Chemicals

Sector Study

July 2022

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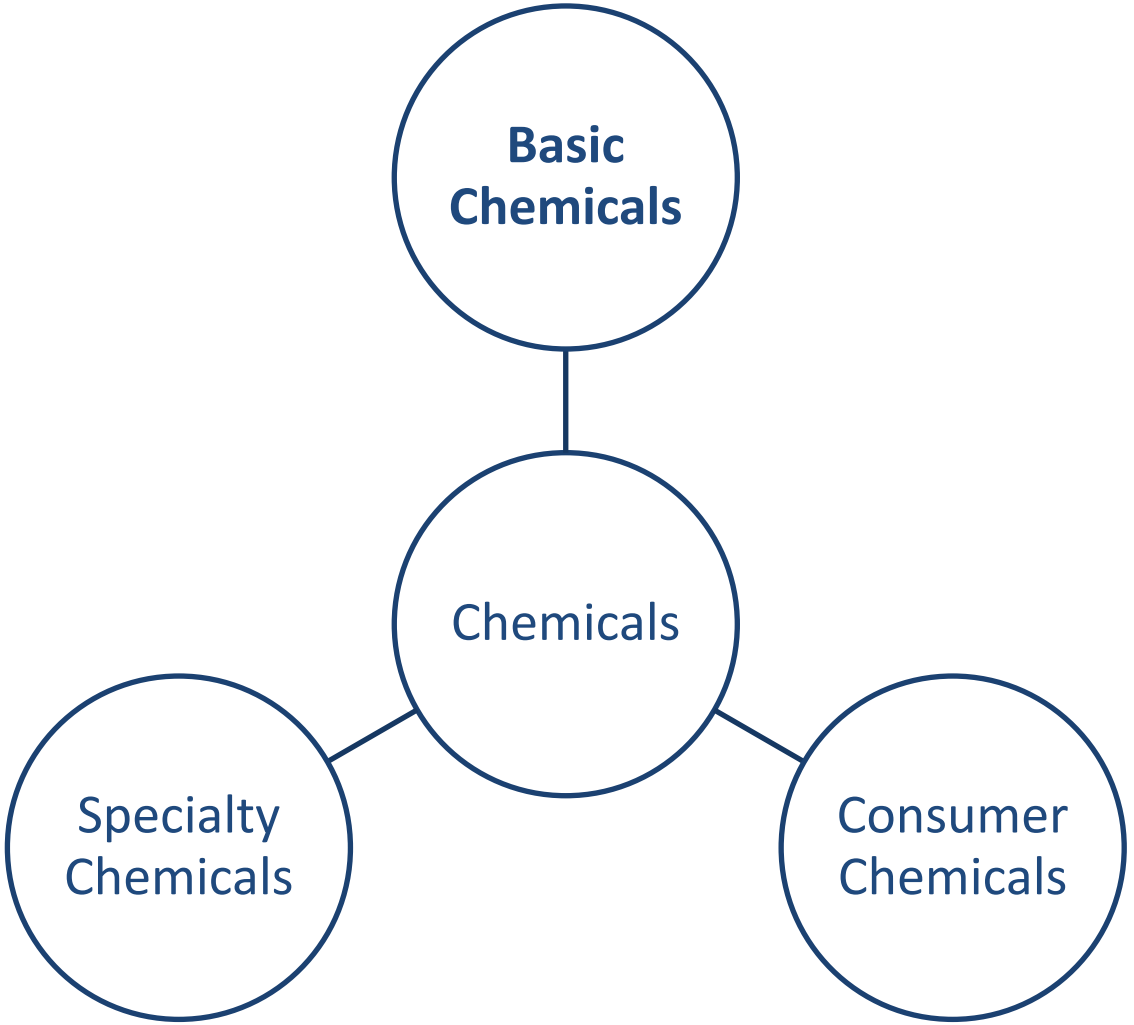
Global Overview

- Chemical industry is an integral part of global economic landscape as the industry creates immense variety of products, which impinge virtually every aspect of our lives.

- While many of the products from the industry, such as detergents, soaps and perfumes, are purchased directly by the consumer, others are used as vital components in industrial manufacturing of various products and goods.

- Chemical industry products can be divided into three categories:

  - **Basic Chemicals**: It includes petrochemicals, polymers and basic inorganics.
  - **Specialty Chemicals**: This category covers a wide variety of chemicals for crop protection, paints and inks, colorants (dyes and pigments).
  - **Consumer Chemicals:** These are sold directly to the public. They include, for example, detergents, soaps and other toiletries.



Source: ECI

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Global Top Companies

- China is the world's largest chemicals market while with giants like Sinopec operating there; the chemical manufacturing industry in the United States is quite prominent, with companies such as Dow, Exxon Mobil Chemicals, and LyondellBasell Industries. The chemical sector in Europe is also very significant, representing a great proportion of their manufacturing trade surplus. Europe (and the European Union) is one of the largest chemical trading regions in the world with Germany accounting for the largest share of total EU chemical revenue.

Sr No.	Company	Country	Revenue (USD bln)
1	Sinopec	China	430
2	Exxon mobil Chemicals	USA	277
3	Formosa Plastics	Taiwan	89
4	BASF	Germany	89
5	Dow Inc	USA	55
6	Sabc	KSA	47
7	LyondellBasell	USA	45
8	Linde plc	UK	31
9	Mitsubishi Chemical	Japan	28
10	Ineos	UK	21

Source: C&En

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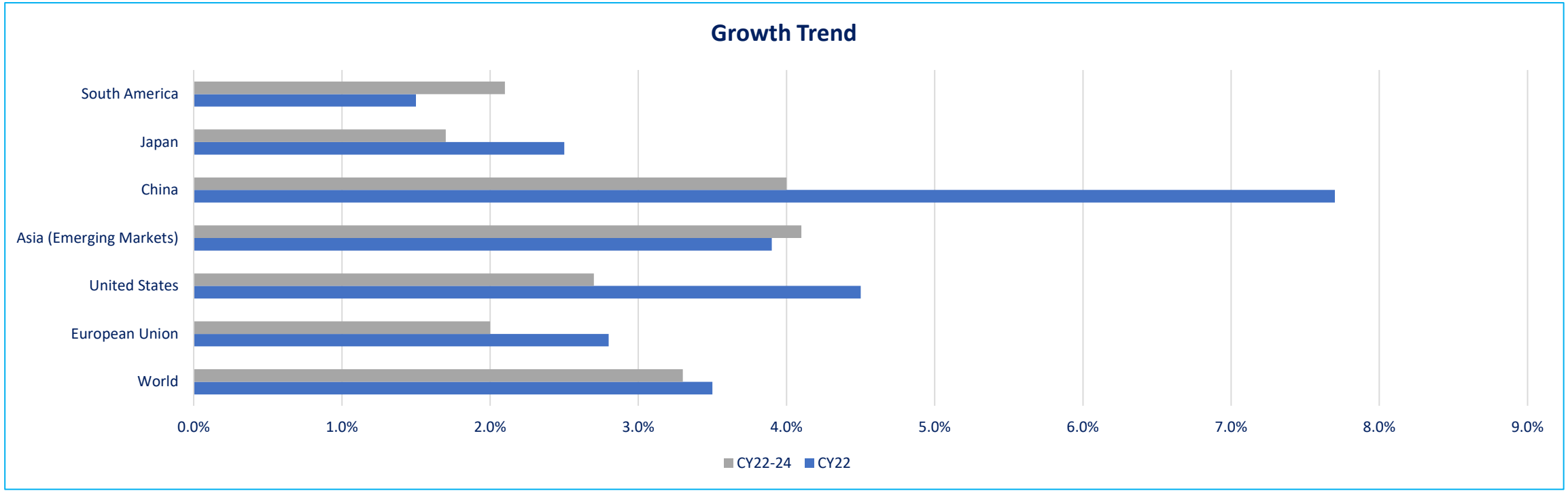
Global Growth Prospects

- Chemical industry is one of the fastest growing sectors globally. It has directly contributed more than USD~4.2trn to the global GDP, accounting for more than ~4.4% to the global GDP. Considering its linkages with different industries, it has significant impact on the growth of vast number of industrial sectors.
- China is the world's largest chemical markets which grew by ~7.7% in CY21; however following the recent lockdowns growth outlook for this market is expected to be at ~4.0% in CY22. Demand from electronics and consumer goods market is expected to be weaker; while growth in demand is expected to originate from the automotive sector. Chemical industry growth is expected to be slightly weaker in Asian emerging markets compared to China.



Source: BASF

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Industry Snapshot

- Considering the high linkages of chemical sector with other sectors of the economy, it is considered as one of the most significant sectors of Pakistan. As mentioned earlier, the sector embodies a large number of products but for the purpose of this sector study we will focus on companies producing Caustic soda, Soda ash, PVC, Hydrogen Peroxide, and Resins.
- Pakistan's reliance on imported chemicals is reducing with time as local companies are injecting more investments to increase their production capacities and hence expand their market base.
- In 11MFY22 The chemical sector contributes around ~4.6% to the country's exports and its share in imports stands around ~11.2%. The sector is considered as a backbone in the development of forward linked industries like textile, leather, footwear, furniture, automobile, food and beverages. Chemical products are also used in backward linked industries also such as surfactants, which are used by oil refineries and oil extracting companies.
- Considering the increase in demand of different basic chemical products, local companies have lately announced capacity expansions. Once completed, these expansion will serve to provide much needed import substitution.

Particulars	FY20	FY21	9MFY22
Market Capitalization of Listed Companies (PKR bln)	44	89	80
Revenue (PKR bln)*	214	239	181
No of Listed Companies	23	23	23
Revenue Growth YoY	-8.1%	11.7%	38.7%
Association	Pakistan Chemical Manufacturers Association		
Members	79	79	101
Imports (PKR bln)	885	1,116	1,128
Exports (PKR bln)	183	159	188

Note: Revenue is based on based on PACRA rated clients and selected listed companies. 9MFY22 numbers are prorated on latest available numbers.
Exports are inclusive of pharmaceutical products

Source: PES, PSX, PCMA

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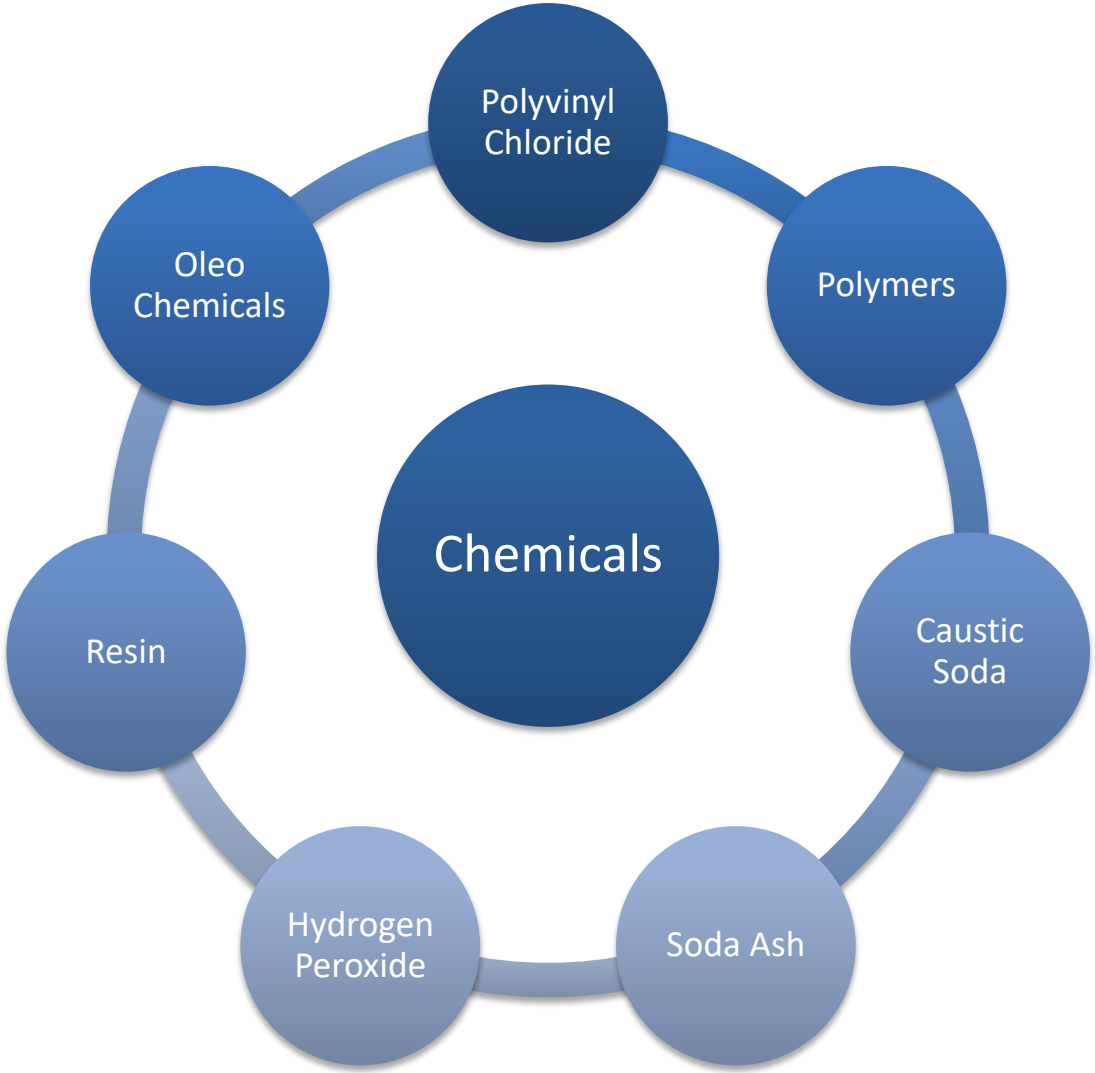
Local Overview

- Pakistan has a gigantic potential for the growth of chemical sector as it is an integral part of our daily lives and industrial progress. Despite this, there are only a few groups focusing on the growth of this sector, therefore, the country still has a big room for development.

- Over the years, the local market has made a considerable progress in basic inorganic chemicals like Polyvinyl Chloride, Caustic soda, Soda Ash, Hydrogen peroxide and has expanded their production capacities to cater the market demand.

- Besides providing support to local industries with the readily available basic chemicals, it is an important import substitution as well.

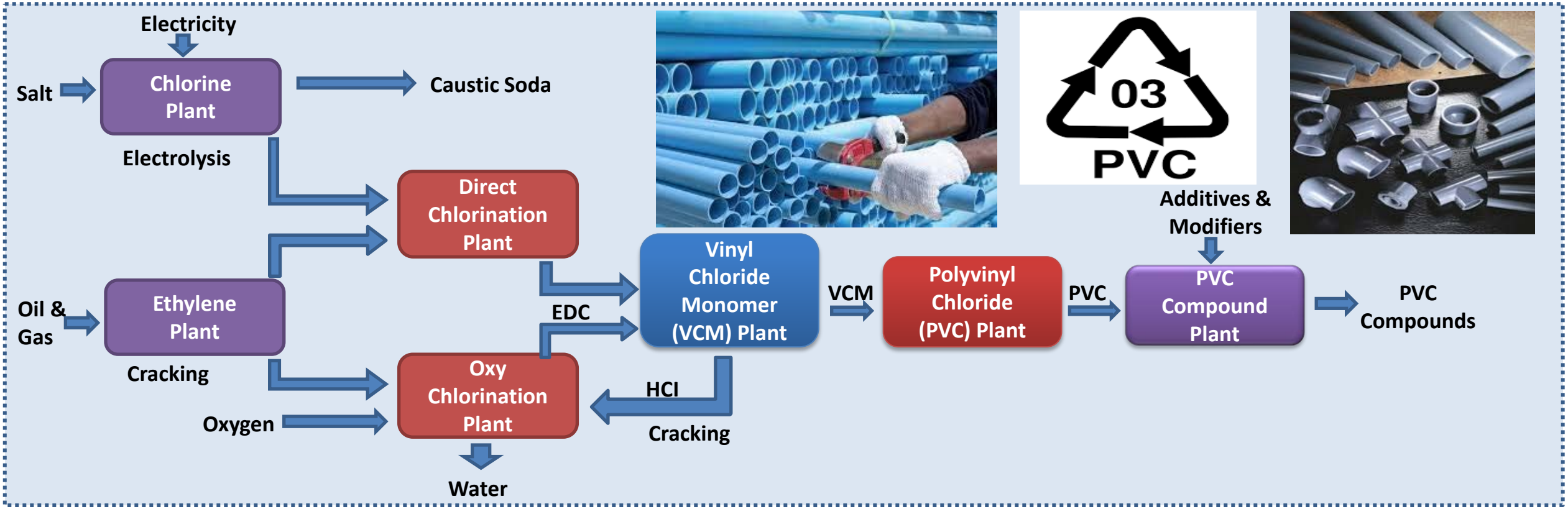
- Although, a variety of chemicals are used in multiple industries, the chemical industry can be broken down into seven main categories based on their type (refer diagram).



Note: Three products, namely, chlorine, caustic soda, and soda ash characterize the chlor-alkali market

Source: Darson

Polyvinyl Chloride Process (PVC)



- Chlorine is extracted from the sea salt via electrolysis and ethylene is derived from hydrocarbon raw materials. These are reacted to produce ethylene dichloride.
- The ethylene dichloride is then decomposed by heating in a high temperature furnace or reactor.
- PVC is made using a process called addition polymerization. This reaction opens the double bonds in the vinyl chloride monomer (VCM) allowing neighbouring molecules to join together creating long chain molecules.

Source: Vinyl.org.au

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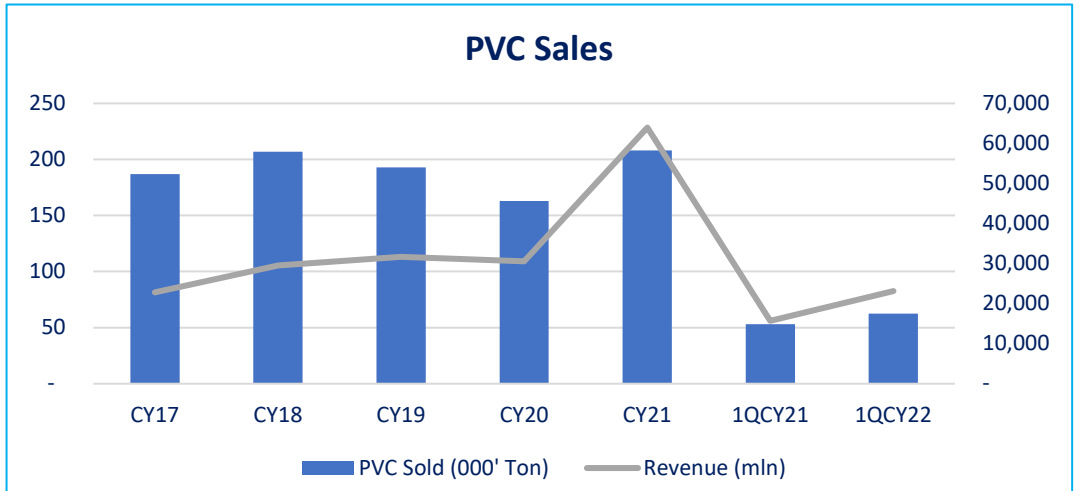
Supply and Demand | PVC

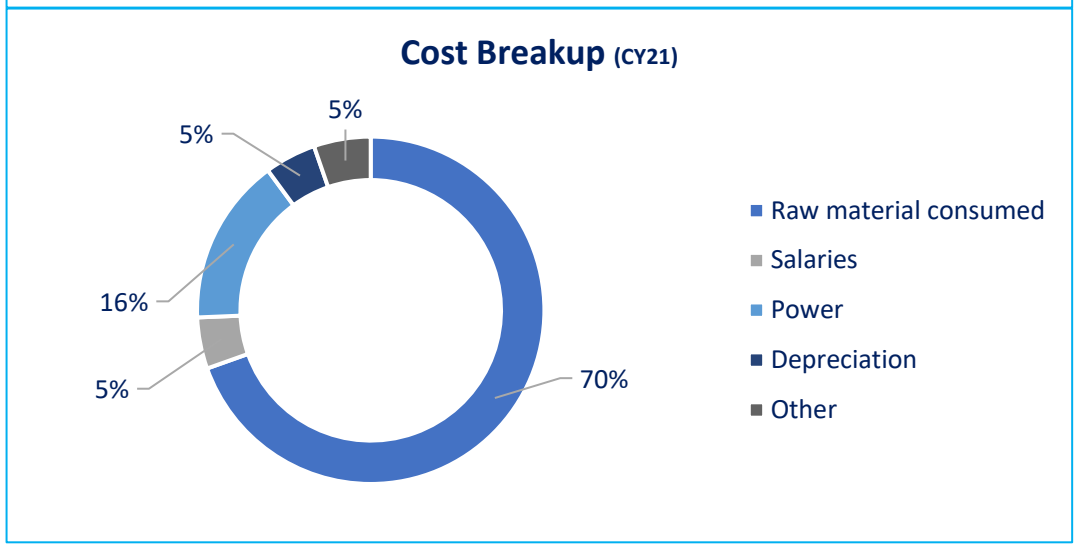
- **Polyvinyl Chloride (PVC) :** Engro Polymer & Chemicals Limited (EPCL), a subsidiary of Engro Corporation, is the only producer of PVC in Pakistan. The plant has an annual production capacity of ~295,000MT.

- Two of the critical raw materials, ethylene and EDC, are imported in the country, therefore subject to exchange rate and international price movement. Raw material accounts for ~70% of the total cost of production. Production of PVC is an energy intense manufacturing process requiring high power consumption which constitutes ~16% of its total cost.

- In FY21, PVC consumption per capita stood at 1.2Kg. PVC demand is driven by construction, packaging and consumer sectors products. More than ~50% demand for PVC is being generated by PVC pipes and fittings while other uses of PVC include film & sheet, cable compound, flexible hose, shoes, profile, flooring and foam board.

- During CY21 overall sales of PVC was recorded at ~208,000MT with a YoY growth of ~27.6% on the back of overall economic recovery and increased demand; continuing momentum in 1QCY22, sales volumes grew by ~18.9% YoY; while ~72,456MTs of PVC was imported in FY21.



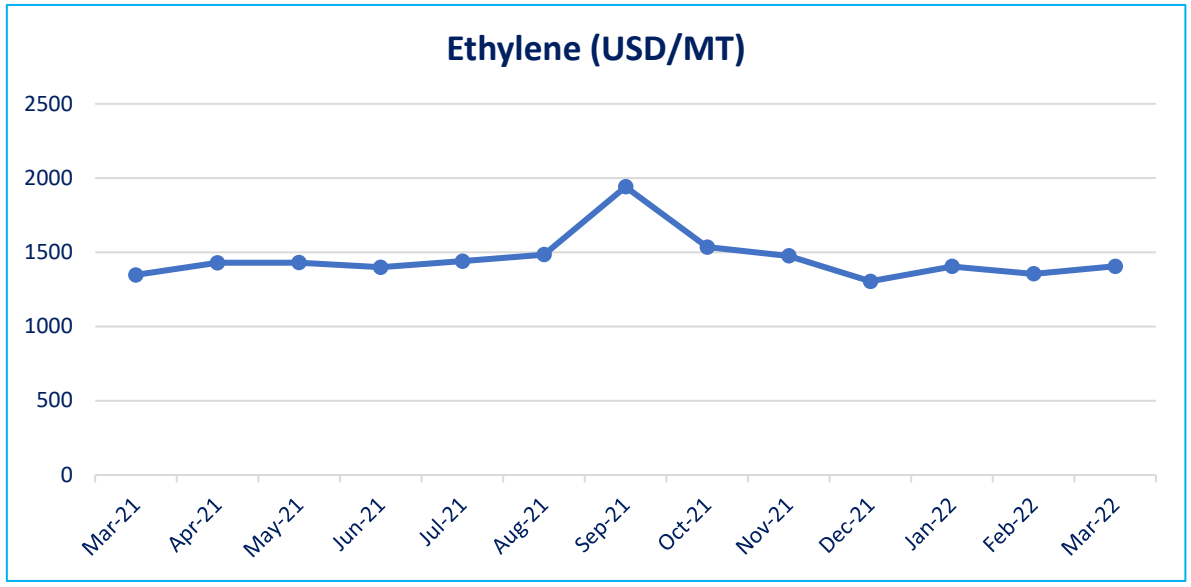


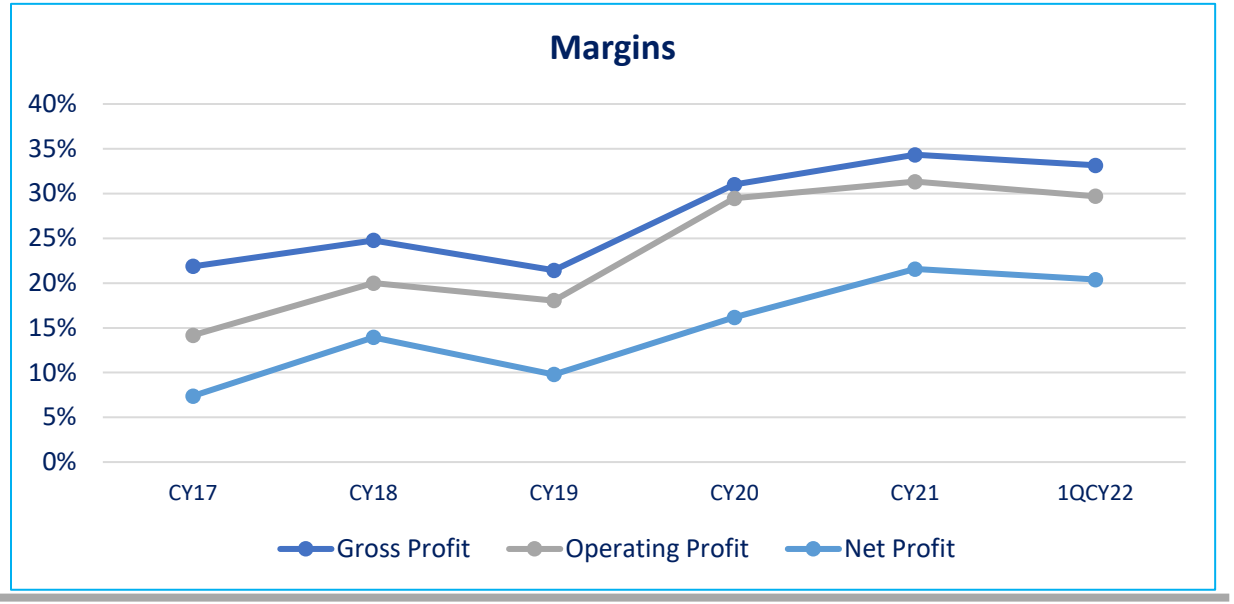
Note: PVC sales is of EPCL only.

Source: EPCL, PACRA Internal Database

PVC Margins

- PVC margins are a function of ethylene international prices and exchange rate fluctuations. PVC is also imported in the country to fill the supply gap due to production limits. International PVC prices continued their declining trend before facing a reversal from the later half of 1QCY22; facing increased cost pressures and robust demand for finished products.
- While global Ethylene prices had increased significantly in relation with multiyear high oil and gas prices, increased cost pressures, limited availability on spot and constricted trade due to high freight rates; following said developments PVC to Ethylene core delta saw a slight dip in 1QFY22 leading to increased cost pressures.
- Installation of Naphtha cracking plant will greatly help the local chemical industry. It will also reduce burden on the country's import bill. From this installation, a variety of chemical can be extracted such as ethylene, propylene, pyrolysis gas and many more.

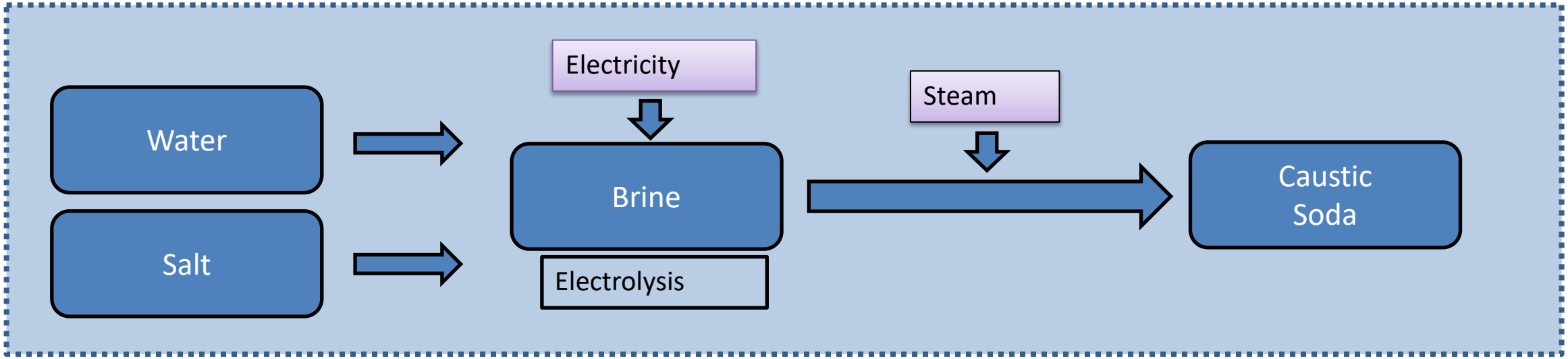




Source: EPCL

Caustic Soda Process

Caustic Soda:



- Nearly all caustic soda is generated by the electrolysis of sodium chloride solution using one of the three cell types: mercury, diaphragm and membrane cells. The electrolysis process produces 2.25 tonnes of 50% caustic soda with each tonnes of chlorine. The primary raw material is common salt, usually in the form of underground deposits which are brought to the surface as a solution in a pumped high pressure water supply. The sodium chloride solution is often called brine.

- Electrolysis is carried out by the mercury amalgam, diaphragm cell processes or membrane cell. Diaphragm cells need plenty of thermal energy to concentrate the caustic solutions but can be cheaper than mercury cells when steam costs are low and have relatively cheap construction costs. Use of membrane cells is growing due to lower capital and energy costs and an absence of environmental problems.

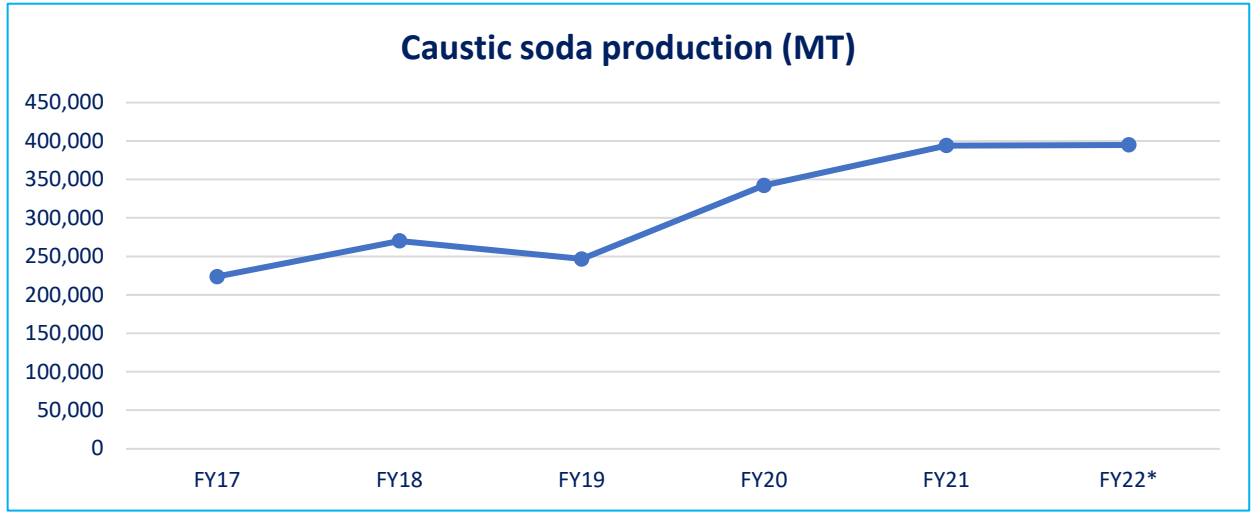
Source: Eurochlor.org

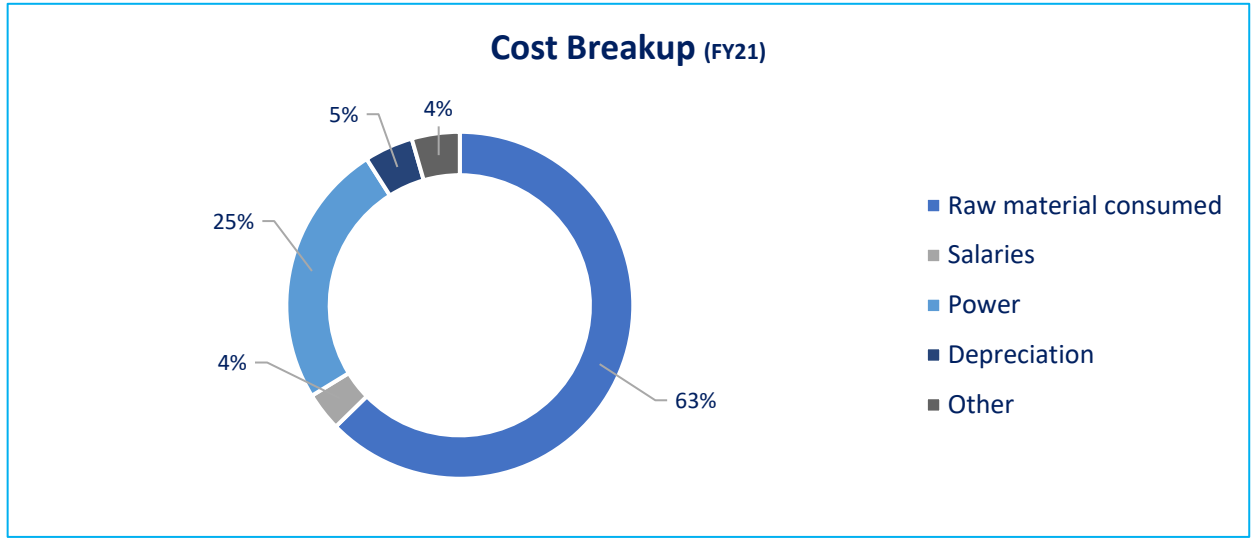
Supply and Demand | Caustic Soda

- **Caustic Soda:** In its pure form, caustic soda is a waxy, white solid. It readily absorbs water and forms aqueous solutions.

- Caustic soda is made by electrolysis process through brine resulting in high electricity usage. Approximately ~54% of the total cost of production accounts for power usage, thus exposing it to any change in electricity tariff. Raw material accounts for 28% of the total cost of production made up of brine, mostly salt and water, which are abundantly available in the country.

- Caustic Soda is used in a wide variety of industrial applications such as; textile industry for processing, soap industry as a raw material, as well as several other industries for water treatment. Thus the demand for caustic soda is from multiple industries and is highly correlated with overall economy. The demand for FY22 is expected to be ~395,000MT.





*Prorated

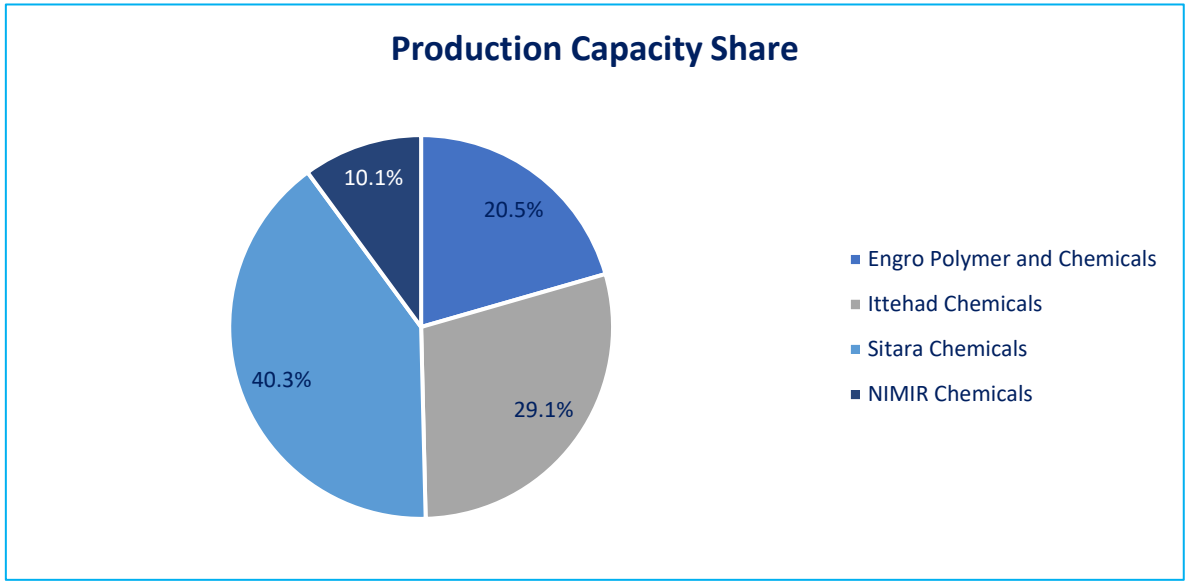
Source: PBS, PACRA internal Database

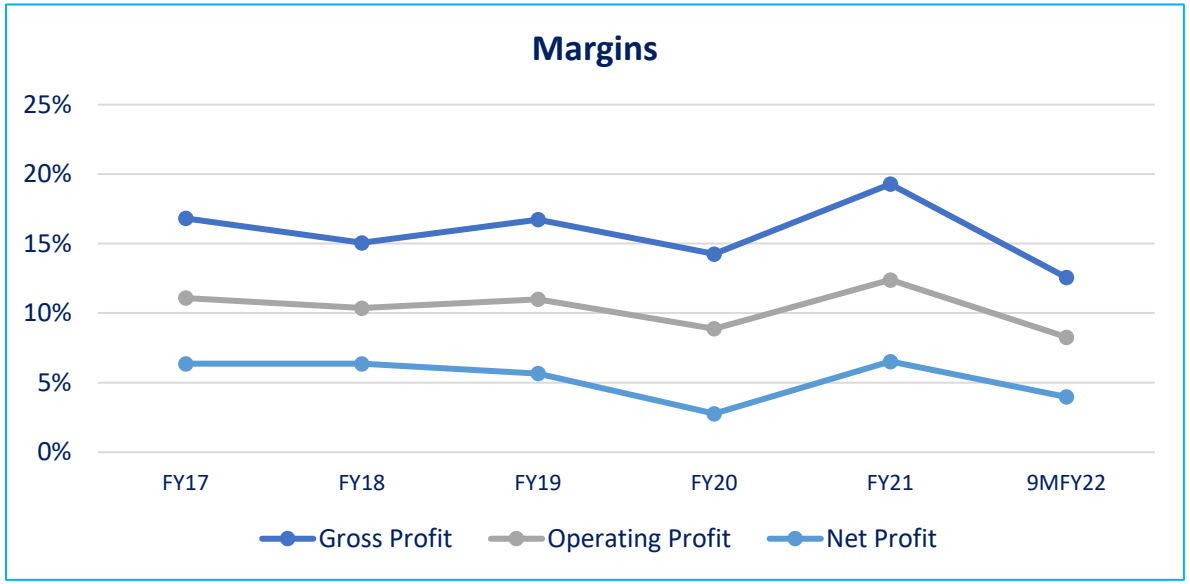
Caustic Soda Margins

- There are three major players in caustic soda segment, Engro Polymer, Ittehad Chemicals and Sitara chemical. The total combined production capacity of all players was recorded at ~515,900MT/year, in 9MFY22 whereas total production during the same period was ~296,218MT translating into ~76% capacity utilization (adjusted for 9M). Amid low capacity utilization, the import of caustic soda is negligible.

- Although the demand for caustic soda remained stable in FY22, margins still suffered due to significant increase in production cost for the industry. This came on the backdrop of spiked energy prices globally, further aggravated by PKR devaluation and increased cost of borrowings following the second quarter of FY22.

- The capacity also far exceeds the demand for caustic soda in Pakistan resulting in competitiveness and tight margins. Increase in prices by any company to pass on impact of rising cost of production comes at the expense of market share.

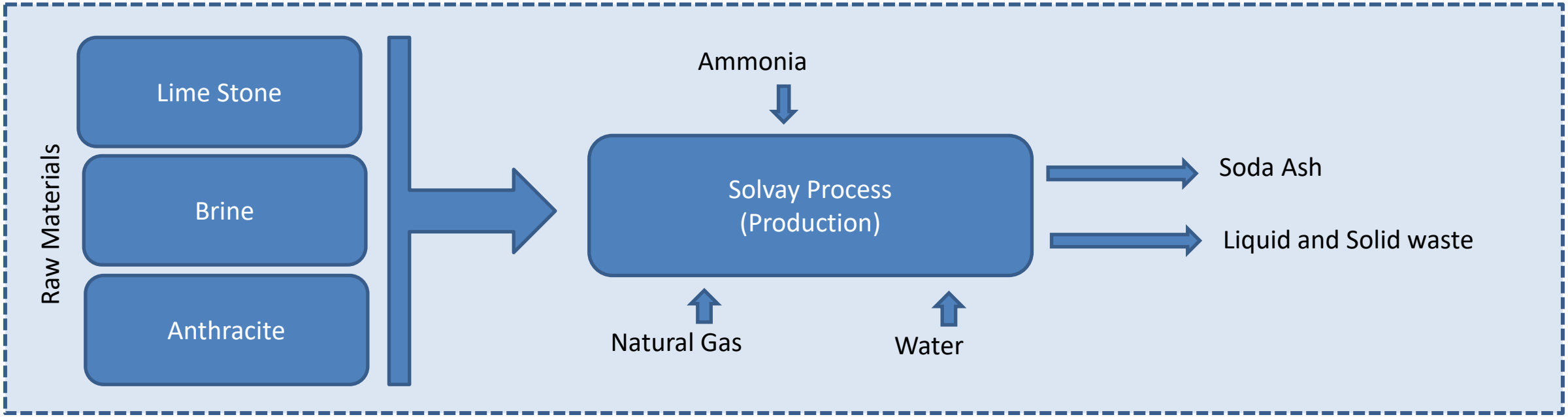




Source: PACRA Internal Database

Soda Ash Process

Soda Ash:



- In the ammonia-soda process, common salt, sodium chloride, is treated with ammonia and then carbon dioxide, under carefully controlled conditions, to form sodium bicarbonate and ammonium chloride. When heated, the bicarbonate yields sodium carbonate (soda ash), the desired product; the ammonium chloride is treated with lime to produce ammonia for reuse and calcium chloride.

- The ammonia-soda process encountered stiff competition from the older Leblanc process, but it ultimately prevailed because it produced soda ash more cheaply.

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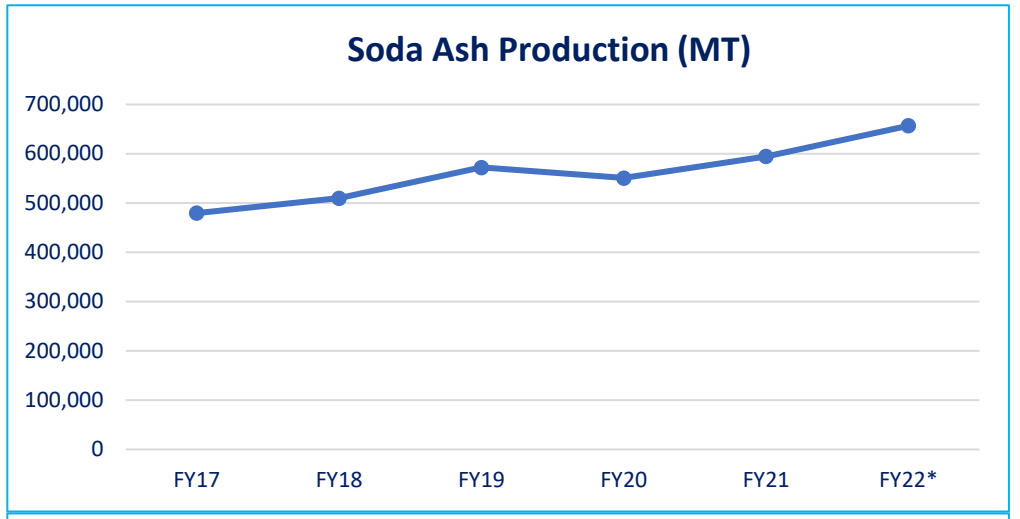
Supply and Demand | Soda Ash

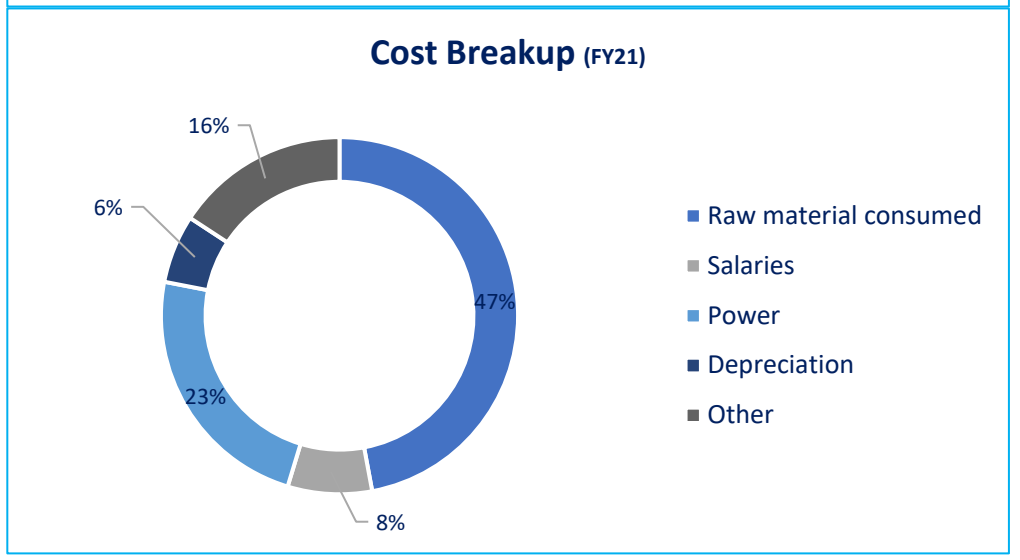
- **Soda Ash:** It is an anhydrous white powder or granular material that is available in two grades, light and dense. Dense soda ash is an anhydrous substance mostly used in the manufacturing of industrial chemicals. Light soda ash is used as pH regulator in various industrial processes.

- Raw material and energy cost on average account for ~60%, split evenly. Lime stone, brine and ammonia are the major raw materials used in Solvay process which are locally available without any hindrances. The heat source used for the solvay process is coal of which approximately ~70% is imported due to its high carbon content and less leftover of slag and residue.

- Soda Ash is an essential raw material used in manufacturing of glass, chemicals, detergents and various industrial products. Only detergents and soap during the pandemic were the main driving force in soda ash sales as hygiene standards increased.

- There are only two major players in the soda ash segment, ICI chemicals and Olympia chemicals, having a combined capacity of ~672,500MT with ~63% and ~37% share respectively. Local demand for caustic soda is met almost entirely through local production. For FY21, only ~3,374MT of soda ash was imported.





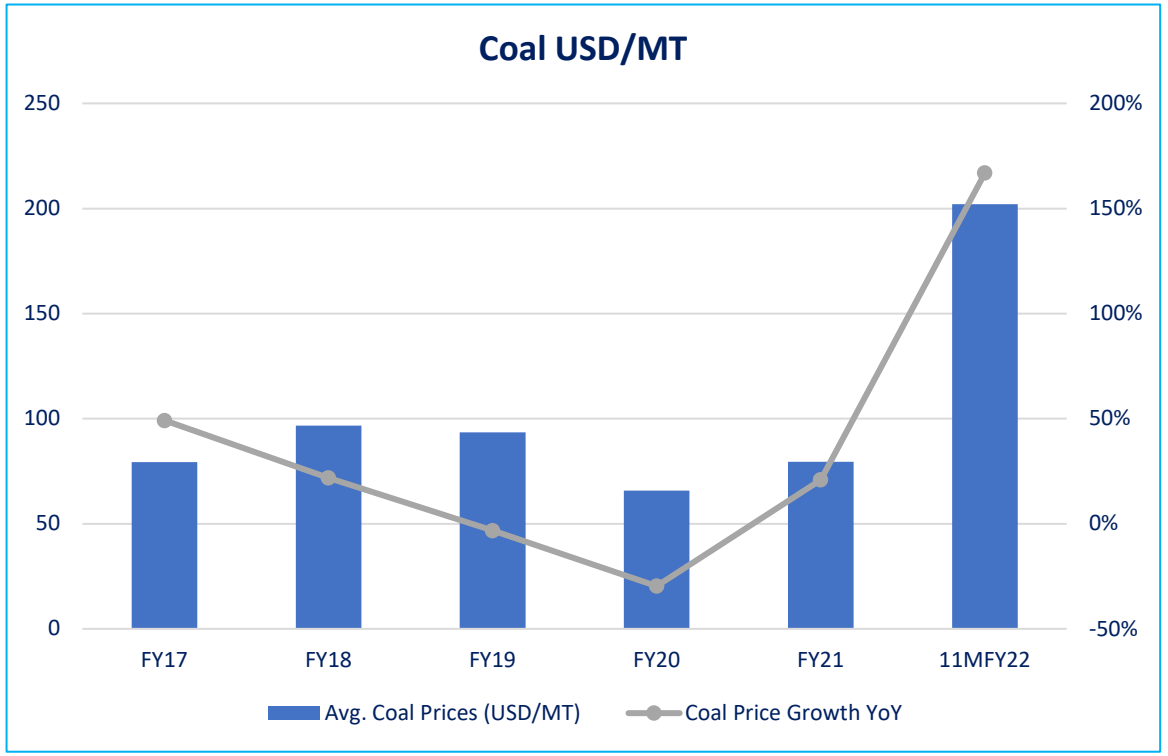
*Prorated

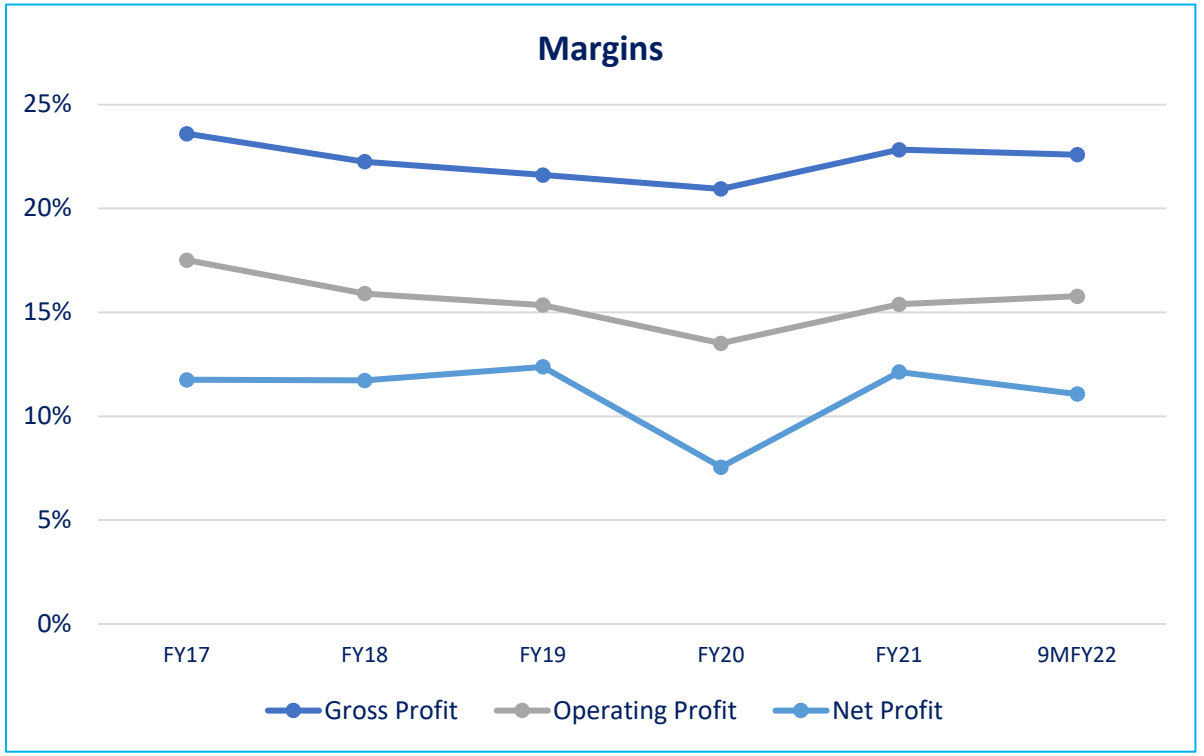
Source: PACRA Internal Database

Soda Ash Margins

- Demand for soda ash has almost reached the capacity available in the country. Soda ash is a high margin product compared to other chlor-alkali products. With growing demand from the improving construction and glass sector, demand for soda ash is expected to outpace its capacity.

- With local market dominated by only two players and negligible imports, players can pass on the impact of increased cost to its customers without compromising on market share or margins.





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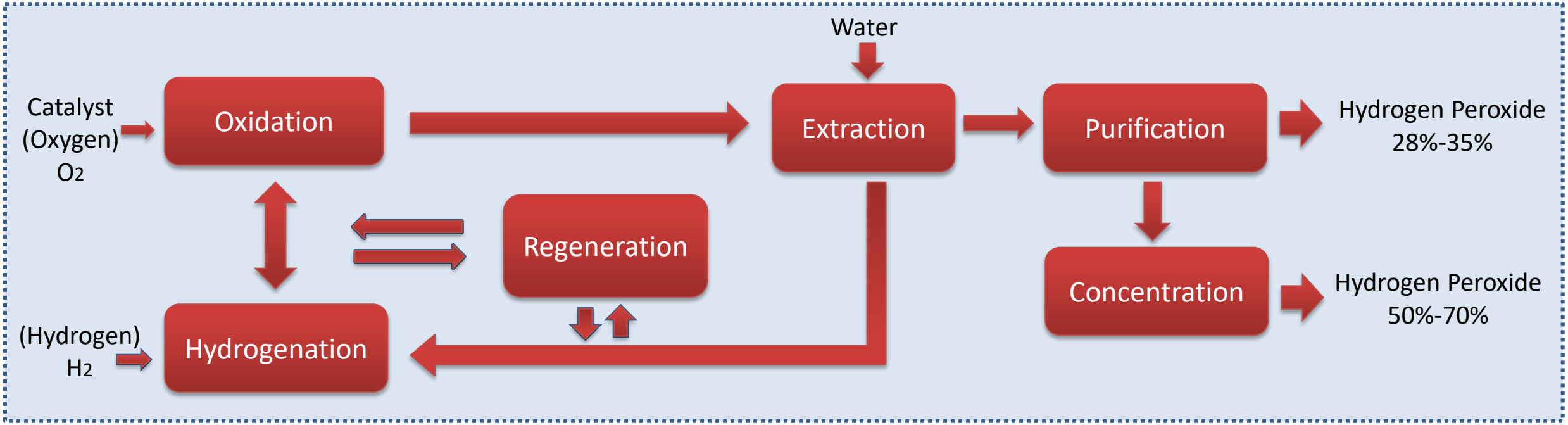
Hydrogen Peroxide Process



- Palladium catalyses the reaction between H2 and anthraquinone to create anthrahydroquinone.
- The palladium catalyst is filtered out of the solution.
- The solution is oxidized by blowing air through the solution, forming the H2O2 (Hydrogen Peroxide).
- The hydrogen peroxide is removed in a liquid-liquid extraction column and concentrated by vacuum distillation.

Source: researchgate

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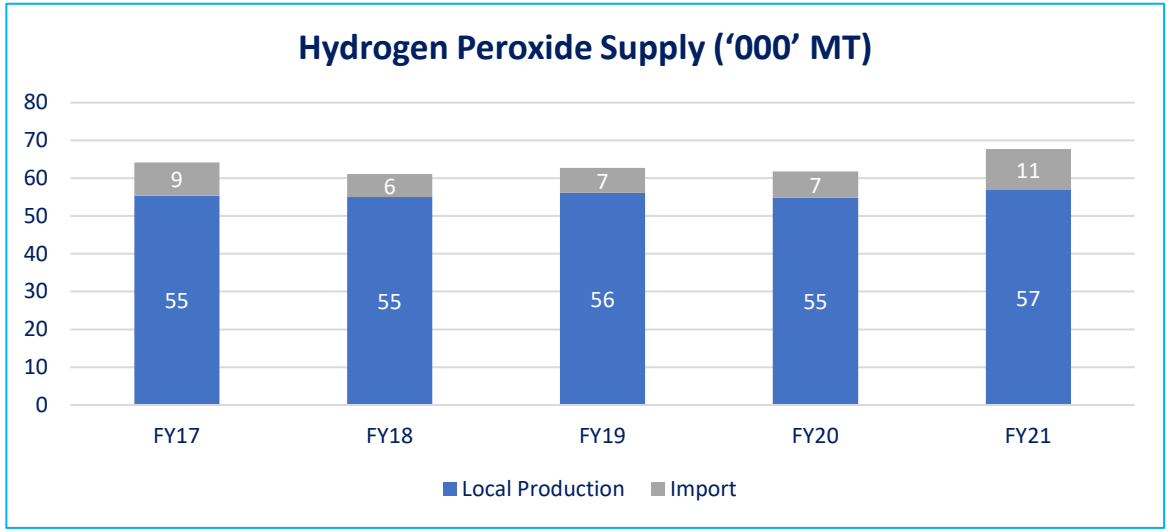
Supply and Demand | Hydrogen Peroxide

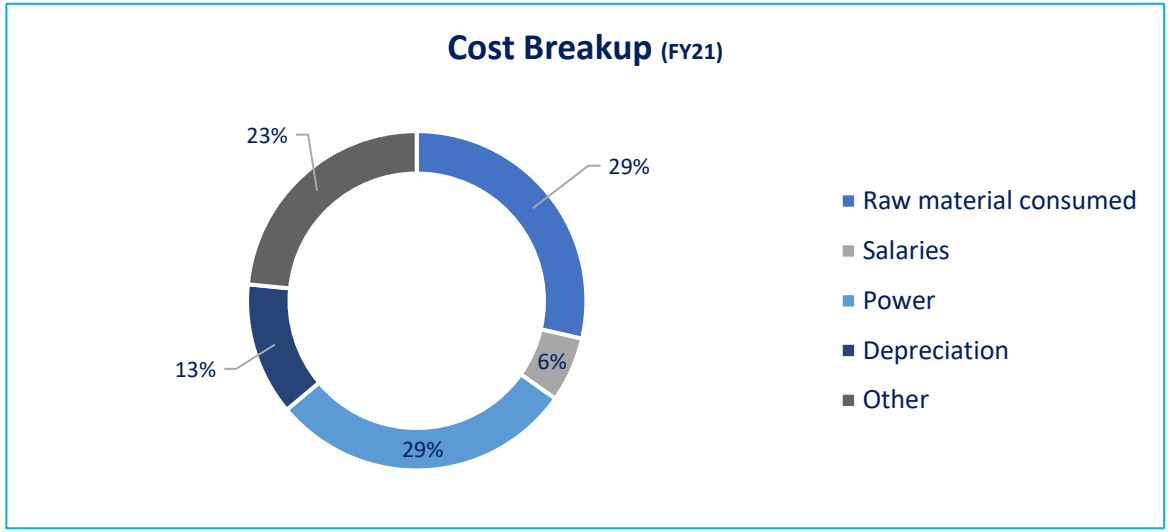
- **Hydrogen Peroxide:** A colorless viscous unstable liquid with strong oxidizing properties. It can, however, act as a reducing agent for strong oxidants. Upon decomposition, it forms water and releases oxygen which makes it an environment friendly product.

- Cost break up is dominated by raw material and power expenses. The two basic raw materials are atmospheric, namely hydrogen and oxygen, which can be attained using multiple sources and chemicals. Power on average accounts for ~32% of cost of production of which ~25% is natural gas followed by electricity making up rest of the 10%.

- The industry's reliance on gas and electricity as the basic raw materials for the production process generates substantial risk, since prices remain volatile and supply of gas is not assured always.

- Hydrogen peroxide is an important chemical with demand driven from the industrial sector where it is used as an oxidizing, bleaching and sterilizing agent. It is used in a variety of industries including textile, paper/pulp, food packaging and healthcare sectors.



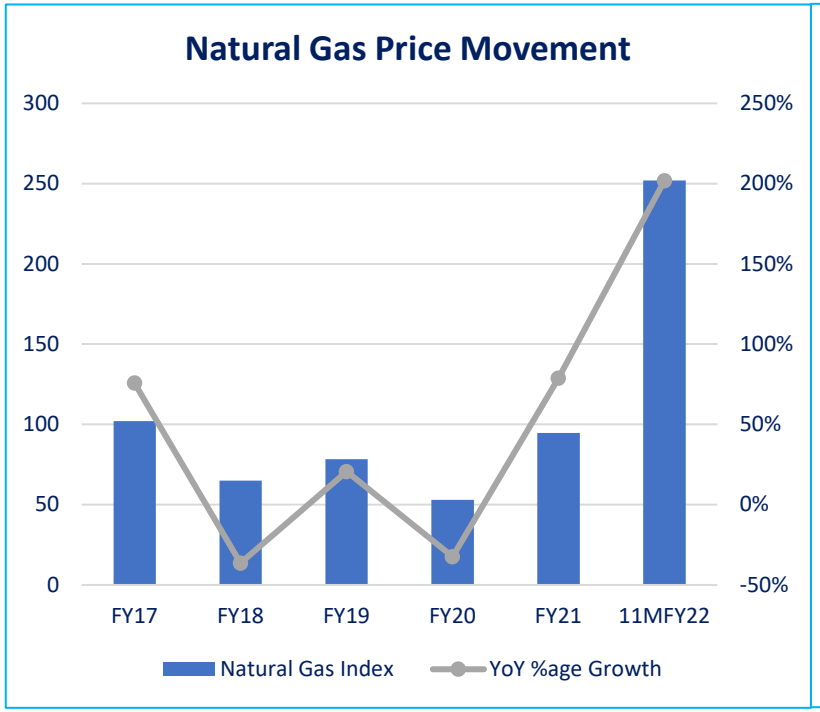


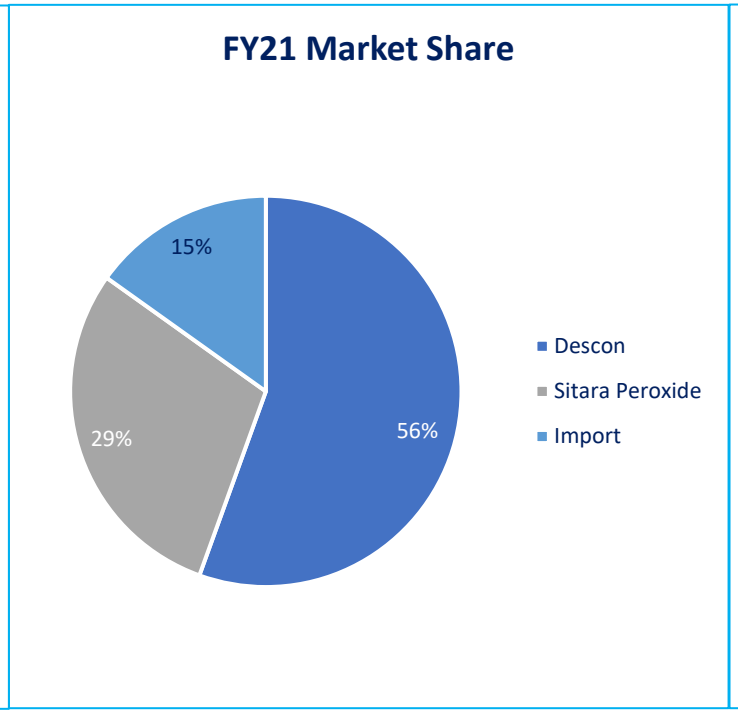
Source: PES, PACRA Internal Database

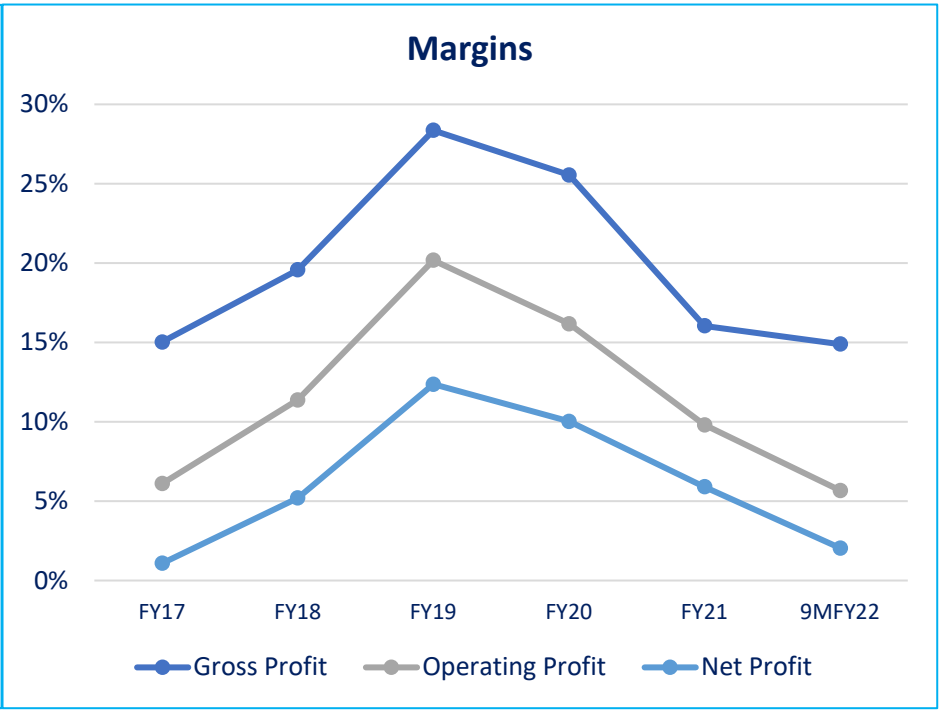
Hydrogen Peroxide Margin

- There are two players in hydrogen peroxide segment; Descon Oxychem Limited (DOL) and Sitara Chemicals Limited (SPL), having a total capacity production of ~51,000MT. During FY21, ~15% of the local demand was met through imports. Considering the demand-supply gap, both players had announced capacity expansions in FY18. DOL has successfully completed its production enhancement whereas, SPL production enhancement is underway. Moreover, EPCL is entering the market with an estimated production capacity of ~28kMT.

- Hydrogen peroxide is a high margin segment. Moreover, due to less competitive nature of the sector, the price pass through abilities of the companies is high.







Source: Business Insider, PACRA Internal Database

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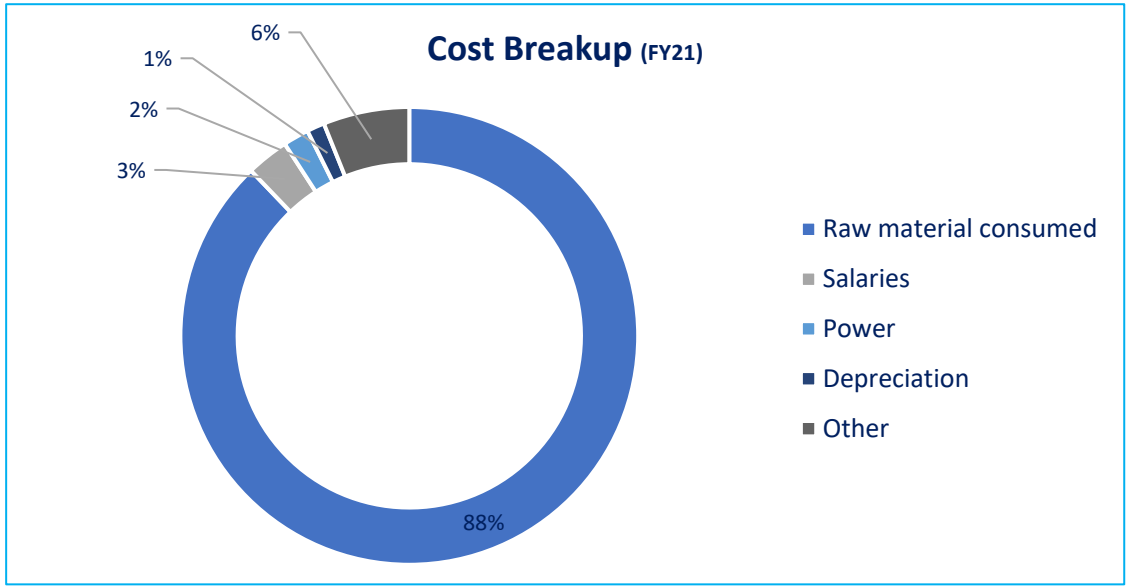
Supply and Demand | Resins

- **Resin**: Resin includes production of chemical emulsions, which comprise adhesive emulsions, homo polymer, co-polymer cross linking agent, acrylates-based emulsion dispersion, pure acrylates emulsion and styrene modified acrylates emulsion.

- Resins are primarily used in the coating and paint industry and derive their demand widely from textile, paper, construction and wood industry.

- Raw material holds the biggest portion in cost of production. Resins are made of different grades and quality depending on the specific use for the industry. The raw materials of resins include lignin, polyol, solvent, catalyst, acid anhydride, and multi-epoxy compound. These are mainly oil derivatives with strong linkage to international oil prices. The production capacity of resin segment is ~61,000MT.

- The growth in resins segment is dependent upon the overall economic growth with major contribution coming from coating and paints (production numbers declined by ~10.4% YoY in 10MFY22) and textile (production numbers grew by ~1.8% YoY in 10MFY22).



Source: PACRA Internal Database

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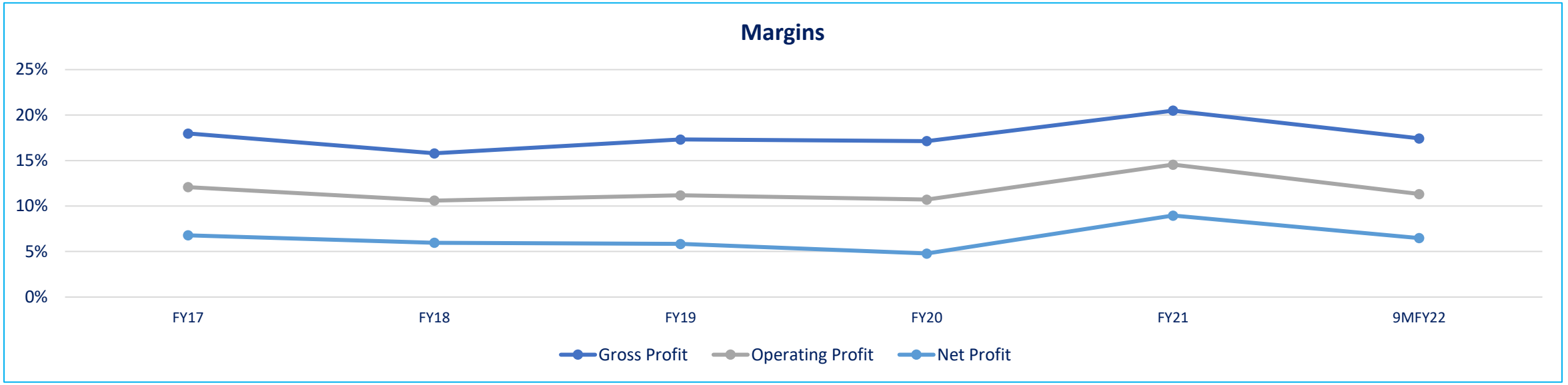
Resins Margins

- Resin manufacturing industry operates in a highly competitive market owing to unsegmented and unorganized small producers who pose threat to large scale manufacturers. The production process consists of mixing different raw materials at certain quantities to make resin of different qualities and grades. Because of simplicity in the production process, the industry is very competitive and margins are relatively on the lower side.

- As on average ~88% of the total cost of production constitutes raw material. Price pass through in times of rising costs to maintain margins remains challenging due to competitive nature of the segment.

- Mounting costs from global commodity prices and freight rate hikes in combination with PKR devaluation are expected to continue exerting pressure on the sector's profitability.



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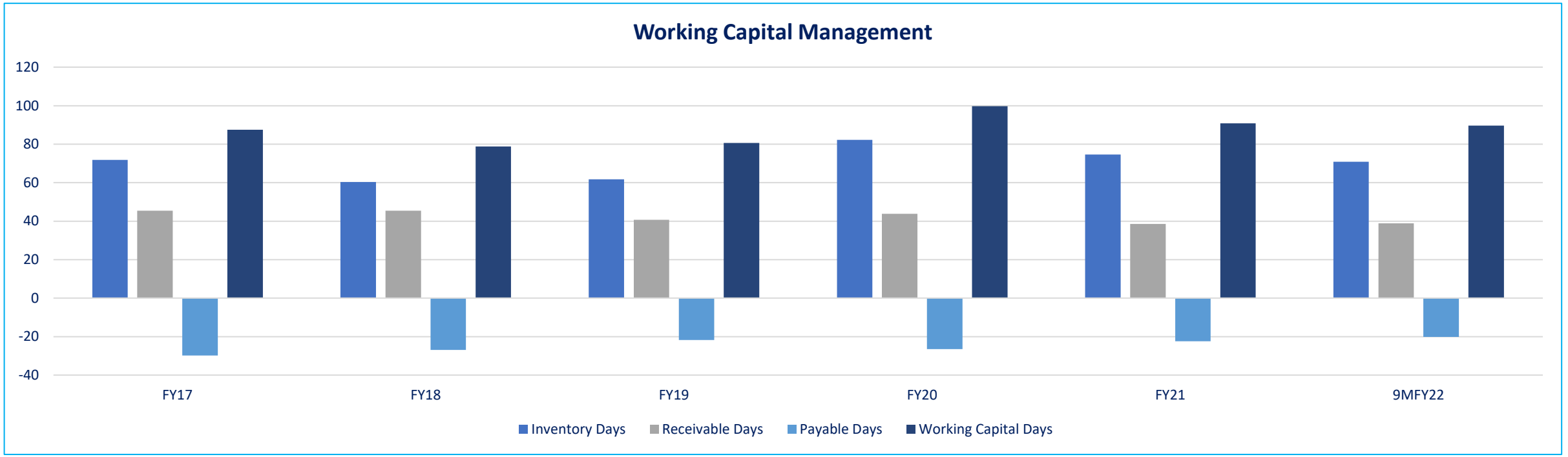
Financial Risk | Working Capital

- Working capital of the sector is characterized by high inventory and receivable days. Receivable and inventory days both declined during FY21. The improvement was mainly due to improving industry conditions and production levels.

- With the decrease in inventory and receivable days, overall cash conversion cycle of the sector also decreased to ~90 days in 9MFY22 from ~100 days in FY20. However, increasing cost pressures and plausible economic cooling can, going forward, deteriorate cash conversion cycle of the sector.



Note: Calculations based on averages of Soda ash, Caustic Soda, PVC, Hydrogen Peroxide and Resins segments of the industry

Source: PACRA Internal Database

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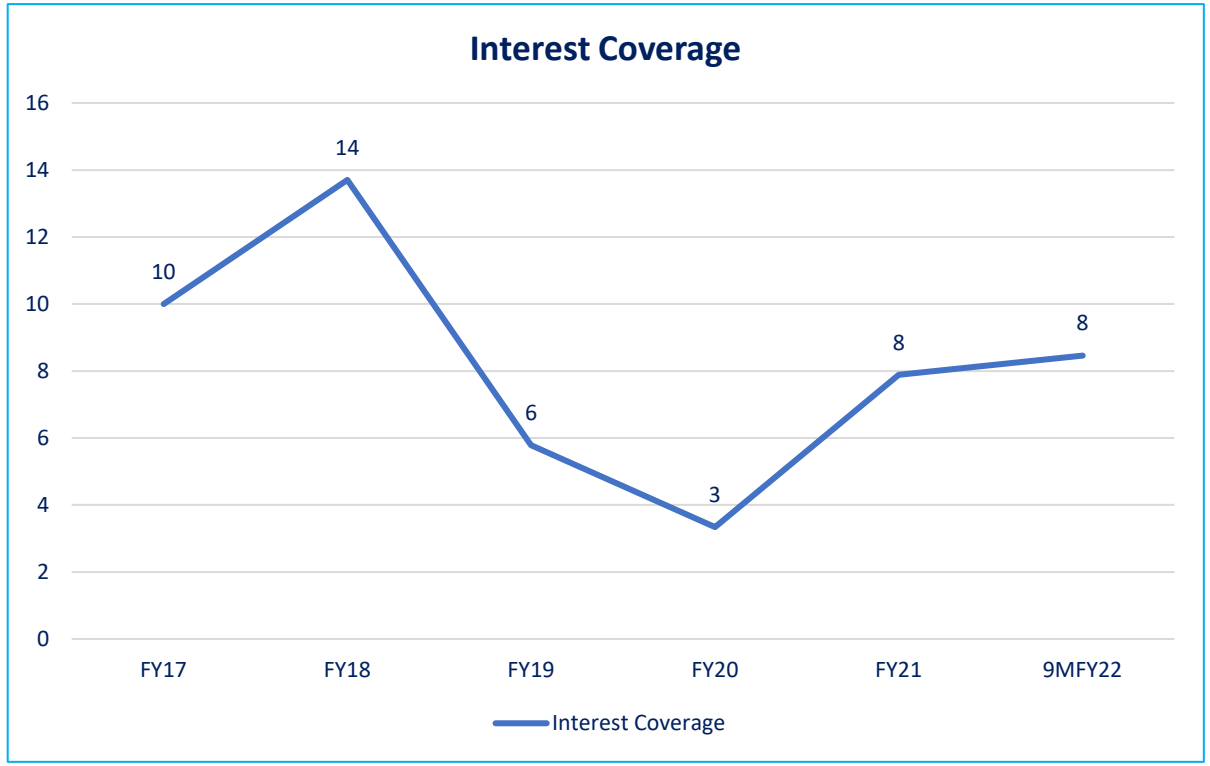
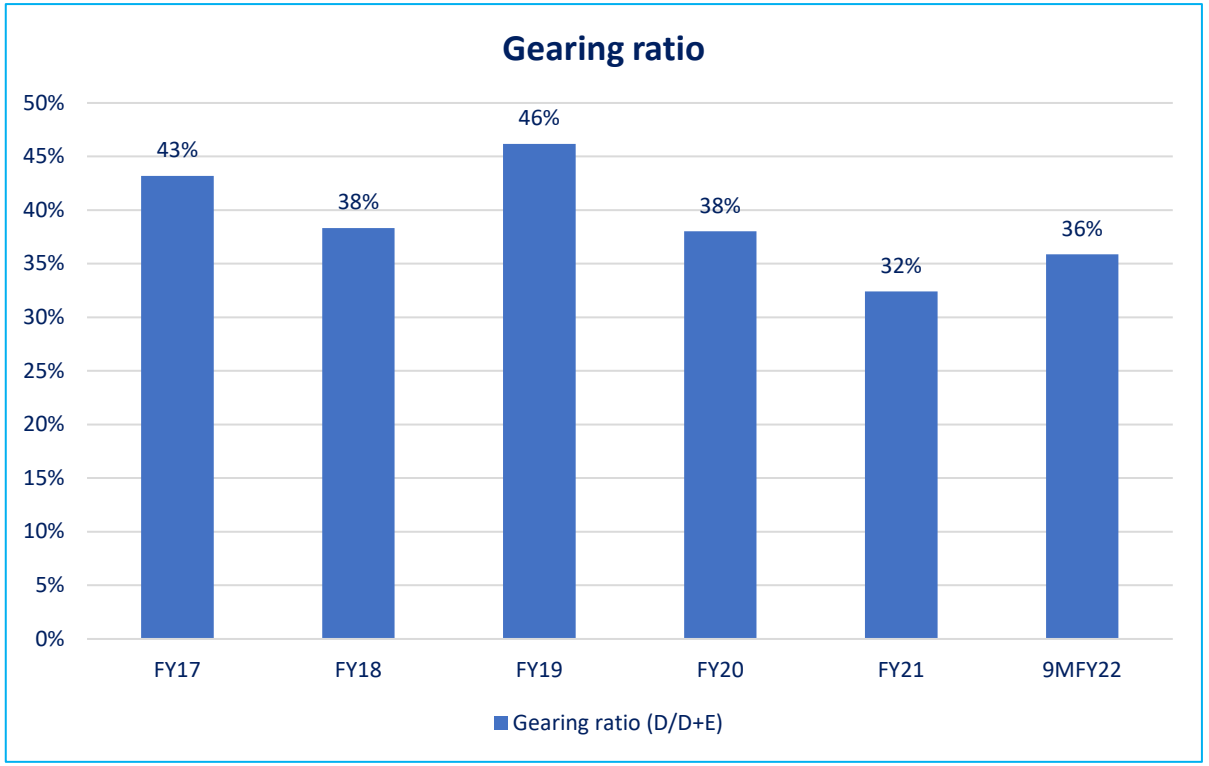
Financial Risk | Leverage

- In 9MFY22, the sector's debt increased by ~52% YoY, while its equity grew by ~9.7% YoY pushing sector gearing ratio to ~36%; which is still indicative of a moderate gearing profile.

- In 9MFY22, the sector's interest coverage ratio decreased to 8.5x (9MFY21: 12.7x) due to increased borrowings and rising interest rates; although the sector's capacity to service debt remains strong, mounting cost pressures and economic uncertainty may deter further expansion and thus borrowings.





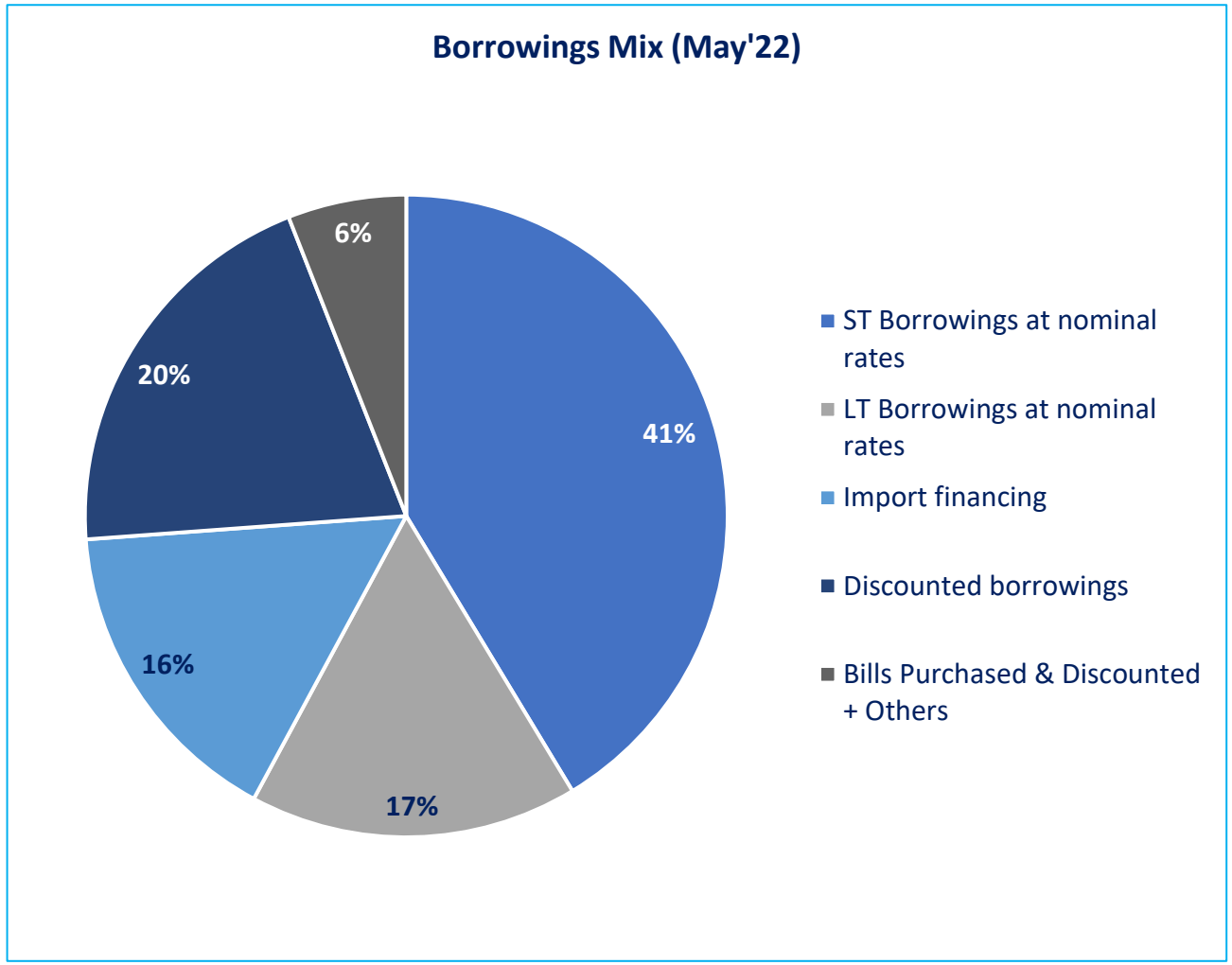
Note: Calculations based on averages of Soda ash, Caustic Soda, PVC, Hydrogen Peroxide and Resins segments of the industry

Source: SBP, PACRA Internal Database

Chemicals

Financial Risk | Borrowing

- Total sector borrowings stood at PKR~87bln as of May'22 (May'21: PKR~50bln), a significant increase of ~72% YoY.
- Long term Borrowings increased by ~40% YoY and held a share of ~17%, mainly used to finance expansion projects.
- Considering the high working capital needs, borrowing to finance working capital constituted ~41% of the total sector's borrowings; while growing by ~107% YoY in May'22.
- Import financing increased by ~71% YoY and held a ~16% share in the sector's borrowings mix.
- Discounted borrowings comprised LTFF, TERF and EFS, almost ~20% of the borrowing book, and grew by ~71% YoY.
- While bills purchased & discounted and others and grew by ~1.6x YoY and held a share of 6% in the mix.



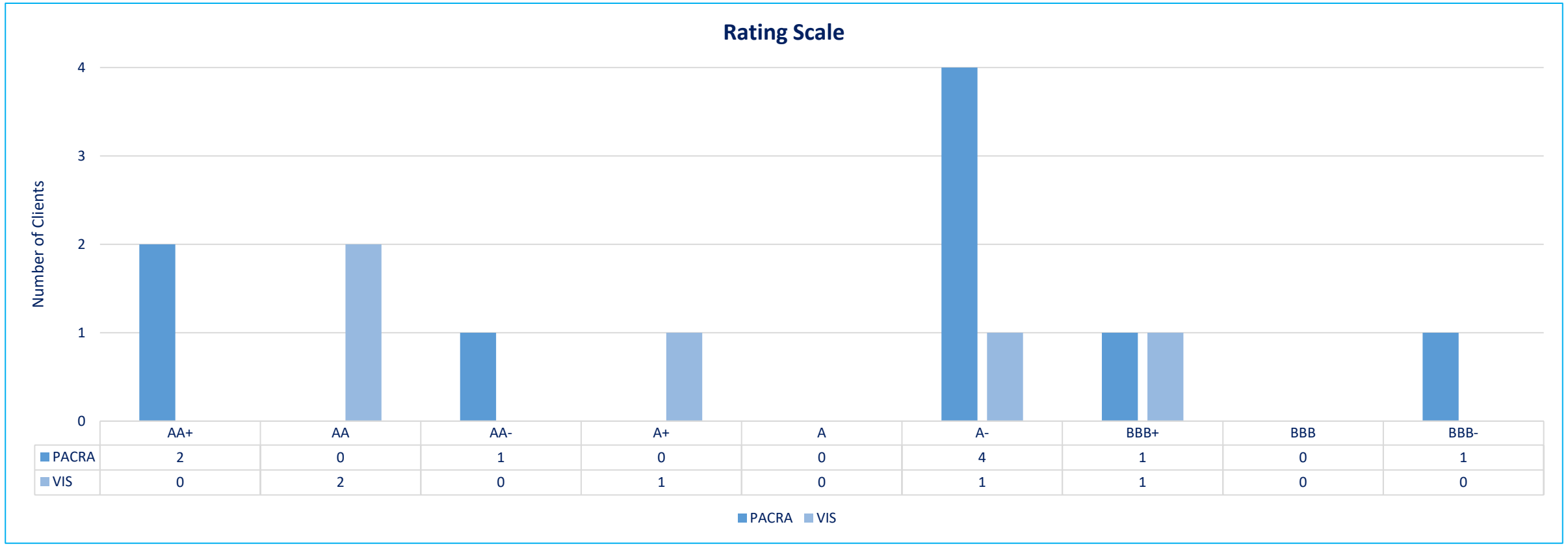
Note: Calculations based on averages of Soda ash, Caustic Soda, PVC, Hydrogen Peroxide and Resins segments of the industry

Source: SBP, PACRA Internal Database

Chemicals

Rating Curve

- PACRA rates 9 players of the chemical industry.
- Rating bandwidth of sector is from AA+ to BBB-.



	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-
PACRA	2	0	1	0	0	4	1	0	1
VIS	0	2	0	1	0	1	1	0	0

Source: PACRA Internal Database

Chemicals

Duties & Taxes

- The duty structure of the sector is designed to support local industries.

Duties and Taxes:

HSD Code	Product	Custom Duty		Sales Tax		Withholding Tax		Additional Custom Duty		Regulatory Duty	
		FY22	FY23	FY22	FY23	FY22	FY23	FY22	FY23	FY22	FY23
3904.22	Polyvinyl Chloride	20%	3%	17%	17%	2%	2%	7%	2%	0%	0%
2815.11	Caustic Soda	20%	20% & PKR4,000/MT	17%	17%	2%	2%	7%	6%	0%	20%
2836.2	Soda Ash	20%	20%	17%	17%	2%	2%	2%	2%	0%	0%
2847	Hydrogen Peroxide	11%	11%	17%	17%	6%	6%	2%	2%	5%	5%

Source: FBR

Chemicals

Porters 5 Forces Model

POTENTIAL NEW ENTRY

- **PVC** | Low|Capital Intensive
- **Caustic Soda** | Medium |Abundant Raw material, Technical Process
- **Soda Ash** | Low|Capital Intensive, Technical Process
- **HPO** | Medium| Abundant raw material, Technical Process
- **Resin** | High| Local Availability of raw material, Simplicity of production process

BUYER Power

- **PVC** | Low|Single Player
- **Caustic Soda** | High |Capacity greater than demand
- **Soda Ash** | Low |Capacity matches demand
- **HPO** | Low|Two Players
- **Resin** | High|Numerous small Players

SUBSITITUTES

- **PVC** | Low
- **Caustic Soda** | High |Multiple other products
- **Soda Ash** | Medium| Availability of other products
- **HPO** | Medium
- **Resin** | High

SUPPLIER Power

- **PVC** | High| Imported raw material
- **Caustic Soda** | Low |Local availability of raw materials
- **Soda Ash** | Low |Local availability of raw materials
- **HPO** | Low|Local availability of raw materials
- **Resin** | Low|Easily available

COMPETITIVE RIVALRY

- **PVC** | Low|Single producer
- **Caustic Soda** | High |Mutiple Producers
- **Soda Ash** | Low |Two Players
- **HPO** | Low |Two Players
- **Resin** | High |Multiple producers

Chemicals

SWOT Analysis

- Steadily increasing demand |All chemicals
- Sole Producer |PVC
- Local availability of raw materials|Soda, Ash, Caustic Soda, HPO
- High profit margins|PVC, Soda Ash, HPO
- Ability to pass on increased cost of production |PVC, Soda ash, HPO

- Reliance on imported power source|Oil, gas, coal
- Exposure to exchange rate volatility|PVC
- Shortage of locally available materials|PVC
- Inability to pass on increased cost of production |Caustic Soda, resin
- Tight margins|Caustic soda, resin

- High level of competition|Caustic soda, resin
- Exchange rate exposure|PVC, Soda ash
- New entry|Caustic soda, HPO, resin
- Potential pandemic lockdown
- Rising energy cost

- Low per capita consumption
- Export market to neighboring countries
- Room for research and development.

Chemicals

Outlook | Stable

- The chemical sector is essential for the production of multiple products which are used in various industries. The demand is highly linked to the economic activity. On the back of sharp economic recovery during FY21, the chemical sector has also performed well during the same period. The momentum continued in the earlier parts of FY22 as preliminary estimates suggest that Pakistan's GDP grew by ~5.97%.
- However the economic momentum has slowed down since the last quarter of FY22, as international commodities prices touched multi year high levels; this coupled with massive PKR devaluation along with fiscal vulnerabilities is leading to macroeconomic slippages; warranting contractionary economic policies.
- The QIM index shrank by ~13.3% MoM in April'22 with chemical production levels declining by ~2.8% MoM; persistent economic adversities can keep the sector growth in check.
- Except some chemicals, raw material for many basic chemicals is available locally, but the manufacturing process of majority chemicals is energy intensive for which different manufacturers use different type of energy sources ranging from imported coal to gas and electricity. As Pakistan is a net importer of oil, gas, coal and allied products, the sector faces considerable production cost pressures amidst high international energy prices and PKR devaluation. However, considering the high demand and low competition levels in most of the segments, the cost is largely transferrable to end consumers.
- The sector's cost of borrowings has also been increasing since 2QFY22, as the MPR increased to 13.75% in May'22; however the sector is moderately leveraged with a healthy debt servicing capacity and thus has lower financial risk exposure; despite this, increased interest rates are likely to deter additional expansionary borrowings, while mounting production costs may encourage fetching of short term lines by the sector.
- Going forward, the government has set a 5% GDP growth rate target for FY23 while IMF forecasts Pakistan's GDP growth at near the long term trend rate of 4.2%; given that level of economic activity, the sector's risk profile can reasonably be expected to remain largely stable.

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