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Policy Brief

Petroleum Policy and Natural Gas Exploration and Production in Pakistan*

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Problem and Background

Pakistan's petroleum sector is characterized by the upstream exploration and production of natural gas. Natural gas has been a significant energy source in the country for many decades, accounting for approximately half of the country's energy requirements. Until 2015, all supplies came from indigenous reserves, and natural gas was highly subsidized for consumers from households and the manufacturing industry, making it relatively lower-priced than oil-based fuels and LPG. The demand for natural gas has increased significantly over the past two decades, whereas domestic gas reserves are unable to meet the growing demand. This rising demand is attributed to the introduction of captive power generation in the domestic industry, the increasing use of gas for cooking and heating in residential areas, and the adoption of CNG in the transportation sector.

The upstream sector of Pakistan has lacked substantial gas discoveries over the last few years, both in onshore and offshore areas, resulting in a rapid decline in local natural gas resources. The Ministry of Planning, Development, and Special Initiatives of the Government of Pakistan predicted that natural gas production in the country will decline at a rate of 5 percent annually from 2021 onwards. Natural gas production has declined from 4,016 MMCFD in 2015 to 3,689 MMCFD in 2020. This trend continues, and future projections pose a rather gloomy picture, as shown in the figure below (IEP, 2023).

Previous medium-term development plans (5-year and annual plans) are more rigorously based on natural gas and plans to replace oil with natural gas, thereby increasing gas consumption across various sectors of the economy. Accordingly, SNGPL and SSGC have laid extensive gas distribution infrastructure downstream for the last few decades. To meet the country's ever-rising gas demand, Pakistan began developing import infrastructure in the mid-2010s by establishing LNG terminals at the Karachi seaport. Additionally, pipelined gas import projects will include Turkmenistan-Afghanistan-Pakistan-India (TAPI) and Iran-Pakistan (IP) projects. The gas pipeline projects face specific challenges due to the region's geopolitical situation; therefore, LNG imports are filling the demand–supply gap of natural gas in the country since 2015-16. The imports initially relieved the constrained gas sector in the short term, but soon led to the looming sectoral debt of over Rs 2.5 trillion within a few years.

Domestic gas was seen as a substitute for oil imports. Hence, successive governments extended infrastructure and connections to households, industries, and the transportation sector. Over the past few decades, low wellhead domestic gas prices have led to a decreased incentive

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for E&P companies to invest in Pakistan's upstream natural gas sector (Jamil, 2012). This study conducted a systematic review of policy documents, academic research, and government reports, shedding light on investment policies from around the globe that contribute to the growth of the natural gas sector. It assesses the extent to which contemporary research is incorporated into policy design and implementation. The analysis helps identify key trends and patterns in successful policy design and implementation to solve the issue of energy shortage in Pakistan.

Policy Context and Analysis

Countries adopt different fiscal terms to regulate upstream sector activities, including concessionary systems, service contracts, joint ventures, and production sharing contracts. The choice of specific fiscal terms reflects the policy objectives, geological potential, and market conditions. This choice depends on the country's resource base, domestic market size, regulatory setup, and political and economic status. Pakistan adopted a concessionary tax-royalty system where exploration and production (E&P) companies obtain the rights from the government to explore and produce oil and gas in a specific area. If drilling is successful, the company commercially manages the reserves and pays the agreed-upon taxes and royalties to the government based on production levels and revenue. Pakistan is striving to increase its domestic natural gas production through a comprehensive incentive package that includes specific policies, such as the petroleum policy, the tight gas policy, and the offshore policy.

Public policies regarding petroleum exploration and production significantly impact the output of the upstream sector, which involves the addition of reserves and the exploitation of fossil fuel resources. Drilling exploratory wells and rigs requires huge investments contingent on economic incentives, financial terms such as tax and royalty rates, and other regulations related to quantity and prices. Pakistan's petroleum policy is crucial 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, technological advancements, regional political economy, and climate change. Addressing these challenges remains pivotal to ensuring a stable and secure energy supply. By promoting private sector investments, deregulation, and technological innovation, Pakistan can traverse the intricacies of global energy markets.

This study provides an in-depth analysis of petroleum policies, offering valuable insights for policymakers and stakeholders. Low wellhead domestic gas prices over the past few decades have led to a shortage of natural gas reserves and production in Pakistan. Natural gas demand steadily rises in all sectors due to its economical status as a fuel compared to its substitutes. This review examines the extent of upstream activities in different petroleum policy regimes. Jamil (2012).[1] To put the problem in perspective, the study found a relationship between wellhead gas price and cumulative gas reserves in Pakistan. It found that the looming gas shortage can be alleviated in the short term and eliminated in the long term through an incentivized wellhead price. To put it briefly, the idea is mooted first to take advantage of domestic reserves to ensure competitive consumer prices for gas.

In our review of the policy documents, not a single citation of a local or international study indicates the fallacy of the policy-making process. Various studies have examined the policy bottlenecks hindering investment in the upstream sector, but their findings appear to be disjointed from the policy process. The role of the policy framework is pivotal in determining investment in a regulated environment. Studies suggest a price elasticity of more than one for the gas price in response to the addition of domestic reserves.

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[1] Jamil, F. (2012). Different public E&P policies impact natural gas reserves and production in Pakistan. *Resources Policy*, *37*(3), 368-374.

Table 1: Province-wise Natural Gas Sector Indicators (Billion Cubic Feet)

Province	Total Recoverable Reserves	Cumulative Production	Remaining Recoverable Reserves	Gas Production in 2000	Gas Production in 2010	Gas Production in 2020
Balochistan	15,508	13,037	2,471	1015	790	782
Khyber Pakhtunkhwa	2,274	1,505	769	0	205	400
Punjab	3,424	1,900	1,524	149	190	111
Sindh	42,104	25,917	16,187	1078	2877	2314
Pakistan	**63,311**	**42,360**	**20,951**	**2242**	**4063**	**3607**

Economic incentives, primarily the wellhead gas price, determine private investment in exploration, reserves expansion, and production. Price expectations adjust the investment level, and crude price affects investment decisions in exploring and producing from new fields. Natural gas production that is unprofitable at $5 per 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. Therefore, we can argue that low wellhead prices over the past few years have led to a decline in investment in Pakistan's upstream oil and gas sector. In addition, the declining investment can be viewed within a holistic framework, and government consumer price controls reduce companies' expectations of future returns from production, resulting in a decline in gas production and a reduction in long-term reserves.

Key Findings and Way Forward

Pakistan has a fascinating geodynamic history and a large, prospective basin with a sedimentary area of 827,268 square kilometers. The country has proven reserves of 50 trillion cubic feet (TCF) of Shale and 50 TCF of tight gas, in addition to approximately 20 TCF of conventional gas. The tight and shale gas potential reserves in Pakistan amount to 280 TCF (EIA, 2011).

Identifying the sources of weak private investment in Pakistan's upstream sector is crucial for recovering private investment, which requires a range of policy adjustments to encourage capacity expansion, relax supply-side constraints, and mitigate the perceived risks of investment. There is no silver bullet for the government in the short term to emerge from the crisis. However, appropriate gas pricing indexation can gear up investment and increase exploration activities in the long run. In a nutshell, the gas shortage is a manifestation of the obstructive policy of keeping the wellhead price low and providing hidden subsidies by the public utilities.

Our review and data analysis suggest that the Petroleum Policy of 1994 offers better prospects for investors and is therefore attractive to exploration and production (E&P) companies. Many well-known international oil and gas companies have established operations in the country, and their efforts have been successful. These operators include BP Amoco and Premier from the United Kingdom, BHP from Australia, China Oil from China, OMV from Austria, Petronas from Malaysia, MOL from Hungary, and Shell Oil from the Netherlands. The Petroleum Policy 1994 introduced the mechanism for the expeditious disposal of applications for the grant of exploration licenses, which remained intact in all subsequent policies. The income tax rate set in the 1994 policy was 50–55%. Royalty charged at 12.5% is quite regressive, leaving the investor with too much when producing gas from a field with high yields. The key findings from this review and analysis are summarized below.

- **Domestic gas:** First and foremost, affordability cannot be achieved without increasing domestic gas, which also provides plenty of revenue to the government.
- **Public interest and upstream risk:** The government must design its fiscal system carefully, considering the numerous risks involved in oil and gas exploration to balance its objectives vis-à-vis risks assumed by E&P companies.
- **Rate of return:** International companies can be attracted only if they find the rate of return high relative to other options. Otherwise, finances will flee towards more lucrative destinations.
- **Stability and Predictability**: Investors prefer stable and predictable regimes to mitigate risks.
- **Government Take**: The total revenue the government receives from the sector, including all taxes, royalties, and other payments.
- **Investment Climate**: Fiscal terms must be competitive to attract investment while ensuring fair returns for the host country.
- **Regulatory Framework**: Effective regulations and transparent processes are crucial for successfully implementing any fiscal regime.
- **Incentivizing Offshore Drilling:** Pakistan's offshore gas sector is characterized by *the Makran and Indus basins that cover* a large area. Although the government is offering incentives, more attractive fiscal terms can be provided to get a breakthrough.
- **Research-based policy making:** It is recognized worldwide that policy-driven research and research-guided policy making are vital for development. Therefore, industry–academia linkages need to be strengthened, and research citation culture should be promoted.