



Pipeline Network Sector Study



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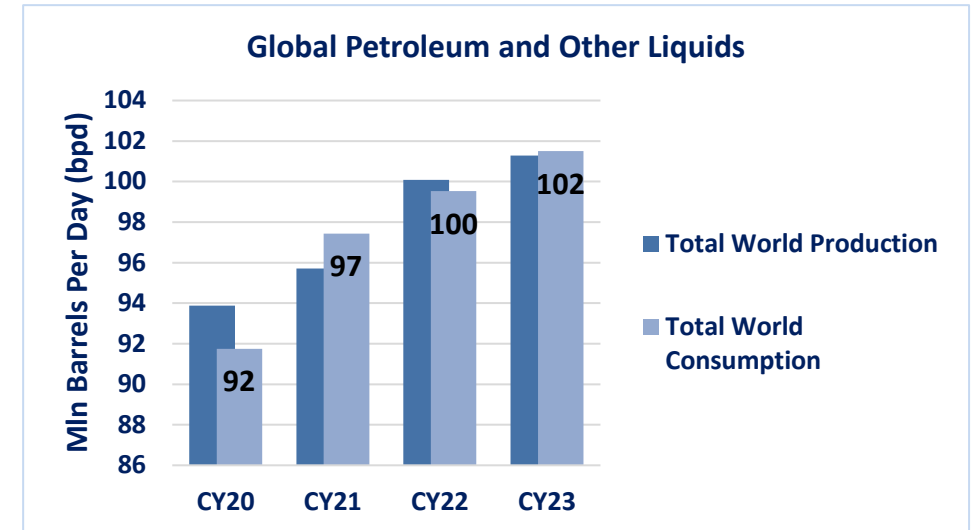


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Pipeline Network

Global Snapshot

- Global Pipeline Network can be divided into oil pipelines and gas pipelines. The Global Pipeline Network Market size was estimated at USD~9bln in CY21 and is expected to reach USD~10bln in CY22. In the next five years, the market size is projected to grow at a CAGR of ~10% to reach USD~16bln by CY27.
- Over the past 50 years, the world's annual energy consumption has nearly tripled.
- Every day, the world consumes some ~100mln barrels of oil and ~60mln equivalent barrels of natural gas.
- Demand:** Around ~100mln bpd of petroleum and liquid fuels was consumed globally in CY22*. Going forward, world oil demand is expected to rise more than ~2% to a record high of ~102mln barrels per day (bpd) in CY23.
- In a bid to meet the rising consumption of oil and gas, the pipeline capacities are being expanded, and new pipeline projects are being commissioned. However, the global shift towards renewable sources for electricity generation poses a huge threat to the demand for oil and gas, which is likely to be a major challenge for the growth of onshore oil and gas pipeline installation in the coming years.
- The total length of global pipeline network is ~2.12mln km (CY22*)



Country - June'22	In Development (Proposed + Construction) in Km	Operating	Share%
United States	2,829	98,015	34%
Russia	2,051	40,092	14%
Canada	1,244	25,332	9%
China	2,533	25,271	9%
India	2,824	8,859	3%
Pakistan	0	3,000	0.3%
Other	12,685	91,883	32%
World	24,166	290,394	

*Note: Estimates used for year CY22 & Forecast of CY23

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Global Overview | Market Growth

- Global pipeline market is fragmented in nature with a large number of companies operating in the industry. USA, Russia, China and India are leading the board. As of Jun'22, more than ~24,000km of new oil pipelines are under development around the world. Russia is developing over ~2,000km of new pipelines, which has been facing oil and gas boycotts from the west over the war in Ukraine and wants to increase its exports in potential markets.
- Asia Pacific is expected to be the fastest growing region in the world for the period CY22 to CY26. As of Jun'22, North America has the largest oil and gas pipeline (operating) network of ~544,727km.
- **For the forecasted period CY22-CY26**, around 536 trunk/transmission oil and gas pipelines are expected to come online. Of these, 333 represent planned pipelines with identified developmental plans, while 203 show the count of early-stage announced pipelines that are undergoing conceptual studies.

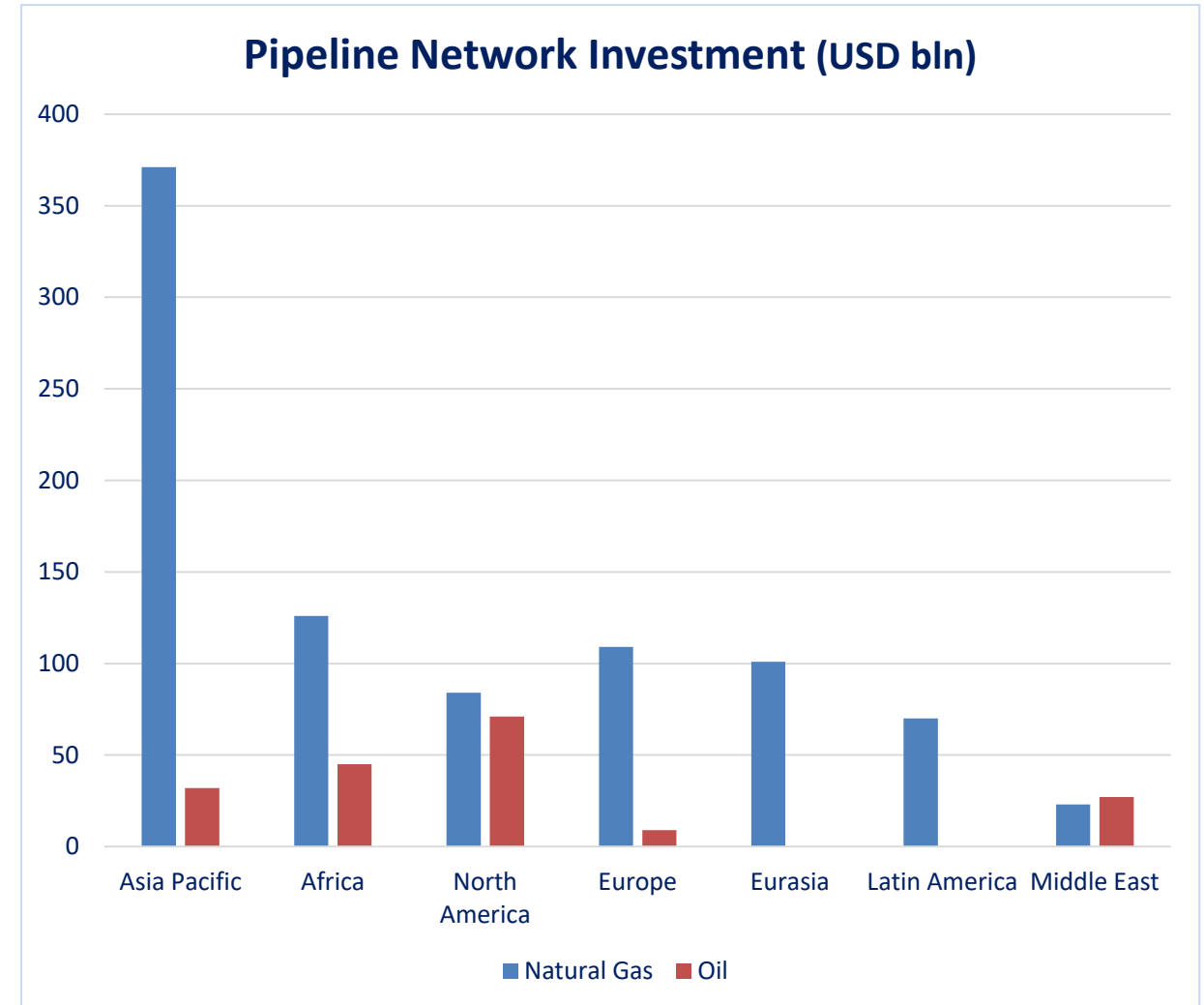
Regions	Oil Consumption - 000'barrels per day			
	CY18	CY19	CY20	CY21
North America	23,753	23,613	20,687	22,264
Europe	14,903	14,831	12,846	13,527
Asia Pacific	35,486	36,131	35,806	35,806
<i>Of which - Pakistan</i>	498	446	437	503
<i>India</i>	4,974	5,150	4,701	4,878
<i>China</i>	13,642	14,321	14,408	15,442
Middle East	9,182	9,004	8,318	8,640
Other	14,166	14,168	11,089	13,851
World	97,490	97,747	88,746	94,088



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Global Overview | Investments

- The availability of abundant natural gas reserves and its lower cost compared to other fossil fuel types, is expected to supplement the demand for natural gas from multiple end-use sectors, including power generation in the coming years. This, in turn, is expected to boost the onshore gas pipeline market.
- Russia and Pakistan have agreed to build a new 1,100km gas pipeline, from Port Qasim in Karachi to Lahore, carrying worth USD~2.5-3bln, which is at negotiation level.
- Growing oil and gas demand in Asia-Pacific holds immense potential for the onshore oil & gas pipeline market and is the fastest-growing market. China and India have been the largest consumers of oil & gas in the Asia-Pacific region and the pipeline network is growing at a significant pace in these countries.
- Focusing on cleaner way to transport fuel, technology developments and cost-efficient methods have been among the driving factors in the demand for the onshore pipeline infrastructure. Renewables sources are the biggest and rising threat to the pipeline network investment, but due to their unreliability, fossil fuels still continue to have the largest share in energy production.

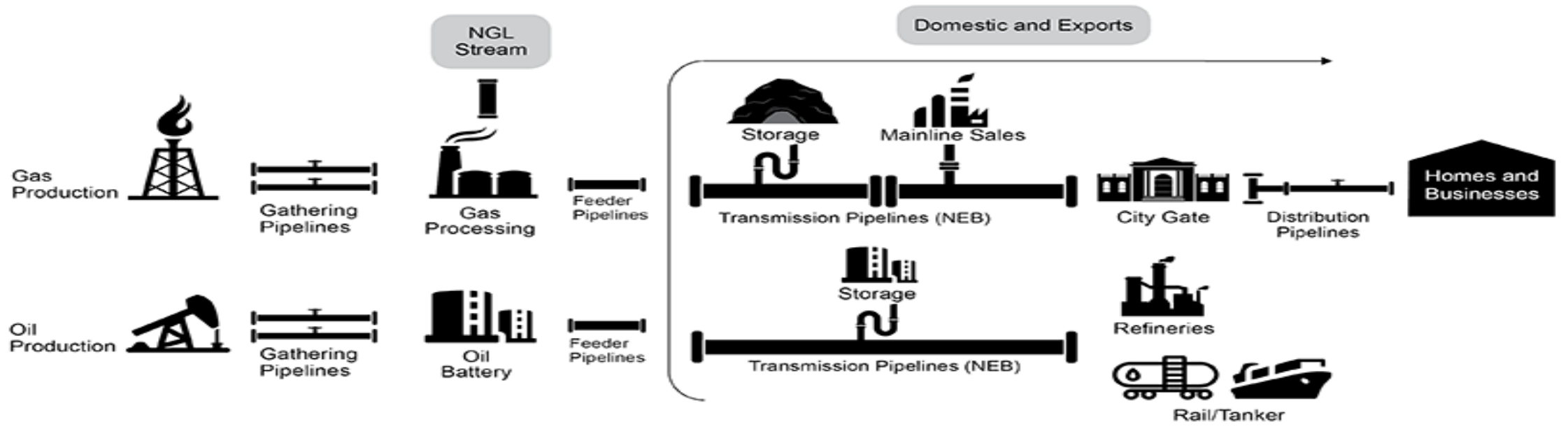




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Supply Chain

- There are two types of oil pipelines: crude oil pipeline and product pipeline. While the former carries crude oil to refineries, the latter transports refined products such as gasoline, kerosene, jet fuel, and heating oil through imports or from refineries to the market. After extraction, pipelines carry gas or oil to processing or storage areas where they are stored and further fed into feeder pipelines connecting to major or nationwide pipeline in use.
- Refineries, after receiving oil from nationwide pipelines refine it and further pump refined petroleum products in the pipeline. Petroleum products are delivered to storage areas where they are transported via oil tankers to fuel pumps or ports for export. Supply chain of petroleum products, either refined or unrefined, is a mix of oil tankers and pipelines.



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Local | Industry Snapshot

- In Pakistan, major portion of oil products are transported through roads. Almost ~70% of total oil products moves by roads followed by pipeline ~28% and ~2% by railways. Moreover, with the start of MOGAS transport through pipeline during last year (FY21), overall throughput of the sector has been improved.
- Total length of the pipeline network in Pakistan is more than ~16,500km majority of which, (almost ~80%) pertains to gas pipelines. Total length of oil pipeline operating network is over ~3,000km, transporting only High Speed Diesel (HSD) and crude oil. Upgradation of one the major pipeline in the country, owned by Pak Arab Pipeline Company (PAPCO), has enabled the company to transport both MOGAS and HSD through its pipeline spanning from Karachi to Mahmoodkot with a total length of ~786km.
- Currently, two companies, Pak Arab Refinery Limited (PARCO) and PAPCO, own all the four ‘major’ oil pipelines present in the country. Two of them are situated at the heart of the industry, Karachi to Mehmoodkot.
- Pipeline is the cheapest and safest mode of transportation for petroleum products. White Oil Pipeline (WOP) is estimated to have reduced the movement of ~4,000 trucks operating out of Keamari to Mahmoodkot and back.

Particulars	FY19	FY20	FY21*	FY22*
Gross Revenue (PKR mln)	6,303	6,709	6,104	7,576
Major Oil Pipelines	4	4	4	4
Structure	Regulated & Unlisted			
Oil Movement-000' (Pipeline)*	3,505	3,432	3,851	3,448
Regulator	Oil & Gas Regulatory Authority			
Association	Oil Companies Advisory Council			
Key Industry Players	PARCO & PAPCO			
Product	Crude Oil, High Speed Diesel and Motor Gasoline			

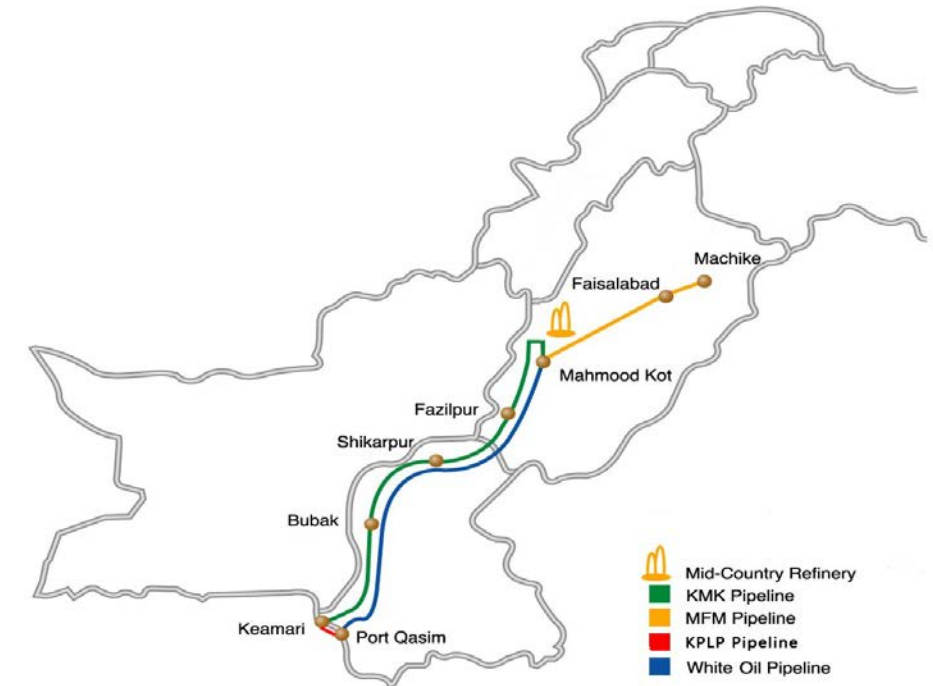
Note: Calculations are based on PAPCO numbers having a market share of more than ~50%. FY22 gross revenue is annualized. This report only includes oil pipelines. Gas pipelines are covered in PACRA Gas distribution report.

Pipeline Network

Geographical Overview

- Entire up-country demand of diesel is being transported from Karachi to Sheikhpura through PAPCO's White Oil Pipeline (WOP) from Karachi to Mehmoodkot and PARCO's Mehmoodkot Faisalabad-Machike (MFM) pipelines. PARCO and PAPCO (a subsidiary of PARCO and operator of the WOPP) have converted the two pipelines from the present single product (diesel) to multiproduct (diesel & gasoline) with an investment of around USD~200mln. The first batch of Mogas (60KT) was launched into WOP on October 26, 2021.

Pipeline	Year Commissioned	Operated by	Length (km)	Route	Oil Type
Karachi-Mahmoodkot (KMK)	1981	PARCO	870	Keamari, Bubak, Shikarpur, Fazilpur, Mahmoodkot	Crude Oil
Mahmoodkot-Faisalabad-Machhike (MFM)	1997	PARCO	362	Mahmoodkot, Faisalabad, Machhike	HSD
White Oil Pipeline (WOP)	2005	PAPCO	786	Port Qasim, Shikarpur, Mahmoodkot	HSD, MOGAS
Korangi-Port Qasim link	2006	PARCO	22	Port Qasim, Keamari	Multi Purpose



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Upgradation & Expansion

- Considering increasing demand of oil products and substantial cost benefit of transporting oil products through pipeline, local companies are upgrading their existing pipeline networks.
- PAPCO has completed the upgradation of its White Oil Pipeline (WOP) In Nov'21. The upgradation has enabled the pipeline to transport both MOGAS and HSD. Previously, it was only capable of transporting HSD. More upgradation and expansion are as follows:
- **Expansion of Pipeline Network by PAPCO:** PAPCO plans to expand its pipeline network from Machhike (Sheikhupura) to TaruJabba (Peshawar), which is at preface stage. The pipeline is expected to be dual purposed (MOGAS and HSD) and the contract for construction has already been initiated. It is expected to be completed in FY23. The ~427km long pipeline is divided into three sections, aimed at ensuring a smooth supply chain of petroleum products from Karachi to Peshawar.
 - Machhike-Chak Pirana (~135km)
 - Chak Pirana-Rawat (~117km)
 - Rawat-TaruJabba (~175km)
- **Upgradation of MFM pipelines:** MFM pipeline is also being upgraded for dual transportation of HSD and MOGAS. Physical works have been completed and commencing of the project is expected as soon as tariff is determined by OGRA. The total cost of upgrading WOP and MFM pipeline stood at USD~194mln.
- These upgrades will reduce traffic congestion, environmental pollution and transportation cost. However, onward distribution from OMCs' oil depots to petrol pumps would remain intact through tankers.

Pipeline Network

Pricing

- The tariff for transporting petroleum products through pipelines is determined by OGRA. The current tariff for KMK and MFM pipelines is linked with railway tariffs and was last notified by the Federal Government effective from Apr-2000 and May-2002, respectively. The tariff rates for White Oil Pipeline were determined by OGRA for the next ~25 years from start of commercial operations with intervals of 5 years each.
- The tariff for transportation of HSD through MFM was approved in 1994 by the Cabinet Committee on Energy (CCOE) in line with the basis of ~85% of the prevalent railway tariff, as provided in the Memorandum of understanding (MoU) between the two Governments, Pakistan and Abu Dhabi.
- In an update by OGRA (Aug'21), Motor gasoline transportation from Mahmoodkot to Faisalabad is fixed at PKR~1,832/MT and PKR~2,227/MT for Mahmoodkot to Machike.

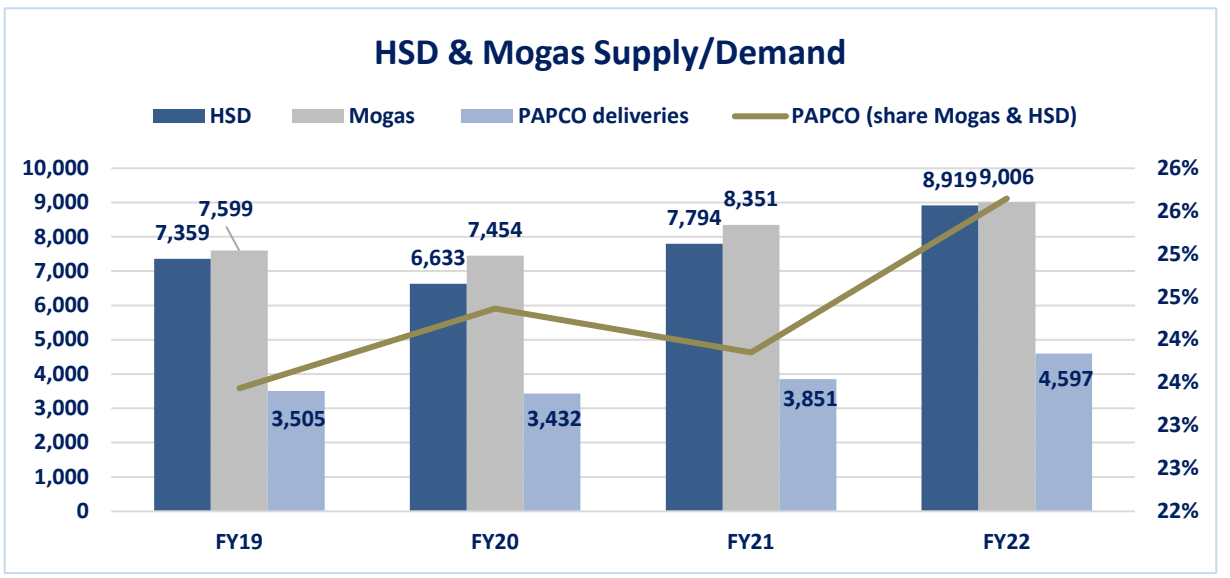
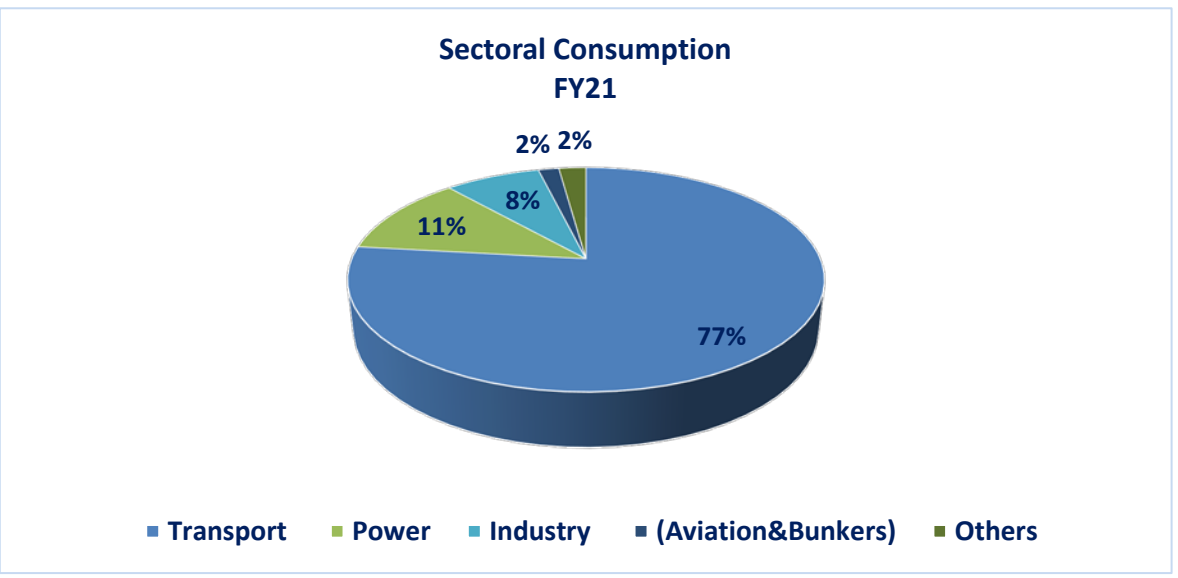
White Oil Pipeline Tariff Structure		
High Speed Diesel	Karachi-Mahmoodkot	Karachi-Shikarpur
	USD/Ton	USD/Ton
1st Five years	15.9	10.1
2nd Five years	15.3	9.8
3rd Five years	13.3	8.5
4th Five years	10.4	6.9
5th Five years	9.7	6.4

White Oil Pipeline Tariff Structure	
Motor Gasoline	USD/Ton
Karachi-Mahmoodkot	11.3
Karachi-Shikarpur	6.4

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Demand

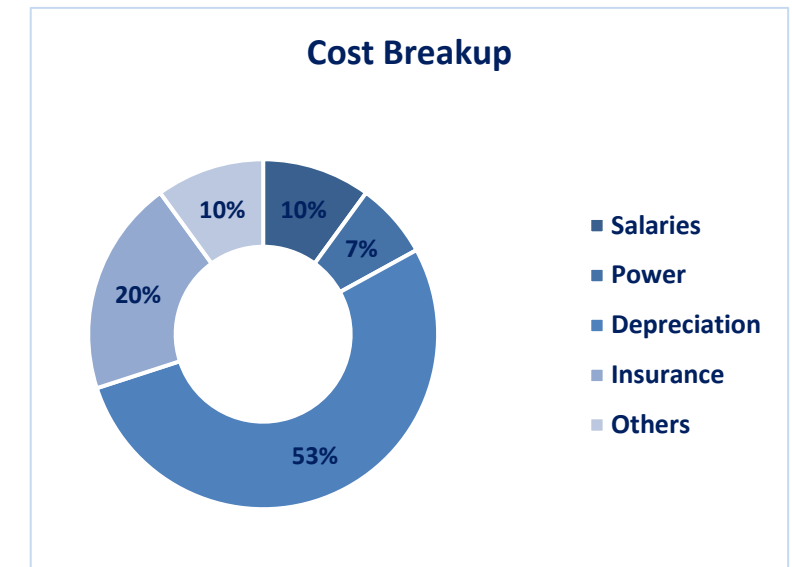
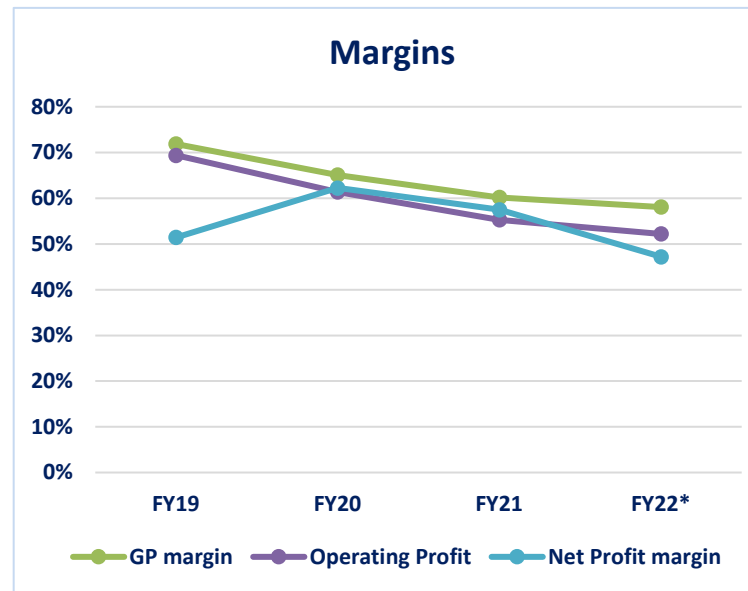
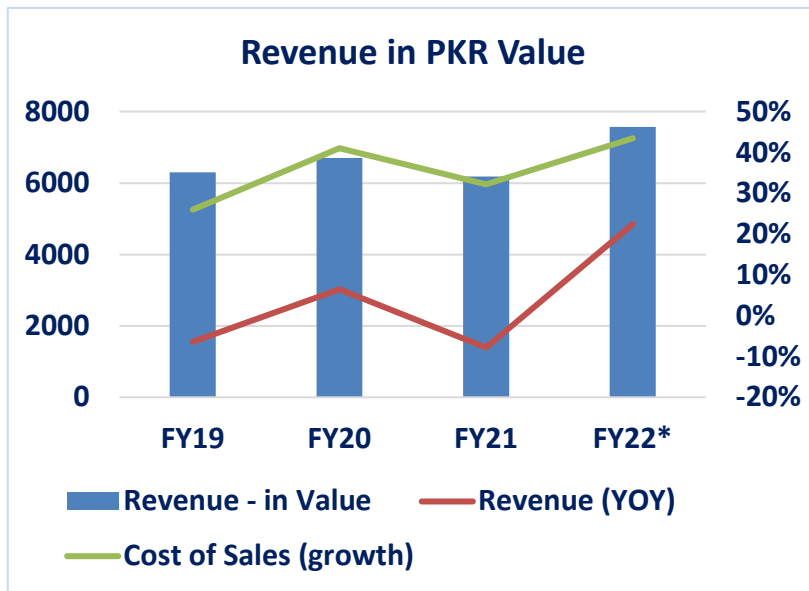
- The demand for petroleum products is highly correlated with the economic activity in the country. With an estimated GDP growth rate for FY22 clocking in at ~6.0% YoY (FY21: ~5.7%); Pakistan's economy maintained its growth momentum. Among major segments; growth in industrial activities is estimated at ~7.2% YoY (FY21: 7.8%). However,, for the fiscal year FY23, Pakistan's economy is forecasted to slow by ~2.3% on account of devastating floods and political/economic imbalances.
- The Large Scale Manufacturing (LSM) is a significant component of the Manufacturing Segment of the Industrial sector. It is considered essential for the country's economic growth considering its strategic importance and linkages with other sectors of the economy. It contributes ~9% to the GDP and in FY22, it is estimated to have grown by ~10.5% YoY (FY21: 11.5%). The Petroleum products Segment, bearing notable weightage in LSM, holds a share of ~6.7% in its composition.
- With pipelines being the cheapest form of transportation for oil, the sector is expected to receive surge in demand. Although a major portion of the petroleum products will still be transported via oil containers, but with MOGAS pipeline upgrades, the sector is expected is receive a boost. PAPCO share in the total consumption of MOGAS & HSD was ~26% in FY22.



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Business Risk

- OGRA regulates and determines the pipeline tariffs. The sector's revenue ceiling is two fold, the fixed tariff, as stated and the quantity of oil transported via pipelines limited by pumping and storage capacity. However, the capacity remains underutilized. Moreover, the sector's topline is USD linked so it provides a natural hedge against adverse exchange rate movements. Depreciation of pipelines and pumping stations remains the highest portion of operational cost and is expected to remain so. Depreciation accounts for ~53% of the total cost while insurance at second place accounts for ~20%.
- Due to fixed nature of revenue (tariff), the effect of revenue is kindred to profit. The effect of revenue volatility can be seen in gross margin, operating margin and net profit margin likely. The pipeline throughput has remained steady since FY19, whereas recent introduction of MOGAS supplies is projected to further improve the revenue side. However, inflationary pressure and interest rates impacts the margins of the sector. Leakages and damage to pipeline are the major risks. However, higher demand for oil pipelines is driving the expansion forward.

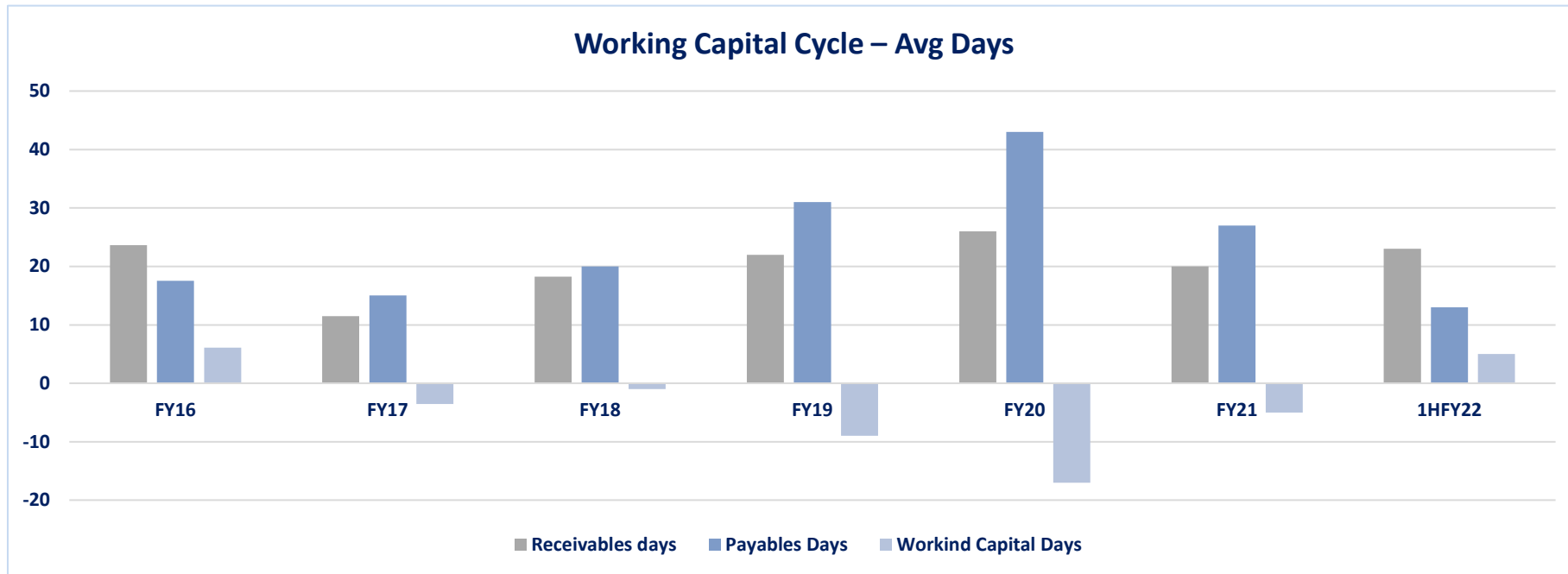


Note: Calculation is based on PAPCO numbers having market share of more than ~50%.

Pipeline Network

Financial Risk | Working Capital

- The sector's working capital is largely a function of payables and receivables. The sector holds no or minimal inventory, however uses storage facilities at its pumping locations to smoothen the oil flow in the pipelines. There is no inventory in the process since storage capacities hold the inventory for the receiving party.
- The sector went through expansion in FY18 for upgrading pipelines for dual transportation of HSD and MOGAS. Receivables hold a larger portion of the working capital management and payables witnessed a continuous drop after FY20. Net working capital for 1HFY22 gone to positive ~5days (FY21: ~-5days) which is considered content.

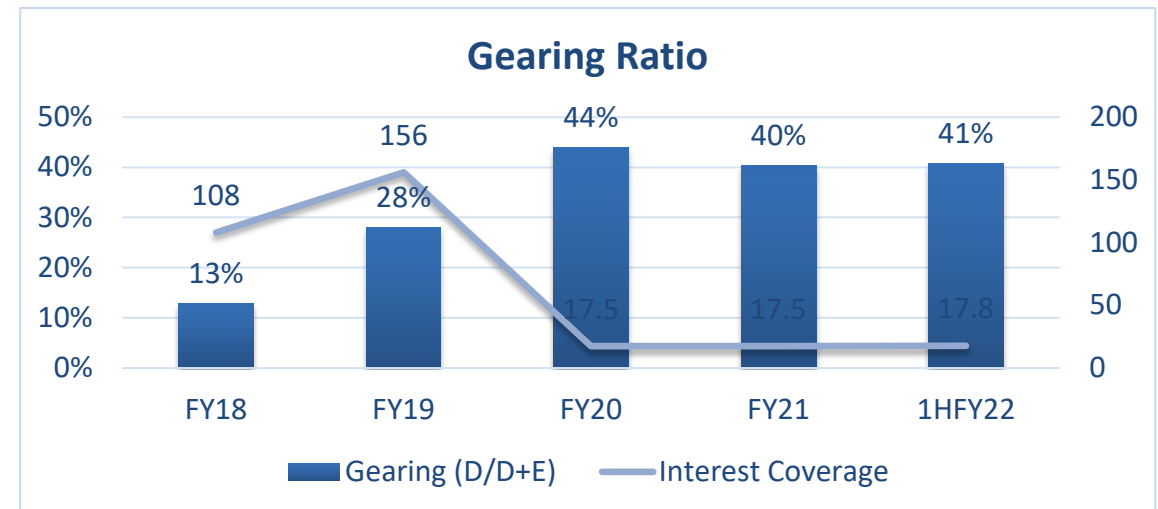
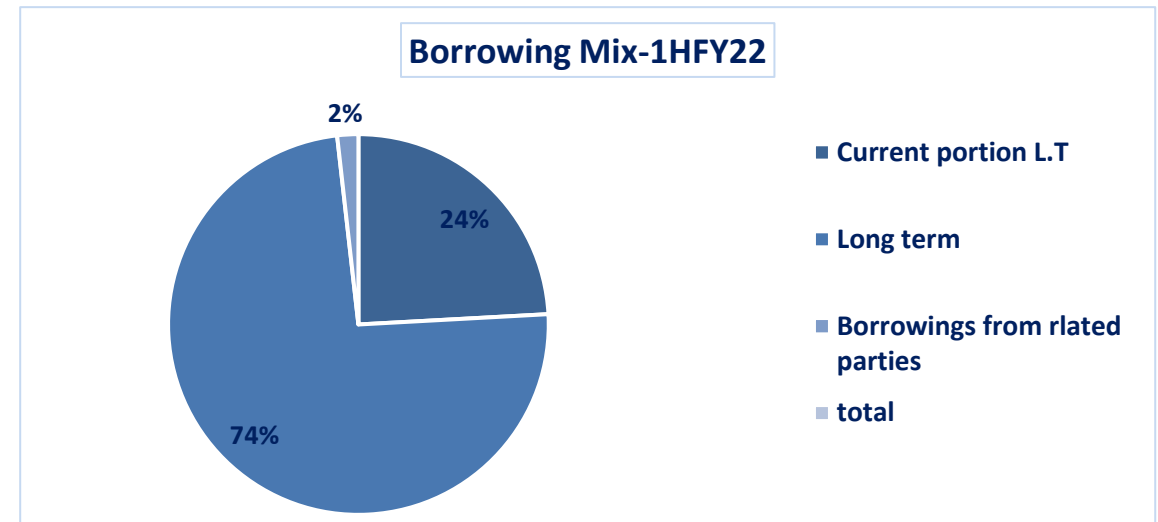


Note: Calculation are based on PAPCO numbers having market share of more than~50%.

Pipeline Network

Financial Risk | Borrowing

- The total borrowing of pipeline sector stood at PKR~13bln as at 1HFY22 as compared to PKR~14bln as at FY21. Total borrowings of the sector mainly comprises long term borrowings (~74%). As the working capital cycle of the sector is cash positive (due to higher payables), the need for short term borrowings only arises to bridge some financing gaps. Long term borrowing are raised to finance expansion and upgradation projects.
- Borrowings increased on the back of higher debt for expansion and upgradation of the pipeline network. As of 1HFY22, gearing ratio stood at ~41% and likely to increase further if expansion of pipeline network to TaruJabba (Peshawar) is planned to execute in the coming years. Interest rate coverage was maintained at ~17.5 since FY20. The sector's gearing and financial risk is moderate.
- Considering low gearing and contained interest coverage, the financial risk of the sector is considered low.



Note: Calculation are based on PAPCO numbers having market share of more than~50%

*Gearing is in % terms while interest coverage is in times .



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Taxes

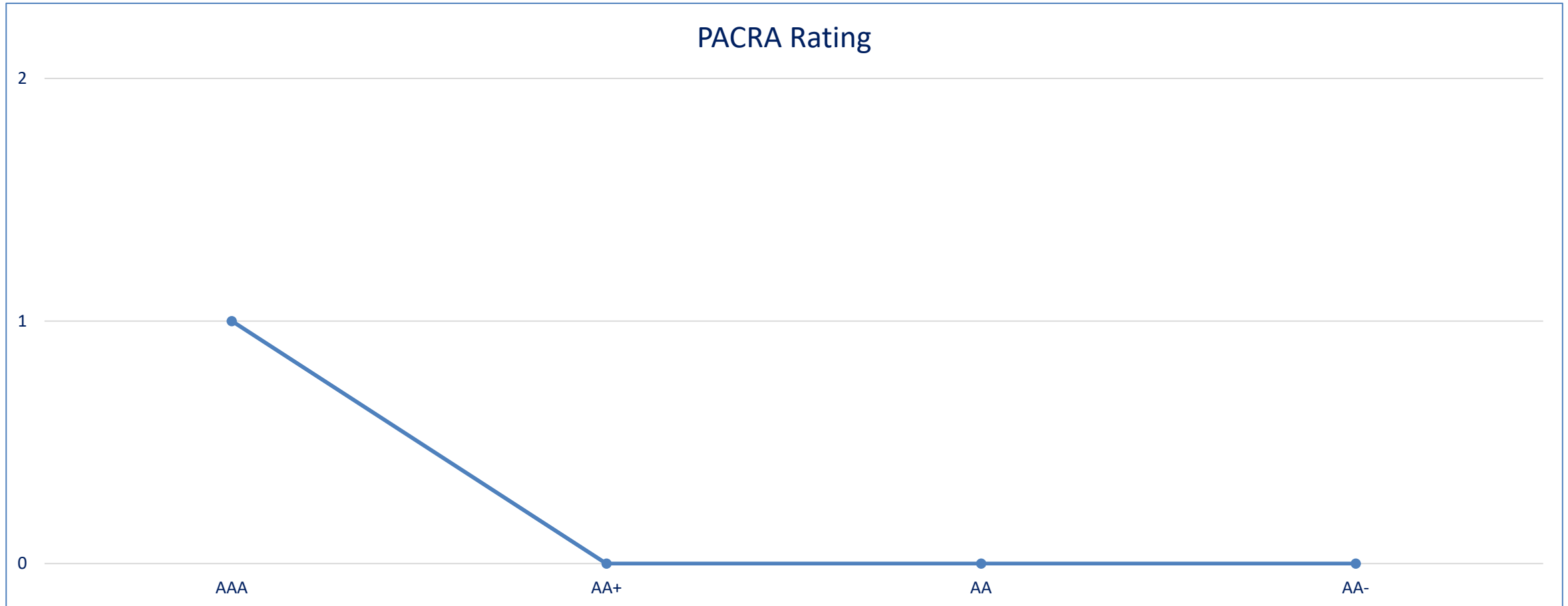
- Sales Tax applicable on the pipeline sector is ~16%. No change was observed in the sales tax for FY22 and FY23 as per the budget.
- Withholding Tax is applicable on the rate of 3%. No change was observed in FY22 and FY23, as per the budget.

Category	FY22	FY23*
Sales Tax	16%	16%
Withholding Tax	3%	3%



Rating Curve

- PACRA rates one player in the pipeline sector.





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Porters 5 Forces Model

POTENTIAL NEW ENTRY



- Very low due to capital intensive nature of the sector and stringent regulatory approvals required.

BUYERS



- Low bargaining power.
- Fixed tariff determination by OGRA role out any negotiations
- Non-availability of alternative pipeline on same routes.

SUBSTITUTES

- Main Substitutes are oil tankers.
- Currently, Oil tanker has major share in oil transportation.

SUPPLIERS



- Medium Power
- Non utilization of full production capacity

COMPETITIVE RIVALRY



- Very low
- There are not many players in the sector.



Pipeline Network

SWOT Analysis

- Few players in the industry
- Growing Demand for pipeline due to cost effectiveness
- No inventory management
- No environmental impact or road accidents
- Unaffected by oil prices
- Tariff based in US dollar (Exchange rate exposure)

Strengths

Weaknesses

- Capital Intensive
- Tariff controlled by OGRA
- High Maintenance and depreciation
- Longer regulatory approval process

- Natural Disasters
- Pipeline Leakages or damage inflicted
- Abolishment of fix tariff regime or conversion to PKR based return

Threats

Opportunities

- Pipeline network is extendable
- Growing opportunity for MOGAS transportation
- Pipelines can be upgraded for dual purposes (MOGAS and HSD)
- Increasing demand for petroleum products in the country

Outlook - Stable

- Pipeline is considered as a cheap and environment friendly mode of oil product movement. This mode of transportation does not only provide efficiency to goods transported within the country but is also used for cross borders movement of oil and gas. It is a strategically important sector considering its importance in the country's energy system.
- Currently, the portion of oil products movement through pipeline is low, as the pipeline accounts for only ~27% of the total oil products moved within the country. However, the long term prospects of the sector are positive, considering its safety and environment friendly nature, in contrast to movement of oil and hazardous liquids through oil tankers. The sector's system share is also expected to improve with the upgradation of existing pipelines and further expansion of pipeline networks.
- PAPCO, the sole commercial operator of White Oil Pipeline, has lately completed its upgradation and commenced the movement of both MOGAS and HSD through its White oil pipeline during FY21. In the longer run, expected expansion plan is to connect Karachi ports with Peshawar and will play a critical role in improvement of the overall energy system of the country to the upper parts of the country as well.
- Fixed tariffs and USD indexation keeps the sector's revenue volatility risk low. A natural hedge against exchange rate fluctuations and negligible price sensitivity foster the sector's margins to a great extent. Volumes remain the key driving factor for growth.
- Almost all debt of the sector is long term in nature and short term borrowing is very low. Considering nature of borrowing and strong interest cover, the financial risk of the sector is reasonably very low.



Pipeline Network

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