SECTOR STUDY . OCTOBER 2024

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Oil Transportation & Storage

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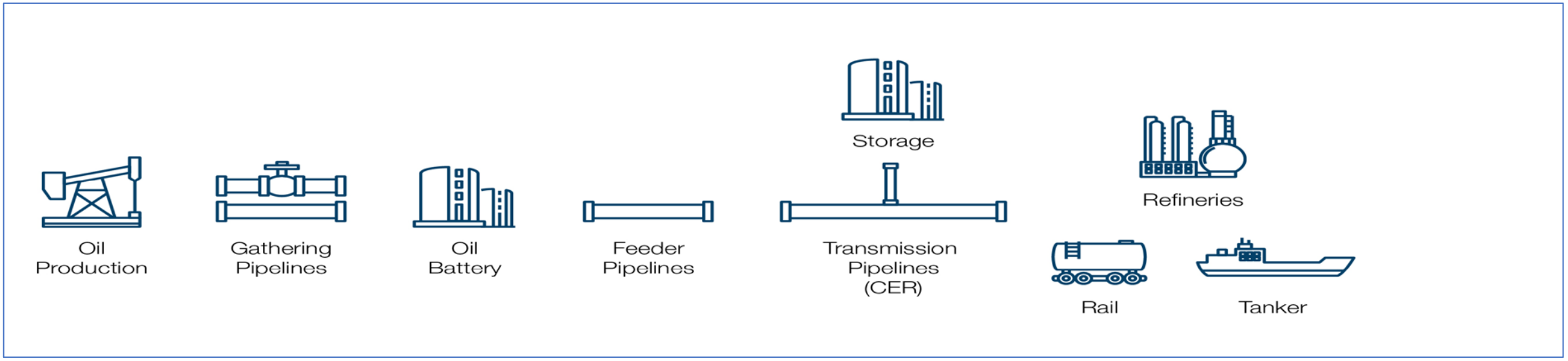
Introduction

- There are two main types of Oil pipelines: Crude Oil pipelines and Product Pipelines. Crude Oil pipelines transport Crude Oil to refineries. In contrast, Product Pipelines carry refined products such as Gasoline, Kerosene, Jet Fuel, and Heating Oil from the refineries or import terminals to the market.

- After extraction, pipelines carry Crude Oil to the processing or storage facilities, where it is stored before being transferred into feeder pipelines, which connect to nationwide pipeline networks in operation.

- Refineries receive the Crude Oil through nationwide pipelines, process it and subsequently pump the refined petroleum products back into the pipeline network.

- Petroleum products are delivered to storage areas where they are transported via Oil tankers to fuel stations or ports for export. The supply chain for Petroleum Products, either refined or unrefined, is mainly comprised of Oil tankers, trucks, railroads, and pipelines.



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Global Pipelines | Crude Oil

- The global pipeline network is broadly categorized into Oil and Gas pipelines. As of End-May'24, the total worldwide length of operating Oil and Gas transmission pipelines stood at ~1,319,983 km (~1,280,514 km in CY22), up by ~3.1% YoY.
- The top 5 countries operating in the Oil pipeline sector are the USA, Russia, China, Canada and Iran. Among them, the Oil pipelines in China, Russia and Iran are entirely state-owned.
- The country-specific data shows that the USA and Russia account for ~41.0% of the operational pipelines.
- The recently completed ~2,000 km Niger-Benin Oil Pipeline has officially started operating in CY24 with an initial throughput of ~110,000 bpd and is expected to rise over time.
- Among the top countries operating in Gas pipelines, the USA and China collectively account for ~46.0% of the total operating share.
- Oil pipeline infrastructure under construction is estimated to cost around USD~25.5bln in capital expenditure.
- Asian and African countries are the leading Oil pipeline buildouts.
- At present globally, a total of ~10,863 km of Crude Oil transmission pipelines are being constructed.
- Iran and India together are constructing ~53.0% of the total Crude Oil pipelines in the world followed by Russia with ~1,238 km of Crude Oil pipelines accounting for ~11.4% of the total construction share of the world.
- Iran is constructing pipelines to continue dominating the world as one of the top Crude Oil exporters of the world. On the other hand, India is building pipelines to expand its existing network for refineries and petrochemical complexes.

Crude Oil Pipelines by Country (End-May'24)	Operating | km	Operating Share (%)
United States	84,867	26%
Russia	50,207	15%
China	28,952	9%
Canada	26,486	8%
Iran	14,474	4%
India	9,254	3%
Pakistan	1,268	0%
Rest of the World	109,363	34%
World	**324,871**	**100%**

Crude Oil Pipelines by Country (End-May-24)	Under Construction | km	Construction Share (%)
Iran	2,920	26.9%
India	2,824	26.0%
Russia	1,238	11.4%
Niger	1,175	10.8%
Benin	650	6.0%
Rest of the World	2,056	18.9%
World	**10,863**	**100%**

Note: Data is recorded as of May'24; bpd – barrels per day
bcm = billion cubic meters

Source: Global Energy Monitor, IEA, S&P Global

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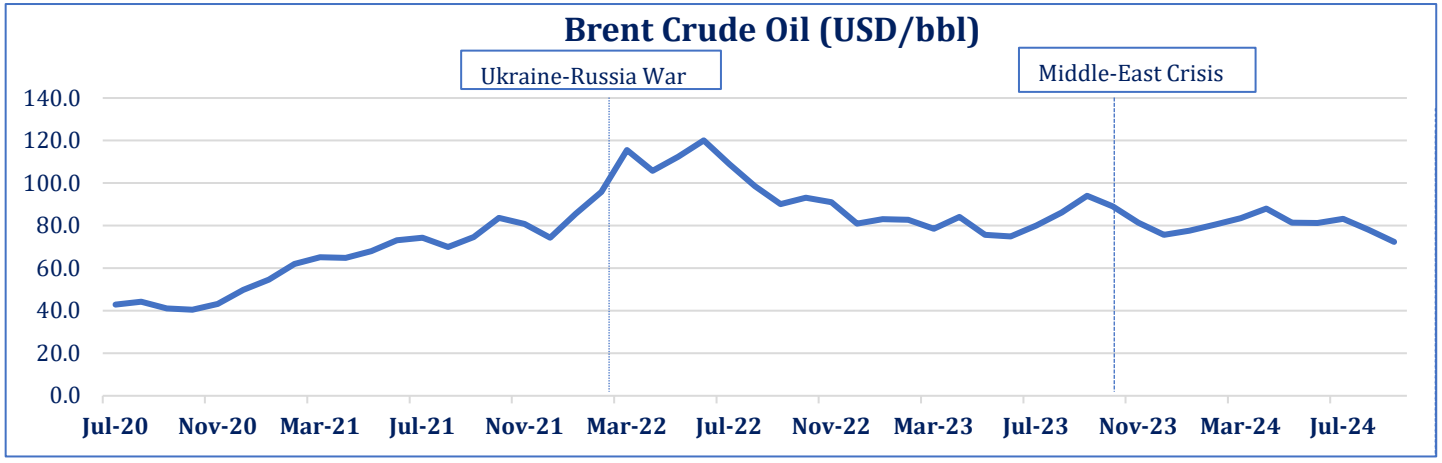
Global | Oil Market Dynamics

- In CY23, global Crude Oil production as a share of total available reserves stood at ~2.1% (SPLY: ~2.0%). Saudi Arabia accounted for ~11.8% of world Crude Oil produced (SPLY: ~13.0%), clocking in at ~531.7mln MT (or ~11.4mln bpd) (SPLY: ~574.2mln MT or ~12.2m ln bpd).
- Meanwhile, the USA made up ~18.3% of global Crude Oil produced (SPLY: ~17.2%), with ~8.5% YoY increase to ~827.1mln MT or ~17.8mln bpd (SPLY: ~16.7mln bpd).
- Overall, the Middle East and North America comprised ~31.3% and ~26.7%, respectively, of the global Crude Oil produced in CY23 (SPLY: ~32.5%, ~25.6%, respectively), while the 'Other CIS' region contributed ~15.0% (SPLY: ~15.4%), with Russia's share in global output recording at ~12.0% (SPLY: ~12.4%)
- Global Crude Oil consumption was up ~2.5% YoY in CY23, clocking in at ~4,530.5mln MT or ~82.8mln bpd (SPLY: ~81.4mln bpd). Asia Pacific formed ~38.5% of global Crude Oil consumption, recording ~1,744.3mln MT (or ~100.2mln bpd).
- China remained the top consumer, making up ~17.0% of the global Crude consumption and recording at ~768.6mln MT (or ~16.6mln bpd). On the other hand, the USA formed ~18.0% of the global Crude consumption, recording ~815.6mln MT (or ~19.0mln bpd).



Crude Oil Production (mln MT)					
Period	**CY19**	**CY20**	**CY21**	**CY22**	**CY23**
Crude Extraction	**4,487.4**	**4,188.2**	**4,237.9**	**4,424.1**	**4,514.1**
Middle East	1,411.4	1,300.3	1,314.7	1,442.1	1,413.9
North America	1,109.4	1,060.4	1,079.0	1,133.6	1,207.5
CIS	718.5	659.1	673.2	679.2	675.2
Asia Pacific	361.5	353.1	348.2	344.5	345.7
S. & Cent. America	329.5	313.0	313.5	339.7	378.1
Africa	397.2	333.9	348.4	333.6	341.5
Europe	160.0	168.4	160.9	151.4	152.1

Crude Oil Consumption (mln MT)					
Period	**CY19**	**CY20**	**CY21**	**CY22**	**CY23**
Crude Consumption	**4,451.5**	**4,051.2**	**4,277.6**	**4,422.1**	**4,530.5**
Asia Pacific	1,661.7	1,574.2	1,613.0	1,656.6	1,744.3
North America	1,031.5	900.8	983.4	1,000.3	1,005.1
Europe	700.3	609.3	639.1	660.5	653.6
Middle East	390.9	362.5	382.9	411.6	421.4
S. & Cent. America	279.2	242.8	271.1	291.1	301.2
CIS	198.3	191.9	202.8	207.0	210.1
Africa	189.6	169.7	185.1	195.0	194.8

Note: Data is recorded as of May'24; bpd – barrels per day
2024 Data is recorded as of Aug'24*

Source: Energy Institute, IEA

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Global | Trade

- **Crude Exports**: In CY23, major Crude Oil exporters included Saudi Arabia, Russia, and Canada, with these forming ~37.4% of the total Crude Oil exported. International Crude Oil trade stood at ~2.1bln MT (or ~68.1mln bpd). For Saudi Arabia, the largest export destinations were other Asia Pacific countries (~26.7%, SPLY: ~25.2%), China (~24.6%, SPLY: ~24.0%) and Japan (~14.7%, SPLY: ~14.4%). Of Russia's total Crude exports, ~13.5% went to Europe (SPLY: ~44.2%), while ~44.4% was imported by China (SPLY: ~32.5%). Meanwhile, the USA exported ~43.5% of its total Crude production to Europe (SPLY: ~44.9%).

- **Crude Imports**: The top three global importers of Crude Oil formed ~62.2% of the total Crude Oil imported globally in CY23 (SPLY: ~75.5%). China remained the largest Crude Oil importer, with ~11.0% YoY higher imports signaling economic recovery. Meanwhile, Europe imported ~10.7% YoY lower Crude Oil (SPLY: ~11.3% YoY growth), with Russia forming ~4.3% of its total Crude Oil imports (SPLY: ~10.0%) and the USA accounting for ~15.2% during the year (SPLY: ~20.3%), reflecting the region's lower dependency on Russia's Crude Oil.

Country	Exports | mln MT (CY23)	Share, Global Exports (%)	YoY Δ
Saudi Arabia	349.1	16.4%	-5.1%
Russia	240.8	11.3%	-8.3%
Canada	207.2	9.7%	+4.2%
USA	185.0	8.7%	+14.7%
Iraq	184.2	8.7%	-3.6%
UAE	170.7	8.0%	-4.3%
ROW	790.0	37.1%	+1.9%
World	**2,127.1**	**100%**	**-0.4%**

Country	Imports | mln MT (CY23)	Share, Global Imports (%)	YoY Δ
China	563.9	26.5%	+11.0%
Europe	436.6	20.5%	-10.7%
USA	323.8	15.2%	+3.5%
Other Asia Pacific	288.5	13.6%	-3.1%
India	231.0	10.9%	-0.1%
Japan	125.5	5.9%	-5.3%
ROW	157.7	7.4%	-3.9%
World	**2,127.1**	**100%**	**-0.4%**

Note: Data is recorded as of May'24; bpd – barrels per day
bcm = billion cubic meters

Source: Global Energy Monitor, IEA, S&P Global

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Local | Industry Snapshot

- Pakistan's Oil movement (Crude and Petroleum Products) is majorly carried through road transport which comprised ~69.0% of the total Oil movement share in FY24 (FY23: ~63%).
- Transport through pipelines stood as the second largest mode of total Oil movement with a share of ~29.0% in FY24 (FY23: ~35.0%), whereas ~2.0% (FY23: ~2.0%) of the transport was conducted through railways.
- Pipelines are the cheapest and the safest mode of transportation for petroleum products. The total length of the Oil pipeline network operational in the country is over ~2,000 km, transporting High-Speed Diesel (HSD), motor gasoline (MOGAS) and Crude Oil.
- The recent upgrade of the White Oil Pipeline (WOP) in CY21 by the Pak Arab Pipeline Company (PAPCO) now allows the transport of both MOGAS and HSD through its ~786km route from Karachi to Mahmoodkot.
- Currently, Pak Arab Refinery Limited (PARCO) and PAPCO control all four of Pakistan's major Oil pipelines, two of which run through the country's industrial hub, connecting Karachi to Mahmoodkot.
- Other players in the sector, along with refineries, operate their pipelines exclusively for internal transportation, not for commercial use.
- With the commencement of the White Oil Pipeline, the movement of trucks operating out of Keamari to Mahmoodkot and back has been reduced by ~4,000 units.

Particulars	FY21	FY22	FY23	FY24	1QFY25
Gross Revenue (PKR mln)	6,104	8,879	10,569	11,126	2,986
Major Oil Pipelines	4	4	4	4	4
Structure	Regulated				
Oil Throughput (000 MT)	3,851	4,880	4,094	3698	1,021
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: OCAC, PARCO, PACRA Internal Database

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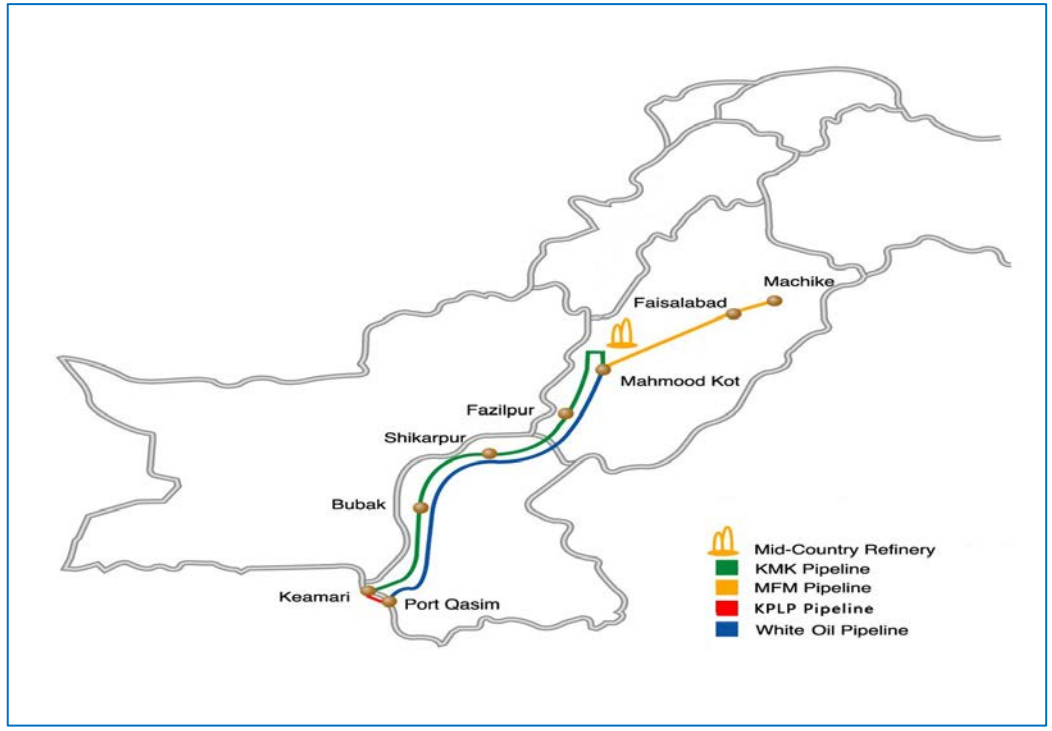
Local | Pipeline Network

- The entire up-country demand for HSD and MOGAS is efficiently met through an integrated pipeline system. PAPCO's White Oil Pipeline (WOP) transports these fuels from Karachi to Mehmoodkot, while PARCO's Mehmoodkot-Faisalabad-Machike (MFM) pipeline extends the supply further to Sheikhupura.

- PARCO and PAPCO (a subsidiary of PARCO and operator of the WOP) in CY21 have converted the two pipelines from the present single product (HSD) to multiproduct (HSD and MOGAS) with an investment of USD~194mln.

Pipeline	Year Commissioned	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

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Upgradation & Expansion WOP

- **Upgradation of MFM Pipeline:** During FY22, the Pakistan Light Oil Pipeline MFM MOGAS (MFM MP) Phase-II Reconstruction and Expansion project was completed. The TS-3 and TS-4 stations are located in Faisalabad and Sheikhupura, respectively.

- **Construction of WOP finalized with SIFC backing:**
  - WOP is a flagship initiative led by the Frontier Works Organization and Pakistan State Oil (PSO) to complete the Oil pipeline.
  - The project, spanning ~477 km, will link key locations in Pakistan, including Machike (Shiekhupura), Thalian (Rawalpindi), and Taru Jabba (Peshawar), and aims to enhance the country's Oil distribution system.
  - Running parallel to the motorway, this two-part pipeline will connect the Attock Refinery with key sites like Chak Pirana (Gujrat) and Faqirabad (Attock), ensuring smoother and more efficient Oil transportation across the country.
  - The pipeline's construction is expected to significantly reduce transportation costs and smoothen the supply chain from the current capacity of ~7mln tons to ~10mln tons annually, reducing the risk of fuel adulteration and increasing safety.

Source: Ministry of Energy, OCAC, PAPCO, PACRA internal data base

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Pricing and Taxes

- PAPCO generates its revenue by way of throughput agreements with the OMCs and refineries.
- The company has been awarded a 25-year tariff plan by OGRA after a competitive bidding process.
- The HSD tariff was finalized with the government at the pipeline's inception in FY00, accompanied by a minimum throughput guarantee of ~8 years to support its initial operations.
- The transportation of MOGAS through the White Oil Pipeline (WOP) has been assigned a tariff regulated by OGRA, fixed for a period of ~20 years, aligning with the project's lifespan.
- The amount is payable in PKR to be converted at a USD to PKR prevailing rate on the date of the payment.
- Sales tax applicable on the sector is ~18.0%. This was increased in FY24 from the previously ~17.0% applicable, through the Finance Supplementary Act 2023.
- The import of Crude Oil is subject to a customs duty of ~2.0%, federal excise duty (FED) of ~5.0%, and income tax of ~12.0%.
- Among Petroleum Products, MOGAS is taxed with an additional customs duty of ~2.0%, a regulatory duty of ~10.0% and an income tax of ~12.0%.
- For High-Speed Diesel (HSD), an additional customs duty of ~2.0%, a regulatory duty of ~10.0%, and an income tax of ~12.0% is applicable.

White Oil Pipeline Tariff Structure		
High Speed Diesel	Karachi-Mahmoodkot	Karachi-Shikarpur
	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: OGRA, PACRA Internal Database

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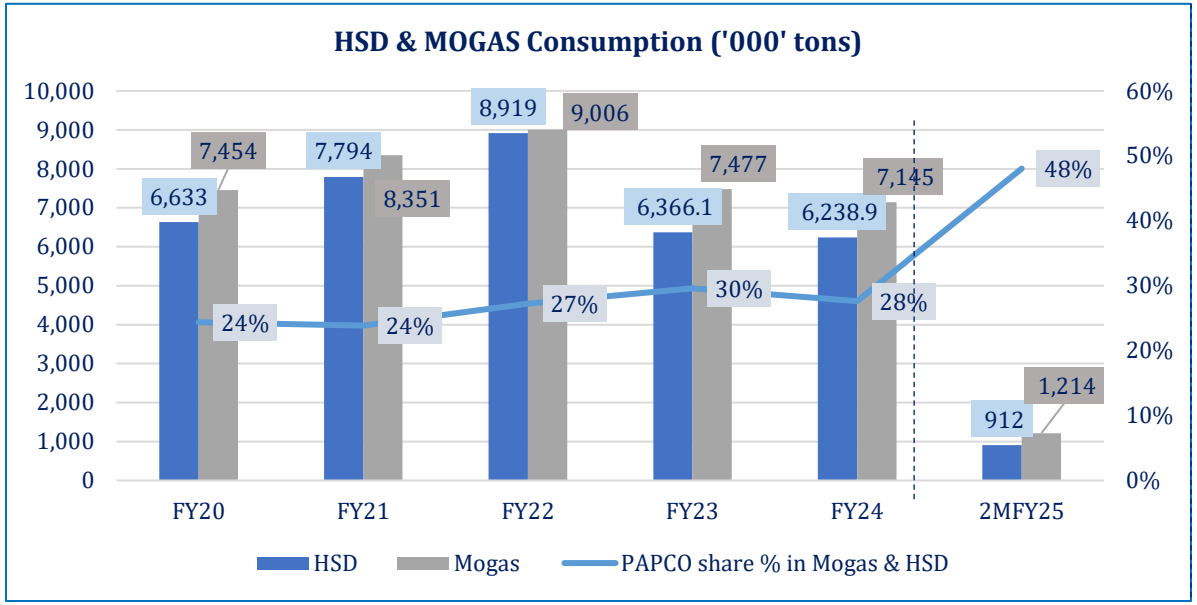
Local | Demand

- Overall consumption of Petroleum Products during FY24 was recorded at ~16.6mln MT, down ~25.5% YoY, whilst comprising ~86.8% White Oils and ~13.2% Black Oils. The three major products, i.e., HSD, MOGAS and RFO cumulatively accounted for ~92.8% of the total petroleum products consumption in the country during FY24 (SPLY: ~94.4%), with RFO consumption down ~11.4% YoY (RFO consumption, during FY20-24, declined at a CAGR of ~1.0%).
- MOGAS and HSD consumption was down ~0.9% and up ~1.4%, respectively, in FY24 (SPLY: down ~74.6% and ~78.1% YoY, respectively).
- During 2MFY25, consumption of Petroleum Products was recorded at ~2.1mln MT. MOGAS and HSD formed ~95.5% of the total petroleum consumption in 2MFY25.
- Among the sectors, the transport sector accounted for ~86.0% of the total petroleum consumption in the country in FY24 while it had an ~87.0% share in 2MFY25.

POL Consumption (mln MT)						
Period	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**2MFY25**
White Oils	**14.9**	**16.9**	**18.8**	**14.9**	**14.5**	**2.21**
MOGAS	7.5	8.4	9.0	7.5	7.1	1.2
HSD	6.6	7.8	8.9	6.4	6.2	0.9
JP-1/ JP-8	0.6	0.4	0.5	0.6	0.8	0.1
Others*	0.2	0.3	0.4	0.3	0.2	0.01
Black Oils	**2.4**	**3.2**	**4.3**	**2.6**	**2.2**	**0.4**
RFO	2.4	3.2	4.3	2.6	2.2	0.4
Total	**17.3**	**20.1**	**23.1**	**17.4**	**16.6**	**2.6**



Note: *Petroleum imports include HSD, Crude Oil, JP-1 & MOGAS*
** Includes Kerosene, LDO, 100 LL, NAPTHA and HOBC.*

Source: OGRA, OCAC, PBS, The Express Tribune

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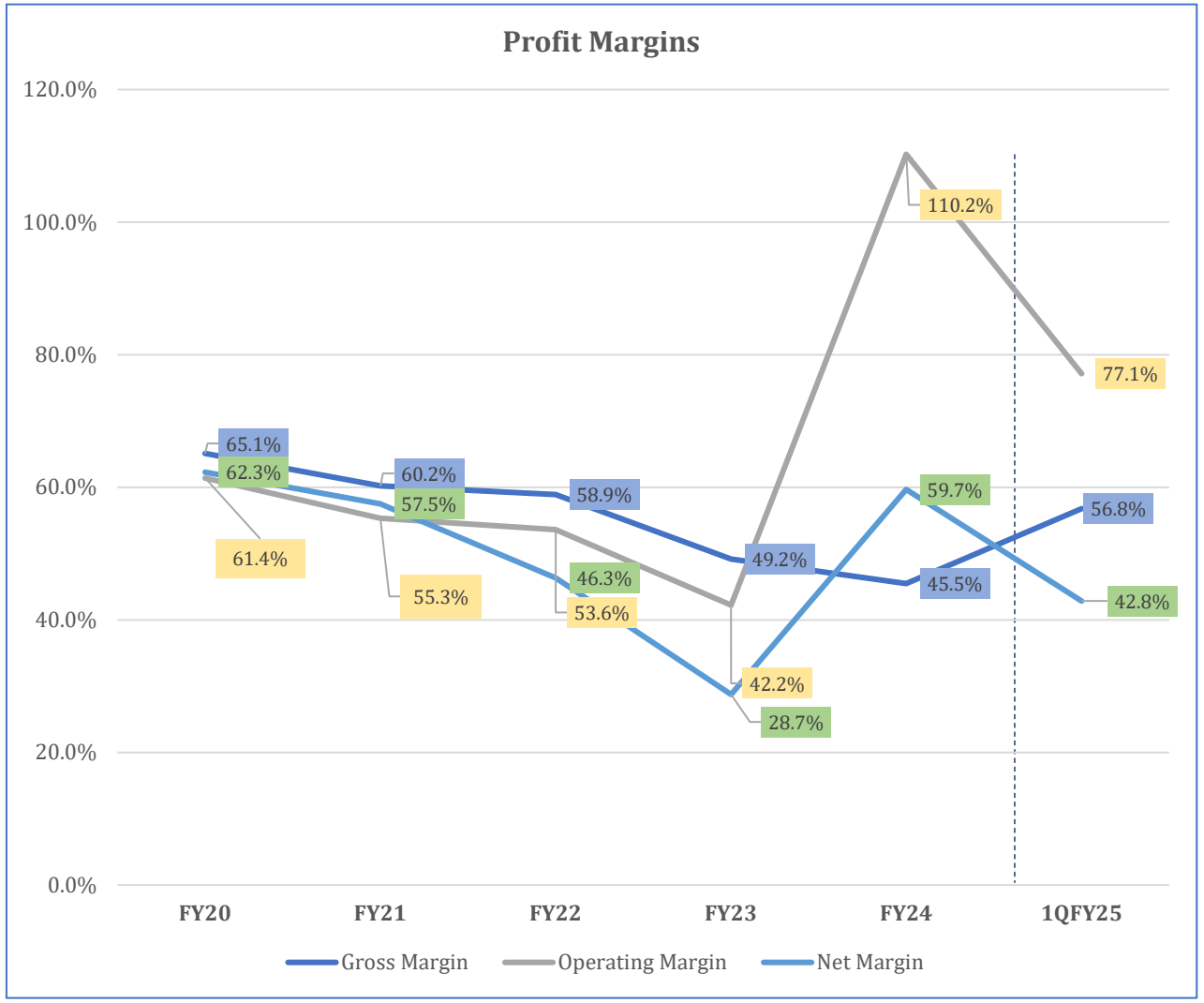
Local | Business Risk

- OGRA regulates pipeline delivery tariffs, which are based on two factors: (i) fixed tariff and (ii) the quantity of Oil transported, determined by pumping and storage capacity.
- The sector's sales revenue is USD-linked, offering a natural hedge against exchange rate fluctuations or reduced deliveries.
- Therefore, despite lower throughput during FY24, the sector registered ~5.0% growth in its sales revenue and clocked at PKR~11,126mln (FY23: PKR~10,569mln), reflecting the aforementioned hedging impact.
- In FY24, gross margins fell to ~45.5%, down ~3.7% from FY23, while operating margins rose sharply to ~110.2%, driven by income from foreign deposits and currency depreciation.
- Net margins improved to ~59.7%, a ~31.0% increase due to a cut in finance costs during FY24.
- For 1QFY25, the sector's revenue reached to PKR~2,986.0mln, with gross margins recording at ~56.8% and operating margins at ~77.1%. However, the lack of foreign deposit inflows this year led to lower operating margins compared to FY24.
- Net margins during the 1QFY25 stood at ~42.8%.
- The sector's reliance on USD-denominated revenue against costs incurred in PKR terms, has helped it maintain healthy profitability over the past five years.



***Note**: Margins updated as of 1QFY25*

Source: SBP, PACRA Internal Database

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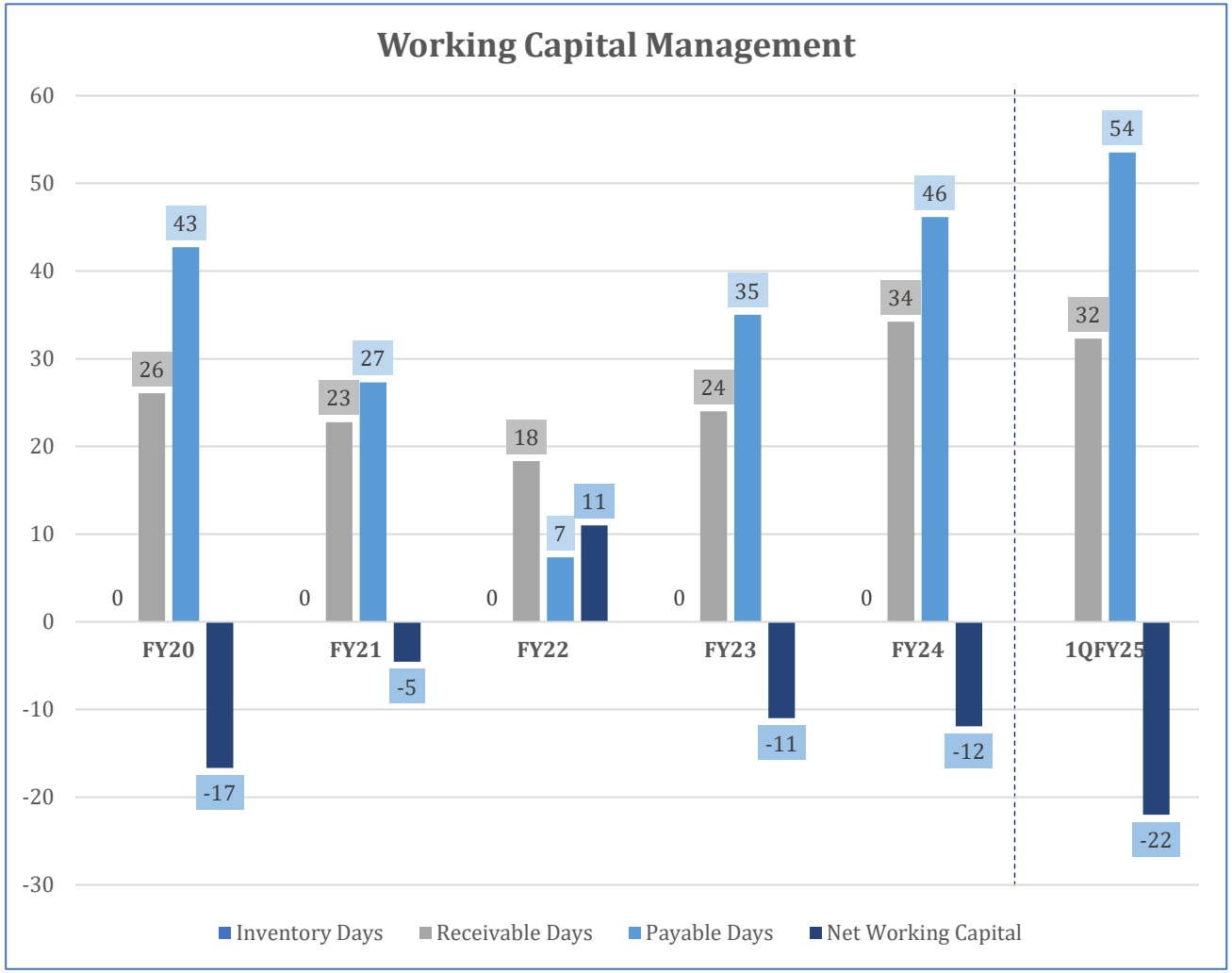
Financial Risk | Working Capital

- The sector's working capital cycle is a function of its trade receivables and payables, as it records minimal or no inventory.
- The sector player utilizes its storage facilities at pumping locations to ensure smooth Crude Oil flow through its pipelines.
- During FY24, the sector's trade receivable days increased by ~10 days, rising to ~34 days from ~24 days in FY23.
- Meanwhile, payable days increased by ~11 days, reaching to ~46 days in FY24.
- During 1QFY25, the sector's net working capital cycle turned negative to ~22 days as payable days were recorded at ~54 days while receivable days stood at ~32 days.
- The sector's operating cycle is derived from the throughput agreements with Oil Marketing Companies (OMCs) and Refineries, under which it is entitled to settle payments and receive funds within 45 days of invoicing.
- This arrangement, under long-term agreements, ensures smooth cash flow and reduces the chances of any delays in the flow of funds.
- Resultantly, the sector maintains a strong working capital cycle, with excess liquidity to meet its operational and financial needs.



***Note**: Calculations are based on PAPCO numbers having market share of more than ~50%.*
3MFY25 revenue has been prorated to 12 months.

Source: PACRA Internal Database

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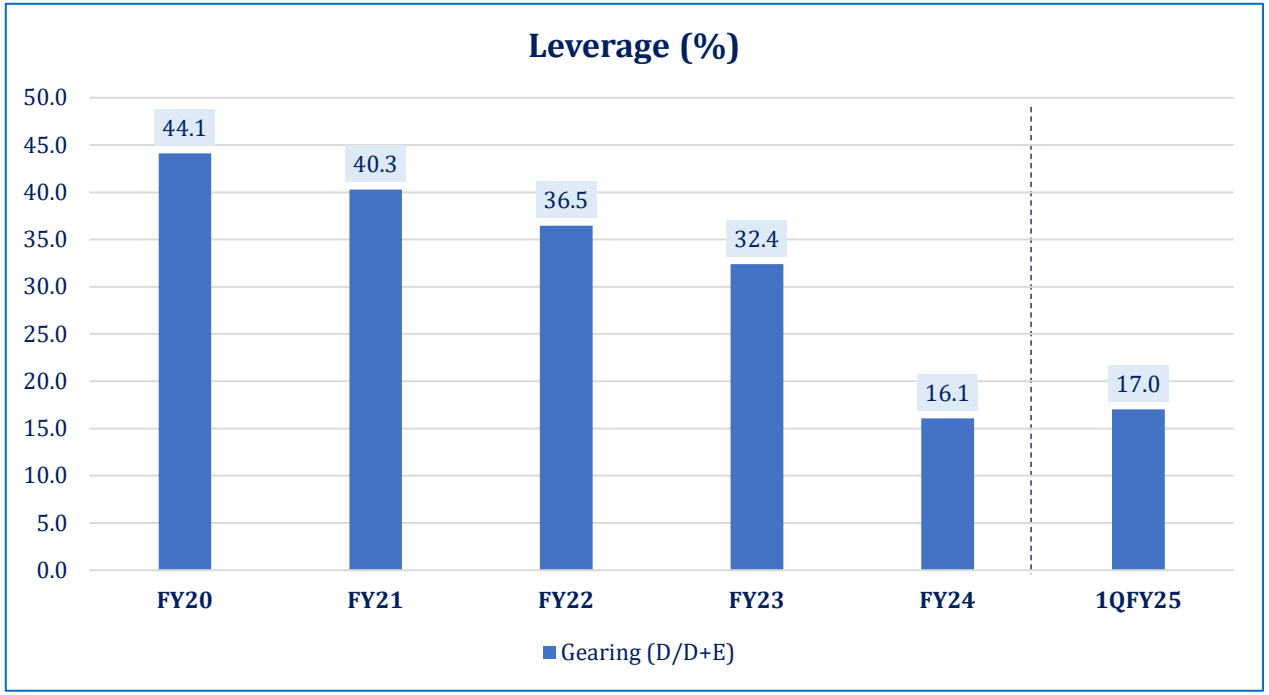
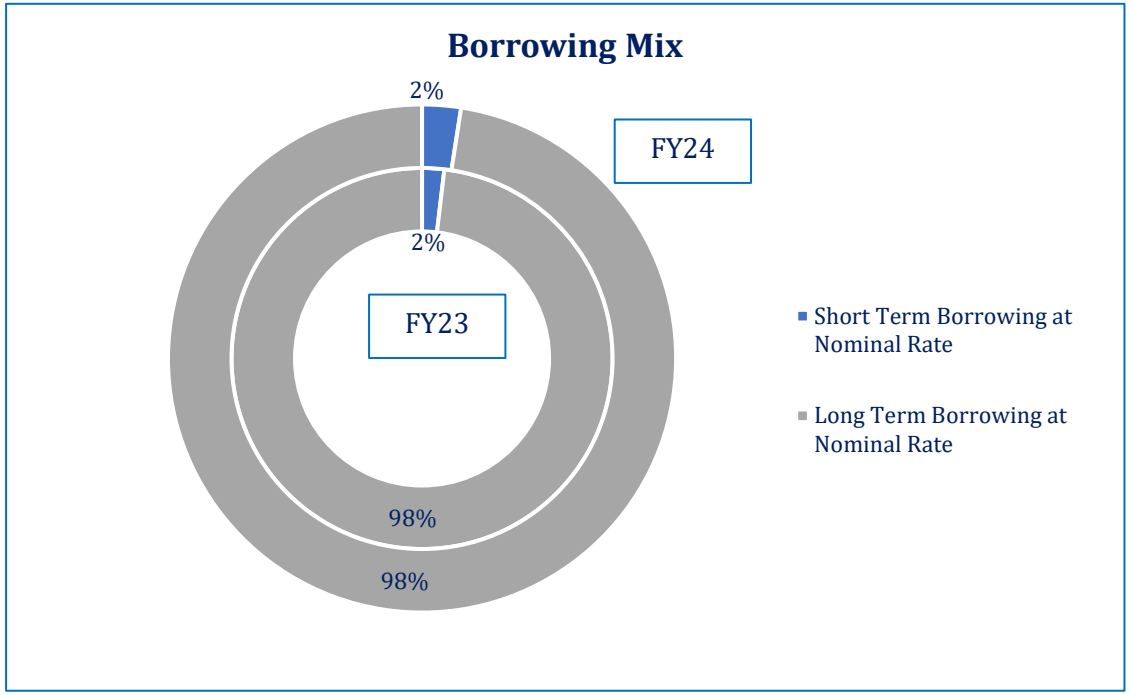
Financial Risk | Borrowings

- The sector's borrowing mix, which comprises short-term and long–term borrowings at nominal interest rates, remained consistent between FY23 and FY24.
- Long-term borrowings constituted the largest share of ~98.0% indicating stable and long-term debt financing.
- Short-term borrowings stood at a nominal share of ~2.0% during FY24, similar to the share in FY23.
- The sector's declining gearing ratio from ~32.4% to ~16.1% reflects an improvement in the sector's capital structure and increased reliance on internal capital. The sector's long-term borrowings reduced by ~48% in FY24 compared to FY23.





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

Source: PACRA Internal Database

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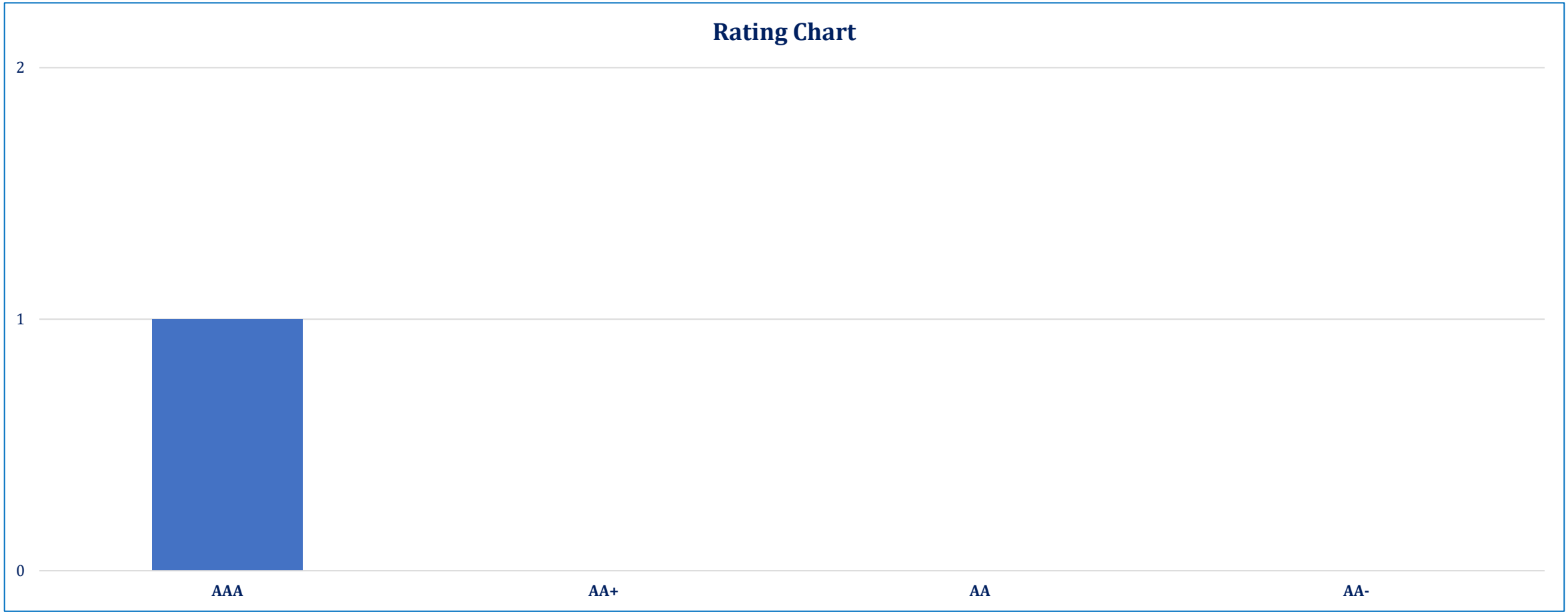
Ratings Chart

PACRA rates one player in the sector with a long-term rating of AAA.



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Porter's 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.
- Non-availability of alternative pipelines on the same routes.

SUBSTITUTES

- Main substitutes are Oil tankers.
- Currently, Oil tanker has a major share in Oil transportation.

SUPPLIERS

- Medium Power
- Non-utilization of full production capacity

COMPETITIVE RIVALRY

- Very low. Currently, the sector has a monopolistic structure.

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SWOT Analysis

- Few players in the industry
- Growing Demand for pipelines due to cost-effectiveness
- No inventory management
- No environmental impact or road accidents
- Unaffected by Oil prices
- USD-indexed tariffs

- Tariff controlled by OGRA.
- High Maintenance and depreciation expense.
- Longer regulatory approval process.

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

- Pipeline network is extendable
- Growing opportunity for MOGAS transportation.
- Pipelines can be upgraded for multiple products (e.g., MOGAS, HSD, Kerosene)
- Increasing demand for petroleum products in the country.

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Outlook: Stable

- Pipelines are considered a cost-effective and environmentally friendly mode of transporting Crude Oil and Petroleum Products. They not only ensure efficient domestic transportation but also facilitate cross-border movement of Oil and Gas, making them a strategically significant part of the country's energy infrastructure.
- Currently, road transport handles ~69.0% of the total movement of Crude oil and Petroleum Products, followed by pipelines at ~29.0%, and railways at ~2.0%. Pakistan's operational Oil pipeline network (Crude Oil + Petroleum Products) spans over ~2,000 km, primarily transporting High-Speed Diesel (HSD), Motor Gasoline (MOGAS), and Crude Oil.
- PAPCO, the sole commercial operator of the White Oil Pipeline (WOP), completed an upgrade in CY21, enabling the transport of both MOGAS and HSD through the pipeline. An expansion project spanning ~477.0 km is expected to start soon, aiming to connect strategic hubs such as Machike (Sheikhupura), Thalian (Rawalpindi), and Taru Jabba (Peshawar), further enhancing the country's Oil Pipeline network.
- The sector benefits from fixed tariffs and USD indexation, which limit its revenue volatility, providing a natural hedge against exchange rate fluctuations. This mitigates price sensitivity and keeps margins highly attractive, with volumes serving as the primary driver of growth.
- Despite lower throughput in FY24, the sector achieved ~5.0% revenue growth, reflecting the positive impact of currency hedging.
- Gross margins stood at ~45.5% while operating margins surged to ~110.2% due to foreign inflows and the PKR depreciation of ~14%.
- Net margins reached ~59.7%, aided by reduced finance costs. Additionally, the gearing ratio improved to ~16.1%, reflecting a ~48.0% reduction in the long-term borrowings. However, borrowing is expected to rise as the WOP expansion project commences soon.
- In 1QFY25, the sector recorded revenue of PKR ~2,986mln, with profitability margins remaining robust. Gross margins were at ~56.8%, operating margins at ~77.1%, and net margins at ~42.8%.
- Going forward, the sector is likely to experience higher throughput volumes in FY25, driven by anticipated economic recovery and declining inflation, which are expected to boost demand for Crude Oil and Petroleum Products in the country.

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