Oil Transportation & Storage

Sector Study

October 2023

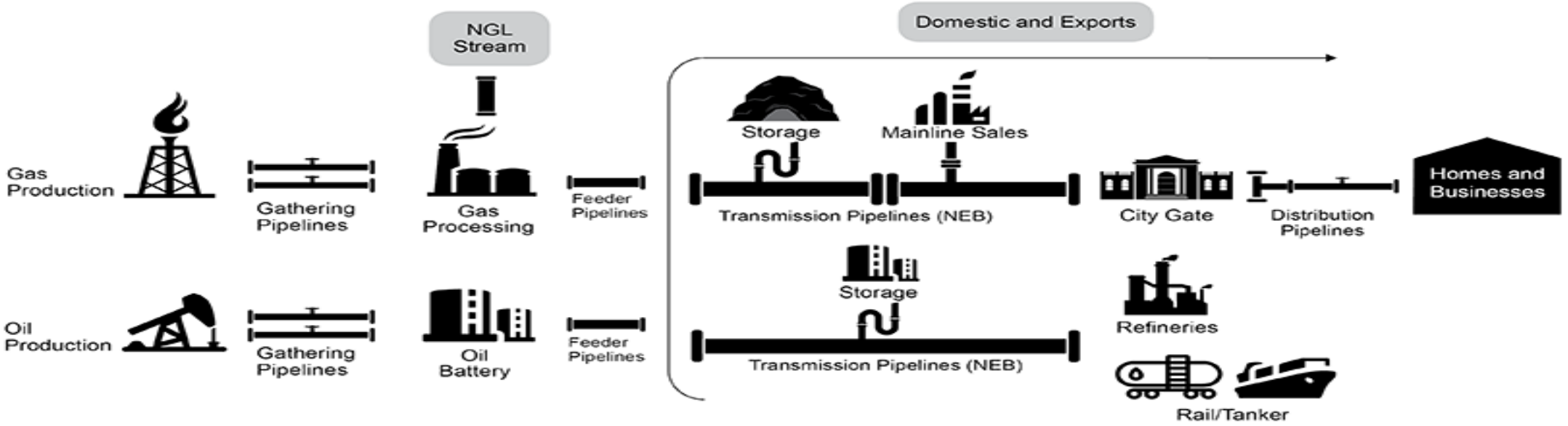
Table of Contents

Oil Transportation & Storage

Introduction | 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, majorly comprises oil tankers, trucks, railroads and pipelines.



Oil Transportation & Storage

Global | Snapshot

- The global pipeline network can be divided into oil pipelines and gas pipelines. The total length of oil transmission pipeline around the globe recorded at ~31,000Km during CY22, an increase of ~30% YoY. Country-wise data reveals that the USA and India form ~14% of in-development pipelines, whereas rest of the world comprises ~66%. The top five leading countries in terms of in-development oil pipelines are the USA, India, Iraq, Iran and Tanzania.
- The top five companies developing oil pipelines are state-owned enterprises and private companies, including Iran's Ministry of Petroleum, the China National Petroleum Corporation, Iraq's Ministry of Oil, India's Numaligarh Refinery Limited, and France's TotalEnergies.
- The longest oil pipelines, slated to commence operations in CY24, are 1,950-Km Niger-Benin Oil Pipeline and Paradip Numaligarh Crude Pipeline in India. Canada houses the world's third largest oil pipeline project under construction, the 989-Km Trans Mountain Expansion (TMX), an expansion to the existing Trans Mountain Oil Pipeline. It is expected to start in CY23.
- The crud expansion in Africa and the Middle East is pumped as a panacea to the existing global demand for crude oil. Global oil demand is forecast at ~102.2mln bpd in CY23, with China accounting for ~70% of the growth. Going forward into CY24, this demand is forecast to slow down by ~1mlb bpd on the back of lackluster economic conditions and new electric vehicles weighing in.
- The total oil pipeline network, as of May'23, including proposed and under construction, are estimated to cost USD~131.9bln in capital expenditure.

Oil Pipelines | CY22	In Development (Proposed + Construction)	Operating	Operating Share (%)
United States	2,834	83,303	27%
Russia	1,714	47,298	15%
China	1,979	28,613	9%
Canada	1,130	24,572	8%
India	2,824	9,051	3%
Pakistan	0	941	0.3%
Rest of the world	20,579	112,802	37%
World	**31,060**	**306,580**	**100%**

Gas Pipelines | CY22	In Development (Proposed + Construction)	Operating	Operating Share (%)
United States	8,582	342,303	35%
China	58,304	117,017	12%
Russia	19,540	99,022	10%
Canada	1,760	61,343	6%
Australia	13,170	28,478	3%
India	16,500	19,365	2%
Pakistan	3,915	7,578	1%
Rest of the World	88,507	298,828	31%
World	**210,278**	**973,934**	**100%**

Note: Data is recorded as of May'23; bpd – barrels per day.

Source: Global Energy Monitor, Reuters, EIA

Oil Transportation & Storage

Local | Industry Snapshot

- In Pakistan, road transport comprises ~69% of total oil movement across the country, followed by pipelines at ~29%, whereas ~2% of the transport is catered through railways. With respect to road transport, the total number of tank lorries/ road bowzers stands at ~14,000-16,000, as of Jul'23, with capacities varying in the range ~10-30MT. Pakistan Railways, on the other hand, operates ~5,400 tank wagons for transporting fuel oils, however, its movement capacity is severely hampered by infrastructure constraints and locomotive availability.

- Total length of the pipeline network in Pakistan is more than ~16,000Km, majority of which (~80%) pertains to transport of gas. The total length of oil pipeline operational network in the country is over ~2,000Km, transporting only High Speed Diesel (HSD), motor gasoline (MOGAS) and crude oil.

- Upgradation of one of the major pipelines 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 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 in the country's industrial hub, Karachi to Mehmoodkot.

- Pipeline is the cheapest and safest mode of transportation for petroleum products. With the commencement of White Oil Pipline (covered later), the movement of trucks operating out of Keamari to Mahmoodkot and back has been reduced by ~4,000 units.

Particulars	FY21	FY22	FY23
Gross Revenue (PKR mln)	6,104	8,879	10,130
Major Oil Pipelines	4	4	4
Structure	Regulated & Unlisted		
Oil Movement (000 MT)	3,851	4,880	4,094
Regulator	Oil & Gas Regulatory Authority (OGRA)		
Association	Oil Companies Advisory Council (OCAC)		
Key Industry Players	PARCO & PAPCO		
Products	Crude Oil, High Speed Diesel (HSD) and Motor Gasoline (MOGAS)		

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

Source: World Bank, OCAC, PARCO, PACRA Internal Database

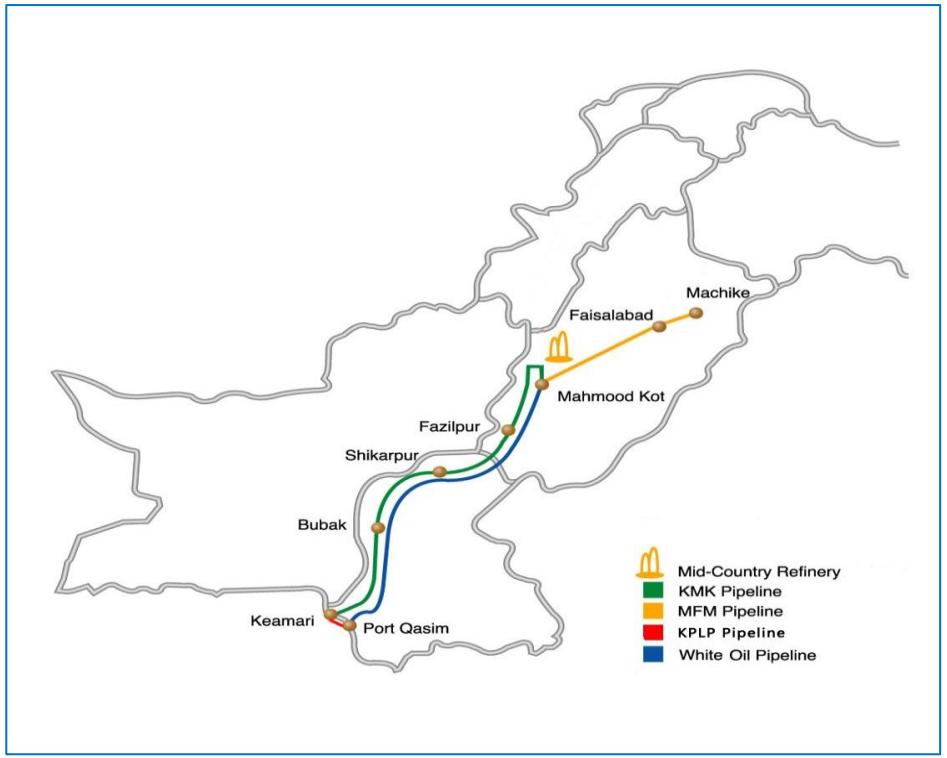
Oil Transportation & Storage

Local | Pipeline Network

- Entire up-country demand of diesel is being transported from Karachi to Sheikhupura 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 WOP) have converted the two pipelines from the present single product (HSD) to multiproduct (HASD and MOGAS) with an investment USD~194mln.

Pipeline	Year Commisioned	Operated by	Length (Km)	Route	Product
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



Source: PARCO, PAPCO

Oil Transportation & Storage

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 network.

- PAPCO completed the upgradation of its White Oil Pipeline (WOP) in Nov'21. The upgradation has since 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, i.e., to transport MOGAS and HSD. The ~435Km long pipeline (18"/20" in diameter), including branch pipeline, is divided into three sections, aimed at ensuring a smooth supply chain of petroleum products from Karachi to Peshawar, via Chakpirana and Sihala depots.

i. Machhike-Chak Pirana (~135Km)
ii. Chak Pirana-Rawat (~117Km)
iii. 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 are expected to reduce traffic congestion, environmental pollution and transportation cost. However, onward distribution from OMCs' oil depots to petrol pumps would remain intact through tankers.

Source: World Bank, OGRA, PAPCO, PARCO

Oil Transportation & Storage

Pricing

- Tariff for transporting petroleum products through pipelines is determined by Oil and Gas Regulatory Authority (OGRA). The current tariff for KMK and MFM pipelines is linked with railways tariff and was last notified by the Federal Government effective Apr'00 and May'02, 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 five years each and eight years' minimum throughput guarantee.

- 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 latest update by OGRA, MOGAS 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/MT	USD/MT
1st five years	15.889	10.068
2nd five years	15.342	9.770
3rd five years	13.252	8.476
4th five years	10.416	6.884
5th five years	9.670	6.387

White Oil Pipeline Tariff Structure	
Motor Gasoline	USD/MT
Karachi-Mahmoodkot	11.27
Karachi-Shikarpur	6.43

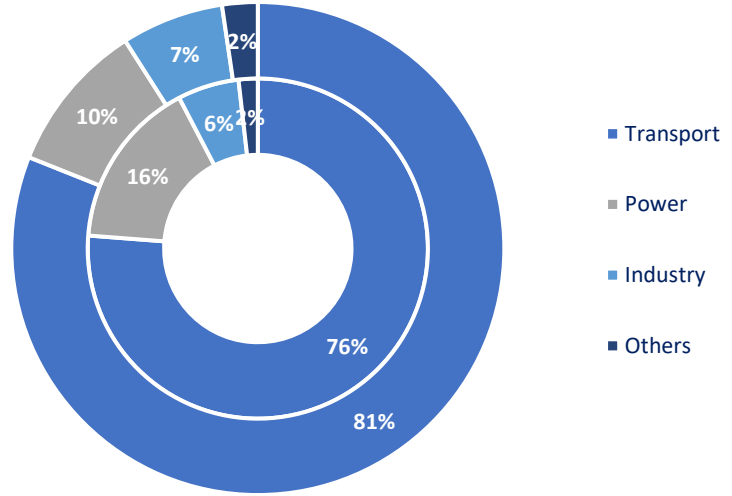
Source: Business Recorder, OGRA

Oil Transportation & Storage

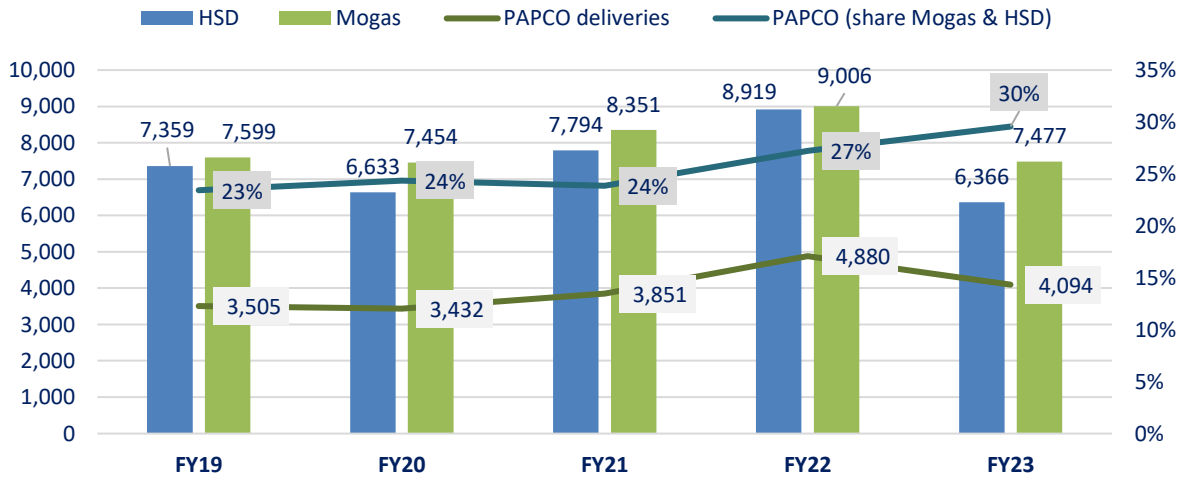
Local | Demand

- Average annual consumption of petroleum products in Pakistan stands at ~17.5mln MT, accounting for ~45% of the country's total energy consumption. Over the period of last five years (CY19-23), MOGAS formed ~42%, while HSD made up ~39% of the country's total energy products' consumption. For FY23, the consumption of MOGAS and HSD declined by ~17% and ~29% YoY, owing to higher inflation levels and increased prices for petroleum products, which came about due to rising international oil prices.
- With respect to oil transported through pipelines, PAPCO's deliveries formed ~30% of the MOGAS and HSD consumed during FY23. However, these also registered ~68% YoY owing to reduced demand and lower imports of petroleum crude and products. During the period, petroleum crude imports declined by ~16% whereas those for petroleum products were lower ~39% YoY. This had resulted largely from the import restrictions that were imposed by the SBP in May'22. However, these have been subsequently lifted in Jun'23.
- During FY20-23, the Transport sector of the economy accounted for ~78% of the total petroleum consumption in the country, with consumption recording at ~13.6mln MT (FY22: ~17.4mln MT) and declining by ~22% YoY.

Sectoral Consumption | FY22 (Inner), FY23 (Outer)



HSD & Mogas | Consumption



***Note**: FY23 figures for PAPCO deliveries have been pro-rated based on 9MFY23 data.*

Source: World Bank, OCAC, PBS

Oil Transportation & Storage

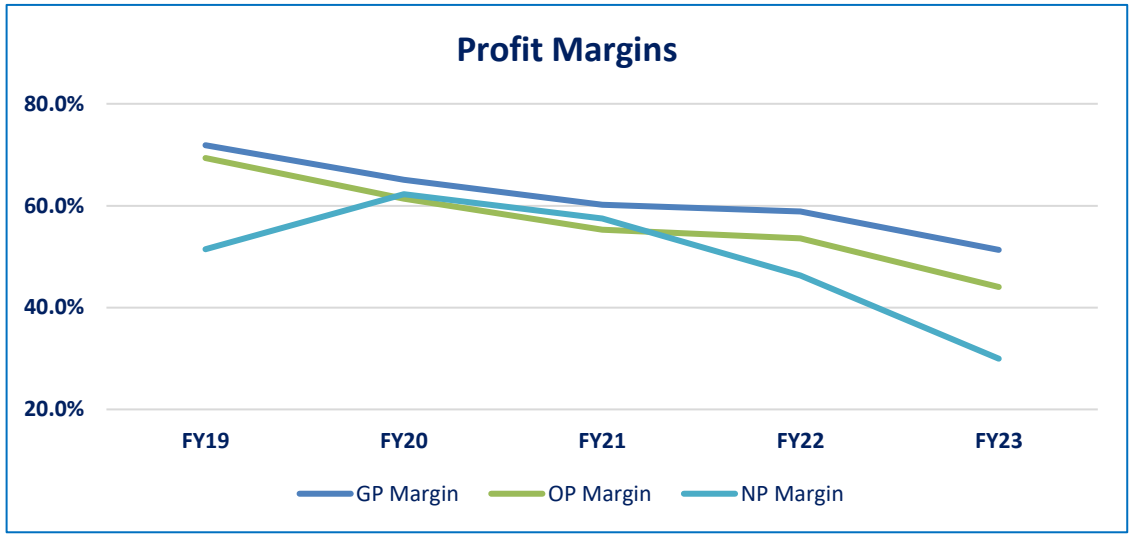
Local | Business Risk

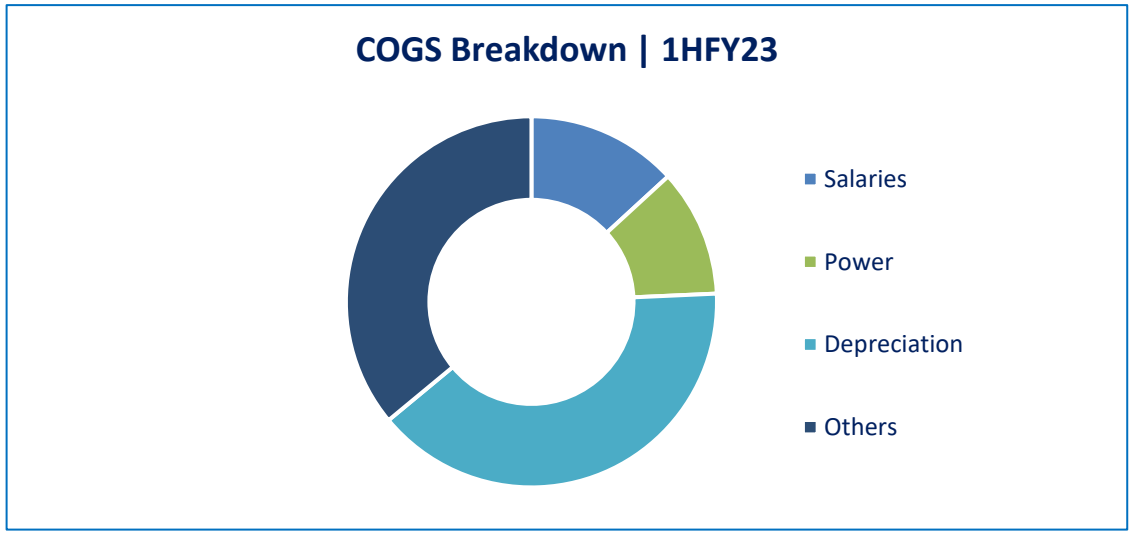
- OGRA regulates and determines the tariffs applicable on deliveries through pipelines. The Sector's revenue ceiling is therefore two-fold, comprising, a) the fixed tariff as stated and b) the quantity of oil transported via pipelines, with the latter remaining limited vis-à-vis pumping and storage capacity. Moreover, the Sector's sales revenue is USD-linked, providing a natural hedge against any adverse exchange rate movements or lower deliveries.

- Therefore, despite lower throughput during FY23, the Sector registered ~14% growth in its sales revenue, reflecting the aforementioned hedging impact. Moreover, during FY23, the PKR depreciated ~39% against the greenback, recording an average of USD~248/PKR (SPLY: USD~178), thereby translating into higher revenue in PKR terms.

- However, with respect to the Sector's profitability, all three profit margins exhibited a downward trend in FY23, keeping in line with the trend observed in the earlier years. Gross margins clocked in at ~51% (SPLY: ~59%), with the decline reflecting increased depreciation and energy costs. Similarly, operating margins declined to ~44% (SPLY: ~54%) while net margins registered ~16% decline and clocked in at ~30%. The latter was due to high finance costs which increased by ~41% YoY.

- Depreciation of pipelines and pumping stations remain the highest contributors of operational cost, accounting for ~40% of the total cost. Meanwhile, other expenses like insurance follow closely at ~36% for the period 1HFY23.





***Note**: FY23 margins have been pro-rated on the basis of 6MFY23 data.*

Source: SBP, PACRA Internal Database

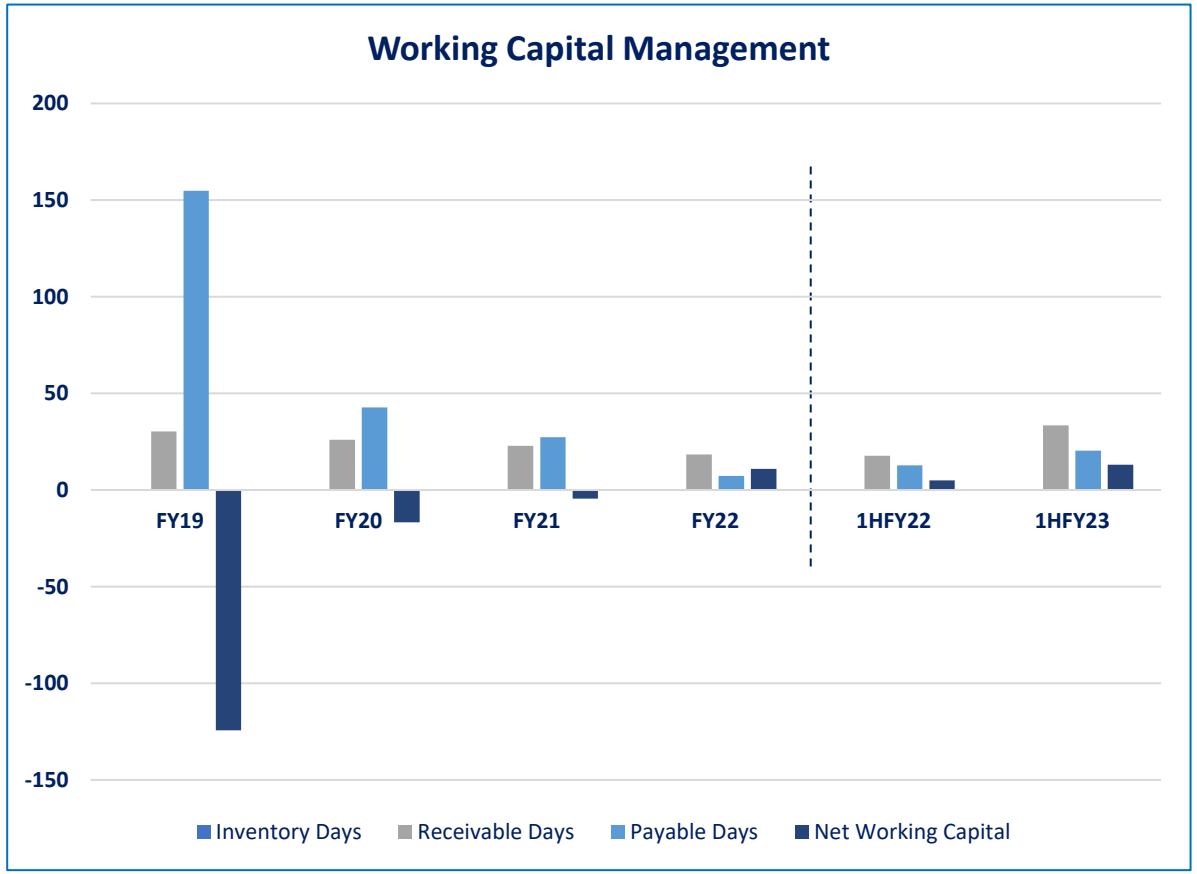
Oil Transportation & Storage

Financial Risk | Working Capital

- The Sector's working capital is largely a function of payables and receivables. The Sector records no or minimal inventory, however, Sector players employ 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 underwent expansion in FY18 in the form of upgradation of pipelines for dual transportation of HSD and MOGAS. Receivables and Payables make up a significant portion of the working capital management of the Sector. However, the latter witnessed continuous drop after FY20, reflecting enough cash generation.

- During FY22, the Net Working Capital (NWC) turned positive, registering at ~11 days, with Payable Days declining to just ~7 days (SPLY: ~27 days). During 1HFY23, Sector's NWC recorded at ~13 days, with Receivable and Payable Days recording at ~33 and ~20 days, respectively.



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

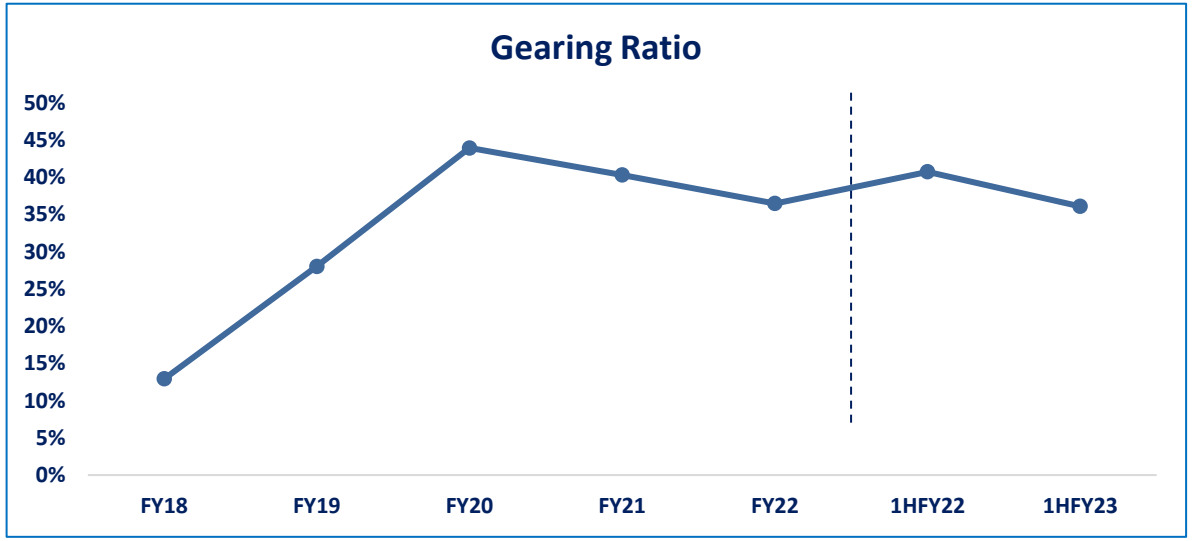
Source: PACRA Internal Database

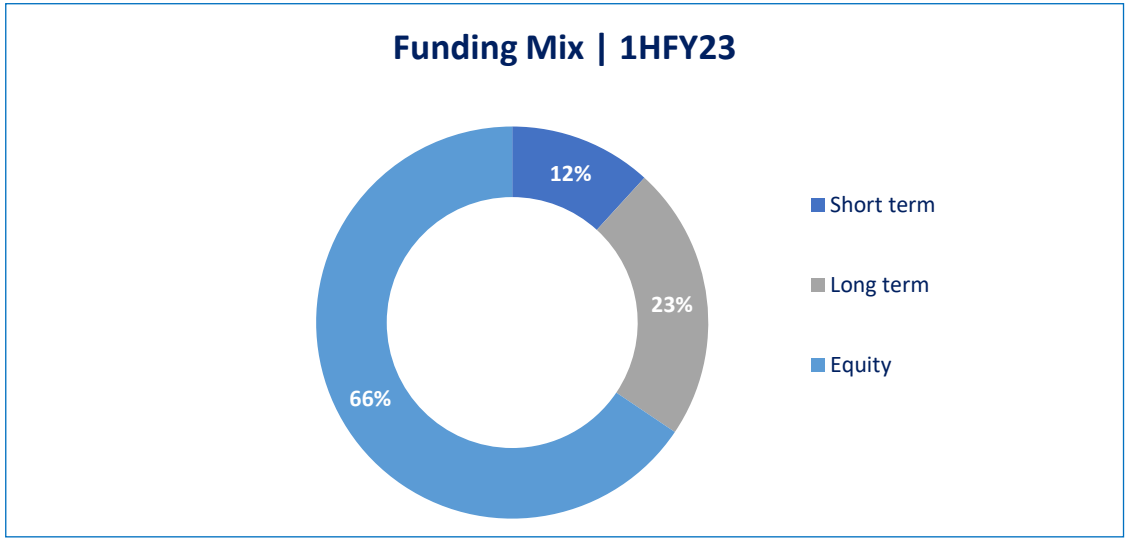
Oil Transportation & Storage

Financial Risk | Borrowing

- The Sector's funding mix, as of 1HFY23, comprised majorly of equity, while borrowing formed ~34% of the total mix. With respect to the borrowing mix, it consists of ~75% long-term borrowings. Since the working capital cycle of the Sector is cash-positive, due to higher payables, the need for short-term borrowings only arises to bridge occasional financing gaps, whereas long-term borrowings are raised to finance expansion and upgradation projects. During 1HFY23, short-term Borrowings stood at PKR~3,591mln, an increase of ~13% YoY, whereas long-term borrowings recorded at PKR~6,907mln, declining by ~29% YoY.

- Accordingly, as of 1HFY23, Sector's gearing ratio stood at ~36% (SPLY: ~43%), with the decline reflecting lower long-term borrowings and ~5% more equity YoY. However, these borrowings could be expected to increase if expansion of pipeline network to TaruJabba (Peshawar) is executed in the coming years. During FY18-1HFY23, the Sector has remained moderately leveraged, thereby exhibiting moderate financial risk.





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

Source: PACRA Internal Database

Oil Transportation & Storage

Taxes

- Sales Tax applicable on the Sector is 18%. This was increased in FY24 from previously 17%, through the Finance Supplementary Act 2023.

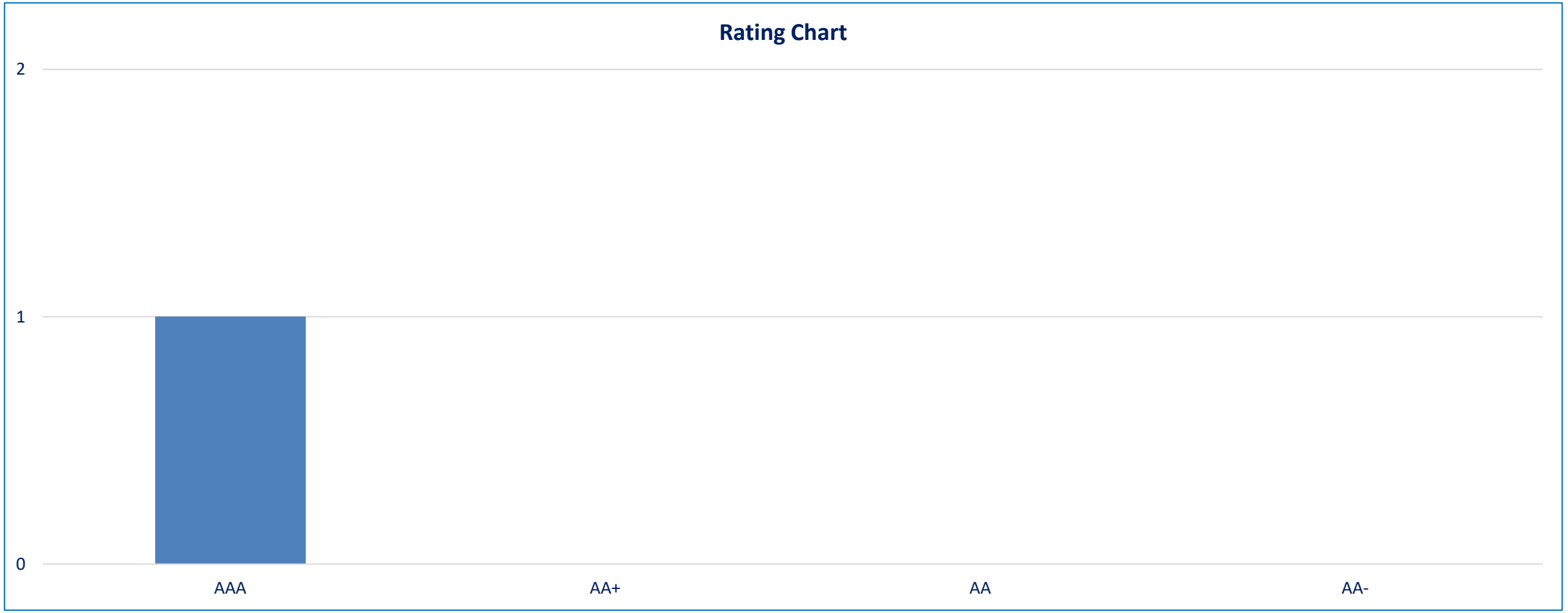
- Moreover, on the import of petroleum products and crude, custom duty of 3%, additional custom duty of 2% and income tax of 12% is also applicable.

Source: FBR

Oil Transportation & Storage

Rating Chart

PACRA rates one player in the Sector.



Oil Transportation & Storage

Porter's 5 Forces Model

POTENTIAL NEW ENTRY

- Very low due to capital intensive nature of the sector and stringentt 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.

Oil Transportation & Storage

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
- USD-indexed tariffs

- 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

- 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

Oil Transportation & Storage

Outlook: Stable

- Pipelines are considered as a cheap and environment friendly mode of oil product movement. This mode of transportation does not only provide efficiency to goods transport 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.
- In Pakistan, road transport comprises ~69% of total oil movement across the country, followed by pipelines at ~29%, whereas ~2% of the transport is catered through railways. With respect to road transport, the total number of tank lorries/ road bowzers stands at ~14,000-16,000, as of Jul'23, with capacities varying in the range ~10-30MT. Pakistan Railways, on the other hand, operates ~5,400 tank wagons for transporting fuel oils, however, its movement capacity is severely hampered by infrastructure constraints and locomotive availability.
- Total length of the pipeline network in Pakistan is more than ~16,000Km, majority of which (~80%) pertains to transport of gas. The total length of oil pipeline operational network in the country is over ~2,000Km, transporting only High Speed Diesel (HSD), Motor Gasoline (MOGAS) and crude.
- PAPCO, the sole commercial operator of White Oil Pipeline, 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 paly 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 in check and therefore the volatility risk remains low. A natural hedge against exchange rate fluctuations and negligible price sensitivity fosters the Sector's margins, while volumes remain the key driving factor for growth. Despite lower throughput during FY23, the Sector registered ~14% growth in its sales revenue, reflecting the aforementioned hedging impact. Moreover, during FY23, the PKR depreciated ~39% against the greenback, recording an average of USD~248/PKR (SPLY: USD~178), thereby translating into higher revenue in PKR terms.
- However, with respect to the Sector's profitability, all three profit margins exhibited a downward trend in FY23, keeping in line with the trend observed in the earlier years. Gross margins clocked in at ~51% (SPLY: ~59%), with the decline reflecting increased depreciation and energy costs. Similarly, operating margins declined to ~44% (SPLY: ~54%) while net margins registered ~16% decline and clocked in at ~30%. The latter was due to high finance costs which increased by ~41% YoY.
- The Sector's financial risk is also low. As of 1HFY23, Sector's gearing ratio stood at ~36% (SPLY: ~43%), with the decline reflecting lower long-term borrowings and ~5% more equity YoY. However, these borrowings could be expected to increase if expansion of pipeline network to TaruJabba (Peshawar) is executed in the coming years. During FY18-1HFY23, the Sector has remained moderately leveraged.
- Going forward through FY24, on the back of relaxation on imports, the Sector is likely to record better throughput volumes, owing to rising demand vis-à-vis increasing population. This is expected to result in better profitability of the Sector.

Bibliography

- PACRA Internal Database
- Oil and Gas Regulatory Authority
- Pak Arab Refinery Company
- Pak Arab Pipeline Company
- Pakistan Bureau of Statistics
- State Bank of Pakistan
- Oil Companies Advisory Council
- Off-Shore-Technology
- Global News Wire
- Energy Sage
- Mordor Intelligence
- Cabinet Committee on Energy
- EIA
- World Bank

Research Team	**Saniya Tauseef** **Senior Manager** *saniya.tauseef@pacra.com*	**Ayesha Wajih** ***Supervising Senior*** *ayesha.wajih@pacra.com*
Contact Number: +92 42 35869504		