4,328	2,797
<b>PPL</b>	344,307	291,494	289,410	232,737	249,844	204,387
<b>Tullow</b>	8,122	3,450	560			
<b>BP</b>	80,100	84,009	90,258			
<b>UEPL</b>				122,270	167,757	100,772
<b>Spud Energy</b>						2
<b>Total mcf</b>	818,342	1,344,953	1,482,848	1,465,760	1,316,632	1,140,637

*Source: HDIP (various issues) Pakistan Energy Yearbook.*

Power and natural gas sectors are closely interlinked. Recently, circular debt in the power sector has adversely affected the gas sector. The power sector has incurred a total financial loss of PKR 12,403 billion, primarily driven by the ongoing circular debt crisis, including PKR 2,393 billion in outstanding circular debt, PKR 6,809 billion in cumulative government budgetary support since 2007, and PKR 3,201 billion in estimated borrowing costs on that support at an 8% interest rate. The circular debt persists due to a combination of delayed tariff adjustments, subsidies that fall short of covering actual costs, high Aggregate Technical and Commercial (AT&C) losses, low bill recovery, and

chronic distributional inefficiencies. Inadequate investment in transmission and distribution infrastructure has created bottlenecks that further hinder operational efficiency.

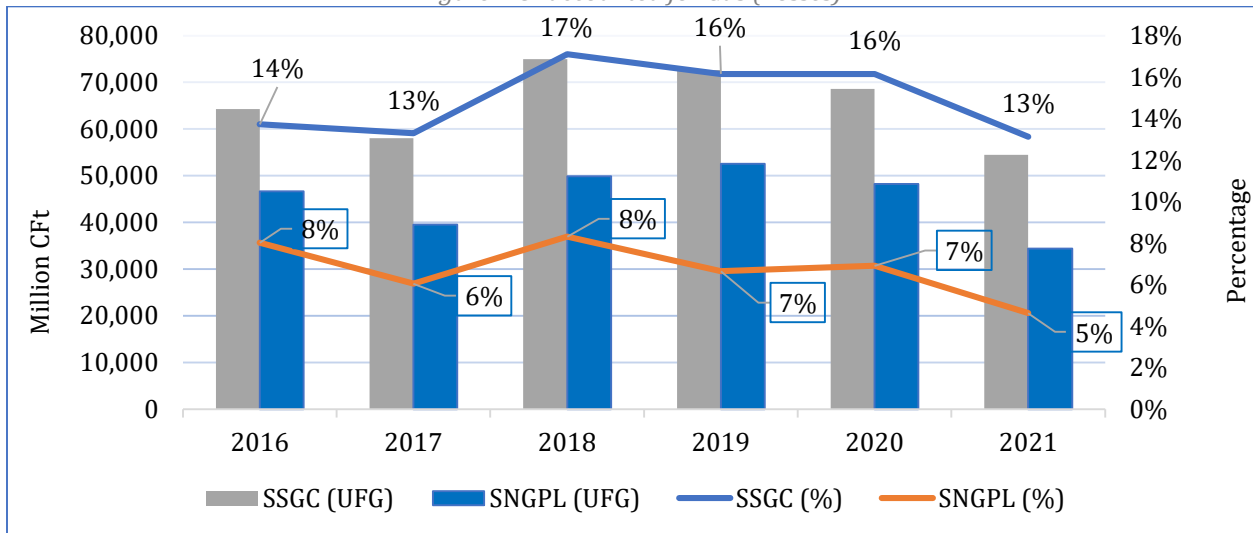
Fragmented institutional oversight, lack of integrated energy planning, and resistance to reforms such as market liberalization through the Competitive Trading Bilateral Contract Market (CTBCM) have allowed circular debt to evolve from a short-term liquidity issue into a full-scale fiscal threat. In the meantime, solar technology offers an opportunity for the power sector, as excessive solarization over the last few years has displaced the grid's base load, affecting gas demand for power.

The government secured a sale and purchase agreement (SPA) with Qatar Energy (QP) primarily to meet the energy requirements of the industrial sector (Captive and Process) and thermal Power plants. Pakistan has two long-term RLNG contracts with Qatar, both via Pakistan State Oil (PSO) and Qatar Energy: one covering 3.75 million tons/year (2016–2031) and another covering 3 million tons/year (2022–2031). Priced at 10.2% of Brent, this SPA agreement ranks among the most competitive long-term LNG contracts globally. The Delivered Ex-Ship price under this SPA is below \$7 per MMBTU at the present Brent price, enabling the supply of 400 mcf/d of RLNG to industrial captive cogeneration- combined heat and power (CHP) consumers at nearly \$9 per MMBTU.

Industry demands that QP SPA cargoes be ring-fenced for industrial consumers, provided that two measures are taken. First, the RLNG cost component must be optimized so that the industrial sector can receive RLNG at \$8.5–9 per MMBTU. More importantly, the industrial RLNG users want a rationalized UFG allocation. For instance, a technical assessment confirms that UFG for high-end industrial connections is around 3%, yet system-wide UFG factors of 12% on SNGPL and 17% on SSGC are imposed on these consumers as well, significantly inflating the delivered cost. Figure 3 provides an overview of the evolving UFG for gas utilities.

Efficient allocation of natural gas means directing this scarce and valuable resource to its highest value uses, maximizing economic output while minimizing waste, and reducing environmental impact while meeting climate targets. In Pakistan, current gas pricing for captive cogeneration and CHP plants is \$14 to \$15 per MMBTU, nearly double the national WACOG of \$7.9 for gas and RLNG, and roughly four times the WACOG for indigenous gas. The discretion of decision-makers diverts scarce molecules for less efficient household consumption, effectively wasting about \$8 per MMBTU. Such a pricing regime directly contradicts the stated objective of export-oriented growth. In a liberalized market, all gas cargoes must go to captive industrial users. This is where economic rents from managing RLNG can be maximized, generating export earnings for the economy.

Figure 3 Unaccounted for Gas (Losses)

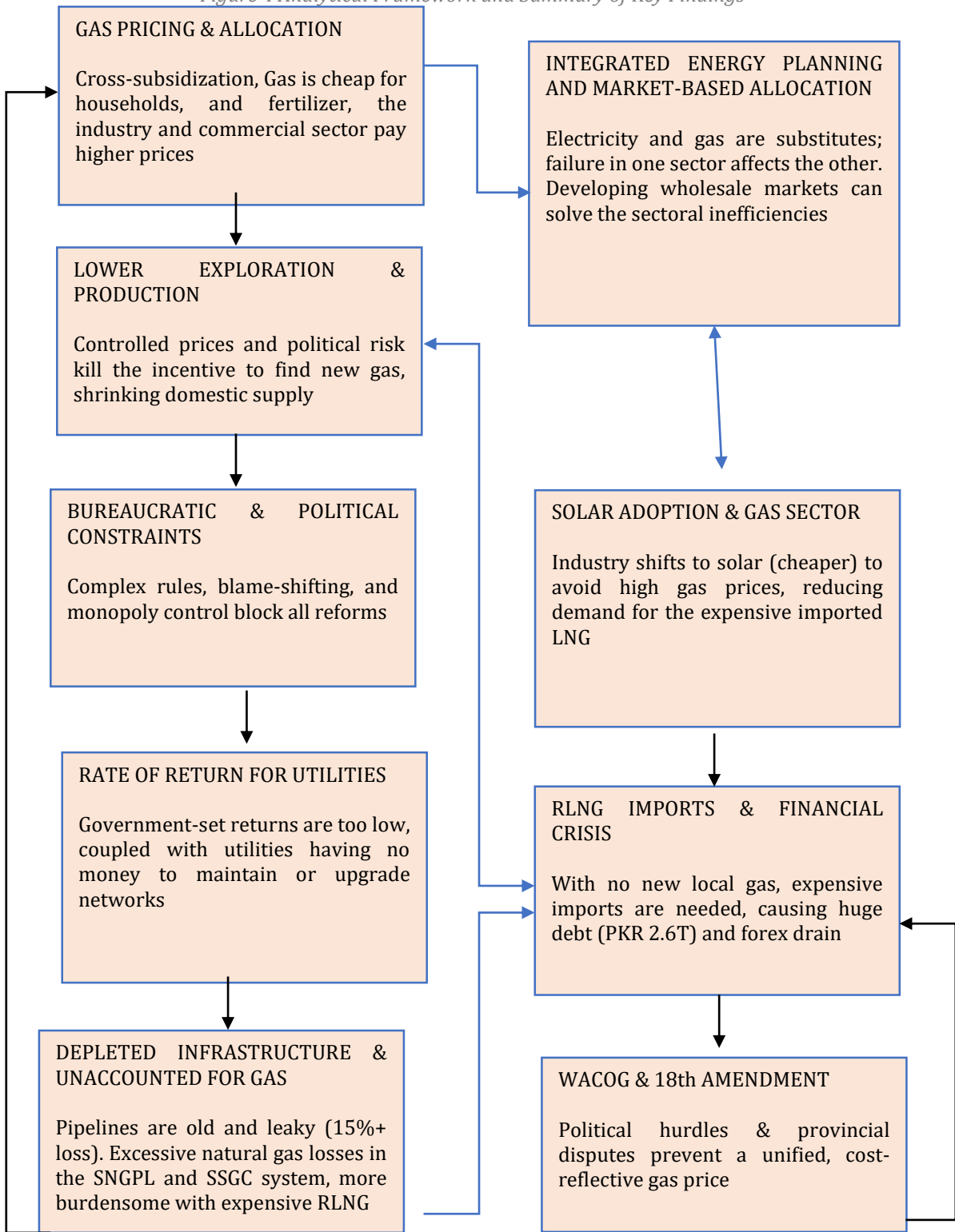


Source: GOP, 2023.

#### 4.2. Qualitative Analysis

The study adopted a pragmatic approach to gather information through Key Informant Interviews from the sector experts. Qualitative analysis draws on information from relevant organizations, both public and private. The choice of respondents is based on purposive cum convenient sampling. This mixed-method sampling technique combines careful, criteria-based selection (purposive) with the ease of access (convenience) to participants. This is a frequently used qualitative research approach that enables the researcher to efficiently select information-rich, accessible cases, thereby targeting specific characteristics relevant to the research objective and saving time and resources. We planned 40 interviews, but limited them to 28 due to information saturation. The respondents are classified as public officials from the Ministry of Energy (Petroleum Division), the regulator (OGRA), Pakistan LNG Limited, SNGPL, SSGC, provincial energy departments, and representatives from E&P companies, industrial captive power, and the fertilizer industry. The Sampling Strategy and respondents' choice comprise the key stakeholders in Pakistan's energy sector.

Figure 4 Analytical Framework and Summary of Key Findings



## **ANALYSIS AND DISCUSSION**

### **5.1. Gas Pricing and Allocation to Sectors**

Pakistan faces an energy crisis primarily due to inefficiencies in its distribution and pricing systems. The government's distribution and pricing of gas have been highly discretionary, with domestic consumers prioritized over other sectors such as industry, power, and commercial sectors. *The Gas Allocation and Management Policy 2005* provided guidelines for the distribution of gas to consumers across different sectors, prioritizing households, fertilizer, and transportation. Currently, more than 20 percent of households across the four provinces have gas connections to obtain piped natural gas. The objective has been to provide affordable energy to urban households; this has resulted in cross-subsidization, with industrial consumers bearing the cost of subsidizing domestic consumption. This policy results in a massive pipeline network across the country, supplying small volumes of gas to households year-round. Different income slabs are charged different tariff rates, and most connections fall in the lowest slab, except during the winter months. This allocation strategy has been criticized by experts, who claim that households' use of gas is not a high-value use of natural gas.

Recently, the textile sector's gas tariffs have almost doubled to encourage industrial consumers to switch to the power grid. This move increases the gas price in the textile sector from around PKR 2000 to PKR 3500. The gas prices for most of the urea plants are invariably low, around PKR 600 per MMBTU. The rationale for this allocation to the fertilizer sector is to ensure affordable food supplies in the country by subsidizing urea for crop growers. The rising tariffs for captive power are attributed to IMF directives as part of the reform agenda, stating that scarce gas resources should be supplied to the most efficient thermal plants. But there are disparities in coverage of residential gas use. Furthermore, Pakistan is among the few countries where the industry cross-subsidizes the household sector's natural gas consumption. This anomaly led to higher industrial gas prices at the expense of households' gas use.

The government's tiered pricing mechanism allocates subsidized gas primarily to the domestic and fertilizer sectors, while industry and power bear disproportionately higher costs. This administrative allocation, rather than a market-based mechanism, creates severe distortions. It not only burdens the economically productive sectors but also creates an artificial demand profile that does not reflect the actual cost of supply. The mismatch between the cost of imported LNG and the subsidized prices offered to prioritized sectors is a primary driver of the sector's circular debt and commercial insolvency. Thus, this tight government policy creates an issue, as there is no sustainable source of subsidies in the system.

### **5.2. Exploration and Production Activities & Discoveries**

The gas sector in Pakistan is experiencing a gradual decline, mainly due to a steady decline in exploration activity and a lack of major new discoveries. Exploration of gas is declining for several reasons, including high administrative costs, bureaucratic hurdles, PEPRAs rules, and security concerns in prospect regions such as Khyber Pakhtunkhwa and Balochistan. "Irregularities in government regulatory frameworks and ineffective policy formulation are slowing down sectoral growth and causing inefficiencies in the supply chain."

Respondents from E&P companies acknowledge that the regulatory environment is flexible and conducive to attracting investment. Although there are delays in bureaucratic processes, such as enabling companies to start commercial production from a newly discovered field. Moreover, the payment for a consignment of gas takes approximately 24 months, which is reflected in circular debt accounting. Despite existing discoveries, vast areas of KP remain unexplored. According to the KP Energy department, only exploration in the Kohat district (which accounts for 17 of the province's 56 total wells) has been successful. Lately, discoveries have been made in the districts of Bannu and Lakki Marwat.

### **5.3. Bureaucratic & Political Constraints**

The public sector is accused of implementing rules and policies that lack consistency, especially downstream. Promoting the use of gas (CNG) in the transport sector is a good example of the private sector making substantial investments in installing CNG kits in its vehicles and establishing filling stations during 2005-2010. Facing acute gas shortages, the government reversed its CNG policy after 2010, incurring high sunk costs for the private sector. These inconsistencies stem from a rigid regulatory framework, inadequate demand and supply projections, and persistent impediments to market operations. Extensive government controls lead to elite capture, compromising the market-based allocation and pricing.

The recent RLNG import decision is a typical example of government controls in Pakistan's energy market. Economic theory suggests that the government is not good at commodity trading or doing business. Its role should be to provide infrastructure for industries that involve networks, such as energy utilities. Therefore, the government should invest in regasification terminals, connecting pipelines, and storage facilities, and the private sector must import RLNG and transport it, paying wheeling charges. The evidence is exactly the opposite, viz., two regasification terminals have been established by the private sector, namely, Engro and EGPL, while the government has entered long-term trade agreements to import LNG cargoes. As the private sector struggles against bureaucratic hurdles to bring in LNG imports and implement new contracts, the public sector shifts the blame onto bureaucrats, who are paralyzed by political pressure. According to one of the respondents, the current reliance on LNG imports was a planned move, stating, "Gas shortage was artificially created here. It was said that there is no other solution now, and discussions regarding LNG importing began." This shift to an import-based model has led the government to maintain a tight grip on infrastructure, despite claims that "The government will not handle LNG imports."

Government regulations have impeded major private investment in the energy sector. Private companies consider it risky to sign long-term contracts due to unclear rules and frequent changes in those rules. That is why the government then relies on expensive imports to fulfill the requirements. A respondent shared, "The government didn't allow two terminals to be set up: one of Engro and one of EGPL. EGPL built extra capacity to import its own gas, but the government didn't allow it. Even though they have now obtained a court order from the UK allowing them to use it. But they are still placing administrative hurdles in the way. The fact is, bureaucracy doesn't want to end the government's procurement monopoly. This bureaucratic control is a curse for Pakistan."

Beyond general regulatory hurdles, specific bureaucratic and political constraints paralyze decision-making. The case of EGPL's terminal, blocked despite a court order, exemplifies how administrative hurdles are used to protect state monopolies. Political pressure often dictates operational decisions in state-owned utilities, overriding commercial sense. This environment of interference and rent-seeking discourages long-term private investment and innovation, ensuring the sector remains inefficient and incapable of reform from within. High line losses and the inability to pass on costs fuel this debt, and the current model is not financially viable. One respondent shared worrisome remarks. According to him, "Pakistan has to go through a fundamental reform if it is to move forward. The way the country is currently running is not sustainable." In addition, reducing government intervention in the gas sector is the only solution to attain energy security. One respondent emphasized, "If we allow the gas market to develop without artificial barriers, our domestic gas production can easily double."

#### **5.4. Rate of Return for Gas Utilities**

A critical factor raising the cost of supplying natural gas is the excessive returns on equity for regulated gas utilities, namely 17.5% and 17% for SNGPL and SSGC, respectively. This rate of return on assets creates biased incentives to expand the pipeline despite dwindling gas resources for distribution. Ironically, the gas distribution companies fail to invest in overhauling pipelines and modernizing infrastructure. The OGRA's set returns disincentivize efficiency improvements and network upgrades. This regulated structure ensures utilities remain financially weak, unable to generate sufficient internal cash flows to reduce line losses or replace aging pipelines, thereby perpetuating the cycle of operational and financial inefficiency.

Furthermore, the gas sector deficit is growing due to the gap between consumer prices and the revenue targets set. The government sells gas to different sectors at rates lower than the actual procurement cost. Now, imported LNG supply has further widened this deficit, and companies are unable to recover their costs. This shortfall has disrupted the entire supply chain. Circular debt exacerbates this crisis, and now it has increased to approximately PKR 2.6 trillion in the gas sector alone. Declining local gas reserves and increased reliance on imported LNG are adding to Pakistan's circular debt, as the LNG is often unpaid for and the government is borrowing to keep the system running. Investments in LNG are also diverting resources that are to be invested in renewable energy alternatives. More recently, KPMG conducted a study in December 2025 to determine the rate of return for gas utilities, and a public hearing is underway at OGRA on the rate of return revision.

#### **5.5. Infrastructure Overhauling & Unaccounted for Gas (UFG)**

Another major issue is the conflict between the public and private sectors regarding infrastructure and governance. In Pakistan, public utilities provide the underlying infrastructure and distribute gas at regulated consumer prices. Even though these prices include a significant rate of return for the utilities, they could not invest in overhauling the depleting pipelines, resulting in significant losses and rising volumes of UFG. More recently, pipelines have been filled with gas, but consumers have to endure gas load shedding for hours daily, and Sui officials justify it to reduce losses and leaks.

In respondents' view, SNGPL and SSGC ignore market principles and are subject to mismanagement and political interference. The primary reason is that these companies lack a business model. Even

though private entities own 40% or more of the shares, when utilities' inefficiencies become a government burden, there is limited scope for performance improvement. As a result, UFGs are 6-7 times higher than the global average because there are few regulatory measures linking financial returns to operational efficiency.

Presently, most of the pipeline infrastructure is outdated, and it has colossal UFG as many respondents think that UFG is the major cause of accumulated circular debt. "The line losses in Pakistan are around 15-16% or more, which way high than the global average of 2-3%." The existing system requires a massive investment to phase out leaking and weak pipelines and to reform utilities' governance structures to efficiently meet market demand. Utilities, crippled by financial shortfalls, cannot fund the replacement of the 60% of pipelines deemed outdated.

For the past couple of years, gas infrastructure expansion has been on hold because of a ban on new connections. However, if there is a new discovery, the distribution companies provide a pipeline network to connect the gas field with the national gas grid or third-party users." Hence, this is a key infrastructural bottleneck that prevents supply from reaching consumers and contributes to system inefficiency. The colossal gas sector circular debt, around PKR 3.0 trillion, precludes essential infrastructure overhauling, but UFG's dilapidated infrastructure further escalates it. This creates a vicious cycle: debt prevents investment in infrastructure, and poor infrastructure guarantees continued high losses and mounting debt, making the system financially and operationally unsustainable. Furthermore, diverting RLNG to residential areas rather than to industries or power generation has only exacerbated the circular debt crisis, compounding the financial strain on the energy sector.

## **5.6. Solar Adoption and Gas Sector**

There is demand for low-priced gas (domestically produced), but it is available at an LNG price. This shift is highlighted by a respondent, "Demand for LNG has reduced over time as the power sector has found cheaper alternatives such as coal and solar energy. Solar has replaced nearly 4,000 MW of grid capacity. On the other hand, the government raised gas prices for industry and imposed a levy to shift demand towards surplus grid electricity. The result was that the industry stopped using gas altogether. Now, the pipelines are saturated with LNG, but there are no buyers because it is too expensive."

The rapid adoption of solar energy, particularly by industrial and commercial users, is fundamentally reshaping gas demand dynamics. As one respondent noted, solar has displaced significant grid demand. This shift is accelerated by government policies that raised gas prices for industry, making renewable alternatives economically compelling. Consequently, the demand for imported LNG has dropped sharply, leaving the gas sector with surplus, financially burdensome contracts. This transition underscores a structural move away from gas-based energy, challenging the viability of long-term LNG import agreements.

Industries and power plants are shifting to solar and other renewable energy sources. "Solar panels are abundantly expanding in capacity and maintaining a significant share in energy supplies." Very few low-income households still use gas for domestic purposes. Overall, gas demand has fallen while

gas supply has increased, but at a faster rate. The government's pricing strategy has reduced demand for LNG, leaving the country with expensive surplus LNG.

### **5.7. RLNG Imports & Domestic Gas Demand**

Pakistan began importing RLNG in 2016, specifically for the thermal power plants *Haveli Bahadur Shah, Balloki, and Nandipur*. These were the most efficient and state-of-the-art power plants planned to take the base load of the power grid. Due to solar adoption taking off since the late 2010s, gas demand for power has been dropping significantly, and imported RLNG has become a surplus. For instance, 15 billion cubic feet (BCF) of RLNG was unsold in 2024, forcing the operating gas fields to curtail their cheaper domestic gas production due to a lack of gas storage infrastructure. As a high-end consumer of gas (power sector) relinquished the RLNG, the gas became surplus, which requires finding new gas demand avenues, such as residential and captive demand. Therefore, the 3 million pending applications for gas connections were offered LNG-based connections. Similarly, the industrial gas tariffs for captive power are also offered in RLNG, thereby significantly increasing them to PKR 3500-4000/MMBTU. Industry representatives see it as penalizing high-efficiency captive cogeneration (CHP) units with tariffs far above WACOG, which contradicts the goal of export-led growth. RLNG at approximately \$9 per MMBtu supports least-cost energy allocation, strengthens competitiveness, and aligns with sustainability objectives.

Respondents from the industrial sector argued that the power sector has not committed to RLNG consumption at PKR 2,000 per MMBTU, even though this is half the captive tariff for its most efficient plants, as stated in the referenced letter. Through deferrals and the net proceeds differential, the Petroleum Division has avoided take-or-pay losses. After deferrals of 45 term cargoes, the WACOG stands at \$7.9 per MMBTU for FY 2025–26. Pakistan's industrial and export sectors' competitiveness depends on stable, competitively priced energy.

In the mid-2010s, the natural gas demand grew rapidly, and public utilities were pressed to import LNG. Retrospectively, it can be argued that the government could have opened the imported gas market to private operators, limiting its role to providing gas to vulnerable consumers and serving as a pipeline infrastructure provider, but it chose to import LNG from Qatar and from ENI, an Italian energy company. As COVID hit in 2020, economic growth fell to 2%, leaving the country with surplus gas. Pakistan has long-term agreements for 12 cargoes annually until 2031. Recently, it renegotiated to defer 21 of its 24 cargoes for 2025 and 2026, as the government's expensive long-term RLNG contracts are financially unsustainable given lower spot market prices and reduced local demand.

The long-term contracts for RLNG imports, signed in the mid-2010s, were based on optimistic demand projections and have become a focal point of the financial crisis. With aggregate demand falling, Pakistan is locked into take-or-pay commitments for expensive cargoes it no longer needs, as seen with the attempted returns to Qatar and ENI. These contracts commit substantial public finances to pay for unused gas, diverting funds from critical development areas and deepening the sector's deficit, thereby contributing significantly to the broader national financial crisis.

The main issue in gas pricing is that our import demand projection is based on the domestic contract prices. In turn, the overall basket price goes up. The IMF has urged the government to pass this additional cost on to consumers by incorporating RLNG into WACOG. The dilemma for gas utilities is

that gas is in demand due to its low prices, and consumers, especially bulk users, will leave if the entire cost is passed on to them. The recent decline in industrial demand is evidence of the impact of the rising tariff to PKR 3600/MMBTU, compared to the previous tariff of PKR 1200/MMBTU. One of the respondents highlighted the fundamental structural flaw, saying, "This issue is related to pricing and recovery. LNG costs us 3,600 rupees, but domestic consumers are provided with subsidized gas at a lower price. If we release this expensive LNG into the pipelines, we won't be competitive in the export market.

### **5.8. WACOG & 18th Amendment**

Cost recovery prices are fundamental to any business model. The Weighted Average Cost of Gas (WACOG) pricing mechanism has been in place for a long time, as the gas sector receives no government subsidy. Rather, utilities recover the cost of gas through cross-subsidization, and revenues remain equal to the cost of supplying natural gas to consumers. However, this equation has been disrupted by LNG imports, as adding LNG prices to the WACOG calculation would significantly raise consumer prices. That is why specific LNG-based connections are offered to different consumers. For instance, there are over 3 million residential gas connection applications pending, and OGRA asks utilities to develop plans to offer LNG to them. As a result, different price regimes will prevail within the same consumer category and location. Respondents from the regulator and gas utilities assume LNG, including WACOG, as a solution to create a uniform, cost-reflective gas price for different consumers.

Overall, our respondents favor WACOG; however, officials from the Energy departments of surplus-producing provinces, namely KP and Sindh, did not agree to include RLNG costs in WACOG or to pass them on to their consumers. Including LNG costs in WACOG is difficult due to political and structural challenges, as well as the 18th Amendment's constitutional provision. Furthermore, the 18th Constitutional Amendment, which devolved significant powers to provinces, contravenes the status quo and national energy distribution. Provinces with gas resources now have greater say in allocation and pricing, leading to disagreements with federal objectives and adding an additional layer of complexity to formulating a cohesive national gas pricing and allocation policy.

The Khyber Pakhtunkhwa (KP) Secretary directly links the implementation failures of the 18th Amendment to issues of gas pricing and allocation. Articles 172(3) and 158 acknowledge the joint provincial right on the gas resource and the first use right, respectively. Although there is a provincial representative who draws a salary from the KP government, the constitutional provision is not truly implemented. Gas leases are awarded by the petroleum concession on its own." The quotes listed under WACOG & 18th Amendment also serve as prime examples of bureaucratic and political constraints, as they describe the failure to implement constitutional rights.

### **5.9. Integrated Planning and Energy Sector Circular Debt**

Amid prolonged energy deficits and outages, the policy discourse shifted to focus primarily on generation and supply-side interventions. Between 2013 and 2018, Pakistan undertook ambitious capacity additions, adding 12,2302 MW to the energy mix (NEPRA, 2012, 2022). The RLNG imports were planned to support the additional power generation capacity. Long-term contracts were made to mitigate price uncertainty. This was working well so far, but the demand projection could not

account for the solar adoption outbreak that occurred in the meantime. Notably, the design and implementation of the RLNG supply chain in a short time was a remarkable milestone in Pakistan's energy mix (GOP, 2023). Pakistan faces deep-seated structural challenges across both the gas and electricity sectors. Historical mismanagement, rooted in siloed sectoral planning, has led to mismatches between supply and demand.

On the one hand, domestic gas reserves are depleting, and production has decreased from over 4,000 MMCFD in 2012 to approximately 2,800 MMCFD in 2025. With remaining recoverable reserves at only 20,951 billion cubic feet, we simply cannot afford to have the gas and electricity sectors working in silos. A major solution is a shift in the residential sector from gas to electricity. The residential sector uses about 698 MMCFD for cooking, but in the winter, that number triples to 1,665 MMCFD because of space and water heating (GOP, 2023; Moeen & Hanaoka, 2025). GOP (2023) suggests that shifting the domestic heating load to electricity could save gas, generate about 5,000 GWh of power, and save the country USD 583 million by reducing our reliance on imported LNG.

An integrated energy plan is the only way for the government to stay ahead in ensuring that the national grid meets industrial needs while phasing out captive power plants. While the gas sector works on stabilizing supply through new terminals and storage, the power sector must continue its push toward renewables and hydro, aiming for a 60% share by 2030. By combining gas conservation strategies—such as electrifying heating—with this transition to green power, Pakistan can build a sustainable energy sector in the future.

Currently, Pakistan is facing a gigantic issue of accumulated energy sector circular debt amounting to over PKR 5 trillion. It turns out to be a black box that pools all sorts of sectoral inefficiencies and drags the public utilities into a trap with no way out in sight. Below are outlined the drivers of circular debt in Pakistan's gas sector.

**Network Inefficiencies and Losses:** System losses in both the gas utilities remain significantly high, exceeding the limits allowed by OGRA. Weak pipelines and metering architecture, leaks, theft, and measurement deficiencies result in annual gas losses exceeding 100 Bcf. Persistently high UFG directly inflates the revenue shortfall, compresses cash flows, and undermines the utilities' cost-recovery framework.

**LNG Import and Pricing Issues:** Imported RLNG is more expensive than domestic gas. In addition, OGRA did not revise the gas tariffs for nearly a decade, and the indigenous gas price remained below its economic value. This administratively maintained price freeze created a wide differential between low-priced domestic gas and imported LNG, undermining the revenue base and distorting consumption patterns. Ironically, the natural gas demand projections were based on these frozen prices, thereby justifying multiple-term contracts that yield 10 cargoes of imported RLNG. However, natural gas utilities cannot supply natural gas at prices anywhere near those prevailing before LNG imports.

**Inadequate Financing of Tariff Differential Subsidies:** The natural gas tariff structure relies on cross-subsidization, in which some consumers subsidize others' consumption. The debt burden on the natural gas utility accumulates when large subsidy receivables remain unpaid, while domestic and certain priority sectors, such as fertilizer, continue to be supplied at below-cost prices. Delayed

or partial release of TDS has contributed to large outstanding balances across SNGPL, SSGC, upstream producers, and fuel suppliers.

**Delayed Tariff Determination and Notification Processes:** Sometimes disruptions in the tariff cycle, both at the regulatory and government notification stages, result in under-recovery of allowable revenue. The government's tariff notification cannot be apolitical. Therefore, delays in tariff notification may be burdensome for the utility as they hamper cost recovery. Timing gaps between OGRA's determinations, Cabinet approvals, and actual notifications further widen receivables.

**Weak Collections and Rising Customer Receivables:** Receivables continue to accumulate across domestic, power, fertilizer, and industrial consumers. Bills collection discipline remains inconsistent, creating liquidity constraints for the gas utilities and undermining upstream payments. Significant overdue payments exist to upstream suppliers and RLNG importers. Foreign E&P companies are particularly affected, as concerns about foreign exchange availability further exacerbate the repatriation of their profits. As a result, many E&P companies quit Pakistan's upstream sector, like OMV and Patronas. However, utilities prioritize RLNG-linked payables to avoid international default events and delay payments to domestic E&P companies, contributing to supply-chain stress.

**The 18<sup>th</sup> Amendment and Sectoral Allocation Policies:** Pakistan's gas sector is exposed to new challenges following the RLNG import. Gas utilities follow allocation decisions and merit-order constraints as well as the contractual and financial realities of imported LNG. These sectoral allocations are not aligned with the constitutional provisions on the first right of use under Article 158. Reduced RLNG offtake from the power sector has increased fixed obligations and forced reallocation to low-tariff segments, magnifying unfunded costs.

**Breakdown of RLNG Ring-Fencing in Practice:** There is a proposal to ring-fence domestic consumers with Indigenous gas supply and pricing, while the impact of RLNG injection into the system would be distributed to all other consumers. The original tariff ring-fence for RLNG became ineffective as surplus molecules emerged. Imported LNG had to be blended into the system gas and allocated to non-cost-reflective consumer categories, creating structural imbalances and diluting the intended segregation.

**Diversion of High-Cost RLNG to Low-Tariff Domestic Consumers:** Pakistan's gas sector has a unique cross-subsidization structure where industrial gas users subsidize households. The gas utilities are losing high-end industrial consumers and are left with residential consumers. As a result, a substantial portion of RLNG has been diverted into the domestic segment at indigenous gas tariffs. Given that households represent a large share of consumption, this practice results in substantial financial losses that directly feed into the circular debt stock.

**Challenges in Implementing WACOG:** The surplus gas-producing provinces of Sindh and KP are opposing the LNG-blended weighted average cost of gas (WACOG). Therefore, implementing a weighted-average cost-based tariff design has introduced new challenges, while the unified price mechanism is expected to stabilize cost recovery. Blending expensive RLNG with indigenous gas raises average tariffs, compresses competitiveness for productive sectors, and obscures true supply costs. These dynamics weaken private-sector appetite for RLNG procurement and intensify the

reliance on diversion and cross-subsidization. Adding to the problem of the gas sector is the failure of the power sector, which has led to the gas tariff for industry captive power being set at an excessively high level, as recommended by the IMF.

It can be summed up in a nutshell as follows. Circular debt arises from the interaction of structurally low tariffs, high system losses, delayed subsidy reimbursements, inconsistent tariff notifications, and misaligned gas allocation policies. The financial strain spreads across the entire gas value chain: LNG importers, transmission and distribution utilities, and upstream producers. Addressing the problem requires coherent pricing reform, strict UFG governance, timely subsidy settlement, and a clear separation of cost structures for indigenous gas and imported LNG.

## CONCLUSION

The study examines key issues in Pakistan's gas sector, primarily from a policy perspective. It identifies a thread that highlights the core issue of denying the market principles of allocation and pricing. The government extends its role as a planner and steps into the market operations. The government's control, driven by bureaucratic and political constraints, denies market-based allocation and pricing, resulting in segregated WACOG implementation and utilities' higher rates of return, which together raises cost of gas supply and fiscal liabilities. Developing the gas market would limit government liabilities threatened by RLNG imports and extensive solar adoption. Here is the bottom line: public sector dominance in the energy sector provides a leeway to pool the entire inefficiency in the black box named circular debt. On the contrary, market mechanisms will provide incentives to update the dilapidated pipeline infrastructure over time.

The contemporary energy sector issues stem from policy incoherence in the gas and electricity sectors, which, by and large, complement each other. Pakistan's economic growth is intricately linked to two key thematic areas of energy (i) affordability, (ii) availability. To maintain competitiveness, it is essential to ensure that energy prices are affordable for businesses, enabling them to use energy productively. Besides, household connections aim to provide clean energy for cooking and heating. Nonetheless, the financial sustainability of the energy sector through cost-recovery supply, coupled with an effective circular debt management plan and the establishment of a liquid energy market, is crucial for achieving an optimal mix of energy resources. Managing the circular debt with discipline is vital to maintaining the financial health of the sector.

Poor cost recovery, a rising RLNG import bill, and the gas sector's accumulated debt call for a robust policy framework to manage the country's gas supply, demand, and pricing. On the supply side, domestic E&P operations must focus on increasing gas availability and reducing reliance on RLNG to reduce pressure on WACOG. Investment policies play a crucial role in enhancing the energy sector's performance, making it more efficient and more revenue-generating. Policies that offer tax breaks, fiscal incentives, and streamlined regulatory procedures for exploration companies will be more effective at discovering untapped natural gas reserves. On the demand side, correcting price and allocation inefficiencies by limiting the government's control would help sustain the sector financially.

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## APPENDICES

### Appendix - I

*Table 8 Historical Performance of Pakistan's Upstream Sector*

	<b>Exploratory wells</b>	<b>Development wells</b>	<b>Success rate*</b>	<b>Oil discovery</b>	<b>Gas discovery</b>	<b>Total discovery</b>	<b>Exploratory drilling density**</b>
<b>1993</b>	350	504	3.9	44	45	85	2364
<b>1994</b>	378	526	3.7	44	57	101	2189
<b>1995</b>	399	551	3.8	47	59	106	2073
<b>1996</b>	420	574	3.8	50	62	112	1970
<b>1997</b>	445	597	3.8	52	66	118	1859
<b>1998</b>	479	610	3.6	56	78	134	1727
<b>1999</b>	492	629	3.6	56	82	138	1681
<b>2000</b>	508	648	3.6	57	85	142	1628
<b>2001</b>	526	679	3.6	57	85	142	1573
<b>2002</b>	540	709	3.7	59	89	148	1532
<b>2003</b>	572	754	3.7	59	95	154	1446
<b>2004</b>	601	778	3.6	63	102	165	1376
<b>2005</b>	620	806	3.5	63	114	177	1334
<b>2006</b>	653	837	3.5	65	120	185	1267
<b>2007</b>	689	878	3.4	66	136	202	1201
<b>2008</b>	716	931	3.4	67	146	213	1155
<b>2009</b>	743	990	3.4	68	150	218	1113
<b>2010</b>	769	1032	3.3	69	164	233	1076
<b>2011</b>	785	1066	3.3	69	168	237	1054
<b>2012</b>	806	1102	3.3	72	175	247	1026
<b>2013</b>	841	1164	3.2	76	184	260	984
<b>2014</b>	891	1214	3.1	80	108	288	928
<b>2015</b>	938	1249	2.98	86	229	315	881
<b>2016</b>	984	1301	2.88	89	253	342	841
<b>2017</b>	1021	1348	2.86	91	266	357	810
<b>2018</b>	1066	1384	2.87	93	278	371	776
<b>2019</b>	1102	1451	2.80	98	295	393	751
<b>2020</b>	1127	1484	2.79	100	303	403	734
<b>2021</b>	1152	1510	2.78	103	312	415	718
<b>2022</b>	1179	1539	2.73	105	326	431	702
<b>2023</b>	1194	1571	2.70	107	335	442	693
<b>2024</b>	1216	1608	2.66	110	347	457	680

*Note: \* Success rate is defined as the ratio of successful exploration to the total exploratory wells.*

*\*\*This is one well per Square Kilometer.*

*Sources: HDIP (various issues) Pakistan Energy Yearbook.*

## Appendix – II: Questionnaire

### (a) Upstream Sector

1. Does Pakistan hold potential oil and gas reserves?
  - On-shore - conventional and tight gas
  - Off-shore
2. Recently, US President Trump talked about Pakistan's oil and gas potential. Do you think this will happen? And will it happen as proposed by Washington, DC?
3. We frequently come across the news of an oil and gas discovery, but the cumulative reserves are constantly declining. Are there delays in wells' commercialization, or is it something else?
4. If yes, what are the significant barriers hindering increased exploration and production (E&P) activities in Pakistan's oil and gas sector?
  - Security
  - Bureaucracy
  - Geopolitical
  - Financial terms
  - Political (decentralization)
5. Do you see potential for economic shale exploration and production in Pakistan?
  - If no, what are the key reasons? If yes, do you feel any steps are being taken in that direction?
6. What are the 3 key policy incentives that the government must introduce to attract more investment from E&P companies?
7. Does the 18th Amendment and devolution affect provincial and federal institutions for implementing upstream activities?
8. Do you think the 18<sup>th</sup> Amendment affects the E&P sector significantly
  - If positively, how?
  - If negatively, how? What is the channel of change, e.g., red tape, corruption, etc?
9. How can a province holding a resource influence the lease awarding process and the E&P operations there?
10. How can a province holding a resource influence the gas allocation among consuming sectors?
11. Which petroleum policy was better for attracting investment in Pakistan's upstream sector?
12. Have the provincial governments and the federal government had problems with issues related to gas royalties' disbursement?
13. Do you think that RLNG imports in 2015-16 was a good decision? Your take on LNG import and LNG contracts?
14. What is the tentative average wellhead price of gas in Pakistan (per mmbtu)
  - Are the royalty issues a source of UFG that gas distribution companies ignore?

### **(b) Supply, import, and distribution**

15. Given the significant supply gap, how could SSGC and SNGPL keep on expanding pipeline infrastructure?
16. Can we manage the seasonal inverse relationship between gas and electricity demand to optimize the use of existing generation capacity and reduce overall gas power supply costs?
17. Do you think long-term LNG import contracts are favorable for Pakistan? Given the losses, is it financially sustainable?
18. In light of the rising costs of RLNG, what long-term strategy should Pakistan adopt for its gas import mix, including a balance between long-term contracts and spot purchases?
19. Beyond gas and RLNG, what alternative energy sources or policies could be explored to reduce the country's reliance on gas imports and improve its trade balance?
20. Regarding cross-country pipelines like the Turkmenistan-Afghanistan-Pakistan-India (TAPI) and Iran-Pakistan (I-P) projects, what are the main political, financial, and logistical hurdles preventing their completion?
21. What is the most effective strategy for reducing Unaccounted for Gas (UFG) losses, and what specific measures should OGRA and the gas companies (SNGPL and SSGC) implement?
22. What can trigger the E&P operations in Pakistan? Is there a potential for the market-based pricing of gas in Pakistan

### **(c) Demand Side Management and Gas Shortages**

23. How can the government effectively shift domestic and commercial consumers from using natural gas for heating to using electricity, and what are the potential economic impacts of such a transition?
24. What are the key policy and infrastructure changes needed to successfully disconnect captive power plants (CPPs) and transition them to the national grid?
25. How can the gas companies improve the accuracy of slab-wise consumption data to inform demand-side management policies better and prevent shortages, especially in winter?

### **(d) Gas Pricing and Circular Debt**

26. How can a gradual and equitable transition to a full weighted average cost of gas (WACOG) based pricing regime be achieved without causing significant economic shock to industries and residential consumers?
27. Do the gas utilities follow the same pricing for different firms? Or different prices for different firms?
28. Is there a potential for switching from gas to electricity for household cooking?
29. If yes, how does it affect the gas system? Will it relieve the gas system?
30. What are your thoughts on the proposed strategy to remove the gas subsidy for fertilizer feedstock? How would this affect the agriculture sector and the fertilizer industry?
31. What are the main consequences of not implementing a cost-reflective gas pricing regime, and what specific steps should be taken to ensure regular price revisions?

32. How can the government address the accumulated gas circular debt, and what role do budgeted subsidies play in this?
33. Do you believe the current priority given to the domestic and commercial sectors over power and fertilizer is sustainable? What are the potential long-term economic effects of this policy?

**Downstream Sector: Fertilizer**

34. How much Natural gas (MMBTU) do you require for the annual production of urea?
  - Where does your company get the gas required for feedstock and fuel needs?
35. Who sets gas prices for the sector?
36. Do you face gas supply shortages during the season? If yes, what best explains the shortage?
  - Reserves shortfall
  - Politically driven distributional factors
  - Gas price issues
37. Are your gas supplies directly dependent on the LNG import volumes?
38. How dependent is your industry output on the availability of natural gas?
39. What are the other important limitations of the sectoral output?
40. How sensitive is the cost of output (urea) to the gas price?

## **Appendix – III: List of Stakeholders**

### **Government Ministries and Divisions**

- Energy Wing, Ministry of Planning, Development & Special Initiatives
- Ministry of Energy (Power Division)
- Ministry of Energy (Petroleum Division)
- Directorate General of Gas
- Directorate General of Petroleum Concessions
- Directorate General of Liquid Gases
- Mari Petroleum Company Limited (MPCL)
- Oil and Gas Development Company (OGDCL)
- Pakistan Petroleum Limited (PPL)
- Provincial energy departments

### **State-Owned Enterprises and Regulators**

- Pakistan LNG Limited (PLL)
- Inter-State Gas Systems (ISGS)
- Oil and Gas Regulatory Authority (OGRA)
- Sui Northern Gas Pipelines Limited (SNGPL)
- Sui Southern Gas Company (SSGC)
- Oil Companies Advisory Committee (OCAC)
- Dr Jamil Masood, Hagler Bailey
- Akhtar Ali, Member, Energy wing
- All Pakistan CNG Association

## Appendix – IV

Table 9: Comparing the Natural Gas Consumption by Sector between 2018-19 & 2023-24

Consumers	2018-19	2023-24	CAGR
Commercial	31	16	-12.4
Fertilizer (as fuel)	37	43	3.1
Transport (CNG)	65	23	-18.8
Fertilizer (as feedstock)	197	229	3.1
General Industry	247	173	-6.9
Residential sector	312	301	-0.7
Power sector	511	388	-5.4
Total consumption	1454	1208	-3.6

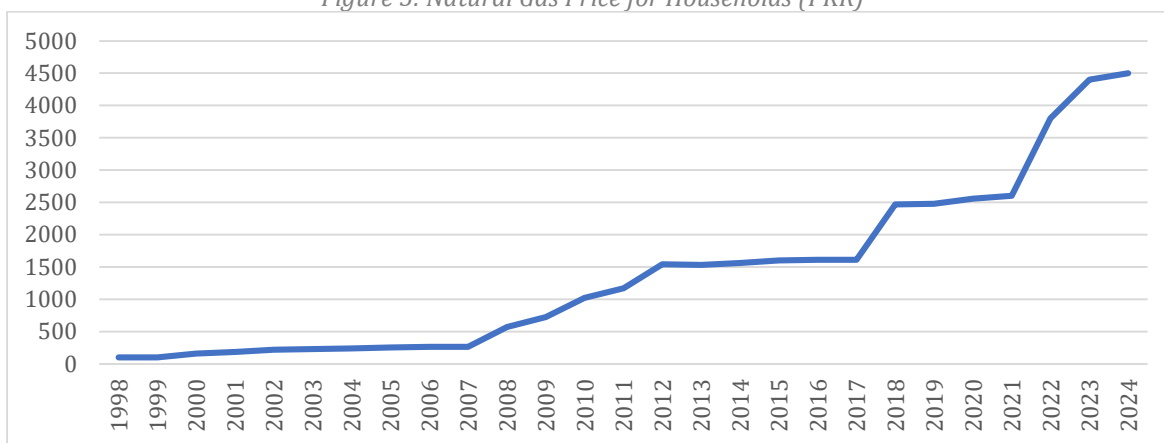
Source: Pakistan Energy Yearbook (various issues), HDIP.

Table 10: Company-wise Natural Gas Production Trends (Million CFt)

Company	2018-19	2023-24	CAGR
MPCL	260,007	327,215	4.7
OGDCL	419,367	322,422	-5.1
PPL	277,420	204,387	-5.9
UEPL	181,527	100,772	-11.1
MOL	117,866	89,007	-5.5
Others	180,539	96,836	-11.7

Source: Pakistan Energy Yearbook (various issues), HDIP.

Figure 5: Natural Gas Price for Households (PKR)



Source: Pakistan Energy Yearbook (various issues), HDIP.