



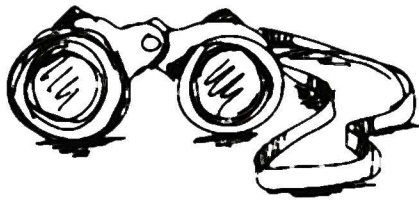
Oil and Gas Sector in Pakistan

Current Status, Challenges and Way Forward

Research and Publications Department
Institute of Cost and Management Accountants of Pakistan

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Oil and Gas Sector in Pakistan

Current Status, Challenges and Way Forward



ABBREVIATIONS

ARL	:	Attock Refinery Limited (ARL)
BCFD	:	Billion Cubic Feet per Day
CNG	:	Compressed Natural Gas
DGPC	:	Directorate General of Petroleum Concessions
HSD	:	High Speed Diesel
KUFPEC	:	Kuwait Foreign Petroleum Exploration Co.
LDO	:	Light Diesel Oil
LGs	:	Liquefied Gases
LNG	:	Liquified Natural Gas
LPG	:	Liquified Petroleum Gas
MMCFD	:	Million Cubic Feet of Gas per Day
MPCL	:	Mari Petroleum Company Limited
NRL	:	National Refinery Limited
OCAC	:	Oil Companies Advisory Council
OGDCL	:	Oil and Gas Development Company Limited
OGRA	:	Oil and Gas Regulatory Authority
OMC	:	Oil Marketing Companies
OPL	:	Orient Petroleum Private Limited
PARCO	:	Pak Arab Refinery Limited
PEL	:	Pakistan Exploration Private Limited
POL	:	Pakistan Oilfields Limited
PPL	:	Pakistan Petroleum Limited
PRL	:	Pakistan Refinery Limited
RLNG	:	Regasified Liquefied Natural Gas
SSGCL	:	Sui Southern Gas Company Limited
SNGPL	:	Sui Northern Gas Pipeline Limited

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Foreword

I am delighted to introduce this valuable booklet dedicated to Pakistan's oil and gas sector. Developed by the ICMA Research and Publication Department, it provides a comprehensive examination of Pakistan's oil and gas industry, offering crucial insights and recommendations for a sustainable energy future. Our goal is to empower decision-makers, shape policies, and contribute to the nation's prosperity.

Energy serves as the vital force behind our nation, fueling economic growth, empowering industries, and safeguarding the welfare of our citizens. The oil and gas sector, with its intricacies, presents us with challenges and opportunities. Hence, it is imperative to comprehend this industry, and this publication is a significant stride in that direction.

The oil and gas sector presents a challenging scenario as we currently produce only a limited percentage of the oil needed to meet our country's demand. This necessitates substantial imports of crude oil and oil products, resulting in an unfavorable trade balance. Global factors, such as the war in Ukraine, disrupt international oil prices, causing a ripple effect in energy prices, including oil and natural gas. To address this, our regulators must remain vigilant and formulate strategies to mitigate rising energy costs.

Ranked 33rd in global oil consumption, Pakistan must explore cost-effective sources for refined petroleum products and boost local oil production by expanding existing refinery capacity, attracting investments, and lowering tariffs on refining equipment. Additionally, exploring new oil reserves can reduce import dependency and enhance energy security.

I would like to appreciate Mr. Ather Saleem, Vice President ICMA and Chairman of the Research and Publications (R&P) Committee, along with the other R&P Committee members, for their exceptional work in producing high-quality publications and supporting government policies. I am confident their contributions will continue to benefit the Institute and the national economy.

I applaud the commitment and efforts of everyone involved in making this publication a reality. I urge everyone to fully utilize the knowledge it provides. Let us together stride confidently into a future where Pakistan's energy sector is not just a source of power but a catalyst for progress and prosperity.

Shehzad Ahmed Malik, FCMA
President, ICMA International



Preface

I am delighted to present this comprehensive booklet, a thorough exploration of Pakistan's oil and gas sector. Our nation's energy landscape is not only pivotal for economic growth but also profoundly impacts the daily lives of our citizens. With a dedicated commitment to fostering a deeper understanding of this complex industry, the ICMA Research and Publications Department has diligently gathered a wealth of invaluable insights, extensive analyses, and key recommendations. We aspire for this resource to empower stakeholders, inform strategic decisions, and contribute to a sustainable and prosperous energy future for Pakistan. As you delve into the chapters, you will discover a wealth of information to prepare you for the challenges and opportunities that lie ahead.

Chapter 1 provides an overview of Pakistan's Oil and Gas sector, emphasizing its development since the country's inception, significant discoveries, and the industry's three main segments: Upstream, Midstream, and Downstream. The chapter also introduces key regulatory bodies, such as the Ministry of Energy (Petroleum Division) and the Oil and Gas Regulatory Authority (OGRA). It offers insights into Pakistan's oil and gas reserves, production, consumption, and global standings. This chapter lays the groundwork for further exploration in subsequent sections.

Chapter 2 delves into the production and consumption dynamics of Pakistan's oil and gas sector. The country possesses substantial reserves, but production is decreasing. Refineries play a crucial role in providing 45% of Pakistan's petroleum products. While natural gas reserves are abundant, there is a challenge with declining production and increasing LNG imports. The use of LPG is on the rise, while CNG supply has halted due to a shortage.

Chapter 3 explores the supply chains of petroleum products, emphasizing Pakistan's energy sector's significance in oil, natural gas, LPG, and LNG. Understanding these supply chains is crucial to meet rising energy demands. The oil supply chain covers exploration, refining, and distribution. Natural gas follows a simpler path from gas fields, managed by state-owned entities. LNG's chain includes import terminals, regasification, and distribution. LPG production results from natural gas processing and crude oil refining, with diverse distribution channels.

Chapter 4 explores Pakistan's substantial dependence on petroleum products for its economic activities. The country leans towards imports due to a disparity between production and consumption. The COVID-19 pandemic had a significant impact on imports, causing a decrease. Notable aspects include reduced imports of crude oil and refined petroleum products, along with increased exports and domestic sales of such products. The chapter also emphasizes Pakistan's endeavors to diversify its LNG suppliers and introduces the arrival of LPG imports from Russia.

Chapter 5 explores the complex intricacies of pricing petroleum products and natural gas in Pakistan. It examines how global factors, such as OPEC choices and market dynamics, affect petrol prices. It also considers the impact of exchange rates, taxes, and transportation expenses. The chapter provides a comprehensive overview of pricing components and the role of OGRA in ensuring transparency. Additionally, it highlights the significance of natural gas pricing and the necessity for reforming the distribution sector. Furthermore, it briefly discusses RLNG pricing, emphasizing its strong connection to global crude oil prices and exchange rates, underlining the need for market-driven approaches and efficient policies.

Chapter 6 outlines Pakistan's oil and gas industry challenges, covering energy shortages, infrastructure issues, security threats, imports dependency, political instability, regulatory hurdles, environmental concerns, investment constraints, outdated technology, financial debt, geopolitical tensions, taxation problems, firm exits, lack of investment, declining gas production, LNG reliance, supply crises, depleted reserves, procurement issues, high costs, supply chain impacts, industrial setbacks, environmental and societal worries, fertilizer sector subsidies, distribution losses, urea shortages, billing system changes, and efficient gas usage initiatives, emphasizing the need for reforms.

Chapter 7 provides practical recommendations for a sustainable oil and gas industry in Pakistan. For the oil sector, this involves stabilizing prices, increasing crude oil extraction, expanding refining capacity, and addressing public sector challenges. In the gas sector, key recommendations include competitive exploration pricing, continuous exploration, transitioning to renewable energy, and optimizing LNG procurement. These proposals aim to ensure a reliable and resilient energy future for the country.

I hope that you would find this booklet interesting and informative. I must thank my fellow colleagues in the Research and Publications Committee for their cooperation and also the hard efforts put in by the R&P Department. Insha Allah, we will continue to bring out such sectoral publications in future as well. Thanks.

Ather Saleem, FCMA
Vice President ICMA and
Chairman Research and Publications Committee

Preamble

In Pakistan's industrial landscape, the Oil and Gas sector plays a critical role. It is the engine behind our energy needs, a driver of economic growth, and a guardian of our energy security. To offer a deep understanding of this dynamic sector, the Research and Publications Department of the Institute of Cost and Management Accountants of Pakistan (ICMA) is delighted to present this comprehensive publication.

Our publications are designed to be guiding lights for those interested in various industry sectors. We provide a complete view of each industry, identify the obstacles it faces, and, most importantly, offer practical solutions to foster its growth. This information is invaluable for policymakers and industry enthusiasts.

This publication, focusing on the Oil and Gas sector, demonstrates ICMA's commitment to nurturing the growth and development of Pakistan's key industries. It is a valuable resource for industry insiders and a broader audience that includes ICMA members, students, industry professionals, academia and experts.

To broaden our knowledge and learn from industry experts, ICMA hosted a webinar that brought together influential individuals from the field and related organizations. This initiative aimed to provide a well-rounded perspective on the significance of the Oil and Gas sector within Pakistan's broader economy.

Mr. Shehzad Ahmed Malik, President ICMA was the guest of honour at the webinar whereas Mr. Ather Saleem, Vice President ICMA and Chairman, Research and Publications Committee presented the welcome speech.

During this enlightening webinar, distinguished speakers shed light on the complex challenges and promising opportunities within the sector. Contributions from experts such as Syed Khalid Siraj Subhani, MD/CEO of Oil & Gas Development Company Ltd. (OGDCL); Imran Maniar, Managing Director of Sui Southern Gas Company (SSGC); Aisha Masood, Secretary of the Oil Companies Advisory Council (OCAC); and Muhammad Arif, Member Gas at the Oil & Gas Regulatory Authority (OGRA) were instrumental in providing a deep understanding of the issues and the path forward.

Furthermore, the panel discussion, skillfully moderated by Muhammad Arif, FCMA, Chief Financial Officer, Government Holdings (Pvt.) Ltd., added an additional layer of insight to the dialogue. His expertise guided a meaningful exchange of ideas, reinforcing our commitment to providing a holistic view of the industry.

In the pages that follow, you will find an in-depth exploration of the current status, challenges, and the promising path forward for the Oil and Gas sector in Pakistan. This publication is not merely a document but a vital resource, inspired by our dedication to promoting informed decision-making and advancing the sustainable development of essential industries in Pakistan. We believe that this booklet will inspire positive change and pave the way for a brighter future for the Oil and Gas sector in Pakistan.



Chapter 1

Overview of the Oil and Gas sector in Pakistan



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Overview of the Oil and Gas sector in Pakistan

Oil and natural gas are major industries in the energy market and play an important part in the global economy as the world's primary fuel sources. Pakistan's oil and gas industry has grown exponentially since the country's independence in 1947, when oil supplies were scarce. At the time, there was no gas production. The petroleum industry has played a vital role in national development over the last half-century by making huge indigenous oil and gas discoveries.

Timelines of Oil & Gas Discoveries

- 1948: Mines and Oilfields and Mineral Development (Government Control) Act, 1948 was promulgated to promote exploration activities in the country.
- 1952: The first oil field was discovered by Pakistan Petroleum Limited (PPL) in the province of Balochistan and during the same period sui gas field was also discovered.
- 1954: Sui Gas Transmission Company Limited was established [later merged to form SSGC]
- 1955: The commercial drilling and exploring of Sui gas fields was started. This sui gas field remains the biggest natural gas field in Pakistan.
- 1959: PPL discovered gas reserves at Zin, Uch, Khairpur fields.
- 1961: PPL and Pakistan Oilfields (POL) discovered Oil in Toot area in the Pothohar Plateau of northern Pakistan which is located approximately 135 kilometres southwest of Islamabad.
- 1963: Sui Northern Gas Company Limited (SNGLP) was established.
- 1964: The first well in Toot Oil field was drilled which started commercial production in 1967.
- 1976: Dhodak gas field was discovered in the province of Punjab.
- 1981: Union Texas Pakistan discovered an oil field in lower Sindh.
- 1983: Dakni gas field was discovered in the south-west of Islamabad and started production in 1989.
- 1984: Tando Adam oil field, located in Hyderabad (Sindh) was drilled and completed.

- 1986: Toot Oilfields started peak production of 2,400 barrels per day.
- 1986: Chak Naurang field was discovered which is located 90 kms away from Islamabad.
- 1989: Sui Southern Gas Company (SSGC) Limited was created after merger of different organizations.
- 1990: Qadirpur gas field was discovered in Sindh. It remains the third largest gas field in Pakistan.
- 1994: Rajjan oil field was discovered in Gujjar Khan in the Rawalpindi District of Punjab.
- 2004: Chanda oil fields located in Khyber Pakhtunkhwa started oil production.
- 2006: Mela oil field was discovered in Kohat in KPK province.
- 2009: NASHPA oil fields were discovered in Karak district of KPK province.
- 2010: Sheikhan gas field was discovered in Kohat in KPK province.
- 2015: OGDCL discovered oil field at Tando Allahyar, Sindh Province.
- 2020: Mari Petroleum Co. Ltd. (MPCL) discovered gas reserves at Iqbal Well-1 in Ghotki, Sindh province.
- 2022: OGDCL discovered oil and agas at Kot Nawab-1 exploration well in Sanghar, Sindh province.
- 2022: OGDCL discovered oil reserves from Toot Deep-1 Well in Attock, Punjab province.
- 2022: MPCL discovered a big gas reservoir of one trillion cubic feet in North Waziristan.
- 2023: MPCL made a gas discovery at Mari Ghazi-1 in Mari D&PL in Sindh province.

Segments of Oil and Gas Industry

The Oil and Gas industry is generally classified into the following three segments:

- 1) Upstream – Exploration and Production (E&P) of crude oil and natural gas
- 2) Midstream – Transportation, storage and processing of oil and gas
- 3) Downstream – Refining, marketing and distribution of oil and gas to end-users.

The upstream oil and gas sector is led by the state-owned companies viz. OGDCL, PPL and Mari Petroleum (owned by Fauji Foundation and OGDCL). All are listed on the Pakistani stock exchange, and OGDCL is also listed on the London stock exchange.

Exploration & Production (E&P) Companies [Upstream]

There are 11 active E&P companies operating in Pakistan; out of which 6 are domestic and 5 are foreign:

Domestic E&P Companies

- 1) Oil & Gas Development Company Ltd (OGDCL)
- 2) Pakistan Petroleum Limited (PPL)
- 3) Mari Petroleum Company Limited (MPCL)
- 4) Pakistan Oilfields Limited (POL)
- 5) Pakistan Exploration Private Limited (PEL)
- 6) Orient Petroleum Private Limited (OPL)



OGDCL, PPL and MPCL are public listed companies whereas POL, PEL and OPL are domestic operating companies which are in active exploration of hydrocarbon.

Foreign E&P Companies

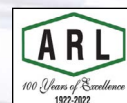
- 1) Ente Nazionale Idrocarburi (ENI) – Italy
- 2) Magyar Olaj-es Gazipari (MOL) – Hungary
- 3) Polskie Gornictwo Naftowe I Gazowinctwo (PGNIG) – Poland
- 4) United Energy Pakistan Limited (UEPL) – China
- 5) Kuwait Foreign Petroleum Exploration Co. (KUFPEC) - Kuwait

Out of five foreign E&P Companies, three are European [ENI, MOL and PGNIG) whereas other two are from China and the Middle East. All of them are actively pursuing exploration and production in Pakistan.

Oil Refineries [Downstream]

Refining is a key step in the oil industry. Currently, there are five local players operating in the oil refining sector in Pakistan which include:

- (1) Pak Arab Refinery Limited (PARCO)
- (2) Attock Refinery Limited (ARL)
- (3) National Refinery Limited (NRL)
- (4) Pakistan Refinery Limited (PRL)
- (5) Cnergyico Pk Limited (formerly Byco Petroleum Pakistan)



All of these refineries are hydro skimming refineries, except for PARCO which is a mild-conversion refinery.

Pakistan's oil refining capacity is about 450,000 barrels per day, equivalent to 20 million tons per annum.

Local refineries have supplied about 60 percent of the country's requirements of diesel, 30 percent of motor gasoline and 100 percent of jet fuel for defense. The rest is imported as refined products.

The product slate typically comprises of energy products i.e. Naphtha, Motor Gasoline (MS), High Speed Diesel (HSD), Furnace Oil (FO), Kerosene, Jet fuel (JP-1&JP-8), High-Octane Blending Component (HOBC), Liquefied Petroleum Gas (LPG), Light Diesel Oil (LDO) and non-energy products.

Regulators of Oil and Gas Industry

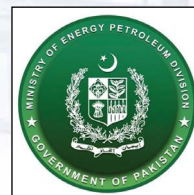
There are two Regulatory Bodies of the Oil and Gas industry in Pakistan as under:

- (1) Ministry of Energy [Petroleum Division]
- (2) Oil and Gas Regulatory Authority (OGRA)

The gas distribution and transmission are mainly owned and operated by two state-owned companies' viz. Sui Northern Gas Pipeline Limited (SNGPL) and Sui Southern Gas Company Limited (SSGCL).

Ministry of Energy [Petroleum Division]

The Ministry of Energy was created on 4th August 2017 after merging the Ministry of Petroleum and Natural Resources with the Power Division of the Ministry of Water and Power (now renamed as Ministry of Water Resources). The Ministry has two divisions - Petroleum and Power.



The Petroleum Division is responsible for dealing with all matters relating to oil, gas and minerals.

The upstream activities in the oil and gas sector are administered and regulated through the Policy Wing of the Ministry of Energy (Petroleum Division). The Policy Wing is responsible for developing policies for oil and gas sector, forecasting future requirement and assessing the impact of existing policies, rules and regulations. The Policy Wing has three more Directorates:

- a) Directorate General of Oil (DG Oil)
- b) Directorate General of Gas (DG Gas)
- c) Directorate General of Liquefied Gases (LGs)

The Directorate General of Petroleum Concessions (DGPC) is one of the Directorates of the Ministry of Energy (Petroleum Division) which functions as the Regulatory authority for all Upstream Exploration & Production activities in Pakistan.

The functions of the DG Petroleum Concessions (DGPC) are as under:

- a) Grant of petroleum rights, exploration licenses, development and production leases
- b) Facilitation of Exploration and Production (E&P) and Services companies/activities
- c) Promotion of petroleum exploration, negotiations with foreign & local E&P Companies
- d) Management of petroleum exploration, development and production operations
- e) Ensuring realization of government receipts (dividend, royalty, rents, application fee etc.)
- f) Compilation of investment data and management and scale of technical data
- g) Analysis of oil and gas fiscal regimes and recommend policies as per international practices

Some of the key functions of the DG Gas are as under:

- a) Formulation of Government policies with regard to Natural Gas, LPG, LNG and CNG
- b) Assessment and management of gas demand and supply
- c) Allocation of gas from new finds to gas utility companies
- d) Allocation of natural gas from different supply sources to various sectors
- e) Review and execution of gas price agreement with producers
- f) Assessment of consumers' gas prices based on prescribed prices determined by OGRA
- g) Budgeting and monitoring of receipts of Gas Development Surcharge

Oil and Gas Regulatory Authority (OGRA)

Oil and Gas Regulatory Authority (OGRA) was established by the Federal Government on March 28, 2002 in pursuance of the Oil and Gas Regulatory Authority Ordinance, 2002 after subsuming the Natural Gas Regulatory Authority (NGRA).



OGRA is now the primary Regulator of midstream and downstream Oil & Gas Industry in Pakistan with the objectives to foster competition; increase private investment in the midstream and downstream petroleum industry; protect the public interest while respecting individual rights and provide effective and efficient regulations.

Some of the key functions of the OGRA are as under:

- a) Grant of licenses for regulated activities in the Natural Gas, CNG, LPG, LNG and oil sectors
- b) Monitor of pricing of petroleum products under the deregulated scenario
- c) Determine revenue requirement and prescribed prices of natural gas utilities
- d) Notify prescribed and consumers sales prices
- e) Notify ex-refinery price of SKO (kerosene oil) including ex-depot prices of SKO and E-10
- f) Enforce technical standards and specifications in all the regulated activities
- g) Resolve public complaints and disputes against licensees and between licensees

OGRA has three main Departments relating to Oil and Gas regulation as under:

a) **OIL DEPARTMENT** – This department grants licenses to undertake marketing of refined oil products, construction & operation of oil refinery, oil pipeline, oil storage facility, lube oil blending/ reclamation facility, establishing/ operation of lubricant Marketing Companies, oil testing facility, quality monitoring of refined oil products, handling complaints related to the sector, enforcement of technical standards etc.

b) **GAS DEPARTMENT** – This department grant licenses for the Sale, Transmission and Distribution of Natural Gas / RLNG; determines revenue requirements of Gas Utility companies i.e. SNGPL and SSGCL on regular basis; monitor and enforce rules, regulations/ standards and applicable license conditions; approve Gas Sale/Purchase Agreements.

c) **LPG DEPARTMENT** – This department issues licenses to construct and operate LPG production, storage / filling facilities, LPG air mix plants and LPG auto refueling stations. All related matters like renewal, amendments, cancellation/revocation and transfer of licenses, enforcement of technical standards, inspections are dealt by this department.

d) **LNG DEPARTMENT** – This department issues licenses to LNG project developers or LNG Terminal Owner/ Operator to construct and operate LNG receiving terminals, processing of licenses for transportation, filling, marketing or distribution of LNG.

Oil Companies Advisory Council (OCAC)

The Oil Companies Advisory Council (OCAC) was formed in 1960 to officially represent the Downstream Oil Industry i.e., Refining, Marketing and Distribution. OCAC is an independent organization formed by Oil Refineries, Oil Marketing Companies and a Pipeline transportation company.



OCAC Members [2022]	
Oil Refineries	05
Oil Marketing Companies (OMC)	31
Pipeline transportation company	01
Total	37

OCAC serves as a platform for projecting and establishing views of Downstream Petroleum Industry which ensures uninterrupted supply of POL products nationwide and provides employment to people.

OCAC acts as a quasi-regulator and develops suggestions pertaining to the oil and gas sector for the Government besides collecting production data for the sector and coordinating import activities.

Economic Snapshot of Oil & Gas Sector in Pakistan

CRUDE OIL RESERVES 540 MILLION BARRELS (2021)	CRUDE OIL PRODUCTION 83 THOUSAND BARRELS PER DAY (2021)	OIL CONSUMPTION 503 BARRELS PER DAY (2021)	OIL REFINERY THROUGHPUT 240 THOUSAND BARRELS PER DAY (2021)	OIL REFINERY CAPACITY 411 THOUSAND BARRELS PER DAY (2021)
NATURAL GAS RESERVES 63 TRILLION CUBIC FEET (Tcf)	NATURAL GAS PRODUCTION 32.7 BILLION CUBIC METRES (2021)	NATURAL GAS CONSUMPTION 44.8 BILLION CUBIC METRES (2021)	LIQUEFIED NATURAL GAS (LNG) IMPORTS 12.1 BILLION CUBIC METRES (2021)	

Pakistan's ranking in Worlds' Oil and Natural Gas Reserves, Production and Consumption

Ranks 52nd Among the countries holding Crude Oil reserves [0.021% share in world oil reserves]	Ranks 53rd Among the countries In Crude Oil production
Ranks 33rd Among the countries in Oil Consumption [0.6% share in world consumption]	Ranks 30th Among the countries holding Natural Gas reserves [0.4% share in world gas reserves]
Ranks 26th Among the countries In Natural Gas Production	Ranks 21st Among the countries in Natural Gas Consumption [1.2% share in world consumption]

Chapter 2

Production and Consumption of Petroleum Products

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Production and Consumption of Petroleum Products

Different studies indicate that Pakistan has extensive oil and gas reserves, with an estimated 27 billion barrels of oil reserves and vast natural gas resources. These resources are primarily located in Balochistan, Sindh, and Khyber Pakhtunkhwa. A study conducted by the United States Agency for International Development (USAID) suggests that the Indus basin alone could potentially yield 14 billion barrels of technically recoverable crude oil.

Production of Crude Oil

Pakistan possesses approximately 540 million barrels of confirmed oil reserves, ranking 52nd globally. Annually, it extracts an average of 83,000 barrels of oil per day, which accounts for 8.5% of its total proven oil reserves and 19% of its yearly oil consumption. Without new discoveries, these domestic oil reserves are predicted to run out within 10-12 years at the current production rate. Crude oil production is projected to decline further, from 62,663 barrels per day in 2025 to 51,029 barrels per day in 2030, with a negative 4 percent growth rate.

Presently, oil production takes place in upper Punjab and lower Sindh, but production levels have consistently declined over time. In the 2021-22 period, daily oil production stood at 73,000 barrels, a decrease from 98,000 barrels per day in 2017. Pakistan holds significant potential to enhance its crude oil production to meet future energy demands.

Production of Refined Oil

In the context of Pakistan, local refineries are critical assets that underpin the nation's economic well-being. They ensure the availability of 45% of Pakistan's annual petroleum product demand, providing essential fuel for defense and transportation while saving over \$1 billion in foreign exchange. These refineries process approximately 70,000 barrels per day of local crude oil and condensate, making a substantial contribution to Pakistan's national economy. However, it's concerning that Pakistan has not witnessed the establishment of new refinery projects in over a decade, with only two refineries added in the last 40 years, raising questions about the nation's energy infrastructure development.

At present, the refining industry in Pakistan has an annual oil refining capacity of around 13 million tons. The total production of refineries [both energy and non-energy products] saw a significant increase of 14.48 percent during FY 2020-21, reaching 10.66 million tons, in contrast to the 9.31 million tons in FY 2019-20. Data given in Table-3 indicates that PARCO achieved the highest production growth, surging by 55 percent, escalating from 2.85 million tons to 4.42 million tons during the year. ARL also witnessed a noteworthy production increase of 18 percent, rising from

1.56 million tons to 1.84 million tons. Conversely, BPPL's production declined by approximately 20 percent, decreasing from 2.13 million tons to 1.70 million tons, while NRL experienced a 7 percent reduction, declining from 1.56 million tons in FY 2019-20 to 1.45 million tons during FY 2020-21.

Table 1: Refineries Production and Growth during FY 2020-21

Table 1: Refineries Production and Growth during FY 2020-21						
(Million Tons)						
Sr.	Refinery	Energy Products	Non-Energy Products**	Total FY 2020-21	Total FY 2019-20	(%) Growth/ (Decline)
1	Pak Arab Refinery Limited (PARCO)	4.36	0.07	4.42	2.85	55.03
2	National Refinery Limited (NRL)	1.45	0.00	1.45	1.56	(7.10)
3	Pakistan Refinery Limited (PRL)	1.24	0.00	1.24	1.21	2.55
4	Attock Refinery Limited (ARL)	1.78	0.06	1.84	1.56	18.04
5	Cnergyico Pk Limited*	1.70	0.00	1.70	2.13	(19.90)
	Total	10.53	0.13	10.66	9.31	14.48

*Cnergyico Pk Limited (formerly Byco Petroleum Pakistan Limited)

** Non-Energy Petroleum Products (NEPP) are those which, once refined, are used either as final goods or as intermediate inputs for other non-energy producing processes. They fall into five categories: petrochemical feedstock, asphalt, petroleum coke, lubricating oil/greases and naphtha specialties.

Table 1: Refineries Production and Growth during FY 2020-21

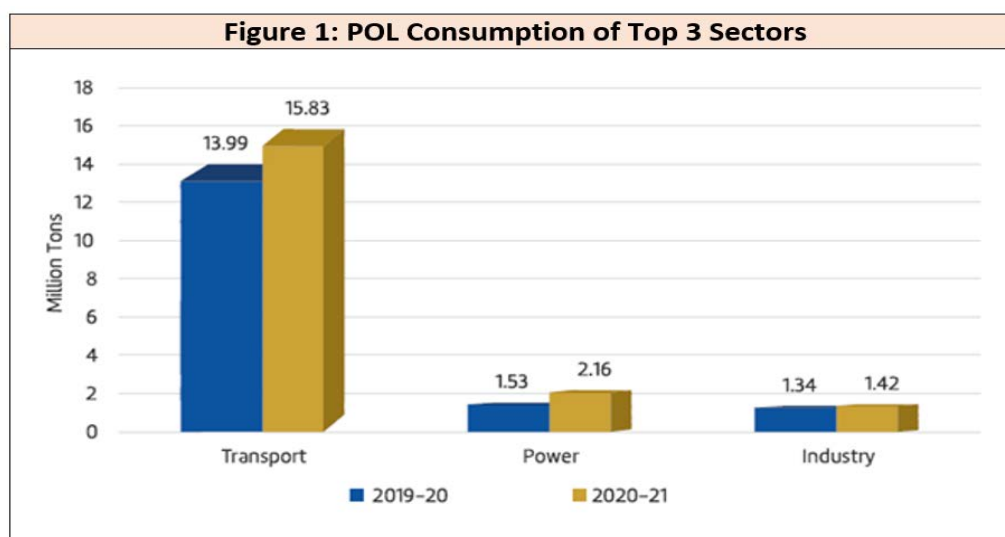
Table 1: Refineries Production and Growth during FY 2020-21							
(Million Tons)							
Sr.	Product	PARCO	NRL	PRL	ARL	Cnergyico	Total
1	High Speed Diesel (HSD)	1.98	0.68	0.61	0.57	0.73	4.57
2	Furnace Oil	0.92	0.36	0.24	0.41	0.60	2.52
3	Motor Spirit (MS)	1.09	0.22	0.07	0.59	0.35	2.52
4	Aviation Fuel	0.20	0.08	0.04	0.13	0.00	0.45
5	Kerosene Oil	0.01	0.00	0.00	0.05	0.00	0.07
6	Light Diesel Oil (LDO)	0.01	0.00	0.00	0.01	0.00	0.02
7	LPG	0.15	0.00	0.02	0.00	0.03	0.20
8	Naphtha	0.00	0.12	0.07	0.02	0.35	0.20
	Total	4.36	1.45	1.24	1.78	1.70	10.53

Consumption of Petroleum products

Pakistan's annual demand for petroleum products stands at 19.92 million tons (MT). Despite this substantial demand, Pakistan fulfills approximately half of it through a combination of local crude oil production and the processing of imported crude oil in its refineries. The primary consumers of petroleum products are the transportation, energy, and industrial sectors, with consumption distributed as follows: transportation accounting for 59%, energy at 32%, and industry at 8%. Pakistan often sources these products from Saudi Arabia, Qatar, and the Gulf Countries due to established commercial ties and the convenience of delayed payments. Furthermore, there is a growing trend of procurement from Russia.

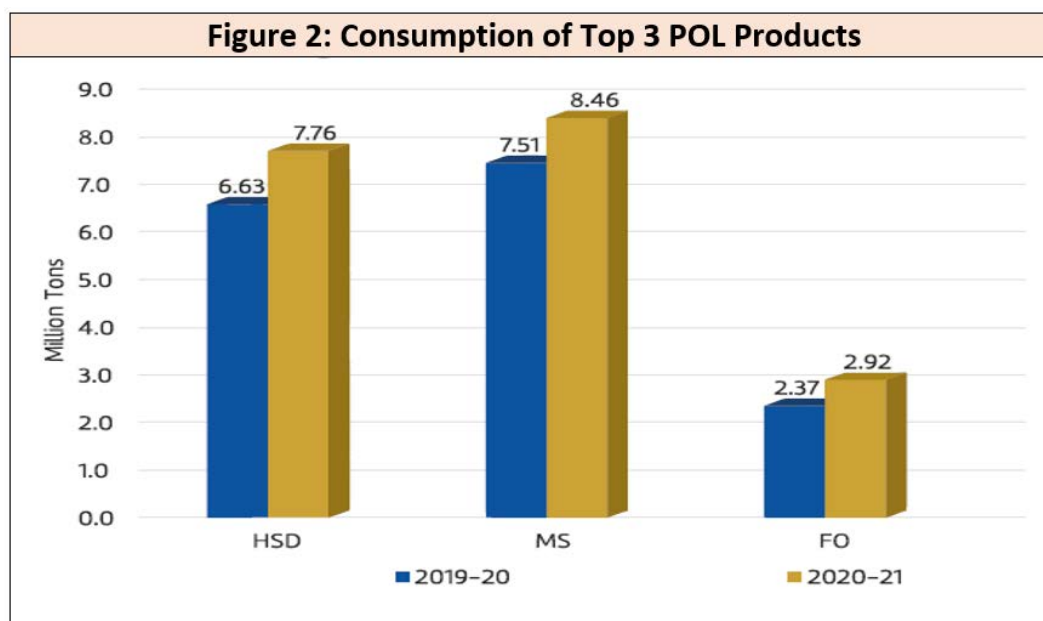
The consumption of petroleum products experienced a remarkable 12.95% increase during FY2020-21, reaching a total of 19.92 million tons, compared to the previous year's consumption of 17.63 million tons. Within specific sectors, the power sector saw a substantial surge of 41.70%, with consumption reaching 2.16 million tons during FY 2020-21, up from 1.53 million tons during FY 2019-20. Similarly, the transport sector witnessed a notable growth of 12.12%, with consumption rising from 13.99 million tons in FY 2019-20 to 15.83 million tons in FY 2020-21. Agriculture also saw an increase of 12.59%, while industry experienced a 6.56% growth compared to the previous year. However, it's worth noting that consumption of petroleum products in the domestic, export, and government sectors experienced significant declines of 82.37%, 37.73%, and 30.09%, respectively, during FY 2020-21 when compared to the previous year ([Table-2](#)).

Sr.	Sector	FY 2019-20	FY 2020-21
1	Transport	13.99	15.83
2	Power	1.53	2.16
3	Industry	1.34	1.42
4	Government	0.44	0.31
5	Domestic	0.05	0.01
6	Agriculture	0.01	0.01
7	Overseas/Export	0.28	0.18
	Total	17.64	19.92



A product-wise analysis reveals that in FY 2020-21, consumption of Furnace Oil (FO) increased by 23.27 percent, High-Speed Diesel (HSD) by 17.02 percent, Motor Spirit (MS), including HOBC, by 12.69 percent, and Light Diesel Oil (LDO) by 5.25 percent compared to FY 2019-20. In contrast, the consumption of Aviation Fuel and Kerosene oil declined by 48.10 percent and 16.82 percent, respectively, during the same period. Table 2 illustrates the sector-wise consumption of POL products (Table-3)

Sr.	Sector	FY 2019-20	FY 2020-21
1	Motor Spirit (MS)	7.51	8.46
2	High Speed Diesel (HSD)	6.63	7.76
3	Kerosene Oil	0.09	0.07
4	Aviation Fuel (AF)	0.70	0.36
5	Furnace Oil (FO)	2.37	2.92
6	Light Diesel Oil (LDO)	0.02	0.02
	Total Energy [1-6]	17.32	19.59
	Total Non-Energy	0.32	0.33
	Grand Total	17.64	19.92



Production of Natural Gas

Pakistan, positioned 29th worldwide for natural gas reserves, possesses a significant 19 trillion cubic feet (Tcf) of proven gas reserves, primarily concentrated in Sindh and Balochistan provinces. The total extractable potential stands at an impressive 24 Tcf, with daily gas production currently at 4 billion cubic feet (BCFT). Notably, Sindh contributes 63% to this production with 124 gas fields, while the Sui region in Balochistan accounts for 6%. Interestingly, Pakistan's proven reserves are equivalent to 12 times its annual consumption.

In 2015, Pakistan's natural gas production was robust at 1,454.98 billion cubic feet, indicating steady growth averaging 4.13% annually from 1996 when production was at 696.41 billion cubic feet. However, a more recent trend has seen production decline to 3,505 MMCFD in 2021 from 4,063 MMCFD in 2010. Projections suggest that if this trajectory persists, natural gas production may diminish to 2,306 MMCFD by 2030.

Natural gas is primarily produced within the country from various regions. Currently, the natural gas supply in the country has reached 4,127 MMCFD. Key gas fields in Pakistan include the renowned Sui Gas Field in Balochistan, the Qadirpur Gas Field, and the Mari Gas Field in Sindh. Pakistan actively fosters exploration and drilling activities, offering exploration and production (E&P) concessions to attract investments. Moreover, Pakistan has been importing LNG since 2015, with Regasified Liquefied Natural Gas (RLNG) playing a significant role in alleviating natural gas shortages. In the fiscal year 2020-21, approximately 33 percent of the country's gas supplies were sourced from imported RLNG.

Pakistan, heavily reliant on natural gas for its energy needs, confronts a pressing challenge due to the rapid depletion of gas reserves. A report titled 'Pakistan Natural Gas: Policy Issues & Way Forward,' released in June 2023, by the Energy Planning Resource Centre (EPRC) under the Ministry of Planning and Development, GOP reveals a significant decline in recoverable gas reserves from 63,311 billion cubic feet (Bcf) to 20,951 Bcf by 2021, underscoring the urgency of addressing future gas production and supply challenges.

Consumption of Gas

Pakistan meets its energy demand through a mix of imported and indigenous resources. Natural gas and imported LNG together contribute more than 40 percent to the country's energy mix, including electricity generation. The demand for natural gas consistently surpasses its production capacity.

In 1999-2000, the country's total natural gas consumption stood at approximately 1,951 MMCFD. This consumption significantly increased to 3,972 MMCFD by FY 2017-18 and reached 3,884 MMCFD in FY 2020-21. The number of domestic gas consumers has risen from 10.3 million to over 10.7 million, yet many households lack access to natural gas for cooking. Around 25 percent of the gas consumption is met through imported LNG. In 2020 and 2021, Pakistan's natural gas consumption stood at around 4.2 billion cubic feet per day (Bcfd).

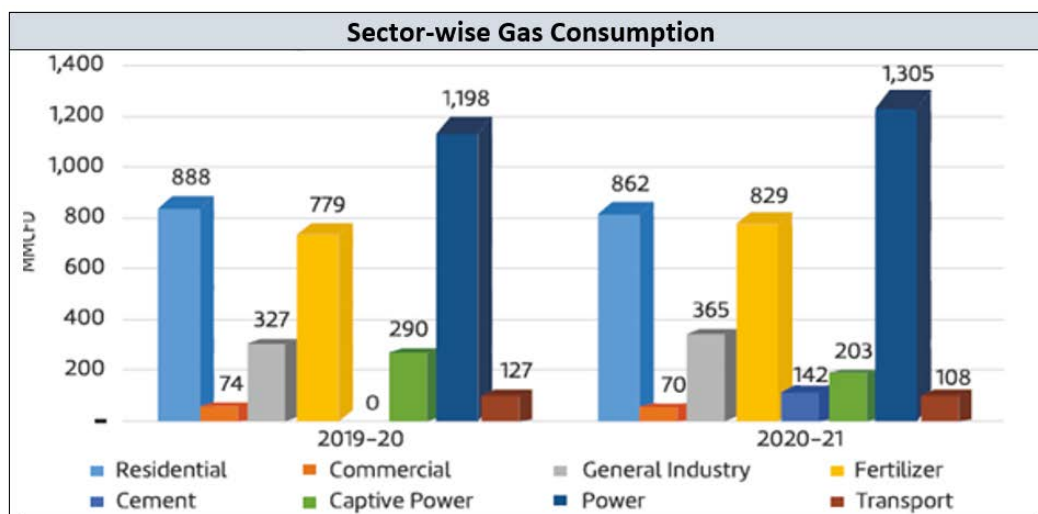
Natural gas consumers are divided into three categories: domestic or residential, commercial, and industrial sectors. The industrial sector includes power, cement, general industry, fertilizer, and transport. During winter, Gas Utility Companies prioritize gas supply, with the domestic sector being the top priority, following the government's Natural Gas Load Management Policy.

Sector-wise Gas Consumption in Pakistan (FY 2020-21)

Sector	Unit Consumed (MMCFD)	Share in Total Gas Consumption
Power	1,305	30.34%
Residential/ Domestic	862	20.04%
Fertilizer	829	19.27%
General Industry	365	8.49%
Captive Power	203	4.72%
Cement	142	3.30%
Transport	108	2.51%
Commercial	70	1.63%

Source: OGRA Petroleum Industry Report, 2021

Note: MMPD stands for 'Million Cubic Feet per Day'. It's a standard unit often used in the energy industry to express gas production or consumption rates.



Province-wise Gas Consumption (FY 2020-21) – [SNGPL and SSGCL Systems only]

Province	Unit Consumed (MMCFD)	Share in Total Gas Consumption
Punjab	1,426	52%
Sindh	1,052	39%
KPK	190	7%
Balochistan	64	2%

Source: OGRA Petroleum Industry Report, 2021

In recent years, Sindh's gas supply decreased by 11%, going from 1,344 MMCFD in FY 2019-20 to 1,192 MMCFD in FY 2020-21. Punjab's share dropped by 9%, from 91 MMCFD to 83 MMCFD, while Balochistan saw a 1% decrease, going from 335 MMCFD to 333 MMCFD. In contrast, KPK's supply increased by 8%, rising from 368 MMCFD to 398 MMCFD during the same period. Overall, Sindh's share of gas supply decreased from 45% to 40%, KPK from 13% to 12%, while Balochistan and Punjab remained steady at 11% and 3%, respectively.

Province-wise Share of Total Gas Supply excluding RLNG (FY 2019-20 vs. FY2020-21)

Province	Share of Total Gas Supply		
	FY 2019-20	FY 2020-21	Change
Sindh	45% (1,344 MMCFD)	40% (1,192 MMCFD)	-11%
Punjab	3% (91 MMCFD)	3% (83 MMCFD)	-9%
Baluchistan	11% (335 MMCFD)	11% (333 MMCFD)	-1%
KPK	13% (368 MMCFD)	12% (398 MMCFD)	+8%

Source: OGRA Petroleum Industry Report, 2021

Gas Supply Infrastructure

In Pakistan, there's a substantial network of pipes for delivering natural gas to homes, factories, businesses, and vehicles. The primary companies responsible for this are Sui Northern Gas Pipelines Limited (SNGPL) and Sui Southern Gas Company Limited (SSGCL). SNGPL manages the northern region, while SSGCL focuses on areas like Karachi and Hyderabad in the south. Despite a decrease in the amount of gas produced in Pakistan, these companies still expanded their networks in the year 2020-21. SNGPL extended its transmission network by 37 kilometers, and SSGCL added 17 kilometers. They also significantly expanded their distribution networks, with SNGPL adding 7,141 kilometers and SSGCL adding 929 kilometers during the same period.

One significant problem in this strong gas supply system is the loss of gas during distribution. SSGC experiences a high 18.28% loss rate, and SNGPL reports a substantial 12.32% loss, both well above the expected industry range of 2-3%. Resolving this issue is crucial for maintaining a reliable and sustainable gas supply to consumers. To tackle this challenge, the government needs to take proactive steps. This includes attracting investments, initiating infrastructure improvement projects, and implementing efficiency measures in the distribution and transmission systems. These actions will help ensure a consistent and dependable gas supply for everyone.

Liquefied Natural Gas (LNG)

Pakistan began importing liquefied natural gas (LNG) in 2015 to address its natural gas deficit. Currently, nearly 23% of the country's natural gas consumption is met through imported LNG.

The government allocates RLNG to different sectors that include power producers, industrial consumers, and commercial consumers. The import of LNG has significantly reduced the overall electricity generation costs in the country, saving approximately Rs 234 billion during FY2017-2020.

Pakistan imports LNG primarily through government-to-government agreements, including a 15-year contract with Qatar Energy on a take-or-pay basis, as well as four agreements with private suppliers in Italy, Singapore and Qatar, also based on term contracts with a take-or-pay arrangement. Over 87% of LNG is sourced from these term agreements, while the remaining portion is acquired through spot purchases.

Pakistan's LNG market is still in development and currently consists of two Floating Storage and Regasification Units (FSRUs) located at Port Qasim in Karachi. The establishment of the Engro Elengy Terminal (Pvt.) Limited (EETPL) in 2015 and the Pakistan GasPort Consortium Limited (PGPC) terminal in 2017 for LNG handling represents a significant milestone in addressing the country's gas shortage. EETPL has an installed regasification capacity of 690 MMCFD, while PGPC has an installed regasification capacity of 650 MMCFD. EETPL serves Pakistan State Oil (PSO), while PGPC serves Pakistan LNG Limited (PLL).

In Pakistan, the LNG/RLNG market is regulated. State-owned companies like PSO and PLL buy LNG from the international market. They sell it to SNGPL, which also transports RLNG to power plants and other consumers. The power sector, including both independent (IPPS) and government-owned plants, is a major user of RLNG, with a total capacity of 3,600 MW. The pipeline network operated by public Sui gas companies is responsible for transporting and distributing imported LNG throughout the country. In the FY 2020 an average of about 798 million cubic feet of LNG was delivered through the pipelines each day. The highest amount, 1,270 million cubic feet per day, was in July, while the lowest, 502 million cubic feet per day, occurred in February.

Pakistan's LNG import infrastructure is equipped to handle up to 13 vessels monthly, with cargo sizes ranging from 143,000 to 165,000 cubic meters (CBM). The two terminals in the country offer a storage capacity of approximately 140,000 tons of LNG and a regasification capacity of 1.35 billion cubic feet per day (BCFD), of which 1.2 BCFD is allocated to the Sui Southern Gas Company (SSGC). In 2018, a total of 74 vessels arrived, with six docking per month at Engro Elengy Terminal Limited (ETPL) and three at Pakistan GasPort Limited (PGPL). ETPL operates at full capacity, while PGPL operates at approximately 47% of its design capacity.

Pakistan has ambitious plans to augment its natural gas supply by expanding LNG terminals, importing from neighboring nations, and constructing a north-south gas pipeline. The LNG import capacity is projected to double by 2030, reaching 31.7 million tonnes per annum. Moreover, an increase in LNG imports from Qatar is anticipated, growing from 9.8 billion cubic meters in 2023 to 21.5 billion cubic meters in 2030.

LNG is relatively more costly compared to indigenous gas, posing a challenge to its adoption, especially in households and industries. Although Pakistan's LNG imports have helped address gas shortages, there are ongoing challenges related to price competitiveness. The further development of LNG infrastructure is crucial to meet the country's expanding energy needs and sustain economic growth.

Liquefied Petroleum Gas (LPG)

LPG, or liquefied petroleum gas, plays a vital role in meeting energy demands in Pakistan. Around 61 percent of the LPG demand is met through local production, while the remaining portion is imported. This vital resource is sourced from refineries, gas-producing fields, and international imports.

LPG Consumption during FY 2020-21 was around 3,541 tons per day, reflecting a 12.46 percent increase compared to the previous fiscal year. This surge in consumption highlights the growing importance of LPG in the country's energy landscape. LPG has gained popularity as a domestic fuel, particularly in areas where natural gas infrastructure is lacking. It serves as a practical alternative during winters to bridge the gap in natural gas supply and demand, especially in remote regions. LPG is valued for its cleanliness and convenience, making it an essential component of the country's energy mix.

Despite its advantages, LPG's share in Pakistan's total energy supply remains relatively low, accounting for only about 1.3 percent. The main factors limiting its broader use are supply constraints and the relatively higher cost of LPG compared to competing fuels like natural gas and traditional biomass sources.

The current market size for LPG in Pakistan is approximately 1,292,539 metric tons per year. Its primary purpose is to fulfill domestic fuel requirements, particularly in areas where natural gas is scarce. Additionally, during peak demand periods in urban areas, LPG plays a crucial role. Its use as a domestic fuel has positive environmental impacts, reducing deforestation in hilly regions and offering a healthier and more hygienic alternative for citizens.

Recognizing the potential of LPG, the government has taken steps to promote its usage. LPG is now permitted for use in the automotive sector, providing an alternative to conventional auto fuels. OGRA has established a comprehensive regulatory framework to facilitate the supply of LPG to vehicles.

LPG consumption is on the rise, with approximately 481,782 metric tons imported during FY 2020-21. To bridge the gap between demand and supply, it is crucial to enhance both local production and imports. This is particularly important to stabilize LPG consumer prices, especially during winter season when demand peaks.

As of June 30, 2021, Pakistan has 11 LPG producers and 219 LPG marketing companies, supported by more than 5,500 authorized distributors. Furthermore, there are 23 operational LPG auto refueling stations in the country. To ensure safety and quality, OGRA initiated the registration of LPG equipment manufacturing companies in 2008. To date, 56 LPG equipment manufacturing companies have been pre-qualified as authorized manufacturers of LPG equipment.

LPG Regional / Sectoral Consumption in FY 2020-21

Sectors/Regions	Domestic	Commercial	Industrial	Total Consumption
Islamabad FCA	7,210	9,425	10,286	26,921
Punjab	225,672	334,046	232,938	792,655
Sindh	26,781	56,270	62,209	145,259
KPK	65,253	32,601	4,041	101,895
Balochistan	20,901	18,354	6,449	45,704
Northern Area	55,833	15,135	21	70,989
FATA	32,165	14,106	55	46,326
AJK	41,865	17,658	3,266	62,788
Total (M.T.)	475,678	497,595	319,265	1,292,539
Daily Tonnes	1,303	1,363	875	3,541

Source: OGRA Petroleum Industry Report, 2021

LPG is sourced from three distinct channels: refineries, gas-producing fields, and imports. The specific quantities supplied from refineries/producing fields are detailed in given table, providing insights into the respective contributions of each supply source to the overall national supply. The total LPG supply during FY2020-21 stood at 1.242 Million Tonnes, out of which 481,782 Million Tonnes were imported.

LPG Supply during FY 2020-21

Source	Annual Supply (Tonnes)	Daily Supply (Tonnes)
Refineries [ARL, PRL, NRL, PARC & BPPL]	200,019	548
Fields [OGDCL, UEPL, POL & PPL]	560,922	1,537
LPG Imports (M.T.)	481,782	1,320
Total Production (Refineries + Fields) (M.T.)	760,941	2,085
Net Total [Production + Imports (M.T.)]	1,242,723	3,405

Source: OGRA Petroleum Industry Report, 2021

Compressed Natural Gas (CNG)

In 1992, the Government of Pakistan took a significant step to address two critical issues: environmental degradation and foreign exchange reserves. At that time, the use of conventional fuels in automobiles was causing severe environmental problems, including air pollution. Additionally, Pakistan was spending a substantial amount of its foreign currency reserves on importing petroleum products.

To tackle these issues, the government introduced compressed natural gas (CNG) as an alternative fuel for vehicles. CNG is a cleaner-burning fuel compared to traditional gasoline or diesel, and it can help reduce air pollution. Furthermore, using domestically available natural gas as a vehicle fuel instead of importing petroleum products would save valuable foreign exchange reserves.

Regulation through CNG Rules (1992)

To ensure the safe and efficient adoption of CNG as an automotive fuel, the government put in place the CNG (Production & Marketing) Rules in 1992. These rules provided guidelines and regulations for both the construction and operation of CNG refueling stations across the country. This regulatory framework aimed to maintain safety standards and the integrity of CNG operations.

Ban on New CNG Licenses (2008)

As the use of CNG gained popularity in Pakistan, there was a need to control the proliferation of CNG refueling stations. In 2008, the government imposed a nationwide ban on issuing new provisional CNG licenses. This decision was likely made to prevent the uncontrolled growth of CNG stations and maintain order in the industry.

Revival of CNG Licenses (2020)

A significant development occurred on October 23, 2020, when the Government of Pakistan made an important decision through the Economic Coordination Committee (ECC). This decision allowed for the issuance of new CNG licenses, but with a twist. Instead of the traditional natural gas supply, these new licenses were based on re-gasified liquefied natural gas (RLNG). RLNG is a form of natural gas that has been converted from a liquid state back into a gaseous state, making it suitable for use in CNG vehicles. This move likely aimed to diversify the sources of natural gas and provide an alternative to the traditional CNG supply.

Closure of CNG Stations

The use of natural gas in CNG stations for vehicles in Pakistan has gone down by about 15 percent. In the year 2019-20, these stations were using 127 million cubic feet of natural gas daily, but in 2020-21, this dropped to 108 million cubic feet. Because of this, more than 700 CNG stations across Pakistan had to close down. This decline has been happening for a while. Back in 2011-2012, these stations were using 325 million cubic feet of natural gas daily, so there has been a big 67 percent drop.

In a bigger picture, in FY 2020-21, the overall use of CNG in the transport sector decreased from 127 million cubic feet per day to 108 million cubic feet per day, leading to the closing of many CNG stations. This drop also means that the transport sector's contribution to natural gas use has gone from 3.11 percent to 2.51 percent.

Despite the challenges of the COVID-19 pandemic, OGRA has not changed its goals. OGRA still wants to encourage competition, get more private companies to invest in the oil and gas industry, and make sure the public is treated fairly through good regulation.

Chapter 3

Supply Chain Dynamics of Petroleum Products

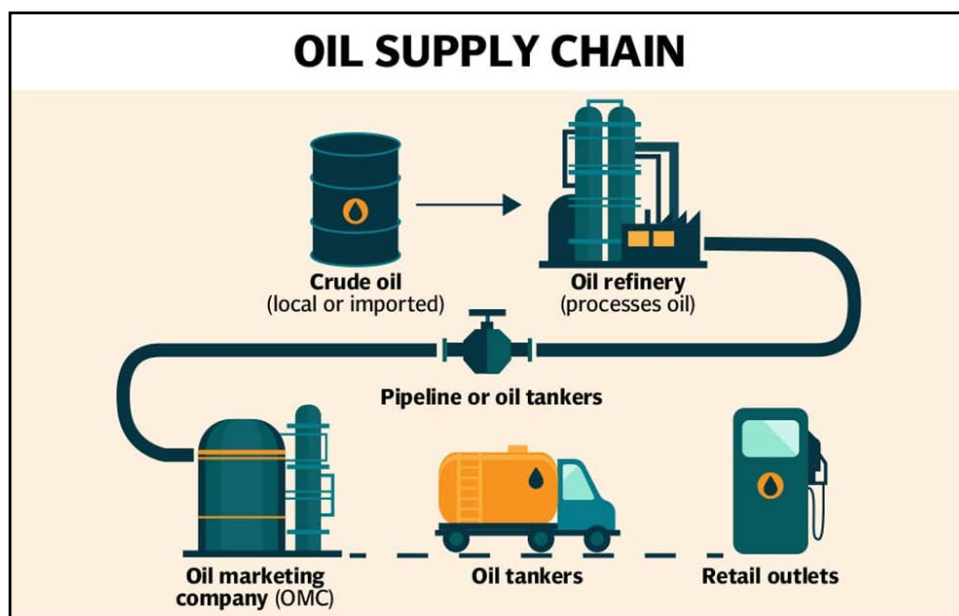
Chapter 3

Supply Chain Dynamics of Petroleum Products

The energy sector is vital to Pakistan's economic growth, with oil, natural gas, LPG, and LNG serving as its foundation and backbone of energy matrix. Understanding the complex supply chain dynamics of these resources is essential for maintaining a reliable energy supply to meet growing demands. With limited domestic oil and declining gas reserves, Pakistan increasingly depends on imports. The supply chain involves numerous interconnected activities, with financial and contractual obligations among companies and regulatory oversight. Disruptions at any point can affect end consumers.

Oil Supply Chain

The journey of oil in Pakistan's energy landscape begins with exploration and drilling of crude oil. Companies engaged in exploration and production extract crude oil from domestic fields and import it from international sources. The major part of produced oil comes from the reserves located in the southern half of the country, where the three largest oil producing fields are located (in the Southern Indus Basin). In addition, some producing fields are located in the middle and upper Indus Basins. Once extracted, crude oil undergoes refining processes to produce various petroleum products. These products are then distributed and marketed to consumers through an extensive network of refineries, pipelines, storage facilities, and retail outlets. Key players in this supply chain include exploration companies, refineries, and marketing companies.

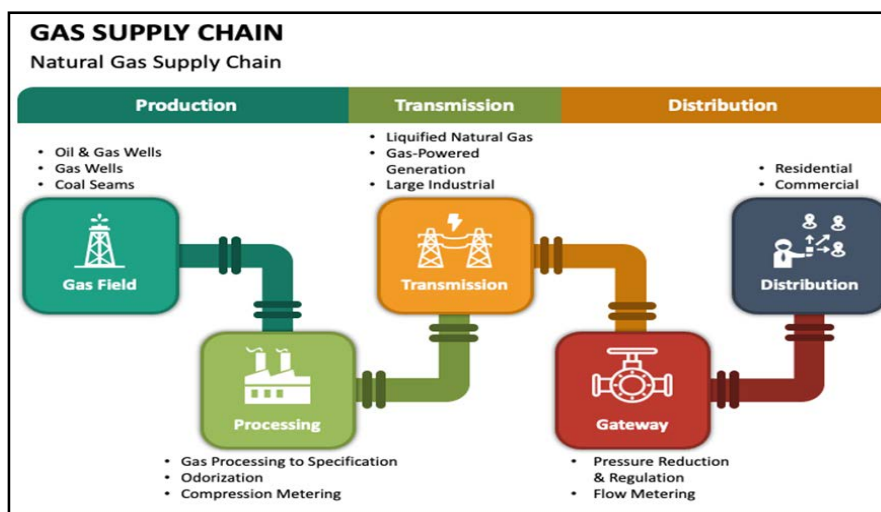


Here's an overview of the Oil supply chain in Pakistan:

- **Crude Oil Import:** The process begins with the import of crude oil into a country. Crude oil is typically transported by large tankers known as oil tankers. Importing crude oil ensures a steady supply of raw material for the production of various petroleum products.
- **Oil Terminals:** Upon arrival at a country's ports, crude oil is unloaded at oil terminals. These terminals are specialized facilities equipped with storage tanks, pipelines, and loading/unloading infrastructure. They serve as hubs for the reception and initial storage of crude oil shipments.
- **Refineries:** Crude oil is transported from the oil terminals to refineries. Refineries are industrial facilities that process crude oil into various petroleum products such as gasoline, diesel, jet fuel, and more. This refining process involves distillation, cracking, and other complex processes to separate and transform the crude oil into different products.
- **Distribution:** After refining, the petroleum products are transported to distribution centers through pipelines, tank trucks, or railways. These distribution centers act as intermediaries between refineries and retail outlets. They may also include bulk storage facilities.
- **Retail Sale:** Finally, the refined petroleum products are delivered to retail outlets such as gas stations. Retail sale refers to the process of selling these products to individual consumers or businesses for various purposes, including fueling vehicles and heating.

Natural Gas Supply Chain

Natural gas, a crucial energy source in Pakistan, follows a parallel supply chain process. It is sourced from domestic gas fields, transported via pipelines, and then distributed for consumption.



Oversight of the gas distribution and transmission sectors is primarily carried out by two state-owned entities, namely Sui Northern Gas Pipeline Limited (SNGPL) and Sui Southern Gas Company Limited (SSGCL). In addition to these state-run operations, there are also independent pipelines connecting locations like Mari and Uch, which supply gas to nearby power and fertilizer plants. Notably, in contrast to the oil supply chain, the natural gas supply chain, originating from gas fields, is relatively simpler in structure. The produced gas is conveyed through pipelines to the central gas utilities, SNGPL and SSGCL, for further dissemination to end users.

Here's an overview of the natural gas supply chain from gas fields to end-user consumers in Pakistan:

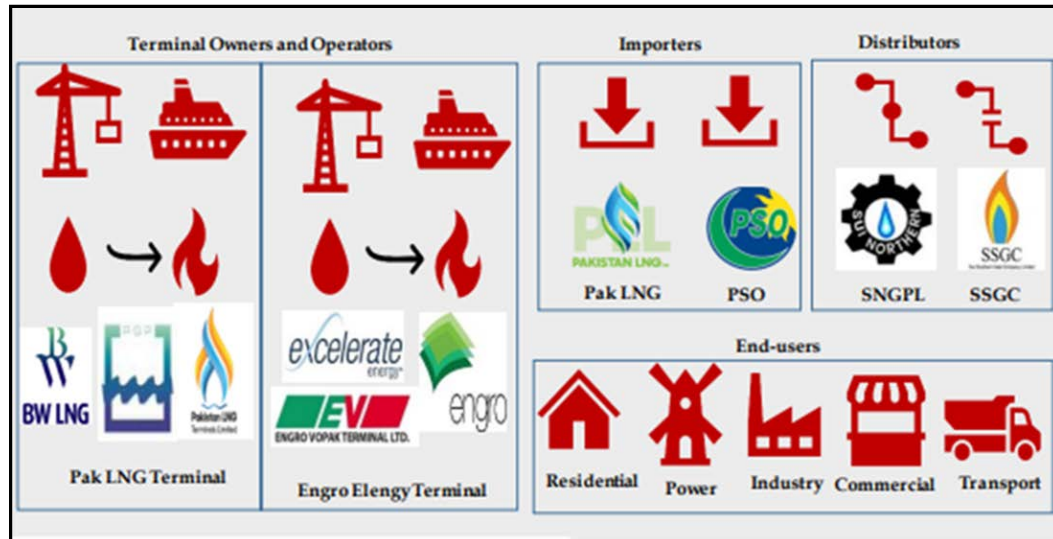
- **Gas Exploration and Production:** Gas exploration companies identify gas-rich areas and extract natural gas from wells.
- **Gas Gathering and Processing:** Raw natural gas is collected from various wells and processed to remove impurities.
- **Transmission:** Processed natural gas is transported through high-pressure transmission pipelines, aided by compressor stations.
- **Distribution:** Natural gas is distributed within urban areas through city gate stations and lower-pressure distribution pipelines.
- **Retail Distribution:** Gas distribution companies (Distribution Network Operators - DNOs) manage the distribution network and deliver natural gas to end consumers.
- **End-User Consumption:** Residential, commercial, and industrial consumers use natural gas for various purposes, including cooking, heating, and manufacturing.
- **Regulatory Oversight:** Regulatory authorities, such as the Oil and Gas Regulatory Authority (OGRA), oversee the gas supply chain to ensure compliance with safety, environmental, and pricing regulations.
- **Maintenance and Safety:** Regular maintenance, inspection of pipelines, and stringent safety measures are crucial to ensure the safe and reliable delivery of natural gas.

LNG Supply Chain

The supply chain of liquefied natural gas (LNG) in Pakistan is distinct and encompasses multiple stages and participants, guaranteeing the dependable and effective delivery of this adaptable energy source from import terminals to end users for a wide range of uses.

Here's an overview of the LNG supply chain from import terminals to the end-users in Pakistan:

- **LNG Import:** The supply chain for liquefied natural gas (LNG) in Pakistan commences with LNG import. This process involves the arrival of LNG carriers at specialized import terminals, including those at Port Qasim Karachi. These terminals serve as entry points for LNG into Pakistan's energy supply chain.
- **LNG Regasification:** Following import, the LNG undergoes regasification at the dedicated plants situated at import terminals. The regasification process, accomplished through the use of heat exchangers, transforms LNG from its liquid state back into its gaseous form. This is a pivotal step in making the gas suitable for further distribution.
- **Integration into the National Gas Grid:** The regasified LNG is seamlessly integrated into Pakistan's expansive national gas grid. This extensive network of pipelines facilitates the efficient transportation of natural gas, including regasified LNG, to various regions and urban areas throughout the country. Compressor stations strategically placed along the gas grid maintain optimal pressure and flow.
- **Transmission and Distribution:** The national gas grid serves as the backbone for transmitting natural gas, including regasified LNG, to different parts of Pakistan. A comprehensive network of pipelines connects various regions, ensuring a steady supply. Furthermore, lower-pressure distribution pipelines branch off from city gate stations, facilitating the delivery of natural gas to residential, commercial, and industrial areas.
- **Retail Distribution:** Gas distribution in Pakistan is primarily managed by Gas Distribution Companies, also known as Distribution Network Operators (DNOs). These entities oversee the distribution network, playing a pivotal role in delivering natural gas, including regasified LNG, to end consumers. The distribution process includes metering to measure consumption and pressure regulation for safe delivery to appliances.
- **End-User Consumption:** End users in Pakistan consume natural gas, including regasified LNG, for a diverse range of purposes. Residential consumers rely on it for cooking, heating, and hot water. Commercial establishments utilize natural gas for heating, cooling, and various industrial processes. Industries, in particular, depend on natural gas for multiple applications, including manufacturing and power generation.



- **Regulatory Oversight:** The LNG supply chain in Pakistan operates under the vigilant oversight of regulatory authorities such as the Oil and Gas Regulatory Authority (OGRA). These bodies ensure strict adherence to safety, environmental, and pricing regulations, contributing to the integrity and reliability of the supply chain.
- **Maintenance and Safety:** To guarantee the safe and reliable delivery of regasified LNG, ongoing pipeline maintenance and equipment inspections are conducted regularly. Stringent safety measures and protocols are implemented across the supply chain to prevent potential leaks and accidents, prioritizing the well-being of individuals and the environment.

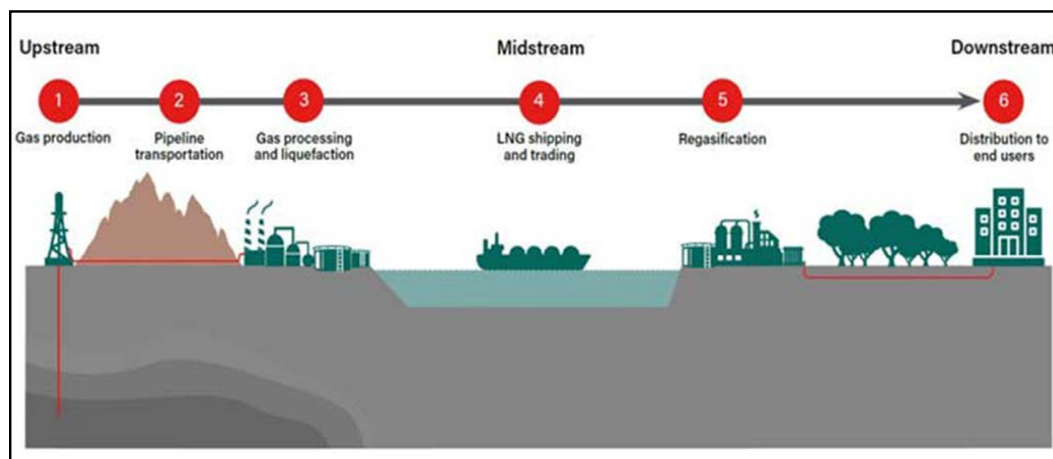
LPG Supply Chain

Liquefied Petroleum Gas (LPG) production in Pakistan primarily derives from natural gas processing and crude oil refining. After extraction and purification at processing plants and refineries, LPG is distributed to consumers through distribution companies and various channels, including cylinder distribution and bulk supply. Consumers, including households, businesses, and industries, rely on LPG for cooking, heating, and industrial applications.

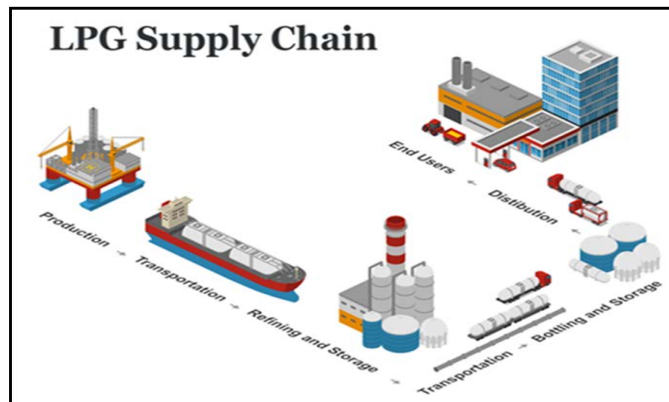
Here's an overview of the LPG supply chain in Pakistan:

- **LPG Production:** LPG is produced as a byproduct of natural gas processing and crude oil refining.
- **Processing and Refining:** LPG is separated and purified during natural gas processing at plants and refining at refineries.

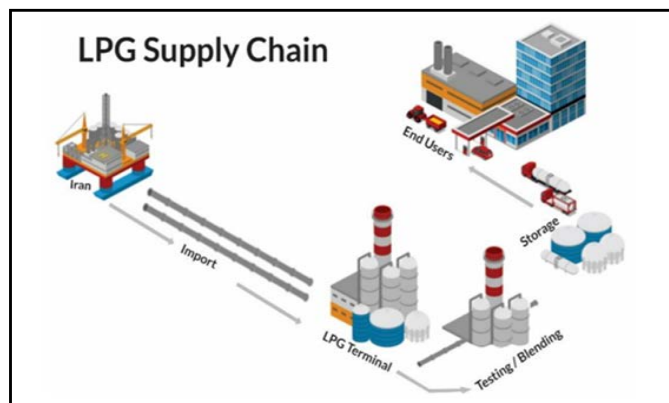
- **Bulk Storage and Filling:** Processed LPG is stored in bulk storage facilities near production sources and then filled into standardized cylinders or tanks.
- **Distribution Companies:** LPG distribution companies procure, transport, market, and sell LPG to consumers.
- **Distribution Channels:** LPG is distributed through various channels, including cylinder distribution to households, businesses, and industrial users, as well as bulk distribution to larger industrial or commercial users.
- **Retail Outlets:** Retail outlets, such as gas dealers and filling stations, serve as points of sale for smaller LPG cylinders.
- **End-User Consumption:** Consumers, including residential, commercial, and industrial users, rely on LPG for cooking, heating, hot water generation, and various industrial applications.
- **Regulatory Oversight:** Regulatory authorities, like the Oil and Gas Regulatory Authority (OGRA) in Pakistan, oversee the LPG supply chain to ensure safety, quality, and adherence to regulations.
- **Safety Measures:** Stringent safety measures are implemented to prevent leaks, accidents, and ensure the safe handling and storage of LPG throughout the supply chain.
- **Market Dynamics:** LPG prices in Pakistan are influenced by international market trends, exchange rates, and government policies, impacting the economics of the supply chain.



LPG Domestic Production



LPG Imports



Future Trends and Developments

The energy landscape in Pakistan is evolving. Emerging technologies, such as renewable energy sources and advanced storage solutions, are expected to reshape the supply chain dynamics. Sustainability and environmental considerations will also play a pivotal role in shaping the future of the energy sector.

Understanding the intricacies of the supply chain dynamics of oil, gas, LPG, and LNG in Pakistan is essential for policymakers, industry stakeholders, and consumers alike. A well-functioning supply chain is the backbone of a reliable and efficient energy sector, ensuring that Pakistan can meet its growing energy needs while fostering economic growth and sustainability.

Chapter 4

Trade Dynamics of Petroleum Products

Chapter 4

Trade Dynamics of Petroleum Products

Pakistan heavily relies on petroleum products to fuel its economy. The trade dynamics of petroleum products in Pakistan are of paramount importance, not only for the country's energy needs but also for its economic stability and development. Pakistan is a net importer of petroleum products due to a significant gap between domestic production and consumption. Pakistan imports crude and refined oil every year from various sources and spends significantly its foreign exchange reserves. The major supplier of petroleum to Pakistan are Saudi Arabia, U.A.E.

Until 2018, there was a consistent widening of the gap between the value of petroleum product imports and exports in Pakistan. This expansion of the gap was primarily driven by a surge in domestic demand for petroleum products, reflecting the country's increasing reliance on these imports. However, during the pandemic period, Pakistan faced a significant downturn in its imports of petroleum products.

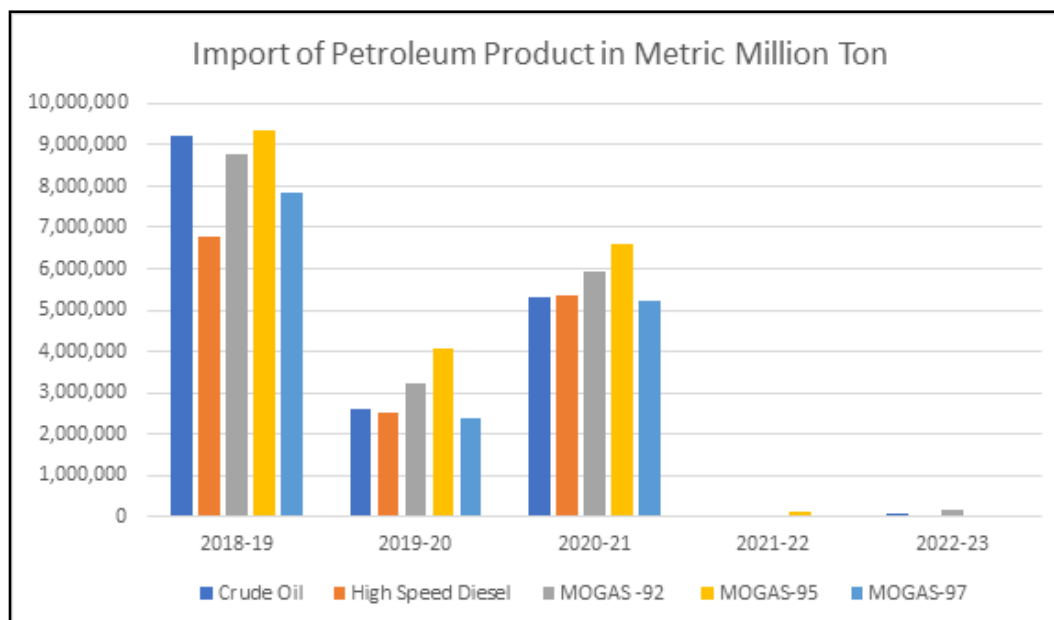
Imports of POL Products

In terms of quantity, the crude oil imports declined significantly by 26.4%, falling from 9,206 million tons in FY 2018-19 to 6,774 million tons in FY 2019-20. This decline can be directly attributed to the adverse impacts of the COVID-19 pandemic, which caused widespread disruptions in global trade and triggered a notable reduction in economic activity. Consequently, there was a decrease in global demand for oil and its associated products, leading to a contraction in Pakistan's imports. However, after reaching 9,338 million tons in FY 2021-22, crude oil imports nosedived again by almost 16% in FY 2022-23, reaching 7,852 million tons. [Table-1](#) shows the import quantity of petroleum productions.

Petroleum Product	2018-19	2019-20	2020-21	2021-22	2022-23
Crude Oil	9,206,615	6,773,854	8,779,700	9,338,364	7,852,947
High Speed Diesel (HSD)	2,590,223	2,514,924	3,222,578	4,086,141	2,363,973
MOGAS – 92 RON	5,318,978	5,371,263	5,926,530	6,600,365	5,204,183
MOGAS – 95 RON	29,428	9,346	13,409	119,860	30,233
MOGAS – 97 RON	52,969	35,032	139,815	9,655	--

Source: Oil Companies Advisory Council (OCAC)

Note: MOGAS means Motor Gasoline



Prepared by Research and Publication Department ICMAP

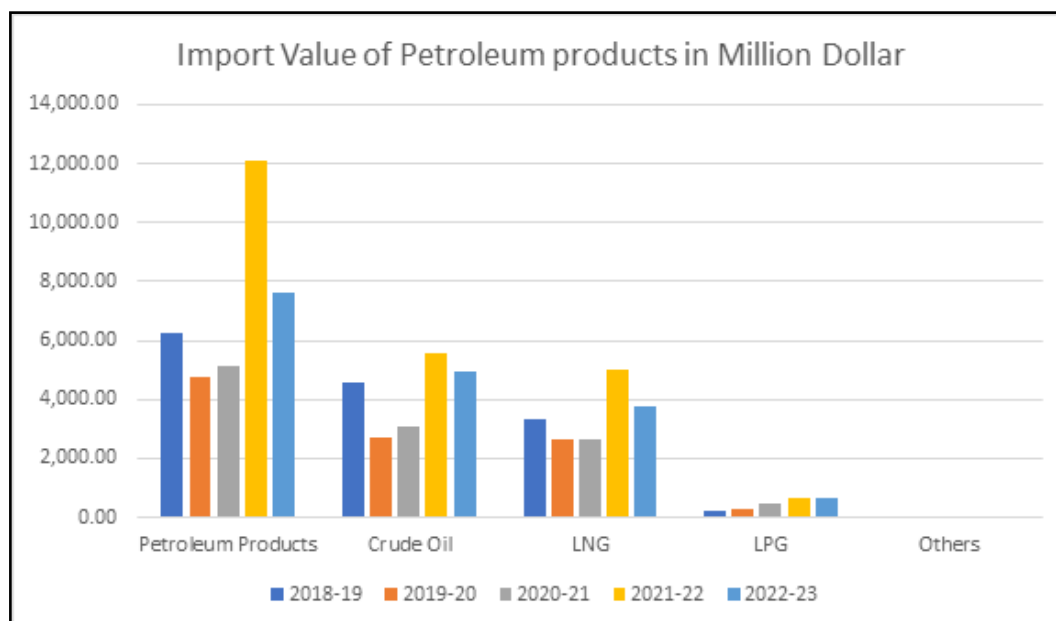
In terms of value, the total imports within the petroleum category, encompassing crude oil, experienced a 27% decrease, totaling \$17 billion during FY 2022-23. This stands in contrast to the previous fiscal year when it amounted to \$23.32 billion. Specifically, the import of crude petroleum saw an 11.64% decline, reaching approximately \$5 billion in FY 2022-23 compared to \$5.6 billion in the preceding fiscal year. The reduction in the import expenses for petroleum products could provide some relief to Pakistan's balance of payments and external finances. Nonetheless, it also underscores the challenges posed by an economic slowdown and elevated product prices, which have contributed to reduced consumer demand and overall consumption in the petroleum sector.

According to data from the Pakistan Bureau of Statistics (FBS), the imports of finished petroleum products (refined) witnessed a substantial 37% decline during FY 2022-23, plummeting from \$12.07 billion in FY 2021-22 to \$7.63 billion in FY 2022-23. These petroleum products mainly constitute finished goods imported to meet domestic demand, given Pakistan's reliance on imports to fulfill its petroleum requirements. The significant drop in the import bill can be attributed to a sharp decline in the sales of petroleum products during the same period. [Table-2](#) presents the import value of petroleum products.

Table-2: Import Value of Petroleum Products (Value: Million UD Dollars)					
Petroleum Product	2018-19	2019-20	2020-21	2021-22	2022-23
% Share	23.75%	23.98%	20.14%	29.08%	30.75%
Petroleum Products	6,283.88	4,742.09	5,160.14	12,069.44	7,628.45
Crude Oil	4,570.58	2,722.02	3,107.31	5,598.67	4,947.22
LNG	3,336.53	2,662.20	2,617.13	4,989.65	3,763.53
LPG	250.19	294.28	472.93	660.68	675.03
Others	0.26	0.23	0.34	0.28	0.34
Total	14,441.44	10,420.82	11,357.85	23,318.72	17,014.56

Source: Ministry of Commerce, Government of Pakistan

Note: Fiscal Year period from July to June



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During the initial two months of FY2023-24, Pakistan's imports of petroleum products registered a significant drop of 41%. Official statistics from the Pakistan Bureau of Statistics (PBS) show that the total import value for July and August in FY2023-24 amounted to \$971 million, a sharp decrease from the \$1.66 billion recorded during the same period in the preceding fiscal year.

This decline in petroleum product imports can be attributed to the following key factors:

1. **High Domestic Prices:** The exceptionally high prices of POL products have discouraged both consumers and businesses from purchasing larger quantities, resulting in reduced imports.
2. **Influx of Iranian Products:** The influx of cheaper Iranian petroleum products, available at lower prices, has redirected business away from foreign suppliers.
3. **Government's Anti-Smuggling Measures:** Government efforts to crack down on smuggling routes have played a role in reducing illegal imports.
4. **Global Price Trends:** The decrease in petroleum product imports may also be connected to elevated global prices, leading to a reduction in the quantity imported.
5. **Decline in Domestic Sales:** Domestic sales of POL products have fallen by 7% during the first two months of FY2023-24, dropping from 2.97 million tons to 2.76 million tons as against last year.

To sum it up, Pakistan's overall imports of petroleum products for FY2023-24 have seen a substantial 34.25% decline, totaling \$2.17 billion during the first two months of the fiscal year. This is in contrast to the \$3.30 billion imported during the same period of the previous fiscal year.

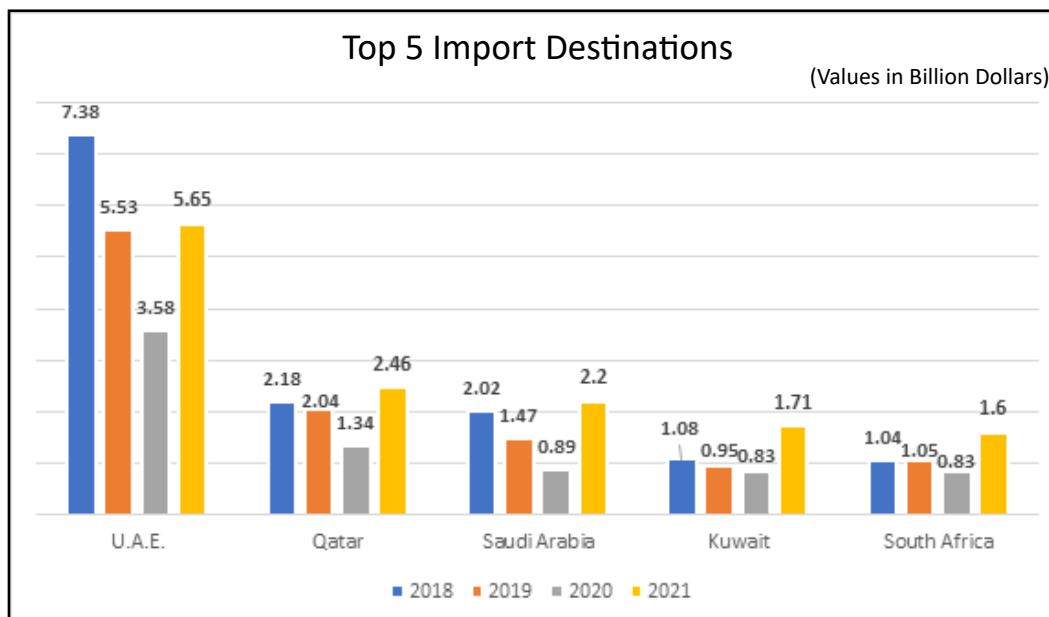
Top 5 Countries from where Pakistan is importing Petroleum products

The Top five countries from where Pakistan is importing petroleum products are U.A.E., Qatar, Saudi Arabia, Kuwait and South Africa. According to the official website of World Integrated Trade Solution (WITS)*, in 2021, Pakistan imported fuels worth \$5.65 billion from U.A.E.; \$ 2.46 billion from Qatar; \$2.20 billion from Saudi Arabia; \$1.71 billion from Kuwait and \$1.60 billion from South Africa (see [Table-3](#)):

Table-3: Top 5 countries from where Pakistan is importing POL products (Value: Billion UD Dollars)				
Exporting Country	2018	2019	2020	2021
U.A.E.	7.38	5.53	3.58	5.65
Qatar	2.18	2.04	1.34	2.46
Saudi Arabia	2.02	1.47	0.89	2.20
Kuwait	1.08	0.95	0.83	1.71
South Africa	1.04	1.05	0.83	1.60

*Source: WITS **

* The World Bank — in collaboration with the United Nations Conference on Trade and Development (UNCTAD) and in consultation with organizations such as International Trade Center, United Nations Statistical Division (UNSD) and the World Trade Organization (WTO) — developed the World Integrated Trade Solution (WITS). This software allows users to access and retrieve information on trade and tariffs.



Prepared by Research and Publication Department ICMAP

POL Imports on Deferred Payment Basis under Saudi Oil Facility

In FY2022-23, Pakistan imported petroleum products worth \$1.182 billion on a deferred payment basis under the Saudi oil facility, significantly exceeding the budgeted estimate of \$800 million. The financing agreement for these imports, totaling \$1.2 billion, was signed in November 2021 between Pakistan's Economic Affairs Division (EAD) and the Saudi Fund for Development (SFD).

During the first two months of FY2023-24, Pakistan imported petroleum products worth \$200 million through the Saudi oil facility, falling short of the anticipated \$600 million budget. In August 2023, \$100 million POL products were imported, with an equivalent supply provided by Saudi Arabia in July 2023.

Saudi Arabia extended the deferred payment arrangement in March of the current FY2023-24, allowing Pakistan to continue availing this facility until February 2024.

Exports of POL Products

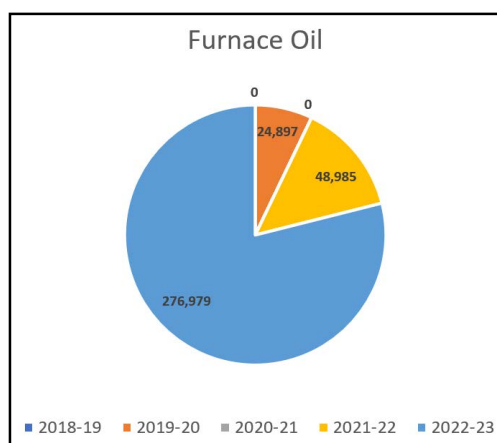
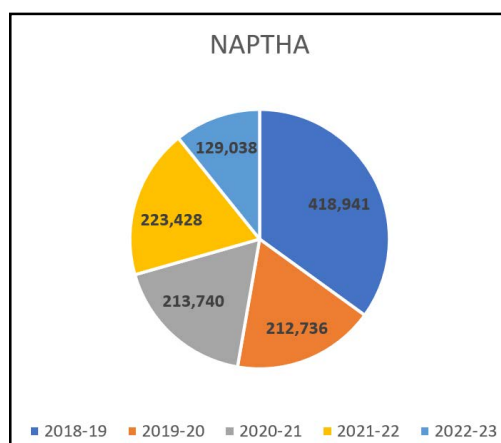
Pakistan major POL exports include motor gasoline, NAPTHA, furnace oil, diesel and jet fuel.

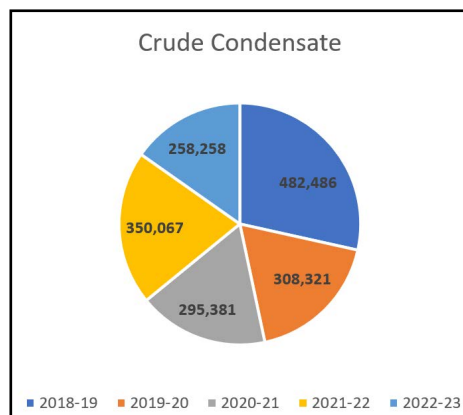
- **Motor Gasoline:** Derived from crude oil, it fuels vehicles.
- **Napththa:** Obtained from crude oil or natural gas, it's a key feedstock for chemicals and plastics.
- **Diesel Fuel:** Refined from crude oil, diesel powers vehicles, trucks, and machinery due to its high energy content and efficiency.
- **Jet Fuel:** Refined from crude oil, jet fuel is designed for aviation, serving as primary fuel for aircraft.
- **Furnace Oil:** Residual product from crude oil refining, used in industrial heating and power generation.

In terms of quantity, Pakistan exported 129,038 tons of NAPTHA in FY2022-23, falling by 42.25% from 223,428 tons in FY2021-22. The exports of Furnace oil have shown a rising trend due to reduced demand at home (See [Table-4](#)).

Table-4: Export of Petroleum Products (Unit: Metric Ton)					
Petroleum Product	2018-19	2019-20	2020-21	2021-22	2022-23
NAPTHA	418,941	212,736	213,740	223,428	129,038
Furnace Oil	--	24,897	--	48,985	276,979
Crude Condensate	482,486	308,321	295,381	350,067	258,258

Source: Oil Companies Advisory Council (OCAC)





Pakistani refineries, typically producing 5,000 to 6,000 tons daily, currently have an excess of 200,000 tons. About 150,000 tons were shipped in March and April of FY2023-24.

Historically, power plants were the main furnace oil consumers in Pakistan. However, economic challenges, inflation, and currency devaluation have led to a drop in electricity demand, causing local furnace oil demand to plummet to less than 10 percent.

Major exporters like Pak-Arab Refinery (PARCO) and Pakistan Refinery (PRL) are redirecting their surplus. Despite selling at lower prices for exports, refineries are absorbing losses to clear excess stock, jeopardizing long-term viability. If losses persist, refineries may face shutdowns, increasing the need for gasoline and diesel imports. Given the subdued demand since November 2022, Pakistani oil refiners expect furnace oil demand to vanish entirely in the next one to two years.

Top 5 Countries to whom Pakistan is exporting Petroleum products

The Top five countries to whom Pakistan is exporting petroleum products are Thailand, U.A.E., Afghanistan, Singapore and Papua New Guinea. According to the official website of World Integrated Trade Solution (WITS)*, in 2021, Pakistan exported POL products worth \$74.36 million to Thailand; \$50.66 million to U.A.E.; \$29.78 million to Malaysia; \$20 million to Papua New Guinea; \$18.82 million to Singapore and \$3.67 million to Afghanistan. (See [Table-5](#)):

Table-5: Top 5 countries to whom Pakistan is exporting POL Products*(Value: Billion UD Dollars)*

Exporting Country	2018	2019	2020	2021
U.A.E.	139.72	167.51	106.24	50.66
Thailand	22.89	36.85	--	74.36
Malaysia	0.04	41.49	23.03	29.78
Papua New Guinea	29.95	--	0.19	19.99
Singapore	46.32	27.43	17.72	18.82
Afghanistan	164.73	61.32	11.22	3.67

*Source: WITS **

* The World Bank — in collaboration with the United Nations Conference on Trade and Development (UNCTAD) and in consultation with organizations such as International Trade Center, United Nations Statistical Division (UNSD) and the World Trade Organization (WTO) — developed the World Integrated Trade Solution (WITS). This software allows users to access and retrieve information on trade and tariffs.

Domestic Sales of POL Products

Petroleum serves three main purposes: transportation, energy, and industry. In Pakistan, transportation consumes 60% of petroleum, with significant imports (See [Table-5](#))

Rising oil prices lead to crises, causing a current account deficit, currency depreciation, and inflation. This inflation occurs in two phases: petroleum product costs rise initially, and then the depreciation prompts businesses to increase product prices, amplifying inflation. Over the past five years, Pakistan has imported over US\$73 billion worth of fuel, impacting affordability and resulting in stagnant energy consumption and economic growth.

Table-5: Sectoral Sales /Consumption of Petroleum Products – Internal Use*(Unit: Metric Ton)*

Sector	2018-19	2019-20	2020-21	2021-22	2022-23
Domestic	60,557	45,844	29,816	29,522	17,952
Industry	1,299,437	1,221,474	1,472,777	1,332,899	1,126,885
Agriculture	15,021	11,993	12,134	11,822	9,209
Transport	14,673,564	13,861,073	15,779,499	17,409,035	13,606,565
Power	2,759,465	1,526,796	2,364,586	3,683,322	1,664,850
Government	409,132	371,303	306,961	373,489	364,001
Total Internal volume	19,217,176	17,038,483	19,965,773	22,840,089	16,789,462

Source: Oil Companies Advisory Council (OCAC)

During FY23, sales of petroleum products declined by 27 percent compared to the previous year, totaling 16.8 million tons. This marks the lowest sales figure for oil marketing companies (OMCs) since FY06, excluding the pandemic-affected FY20. Back in FY06, OMCs recorded sales of 14.6 million tons, as reported by the Pakistan Energy Yearbook.

The most substantial decreases in sales among petroleum products in FY23 were witnessed in furnace Oil (FO) and High-Speed Diesel (HSD), which experienced year-on-year drops of 49% and 28%, respectively. Additionally, Motor Spirit (MS) sales declined by 17% compared to the previous year. This decline can be attributed to higher product prices and an overall economic slowdown, both of which have significantly impacted consumer demand.

Imports of LNG by Pakistan

LNG holds immense importance for Pakistan, as more than a third of its electricity generation relies on natural gas, while its local gas reserves fall short in meeting the escalating electricity needs of a population exceeding 230 million. Consequently, this deficit results in frequent power outages.

Pakistan has been procuring LNG through both government-to-government agreements, such as the 15-year contract with Qatar based on a take-or-pay arrangement, and agreements with private suppliers in Italy and Qatar, also structured as term contracts on a take-or-pay basis. Specifically, Pakistan has entered into two long-term supply contracts with Qatar, one inked in 2016 for an annual supply of 3.75 million metric tons of LNG and another in 2021 for 3 million metric tons. Additionally, there is an annual portfolio contract with ENI for 0.75 million metric tons annually.

Predominantly, Pakistan sources the majority of its LNG from Qatar, which supplied 8.6 billion cubic meters out of a total 9.7 billion cubic meters of LNG imports in 2022. Nigeria followed as a distant second, providing 0.4 billion cubic meters. Over the past three years, more than 87 percent of Pakistan's imported LNG has been procured through these term agreements, while the remaining 13 percent constitutes spot purchases to fulfill demand beyond the term contracts.

As of 2021, several operational LNG terminals, including the Engro Elengy Terminal (EETL) in Port Qasim, the Pakistan GasPort Consortium Limited terminal, and the Energas LNG terminal, have been pivotal in this endeavor. Under the existing arrangement, the EETL terminal handles all the contracted volumes imported by PSO, whereas the PLL manages both long-term and spot cargoes.

Pakistan Gasport owns the nation's largest LNG import and regasification terminal at Port Qasim, but historically, LNG imports have been coordinated by Pakistan LNG, a state-run entity that last acquired a spot cargo from PetroChina in June 2022.

In 2022, Pakistan's LNG imports decreased to 6.93 million metric tons for the year, down from 8.23 million metric tons in 2021, as per data from data analytics group Kpler.

Pakistan has been diligently working to diversify its sources of LNG procurement to ensure a stable and dependable supply. In early June 2023, Pakistan finalized a government-to-government agreement with Azerbaijan, in which Azerbaijan's state-owned energy company Socar will offer PLL the monthly option to purchase LNG shipments at prices below the prevailing global rates. Moreover, Pakistan is contemplating a proposal to privatize the import of Liquefied Natural Gas (LNG) from the spot market in order to utilize its idle capacity of 200 mmcf/d.

Imports of LPG by Pakistan

Pakistan imports liquefied petroleum gas (LPG) primarily from Middle Eastern countries like Saudi Arabia, Qatar, and the UAE, along with other LPG-producing nations. These imports are facilitated through ocean-going vessels and road tankers, with storage and distribution taking place in terminals and depots across the country.

The demand for LPG in Pakistan has been steadily increasing due to its versatility in applications, including cooking, heating, and industrial processes. The government of Pakistan regulates the LPG industry through the Oil and Gas Regulatory Authority (OGRA), which sets pricing guidelines, quality standards, safety regulations, and licenses for LPG companies.

While Pakistan does have domestic LPG production through natural gas processing plants, it often falls short of meeting the growing demand. As a result, the country relies on imports to bridge the gap between supply and demand.

Several private and public sector companies operate in the LPG industry in Pakistan, including international giants like Shell and Total, as well as local entities like Sui Southern Gas Company (SSGC) and Sui Northern Gas Pipelines Limited (SNGPL). These companies play key roles in the import, storage, distribution, and marketing of LPG.

Pakistan has received its inaugural LPG shipment from Russia as part of a recent agreement between the two countries. The first batch, comprising 100,000 metric tons of LPG, was transported to Pakistan through Iran's Sarakhs Special Economic Zone.

Chapter 5

The Dynamics of Petroleum Products Pricing



Chapter 5

The Dynamics of Petroleum Products Pricing

Petroleum products hold a crucial place in our daily lives, with a consistently strong demand. On a global scale, petrol prices, including those in Pakistan, are subject to the sway of OPEC and the worldwide oil production landscape. Particularly, OPEC's decisions on oil production have a profound ripple effect on oil prices, subsequently impacting petrol prices.

In a similar vein, the intricate interplay of factors like supply and demand dynamics, inventory levels, and market sentiment also exerts an influence on global crude oil prices. Market speculation, a common feature in oil futures trading, further complicates the picture as traders make predictions about future production and consumption patterns, adding an element of unpredictability. In contrast, spot prices directly reflect the current market value of the commodity.

In Pakistan, the pricing of fuel is susceptible to the unpredictable nature of the global market and fluctuations in the exchange rate of the Pakistani Rupee. Recent global developments have unexpectedly driven up petroleum product costs, a situation worsened by the Rupee's depreciation and the removal of subsidies, ultimately resulting in historically high petrol prices in Pakistan.

Reasons for petrol price fluctuations

It is essential to grasp the intricacies of petrol price fluctuations in Pakistan. As mentioned earlier, the petrol prices in the country are significantly swayed by the global crude oil market, where disruptions in supply and geopolitical conflicts can trigger price spikes. Conversely, a drop in global oil prices tends to translate into lower petrol costs domestically.

Moreover, fluctuations in the exchange rate between the Pakistani Rupee and the US dollar exert direct pressure on petrol prices. When the Rupee weakens, the expenses associated with oil imports rise, resulting in higher petrol prices. Conversely, a stronger Rupee may lead to more affordable petrol prices.

Government-imposed taxes and duties, such as sales tax, petroleum levy, and customs duty, play a substantial role in shaping petrol prices. Alterations in government policies and taxation can directly influence the overall cost of petrol.

Transportation and distribution expenses, which are sensitive to fuel prices, maintenance of infrastructure, and logistical considerations, also contribute to petrol prices. Any shifts in these costs can impact the ultimate retail price of petrol.

POL Pricing

To understand how petrol and diesel import prices are determined, let's examine the key parameters involved. The base price is set by referencing the 15-day average FOB (Free on Board) prices of the Arab Gulf market, as published in the Platt's Oilgram. These prices are denominated in US dollars and are then converted into Pakistani Rupees per liter using the most recent provisional exchange rate available at the time of calculation. It is crucial to note that any fluctuations in the exchange rate are accounted for when revising prices, based on the actual exchange rate applied to Pakistan State Oil's LCs (Letter of Credits) during that specific period.

Role of OGRA in POL pricing

The role of the Oil & Gas Regulatory Authority (OGRA) in the pricing of petroleum products in Pakistan is integral to maintaining transparency and accountability within the sector. Currently, the prices of certain petroleum products, such as petrol and high-speed diesel (HSD), are regulated, while furnace oil prices are deregulated.

OGRA, in compliance with a mandate from the Federal Government, is responsible for determining the prices of regulated products like MOGAS (Motor Gasoline) and Diesel on a fortnightly basis. Their approach resembles that of a financial accountant, as they calculate the landing cost of petroleum products, relying on information provided by Pakistan State Oil (PSO). This calculation takes into consideration the prevailing exchange rate and includes taxes and commissions for dealers and Oil Marketing Companies (OMCs). It's worth noting that the final decision on pricing rests with the Ministry of Finance, subject to approval from the Prime Minister.

OGRA's mandate also includes the pricing of various other petroleum products, such as MS 87 RON, HOBC, Kerosene Oil, Light Diesel Oil, JP-1, and JP-4, as per the Federal Government's decision dated March 02, 2006. These prices are determined in accordance with a prescribed formula. The Oil Companies Advisory Committee (OCAC) recommends an Inland Freight Equalization Margin (IFEM) as part of a self-management system. To ensure the authenticity and transparency of the IFEM system, OGRA conducts thorough independent audits every six months, assessing its critical aspects and functionalities. These audits bolster the credibility and fairness of the pricing mechanisms overseen by OGRA.

Price components of POL products

There are six different price components embedded in a pricing formula, as per OCAC and OGRA, which, although they may be based on reasonable logic, contribute to the pricing structure of petrol. Below is an exhibit of the price per liter and its breakdown:

1. **Ex-Refinery Price (Formula by OCAC and OGRA):** This is determined using a high-low method based on the average Platt's price over the past 30 days and the impact of foreign exchange rates.
2. **Inland Freight Equalization Margin (IFEM):** This is an essential element of the pricing structure, ensuring that prices remain uniform across the country.
3. **Distributor and Dealer Margins:** These are the gross margins earned by OMCs and petrol station owners, respectively, based on the sale of petroleum products such as Petrol and Diesel.
4. **Petroleum Levy (PDL):** This is a form of tax imposed by the government.
5. **Sales Tax (GST):** This is a gross sales tax imposed by the government, with a fixed percentage determined by the FBR over time.
6. **Secondary Freight Rates (OCAC):** These are the rates for delivering the product from the depot to the petrol station.

It may be noted here that the pricing process begins with the 'Ex-Refinery Price,' set by OGRA. It used to be based on monthly data from PSO and international prices but since September 2021, it is updated every two weeks using Platt's Index. OMCs are required to keep a 20-day fuel stock in various depots across the country to avoid running out. The final retail price is calculated by adding Petroleum Levy (PL), Inland Freight Equalization Margin (IFEM), OMC margin to the Ex-Depot Price, then including Dealer Commission and applying Sales Tax. This ensures a steady supply of petrol to consumers.

Now, let's explain briefly some key price components:

Ex-Refinery Price

The ex-refinery price represents the monetary value at which a refinery sells its petrol and diesel inventories. OCAC calculates this price using a formula that determines the Import Parity Price by averaging international prices over the past 30 days. After computing this average, it is adjusted with the allowable expenses for the refinery, encompassing handling, bank and ocean charges, marine insurance, wharfage, surcharges, and factory overheads. The ex-refinery margin is also earned by the refinery, contingent on its ability to manage expenses and Platt's prices.

Petroleum Development Levy (PDL)

The Petroleum Development Levy (PDL) is a tax collected by the government from oil companies on the sale of petroleum products. It is used to fund various development projects and infrastructure improvements. The revenue generated from the PDL is often included in the pricing of petroleum products, affecting their final retail prices.

Inland Freight Equalization Margin (IFEM)

Inland Freight Equalization Margin (IFEM) ensures that petrol prices remain uniform throughout the country, despite the concentration of imports in the south, specifically at Keamari and Port Qasim in Karachi. It does this by covering transportation costs, which keeps prices consistent. OGRA checks regularly to ensure it's working as intended. In some areas like hilly regions, OCAC has Special Freight rates. The government pays OMCs for transportation costs there to keep prices fair for customers. This is part of the IFEM strategy to maintain consistent petrol prices.

Distributor Margin

The Distributor Margin is the profit distributors earn by selling petroleum products like petrol and diesel. It's the gap between what they pay for the products and what they charge retailers. This margin can influence the final prices at petrol stations and can vary based on market conditions and distributor-oil company agreements.

Ex-Depot price

The ex-Depot price refers to the cost of petroleum products when they are sold by oil companies or refineries to distributors or dealers at their storage depots. This price reflects the initial cost at the depot before considering other expenses like transportation, taxes, and dealer commissions. The Ex-Depot Price is a fundamental component that contributes to the ultimate retail price of petroleum products for consumers

Sales Tax (GST)

Oil Marketing Companies (OMCs) play a role in collecting a predetermined percentage of sales tax on a monthly basis on behalf of the tax authorities and regularly submitting tax returns. GST is on the sum of previous petroleum price components.

Dealers' Margin

Dealers' commission or margin is the payment or fee that retailers receive for selling petroleum and related products on behalf of oil marketing companies. It is the profit earned by dealers for their role in distributing these petroleum products [HSD and MOGAS].

OMC Margin

OMC margin is the profit earned by oil marketing companies in the petroleum industry, encompassing the difference between their costs and revenue from refining and selling petroleum products. It can fluctuate due to various factors and is just one component of final retail price of petroleum products.

Petrol Price Breakdown per Litre

The petrol price (E-10) breakdown per litre during the last two months i.e. Sept-23 and Oct-23 are provided in [Table-1](#). It may be noted here that the Government is charging Rs. 60 per litre PDL on petrol whereas on HSD it is Rs. 50 per litre.

Table 1: Petrol Price Breakdown Per Litre during Sep-Oct 2023				
<i>(Value in Pak Rupee)</i>				
Price component	16-Oct 2023	01-Oct 2023	16-Sept 2023	01-Sept 2023
Ex-Refinery	202.33	243.09	252.13	228.59
PDL	60.00	60.00	60.00	60.00
IFEM	5.41	5.53	5.37	3.77
OMC Margin	7.41	6.94	6.47	6.00
Dealer Margin	8.23	7.82	7.41	7.00
Sales Tax	0.00	0.00	0.00	0.00
Total	283.38	323.38	331.38	305.36

Source: OGRA

Natural Gas Pricing

Gas pricing in Pakistan is a complex issue. Natural gas can come from local fields or be imported, and the way it's priced is puzzling. Locally, it costs around \$2 to \$5 per million BTUs (mmbtu) for most customers, but if it is imported, the cost shoots up to \$12.37 per mmbtu.

The problem is that importing gas and selling it to domestic customers doesn't make economic sense. This has led to shortages and higher prices, especially in winter when demand for heating rises. To make up for this, many people switch to more expensive Liquefied Petroleum Gas (LPG), which is sold in containers. LPG costs \$23.75 per mmbtu, which is 91% more expensive than imported gas.

The current pricing system favors traders and middlemen but hurts both consumers and producers. A change is needed, but it's a politically tricky issue. It's essential to shift toward a market-based pricing system and communicate the benefits of this approach. Reforms in the gas distribution sector are also long overdue. Without these changes, gas distribution companies could collapse, billions of dollars invested in pipelines will go to waste, and consumers will keep paying more. It's time to let the market decide gas prices and focus on policies that benefit consumers and ensure efficiency.

In Pakistan, the pricing of natural gas follows a “cost plus” approach, where government authorities, including OGRA, determine consumer prices by considering several key factors:

1. The expenses of Sui companies buying gas from E&P firms.
2. Costs for network operation, maintenance, investments, debts, and shareholder returns.
3. Government taxes, duties, and charges.

The historical evolution of gas pricing in Pakistan has seen the following changes:

Initially, gas prices were linked to production costs. In mid-1980s, a shift occurred towards using international benchmark prices for different gas fields. This benchmark was set at 66% of the Cost, Insurance, and Freight (CIF) price of fuel oil, with allowances negotiated based on geological conditions.

In the early 1990s, allowances were eliminated, and gas prices were standardized at approximately two-thirds (66%) of the landed cost of fuel oil. This alteration encouraged more exploration activities and contributed to increased gas production.

In the late 1990s, gas prices were correlated with a percentage of the international crude oil price, with variations accounting for geological characteristics and exploration conditions. Additionally, producers were granted the flexibility to share benefits when international oil prices rose.

Under the 2012 Petroleum Policy, the government raised the price ceiling from \$35 to \$100 per barrel, utilizing actual oil prices as the reference for gas pricing.

Consumer Tariffs

Consumer gas tariffs in Pakistan differ by category, with lower tariffs for households, partly driven by a long-standing policy aimed at supporting food security. The adjustments in gas prices aim to cover the rising costs of gas procurement and network maintenance, striking a balance between consumer affordability, industry competitiveness, and the financial sustainability of gas distribution companies.

Oil and Gas Regulatory Authority (OGRA) on 15th February 2023, issued a notification of gas sale price for domestic, commercial and industrial sectors, which became effective from January 1, 2023. The details of tariffs for these three sectors as mentioned in the notification are as under:

SCHEDULE

[For SSGCL and SNGPL]

Consumer gas tariffs in Pakistan differ by category, with lower tariffs for households, partly driven by a long-standing policy aimed at supporting food security. The adjustments in gas prices aim to cover the rising costs of gas procurement and network maintenance, striking a balance between consumer affordability, industry competitiveness, and the financial sustainability of gas distribution companies.

Oil and Gas Regulatory Authority (OGRA) on 15th February 2023, issued a notification of gas sale price for domestic, commercial and industrial sectors, which became effective from January 1, 2023. The details of tariffs for these three sectors as mentioned in the notification are as under:

(I) Domestic Sector / Consumers

- a) Standalone Meters
- b) Mosques, Churches, Temples, Madrassas, Other religious places and hostel attached there to:

Sale Price	Rs. / MMBTU
*Protected Category	
Up to 0.25 hm ³ per month:	121
Up to 0.5 hm ³ per month:	150
Up to 0.6 hm ³ per month:	200
Up to 0.9 hm ³ per month:	250
**Non-Protected Category	
Up to 0.25 hm ³ per month:	200
Up to 0.6 hm ³ per month:	300
Up to 1 hm ³ per month:	400
Up to 1.5 hm ³ per month:	600
Up to 2 hm ³ per month:	800
Up to 3 hm ³ per month:	1,100
Up to 4 hm ³ per month:	2,000
Above 4 hm ³ per month:	3,100

The billing mechanism will be revised so that the benefit of one previous/preceding slab is available to domestic consumer (residential use).

* Protected Category to pay a fixed charge of Rs. 50/- (Less Meter Rent Rs. 40/-)

** Non-Protected Category to pay a fixed charge of Rs. 500/- (Less Meter Rent Rs. 40/-)

[Protected Category: Includes a domestic consumer whose average consumption of last 4 winter months, i.e., November to February shall be below or equal to 0.9 hm³

Non-Protected Category: Includes a domestic consumer other than the one in protected category.]

As per OGRA notification dated April 4, 2023, the Minimum Charges are as under:

- **Protected Category:** Rs. 107.37 per month
- **Non-Protected Category:** Rs. 177.47 per month
- Government and Semi-Government Offices, Hospitals, Clinics, Maternity Homes, Government Guest Houses, Armed Forces Messes, Langars, Universities, Colleges, Schools and Private Educational Institutions, Orphanages and other Charitable Institutions along-with Hostels and Residential Colonies to whom gas is supplied through bulk meters including Captive Power.

The tariff for captive gas use in this category will be charged as per captive power category i.e. Rs. 1,200 per MMBTU.

- a) All off-takes at flat rate of Rs 1,600 per MMBTU
- b) Minimum Charges: Rs. 3,900 per month

(II) Special Commercial [Roti Tandoors]

Sale Price	Rs. / MMBTU
Upto 0.5 hm ³ per month	110
Upto 1 hm ³ per month	110
Upto 2 hm ³ per month	220
Upto 3 hm ³ per month	220
Over 3 hm ³ per month	700

(III) Commercial

All establishments registered as commercial units with local authorities or dealing in consumer items for direct commercial sale like cafes, bakeries, milk-shops, tea stall, canteens, barber shops, laundries, hotels including hotel industry, malls, places of entertainment like cinemas, clubs, theaters and private offices, corporate firms, etc.

- a) All off-takes at flat rate of Rs 1,650 per MMBTU
- b) Minimum Charges: Rs. 6,415 per month

(IV) Ice Factories

- a) All off-takes at flat rate of Rs 1,650 per MMBTU
- b) Minimum Charges: Rs. 6,415 per month

(V) General Industrial

All consumers engaged in the processing of industrial raw material into value-added finished products irrespective of the volume of gas consumed but excluding such industries for which a separate rate has been prescribed.

- a) All off-takes at flat rate of Rs 1,200 per MMBTU
- b) Minimum Charges: Rs. 35,540 per month

(VI) Captive Power (General Industry)

Captive Power Plant/Unit means an industrial undertaking/unit carrying out the activity of power production (with or without co-generation) for self-consumption and/or for sale of surplus power to a Distribution Company or bulk-power consumer.

- a) All off-takes at flat rate of Rs 1,200 per MMBTU
- b) Minimum Charges: Rs. 36,653 per month

(VII) Export Oriented (General Industry)

- a) All off-takes at flat rate of Rs 1,100 per MMBTU
- b) Minimum Charges: Rs. 27,616 per month

(VIII) Export Oriented (Captive)

- a) All off-takes at flat rate of Rs 1,100 per MMBTU
- b) Minimum Charges: Rs. 28,729 per month

(IX) CNG

- a) All off-takes at flat rate of Rs 1,805 per MMBTU
- b) Minimum Charges: Rs. 46,229 per month

(X) Cement

- a) All off-takes at flat rate of Rs 1,500 per MMBTU
- b) Minimum Charges: Rs. 45,589 per month

(XI) Fertilizer Companies**a) ON SNGPL SYSTEM**

Name of Company	Sale Price for Gas used as Feed Stock [Per MMBTU]	Sale Price for Gas used as Fuel for Power Generation, Steam and for usage of Housing colonies [Per MMBTU]
Pak-American Fertilizer Co. Ltd.	Rs. 510	Rs. 1,500
Dawood Hercules Chemicals Ltd., Sheikupura	Rs. 510	Rs. 1,500
Pak-Arab Fertilizer Ltd., Multan	Rs. 510	Rs. 1,500
Pak-China Fertilizer Ltd. Haripur	Rs. 510	Rs. 1,500
Hazara Phosphate Fertilizer Plant Ltd., Haripur	Rs. 510	Rs. 1,500
ENGRO Fertilizer Co. Ltd.	US\$ 0.70	Rs. 1,500

b) ON SSGCL SYSTEM

Name of Company	Sale Price for Gas used as Feed Stock [Per MMBTU]	Sale Price for Gas used as Fuel for Power Generation, Steam and for usage of Housing colonies [Per MMBTU]
Fauji Fertilizer Bin Qasim Ltd.	Rs. 510	Rs. 1,500

(XII) Power Stations (WAPDA's and KE's Power Stations)

WAPDA's and KE Power Stations and other electricity utility companies:

- a) All off-takes at flat rate of Rs 1,050 per MMBTU
- b) Minimum Charges: Rs. 28,898 per month

WAPDA's Gas Turbine Power Station, Nishatabad, Faisalabad:

- a) All off-takes at flat rate of Rs 1,050 per MMBTU
- b) Fixed Charges: Rs. 975,000 per month

(XIII) Independent Power Producers (IPPs)

- a) All off-takes at flat rate of Rs 1,050 per MMBTU
- b) Minimum Charges: Rs. 28,898 per month

RLNG Pricing

In Pakistan, the LNG/RLNG market is regulated by the Government. State-owned companies like Pakistan State Oil (PSO) and Pakistan LNG Limited (PLL) handle the purchase of LNG from the international market. This LNG is bought by SNGPL, which also transports RLNG and has agreements with power producers, industries, and commercial users. The main sector using RLNG is power generation, including both Independent Power Producers (IPPs) and government-owned plants like Bhiki, Balloki, and Haveli Bahadur Shah, with a total capacity of 3600 MW.

OGRA determines the LNG price through a weighted average approach considering multiple factors like import volumes, delivered ex-ship (DES) price, importer margins, terminal charges, retainage and T&D loss adjustments, cost of supplies to pipeline companies, and distributor margins. As a result, imported LNG becomes notably more expensive compared to locally sourced natural gas, especially for households, fertilizer production (as feedstock), and general industries.

The **DES price** is calculated by applying the agreed-upon Brent slope from the term or spot contracts to the average of the crude spot prices from the past three months. The resulting US\$/mmbtu prices of each cargo are then used to determine a weighted average DES price for the two importers, PSO and PLL, based on the quantity of imported LNG.

In the LNG import structure, the company running the terminal is separate from the users. The terminal company does not buy or sell gas but provides services to turn LNG back into gas, earning money from users through fixed and variable fees. Under the tolling system, the terminal owner provides services like unloading and storage to importers like PSO and PLL and charges fees for these services.

Price components of RLNG

The pricing of RLNG involves a total of seven components, with the Federal Government having a hand in determining five of them. These five components encompass:

1. The price of LNG Delivered Ex-Ship (DES)
2. Actual import-related costs like port charges and handling fees.
3. Terminal charges @\$0.5098 for PSO and @\$0.5673 for PLL
4. A 2.5% margin for LNG importers
5. LSA margin set at \$0.025 per MMBTU

The remaining two components include:

1. The cost of services and transportation
2. Losses during transmission and distribution

These last two are determined through the revenue determination process of the Sui companies and are incorporated into the RLNG price according to the ring-fenced mechanism. OGRA calculates all these components and establishes the RLNG price based on the policy directives provided by the Federal Government under Section 21 of the OGRA Ordinance, 2002.

Calculation of RLNG Price

- **Regulatory Framework for RLNG Pricing:** The pricing structure for RLNG is established in accordance with the regulations stipulated by the Petroleum Product (Petroleum Levy) Ordinance 1961 and is guided by the policy directives of the Federal Government.
- **Official Classification of RLNG:** In May 2015, RLNG was officially designated as a petroleum product, and the Federal Government included the names of SSGCL and SNGPL as recognized petroleum companies in the first schedule.
- **Pricing for Public Sector and Third Parties:** OGRA determines the price of RLNG for public sector gas utility companies when it is procured by PSO/PLL. Conversely, the pricing for RLNG sold to third parties is contingent upon mutually agreed terms.
- **Provisional and Actual Pricing Determination:** The RLNG price is determined through both provisional and actual calculations. Initially, prior to the emergence of the second terminal, OGRA calculated RLNG pricing exclusively when PSO was the sole procurer. Subsequently, with the introduction of the second terminal and separate LNG procurement by PLL, OGRA independently calculated provisional prices for both PSO and PLL in January 2018.

- **Monthly Weighted Average Sale Price Requirement:** In response to a directive from the Federal Government pertaining to “RLNG Allocation, Pricing, and Related Matters” in January 2018, OGRA was tasked with the additional responsibility of establishing the monthly weighted average sale price of RLNG.

In September 2023, RLNG prices increased for SNGPL and SSGC due to higher global RLNG Brent prices and the weaker Pakistani rupee. SNGPL prices went up by 2.79%, and SSGC prices rose by 3.08% compared to August. These changes, in line with government rules, started on September 1, 2023.

SNGPL consumers now pay \$12.8366 per mmbtu, and SSGC consumers pay \$13.3636 per mmbtu for RLNG. This is the second price increase this year, with previous decreases in the preceding months.

RLNG prices are affected by global crude oil prices and currency exchange rates. Prices depend on imports by PSO and PLL, connected to Brent crude oil prices. It’s essential to know that RLNG prices are closely linked to global crude oil prices, impacting RLNG costs in Pakistan.

Chapter 6

Challenges in Pakistan's Oil and Gas Industry



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The oil and gas sector is the backbone of Pakistan's energy requirements and a pivotal driver of the nation's economic growth, supporting industries, and powering essential services. Yet, beneath the surface of this vital sector lies a complex blend of challenges and intricacies that require meticulous scrutiny. Within this chapter, we embark on an in-depth exploration of Pakistan's oil and gas industry, offering a concise overview of the challenges it confronts. These challenges have profound implications for the nation's energy security, economic stability, and environmental sustainability. Ranging from energy shortages and aging infrastructure to security issues and regulatory intricacies, this chapter illuminates the key facets that shape the landscape of Pakistan's oil and gas sector.

One of the most pressing concerns is the recurrent energy shortages that disrupt our daily lives and business operations. These shortages, often leading to power outages, have a significant impact on the sector's reliability and productivity. Adding to this challenge is aging infrastructure, with much of the sector's assets being outdated and in dire need of significant upgrades. This not only results in inefficiencies but also increases maintenance costs.

Security remains a paramount concern. The sector is vulnerable to security threats, including attacks on pipelines and facilities. These incidents not only disrupt the energy supply but also necessitate additional security measures and risk mitigation, adding to the operational costs.

The sector is also exposed to geopolitical issues due to its proximity to volatile regions. This can lead to tensions and uncertainties that affect operations.

Economic and political instability further compounds the challenges. Frequent changes in government policies create uncertainty, making it difficult for companies to plan long-term investments. This instability can disrupt the sector's development.

The regulatory environment is also a significant issue. Bureaucracy, corruption, and a cumbersome regulatory framework hinder the ease of doing business and obstruct investment. Streamlining these processes is crucial.

The exodus of international firms from the sector, driven by regulatory, security, and economic challenges, necessitates comprehensive reform.

Pakistan's heavy dependence on oil imports raises concerns about supply security. The sector is vulnerable to international price fluctuations and supply disruptions, which can have significant economic ramifications.

Market diversification is a challenge as Pakistan seeks to reduce its reliance on traditional oil imports and explore alternative energy sources, including renewables.

The sector also faces increasing international pressure to adopt stricter environmental regulations and adopt cleaner and more sustainable practices in line with global environmental goals. This would raise compliance costs for the industry.

Attracting investments is a perpetual challenge, both from foreign and domestic sources. Political risks and limited incentives discourage companies from undertaking projects in the sector.

Exploration and production challenges continue due to limited modern technology and exploration efforts. Adopting advanced technologies is vital for efficiency and cost reduction, but it demands significant investments and skill development.

The circular debt issue is a big financial problem for both public and private companies in the sector, affecting their financial health.

Furthermore, infrastructure development, including transportation and distribution networks, remains underdeveloped in some regions. This hinders the efficient movement of resources.

Taxation complexities, such as the introduction of the Windfall Levy on Oil, have deterred investment and hindered the sector's potential. Security concerns persist in certain regions, casting doubts on the safety and stability of oil and gas operations.

Challenges in the Oil Sector

1. **Energy Shortages:** Frequent energy shortages negatively impact oil sector reliability and productivity, and power outages disrupt operations.
2. **Aging Infrastructure:** Outdated infrastructure necessitates upgrades to avoid inefficiencies and increased maintenance costs for older facilities.
3. **Security Concerns:** Vulnerability to security threats, including attacks on pipelines and facilities, leads to additional costs for security measures and risk mitigation.
4. **Imports Dependency:** Heavy reliance on oil imports exposes the sector to international price fluctuations and supply disruptions.

5. **Economic and Political Instability:** Frequent policy changes create uncertainty, while economic instability poses challenges for long-term investments in the sector.
6. **Regulatory Environment:** Bureaucracy and corruption hinder the ease of doing business, and cumbersome regulatory processes obstruct investment.
7. **Environmental Concerns:** The sector faces criticism for its environmental impact, and there is pressure to adopt cleaner and more sustainable practices.
8. **Investment Constraints:** Political risks discourage both foreign and domestic investments, and limited incentives for oil sector projects hinder progress.
9. **Exploration and Production Challenges:** Geological complexities hinder domestic production efforts, and limited exploration coupled with outdated technology are pressing issues.
10. **Circular Debt:** The circular debt issue affects the financial health of the industry and impacts both public and private entities within the sector.
11. **Geo-Political Issues:** The sector's proximity to volatile regions leads to geopolitical tensions, introducing uncertainties due to geopolitical factors.
12. **Technology Adoption:** The need for modern technology in exploration and production is an issue, requiring significant investments and skill development.
13. **Environmental Regulations:** International pressure for stricter environmental regulations imposes compliance costs on the industry.
14. **Infrastructure Development:** Underdeveloped transportation and distribution infrastructure hinders the efficient movement of resources within the sector.
15. **Market Diversification:** The sector aims to reduce its reliance on traditional oil imports and diversify energy sources, including renewables.
16. **Regulatory Ambiguity:** Challenges arise due to regulatory inconsistencies, leading to inefficiencies that impact sector growth.
17. **Policy Uncertainty:** The regulatory environment's unpredictability discourages investment and hinders planning.
18. **Taxation Complexities:** The introduction of the Windfall Levy on Oil, along with regulatory intricacies, deters investment in the sector.

19. **Exodus of International Firms:** Several international companies exit the sector due to regulatory, security, and economic challenges, highlighting the need for reforms.
20. **Lack of Investment:** The lack of investment in the oil industry is a significant issue. It not only strains foreign exchange reserves but also leads to a heavy dependence on imports. This problem can be primarily attributed to the declining tariff protection for refineries.

Challenges in the Gas Sector

1. **Declining Domestic Gas Production:** One of the foremost challenges in the gas sector is the decline in domestic gas production, presenting serious issues related to supply reliability and continuity.
2. **Reliance on Imported LNG:** The sector faces a significant challenge in heavily depending on imported LNG to meet a substantial portion of its gas demand. This reliance strains available resources and poses concerns related to efficiency and environmental sustainability.
3. **Severe Gas Supply Crisis:** The gas sector is confronted with a severe supply crisis, particularly during the winter months, where demand consistently outstrips the available supply, creating a pressing issue.
4. **Depletion of Local Gas Reserves:** Rapid depletion of domestic gas reserves is a grave concern, as it forces the sector to increasingly rely on costly LNG imports, impacting both economic and energy security.
5. **Challenges in LNG Procurement:** The procurement of LNG has become increasingly challenging due to soaring prices and supply difficulties, adding a layer of complexity to the sector's operations.
6. **High Economic Costs:** The high cost of LNG is a significant economic challenge, further exacerbating existing issues, such as low tariffs, cross-subsidization, and circular debt.
7. **Impact on Supply Chains:** The sector's inability to meet demand has far-reaching ramifications on supply chains, which, in turn, affect downstream industries and businesses, creating a cascading series of challenges.
8. **Effects on Diverse Industries:** Industries spanning textiles, ceramics, glass, and steel face serious challenges, including production setbacks, reduced capacities, delays, and increased operational costs.
9. **Environmental and Societal Concerns:** The expansion of gas extraction and related infrastructure raises a spectrum of environmental and societal concerns, including biodiversity loss and heightened health-related risks.

10. **Subsidies in the Fertilizer Sector:** The persistent subsidies in the fertilizer sector create challenges by straining resources and efficiency, impacting both the industry and the broader economic landscape.
11. **Distribution Losses:** Companies like SSGC and SNGPL experience losses that exceed industry standards, necessitating significant investments in infrastructure and posing operational challenges.
12. **Potential Urea Fertilizer Shortages:** The possibility of urea fertilizer shortages is a pressing issue within the gas sector, necessitating consideration of importing urea to mitigate potential supply shortfalls.
13. **Revised Billing System for Domestic Consumers:** The introduction of a new billing system has given rise to concerns about transparency and fairness, particularly with the classification of consumers based on their gas consumption, indicating challenges in implementation.
14. **Transition to More Efficient Cooking Methods:** Initiatives aimed at encouraging households to adopt more efficient cooking methods are indicative of the challenges in improving efficiency and accessibility in gas consumption, as it requires changes in consumer behavior and infrastructure.

Chapter 7

Towards Sustainability: Recommendations for Oil and Gas

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Towards Sustainability: Recommendations for Oil and Gas

In this chapter, we explore recommendations and the path forward for a sustainable oil and gas landscape, drawing on the insightful proposals from previous sections of this booklet. These issues and solutions serve as practical guidance for policymakers, including the Ministry of Energy and OGRA, as they lay the foundation for a more resilient and reliable energy future in Pakistan.

Recommendations for Oil Sector

1. **Control Oil Prices and Ensure Stability:** ICMA recommends implementing policies for controlling and stabilizing oil and petroleum product prices in the country to ensure economic stability.
2. **Enhance Crude Oil Extraction:** ICMA emphasizes the importance of prioritizing the extraction of crude oil reserves from underutilized regions within Pakistan, a vital step to reduce dependence on crude oil imports and strengthen energy security.
3. **Expand Refining Capacity:** ICMA recommends that Pakistan's exports can be increased by increasing refining capacity in existing petroleum refineries and promoting the establishment of new facilities. Incentivizing investors and reducing tariffs on refining machineries is crucial for this purpose.
4. **Encourage Investor Participation:** ICMA recommends incentivizing investors and reducing tariffs on refinery machinery to attract investments, essential for capital injection and technological advancement in the industry.
5. **Establish a Minimum Rate of Return for Investments:** ICMA believes that setting a minimum rate of return over a specific period can incentivize companies to invest in Pakistan, fostering economic growth in the oil sector.
6. **Utilize Used Petroleum Oil Refineries:** ICMA is of the view that used petroleum oil refineries may be permitted due to their lower capital requirements, presenting a viable strategy for energy self-sufficiency.
7. **Modernize Refineries for Meeting Growing Demand:** The upgrading and expansion of oil refineries are of utmost importance to reduce the country's dependence on costly imported refined products and bolster self-sufficiency.

8. **Address Public Sector Challenges:** ICMA suggests tackling issues faced by Public Sector Oil and Gas Companies, including Circular Debt, sector-specific procurement rules, security concerns, and exploration licenses. This is crucial for the health and efficiency of the sector.
9. **Streamline Supply Chain:** The view is to leverage the Petroleum Refinery Management (PRM) framework to streamline the supply chain, an essential step to ensure the efficient distribution of petroleum products, meeting the growing national demand effectively.
10. **Optimize Import Policies for Balanced Economic Impact:** ICMA suggests carefully managing import policies to strike a balance between domestic production and demand without adversely affecting the overall economy, a critical economic imperative.
11. **Promote Uniform Tariffs and Foster Market Development:** ICMA suggests aligning with the National Electricity Policy 2021 to maintain uniform tariffs and promote market growth, a significant measure to enhance energy accessibility and market development.
12. **Diversify Petroleum Product Imports:** ICMA suggests that the government should diversify their import of petroleum products from different countries, as indicated by the 4-digit, 6-digit, and 8-digit HS-Code analysis, to ensure a stable and cost-effective energy supply.
13. **Tax and Duty Exemption for Refineries:** ICMA proposes that all refineries must be exempt from taxes and duties to foster a competitive environment. Aligning with the 1997 oil policy, a 20-year tax and duty exemption for new refineries and a 10-year modernization exemption for old refineries would be instrumental.
14. **Invest in Pipeline Infrastructure:** ICMA recommends that governments need to attract investments in pipeline infrastructure. This will encourage companies to set up oil refineries in central and upper Pakistan, addressing regional energy disparities.
15. **Encourage Incentives for Storage Companies:** ICMA suggests the government should provide incentives to storage companies in both the private and public sectors. A temporary levy on petrol and diesel can facilitate the construction of storage facilities, enhancing energy security by stabilizing oil prices.
16. **Purchase Refined POL Products from Saudi Arabia and Malaysia:** The findings of the report suggest it is more beneficial for Pakistan to buy refined petroleum products from Saudi Arabia and Malaysia as compared to the UAE, ensuring a consistent and cost-effective supply of high-quality petroleum products.

Recommendations for Gas Sector

1. **Competitive Exploration Prices:** ICMA strongly suggests making exploration prices competitive to attract potential investors, especially for new gas fields, a vital step in addressing gas shortages and dwindling reserves.
2. **Continuous Exploration of Gas Fields:** ICMA emphasizes the continuous exploration of new gas fields, free from political influence, to meet present and future gas demand, optimizing the utilization of available resources.
3. **Enhance Oil Transportation:** ICMA proposes that addressing the need to enhance transportation infrastructure, including expanding pipeline capacity and improving the efficiency of the railway network, is critical for smooth and efficient oil transportation.
4. **Explore Neighboring Gas Sources:** ICMA recommends focusing on exploring gas imports from neighboring countries and expediting pipeline projects, vital to diversify gas sources and ensure long-term energy security.
5. **Transition to Renewable Energy:** ICMA underscores the need to promote the transition from gas-based appliances to electric ones and prioritize renewable energy sources for sustainable energy security.
6. **Encourage Exploration Agreements with Iran and Central Asian Countries:** ICMA advises the government to finalize agreements with Iran and Central Asian countries to ensure short-term gas supply, alleviating gas shortages and enhancing energy reliability.
7. **Advocate for Subsidizing Renewable Energy:** In the public sector, ICMA advocates prioritizing renewable energy and fostering collaboration with technologically advanced countries like China to improve bilateral relationships. Subsidizing the renewable energy industry can significantly contribute to addressing Pakistan's energy challenges.
8. **Reevaluate LNG Procurement Contracts:** ICMA suggests that Pakistan should reevaluate its contracted LNG procurement to ensure efficient utilization of terminal and pipeline capacity, with a focus on importing and distributing RLNG.
9. **Maximize RLNG Send Out Rate:** In the CNG sector, ICMA recommends maximizing RLNG send out rates and empowering CNG sector companies to import and distribute RLNG independently, revitalizing the sector.
10. **Optimize Power Generation and Supply Infrastructure:** ICMA proposes that power generation should be based on imported LNG, and existing power supply infrastructure should be used for exporting power from South to North, relieving pipeline capacity constraints and supporting energy reliability.

11. **Optimize LNG Costs:** ICMA suggests ensuring the availability of Liquefied Natural Gas (LNG) within the domestic sector as a cost-effective alternative to natural gas, essential for promoting its use and supporting economic sectors.
12. **Expand LNG Terminal Capacity:** ICMA recommends increasing the number of LNG terminals, important for effectively managing growing LNG imports and enhancing the country's energy infrastructure.
13. **Oil Logistics and Infrastructure Study:** ICMA suggests undertaking a thorough analysis of the nation's oil logistics and infrastructure to identify bottlenecks and devise long-term solutions, important for the effective management of oil resources.
14. **Highlight the Need for a Transparent LNG Import Policy:** ICMA recommends the development of a transparent LNG import policy, enabling utility buyers to create their own LNG import hedging strategies and promoting cost-efficiency in the energy sector.
15. **Diversify Gas Sources through Qatar Imports:** ICMA recommends exploring opportunities to import natural gas from Qatar, a priority as it reduces the nation's import bill and ensures a diversified and sustainable energy supply.
16. **Strengthen Regulatory Oversight:** ICMA recommends enforcing safety standards and expanding infrastructure in the LNG and CNG sectors, critical to guaranteeing safe and efficient energy transportation and distribution.

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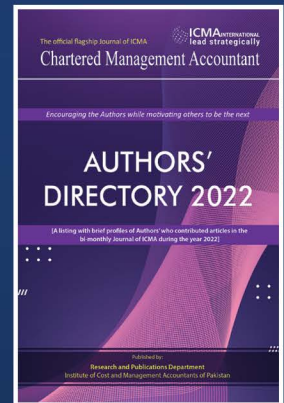
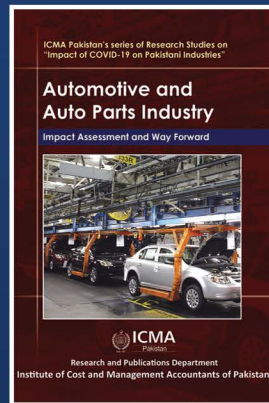
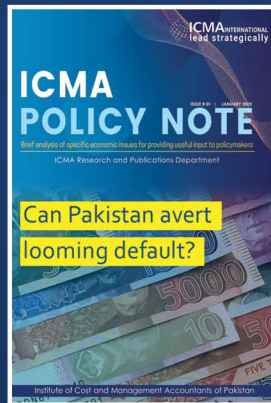
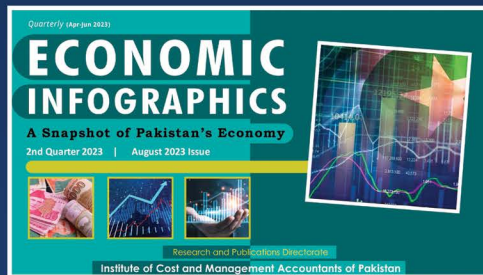
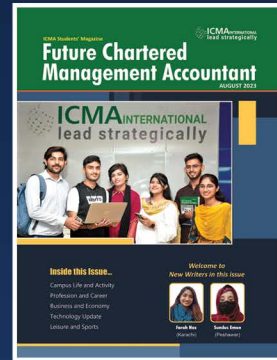
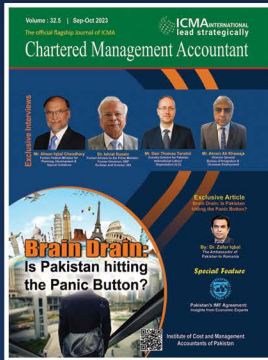
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