



# Chemicals Sector Study



# Table of Contents

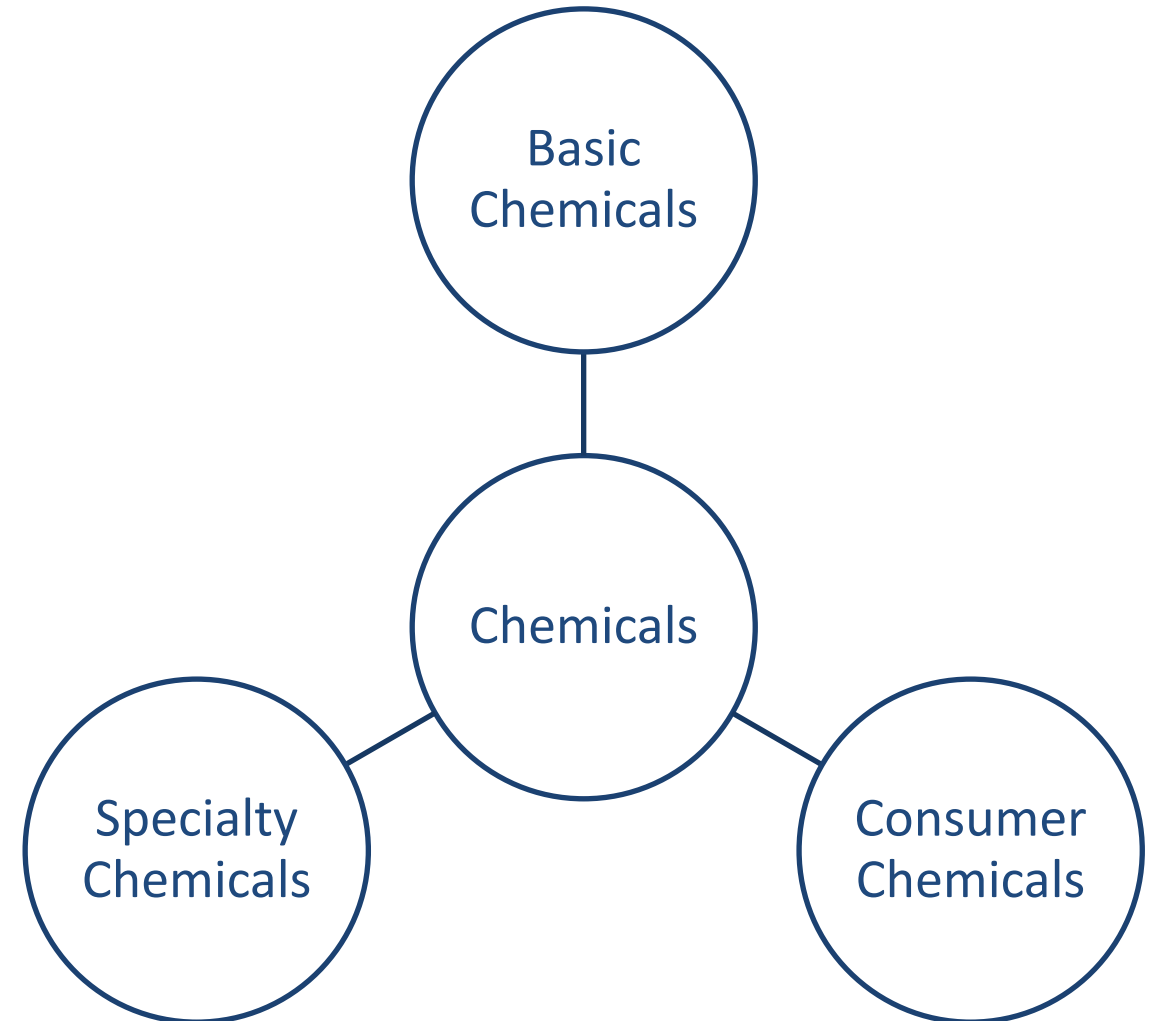


| Contents                               | Page No. | Contents                              | Page No. |
|--|----------|---------------------------------------|----------|
| Global Overview                        | 1        | Soda Ash Margins                      | 14       |
| Global Top Companies                   | 2        | Hydrogen Peroxide Process             | 15       |
| Global Growth Prospects                | 3        | Supply and Demand   Hydrogen Peroxide | 16       |
| Industry Snapshot                      | 4        | Hydrogen Peroxide Margin              | 17       |
| Local Industry Overview                | 5        | Supply and Demand   Resins            | 18       |
| Polyvinyl Chloride Process             | 6        | Resins Margins                        | 19       |
| Supply and Demand   Polyvinyl Chloride | 7        | Financial Risk   Working Capital      | 20       |
| Polyvinyl Margins                      | 8        | Financial Risk   Borrowing            | 21       |
| Caustic Soda Process                   | 9        | Rating Curve                          | 22       |
| Supply and Demand   Caustic Soda       | 10       | Duties & Taxes                        | 23       |
| Caustic Soda Margins                   | 11       | Porters 5 Forces Model                | 24       |
| Soda Ash Process                       | 12       | SWOT Analysis                         | 25       |
| Supply and Demand   Soda Ash           | 13       | Outlook   Stable                      | 26       |
|  |          | Bibliography                          | 27       |



## 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.



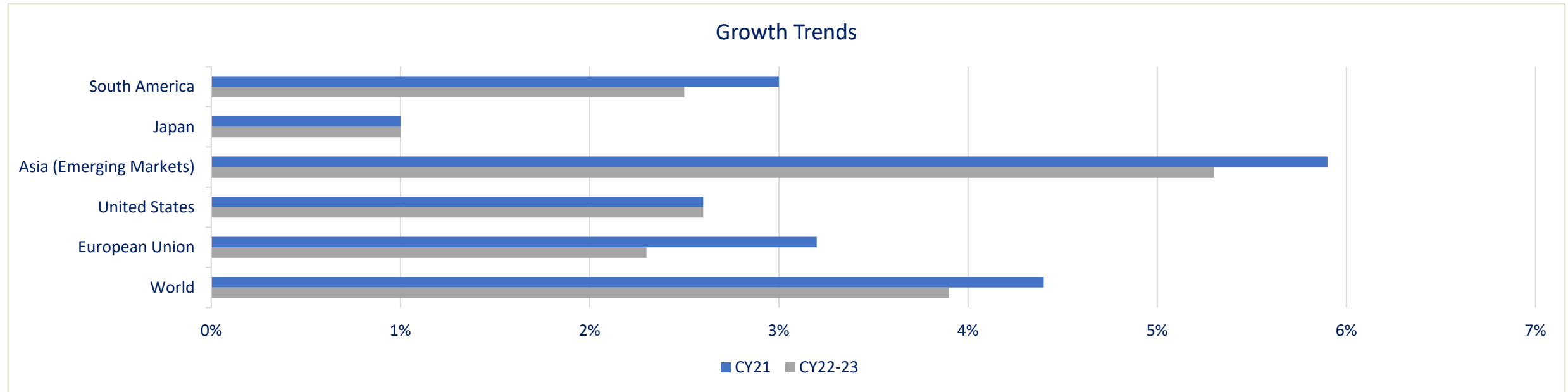
## Global Top Companies

- 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      | BASF                  | Germany      | 66                |
| 2      | Sinopec               | China        | 62                |
| 3      | Dow Inc               | USA          | 43                |
| 4      | Sabic                 | Saudi Arabia | 34                |
| 5      | Ineos                 | UK           | 32                |
| 6      | Formosa Plastics      | Taiwan       | 31                |
| 7      | Exxon Mobil Chemicals | USA          | 27                |
| 8      | Mitsubishi Chemical   | Japan        | 27                |
| 9      | LyondellBasell        | USA          | 27                |
| 10     | Linde plc             | UK           | 25                |

## Global Growth Prospects

- Chemical industry is one of the fastest growing sector. It has directly contributed more than USD~1.1 trillion to the global GDP, accounting for more than ~1.35% of global GDP. Considering its linkages with different industries, it has significant impact on the growth of vast number of industrial sectors. The supply chain and payroll induced impact of chemical industry is more than USD~5.7 trillion translating into over ~7% contribution to the global GDP. Therefore, creating more than ~120mln direct and indirect jobs.
- China, the world’s largest chemical markets with ~6.3% growth forecasted in CY21 (CY20: 3.4%). Momentum is likely to slow down after the rapid recovery in production in CY20. Nevertheless, anticipated demand in CY21 across all customer industries is expected to grow for intermediate inputs from the chemical industry, in particular consumer goods and in the automotive industry.



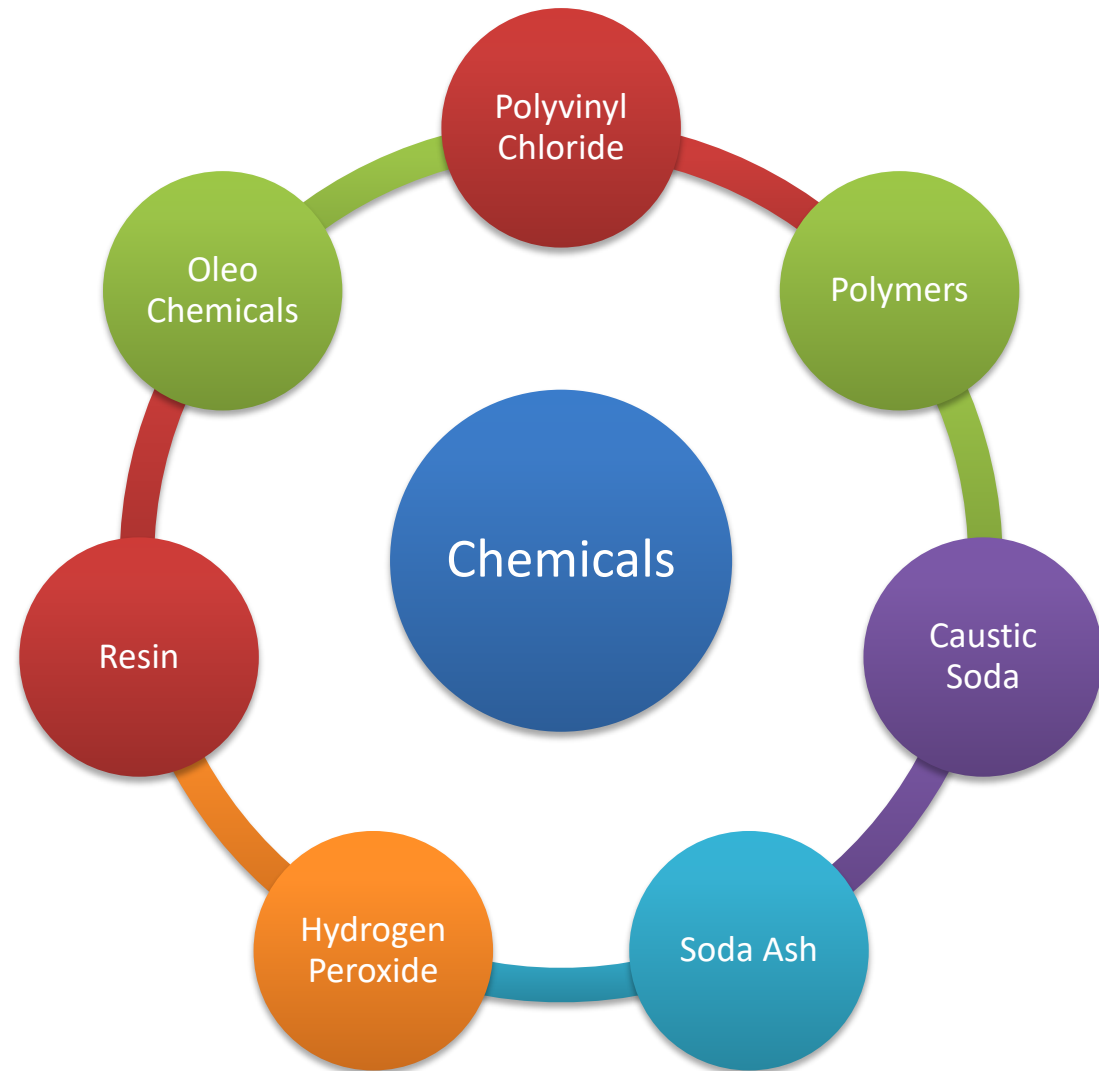
## Industry Snapshot

- Considering the high linkages of chemical sector with other sector of the economy, it is considered as one of the important sectors of Pakistan. As mentioned earlier, the sector embodied the large number of products but for the purpose of this sector study we will focus on companies producing basic chemicals excluding fertilizers in Pakistan.
- Pakistan reliance on imported chemical is reduced over the years as the local companies invested more to increase their production capacity and hence market share.
- Chemical sector of Pakistan contributes around ~4.5% in exports and its share in imports is ~12%. The sector plays a vital role 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 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 announced capacity expansion. Once completed, these expansion will provide much needed import substitution.

|   | FY19                                   | FY20   | 9MFY21 |
|---|--|--------|--------|
| Market Capitalization of Listed Companies (PKR bln) | 155                                    | 168    | 234    |
| Revenue (PKR bln)*                                  | 232                                    | 214    | 216    |
| No of Listed Companies                              | 23                                     | 23     | 23     |
| Growth  | 14.20%                                 | -8.10% | 13.50% |
| Association   | Pakistan Chemicals Members Association |        |        |
| Members   | 74                                     | 79     | 79     |
| Structure   | Oligopolistic                          |        |        |
| Imports (PKR bln)                                   | 865                                    | 851    | 136    |
| Exports (PKR bln)                                   | 154                                    | 159    | 758    |

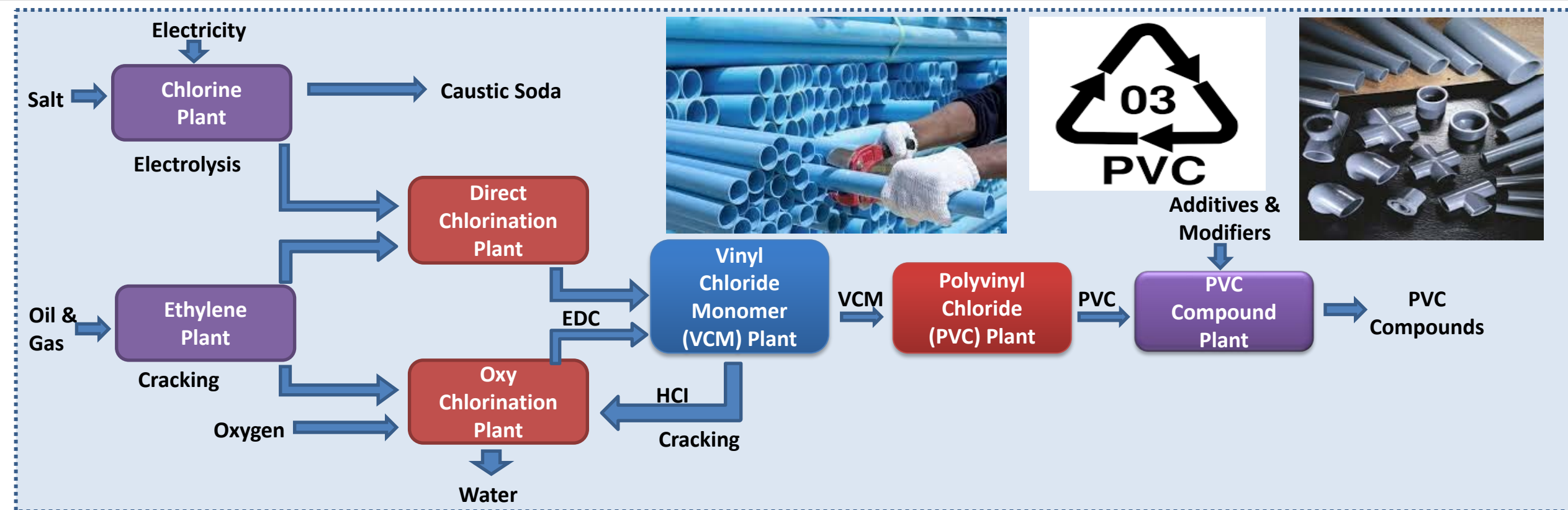
## Local Overview

- Pakistan has the gigantic potential to the growth of chemical sector as it is the integral part of our daily life and industrial progress despite there are only few groups focusing on this sector so still country has big room for investment.
- Over the years the local market has made considerable progress in basic inorganic chemical like Polyvinyl Chloride, Caustic soda, Soda Ash, Hydrogen peroxide and has expanded their production capacity to cater the market demand.
- Besides providing support to local industries with the readily availability of basic chemicals, it is an important import substitution as well.
- Although variety of chemicals are made used in multiple industries, the chemical industry can be broken down into seven main categories (figure).





## Polyvinyl Chloride Process (PVC)

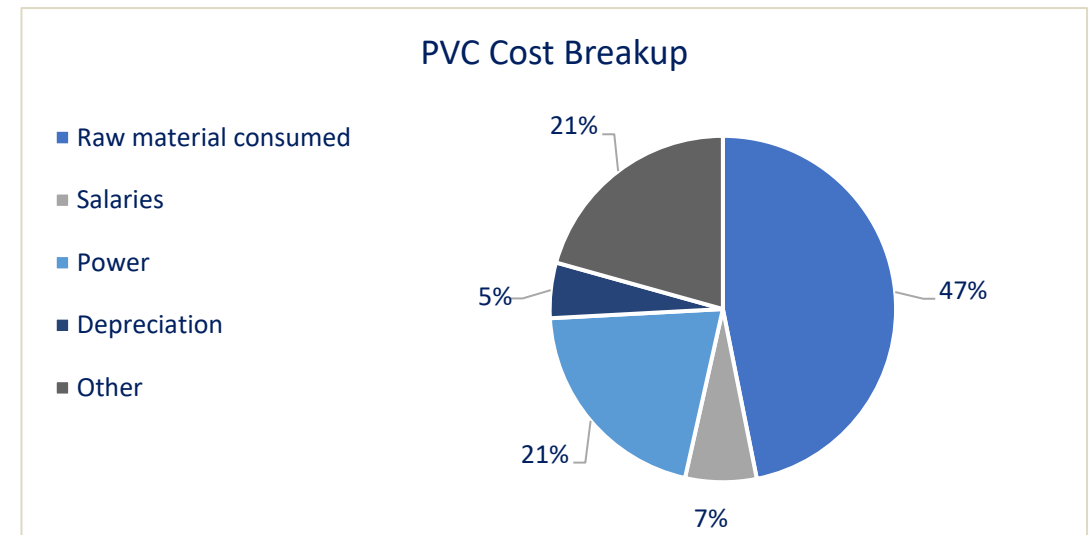
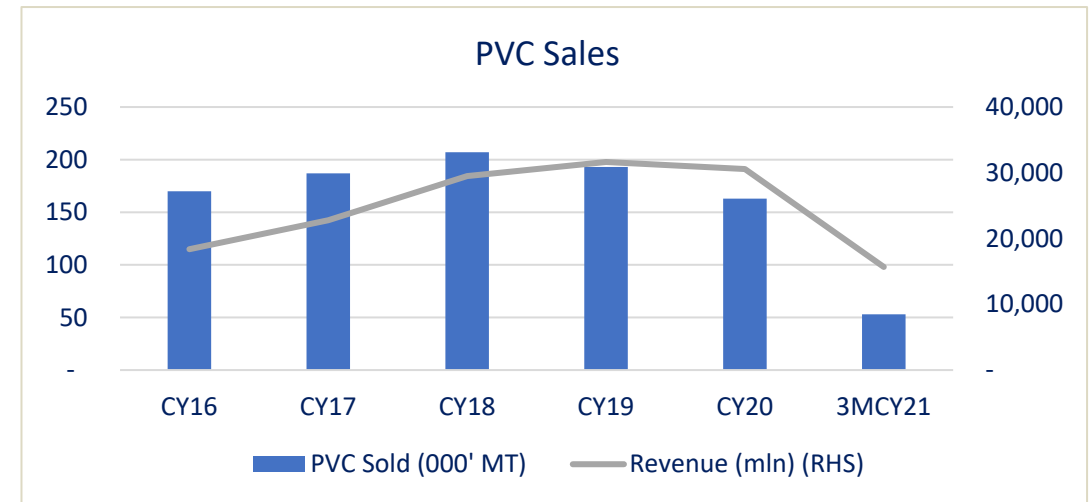


- Chlorine is extracted from sea salt via electrolysis and ethylene is derived from hydrocarbon raw materials. These are reacted to produce ethylene dichloride.
- The ethylene dichloride is then decomposed by heating in a high temperature furnace or reactor.
- PVC is made using a process called addition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



## 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 annual production capacity of 295,000MT.
- Two of the critical raw material, ethylene and EDC are imported which are subject to exchange rate and international price movement. Raw material accounts for ~47% of the total cost of production. Production of PVC is an energy intense manufacturing process requiring high power consumption which constitutes ~21% of its total cost.
- As of FY20, PVC consumption per capita stood at 1.12Kg. 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 the other consumer of PVC are film & sheet, cable compound, flexible hose, shoes, profile, flooring and foam board.
- During CY20 overall sales of PVC was recorded at ~163,000MT with YOY decline of ~15.5% on the back of lock down being imposed during 2QCY20. Moreover, with uptick in construction activity overall demand of PVC is expected to increase in CY21 as evident by higher sales volumes in 1QCY21.

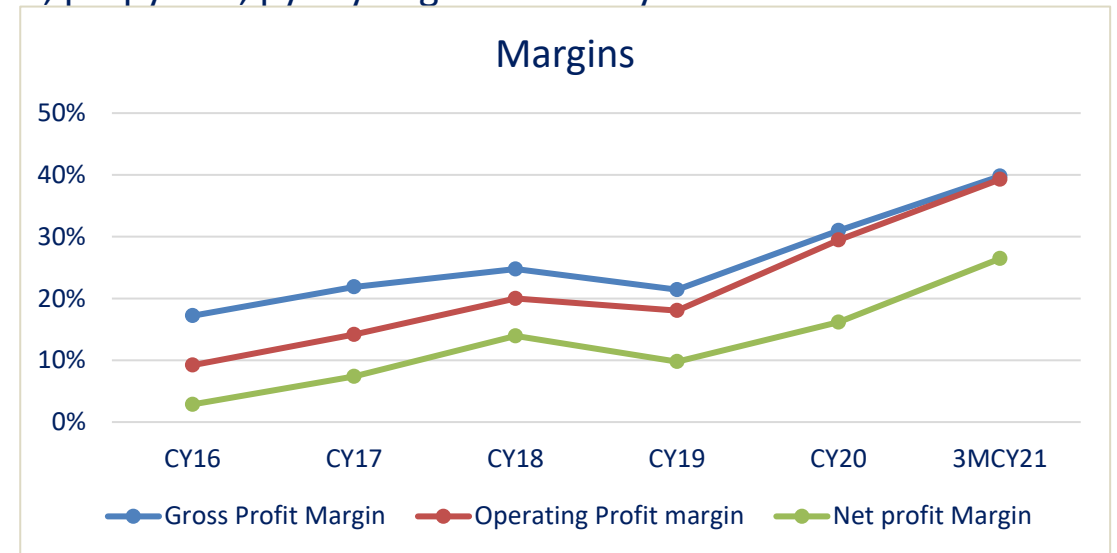
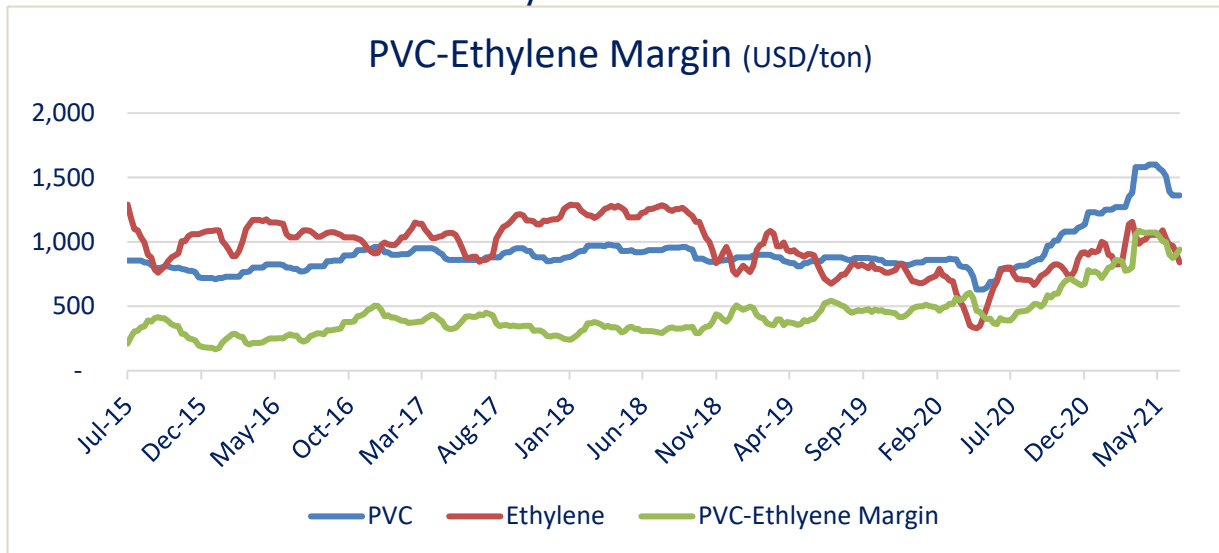


Note: PVC sales is of EPCL only.

# Chemicals

## PVC Margins

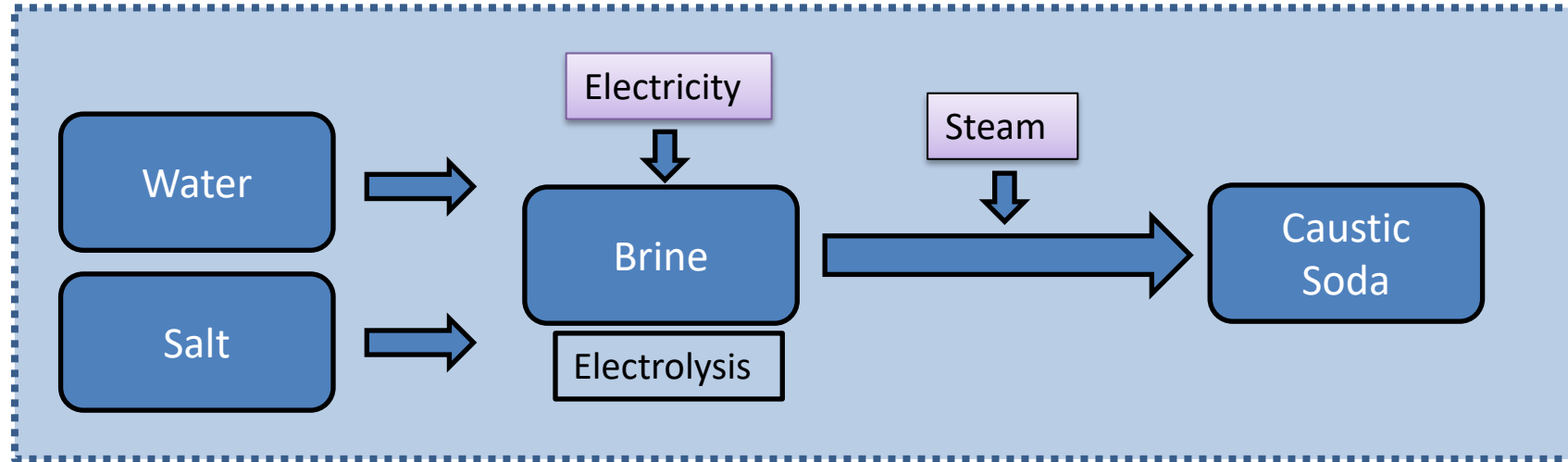
- PVC margins are a function of ethylene international prices and exchange rate. PVC is also imported to fill the supply gap due to production limits. International PVC prices increased significantly during FY21 due to increased demand on the back of increased activity across the globe, post relaxation of COVID restriction in major economies.
- Despite the increase in Ethylene price, PVC-Ethylene margins show exponential growth on the back of sharp increase in international PVC prices during 2HCY20. With increased in PVC-Ethylene margins, overall margins of the sector also increased during CY20. With the increased demand the margins of the sector are expected to remain strong.
- Installation of Naphtha cracking plant with greatly help the local whole chemical industry. It will also reduce burden on the import bill. From this installation variety of chemical can be extracted such as ethylene, propylene, pyrolysis gas and many more.





## Caustic Soda Process

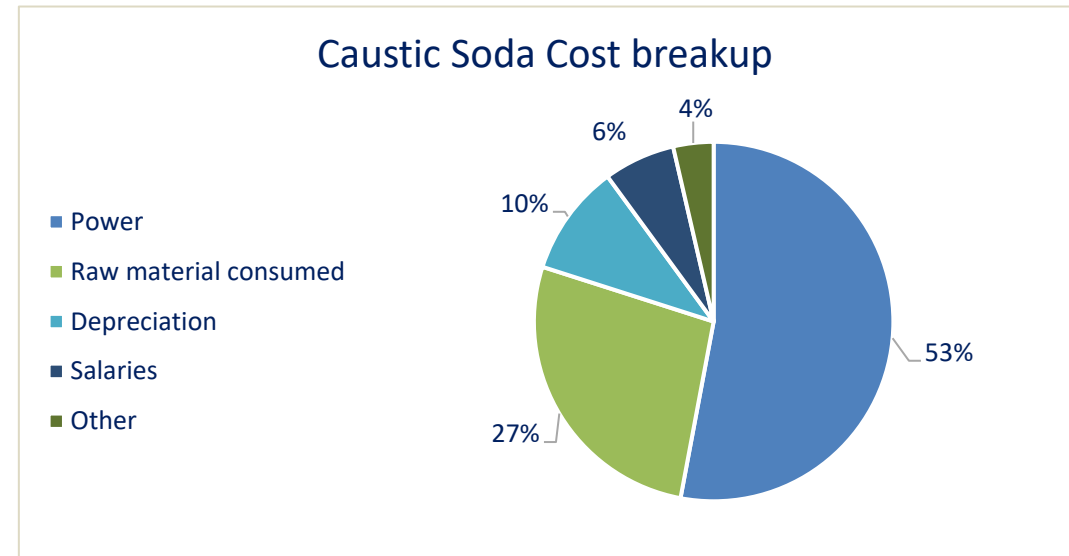
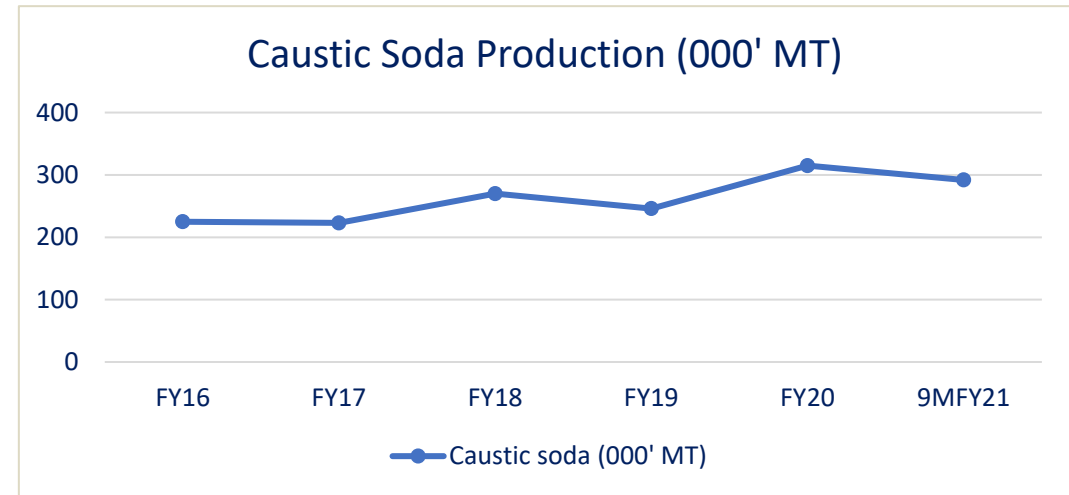
### Caustic Soda:



- Nearly all caustic soda is generated by the electrolysis of sodium chloride solution using one of 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 has been 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.

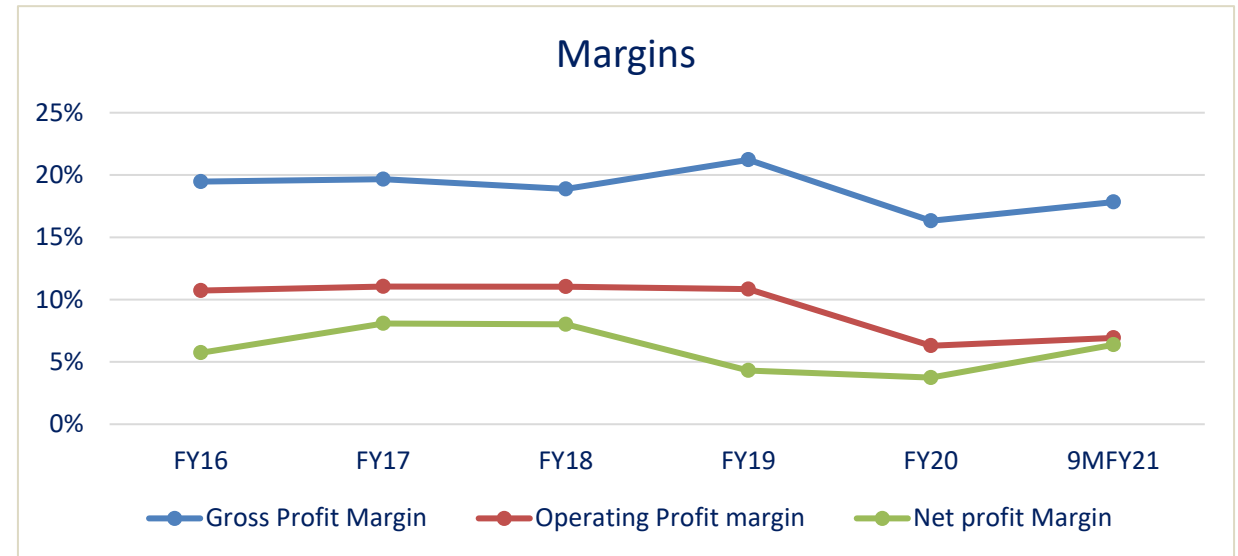
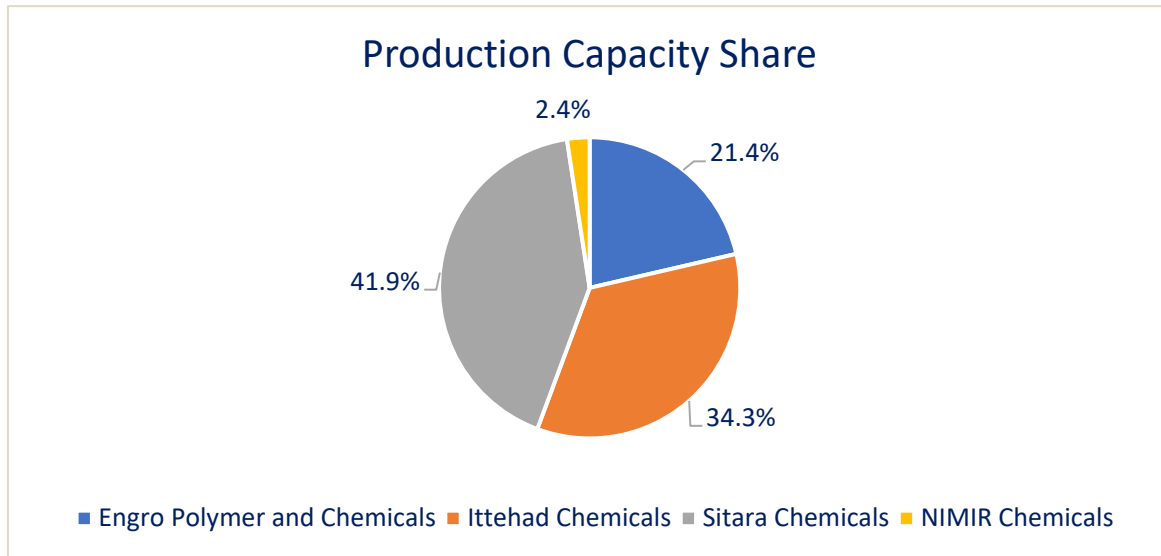
## Supply and Demand | Caustic Soda

- Caustic Soda:** In pure form, caustic soda is a waxy, white solid. It readily absorbs water and forms aqueous solutions.
- Caustic soda is made through electrolysis process through brine resulting in high electricity usage. Approximately ~53% of the total cost of production accounts for power usage, thus exposing it to any change in electricity tariff. Raw material accounts for 27% of the total cost of production made up of brine, mostly salt and water, which are abundantly available locally.
- 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. However, the COVID-19 gave rise to soap industry for which caustic soda is used. The expected demand for FY21 is expected to be ~388,000MT.



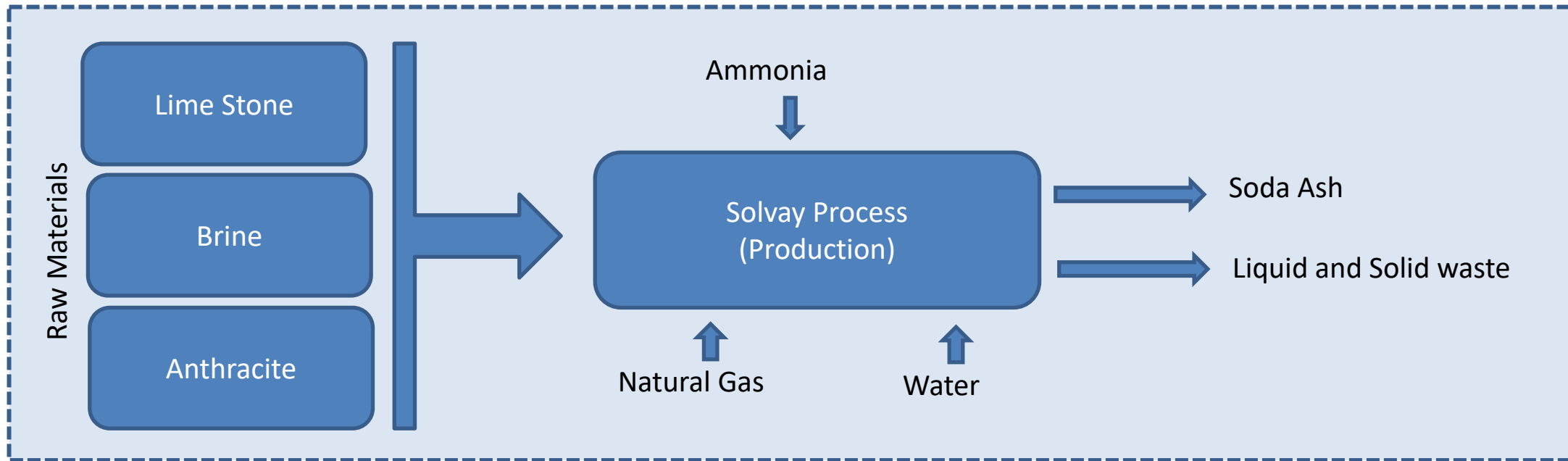
## Caustic Soda Margins

- 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 ~495,900MT during 9MFY21 whereas total production during the same period was ~315,000MT translating into ~65% capacity utilization. Amid low capacity utilization the import of caustic soda is negligible.
- Although demand for caustic soda increased in FY20, margins still suffered due to significant increase in production cost for the industry. The capacity 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 increase in cost of production will be at the expense of market share.
- NIMIR industry has announced to expand its current production capacity of caustic soda from ~12,000MT in FY21 to ~42,000MT in FY23.



## Soda Ash Process

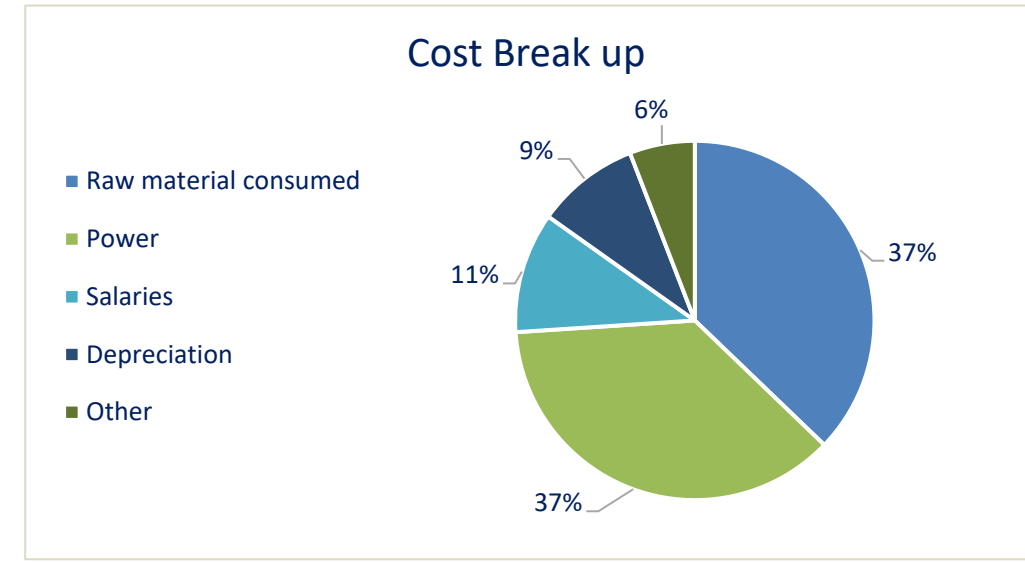
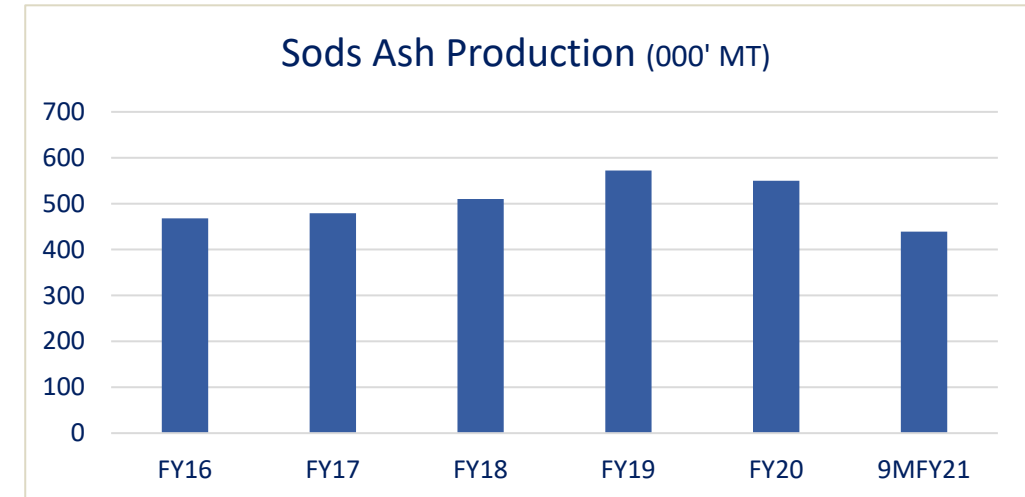
### Soda Ash:



- 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.

## Supply and Demand | Soda Ash

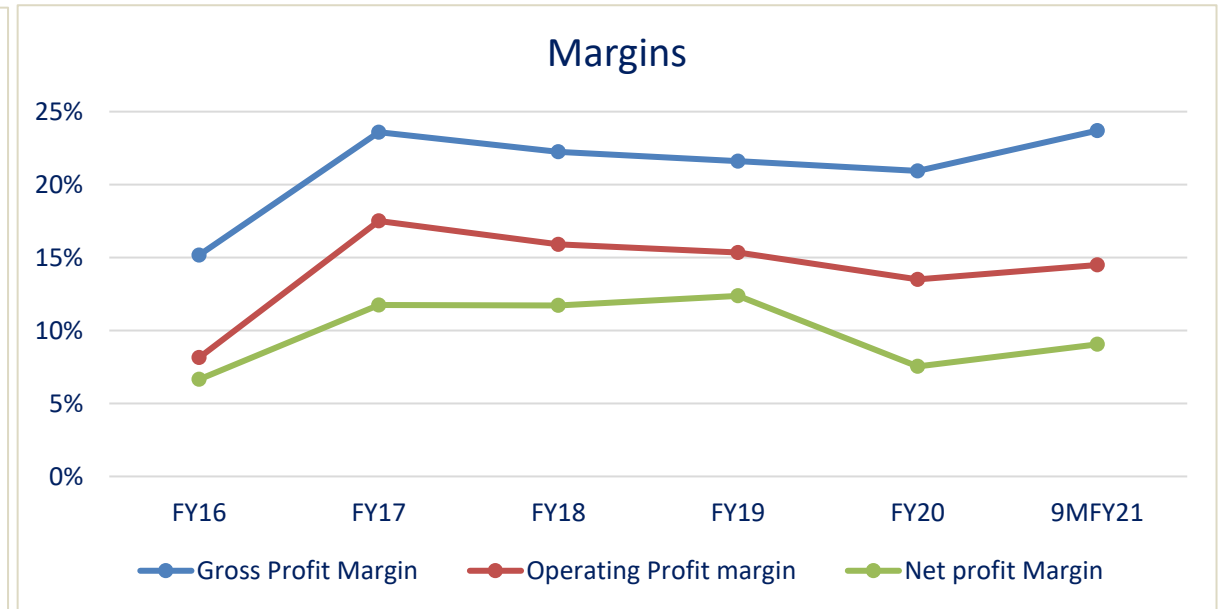
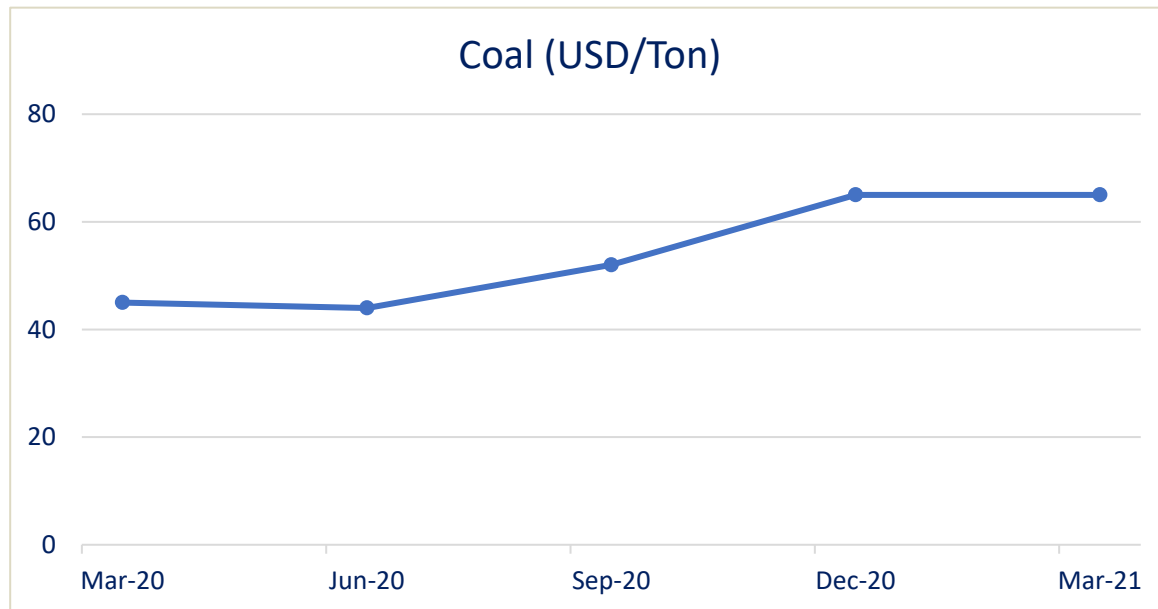
- Soda Ash:** It is an anhydrous white powder or granular material that is available in two grades, light and dense. Dense soda ash is an anhydrous substance mostly used in the manufacturing of industrial chemicals. Light soda ash is used as pH regulator in various industrial processes.
- Raw material and energy cost account for ~74%, 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. As the economy is recovering, demand for glass especially from construction supported by various government packages.
- There are only two major players in the soda ash segment, ICI chemicals and Olympia chemicals, having a combined capacity of ~699,500MT with ~65% and ~35% share respectively. Local demand for caustic soda is met almost through local production. For the FY20, only ~823MT of soda ash was imported.



# Chemicals

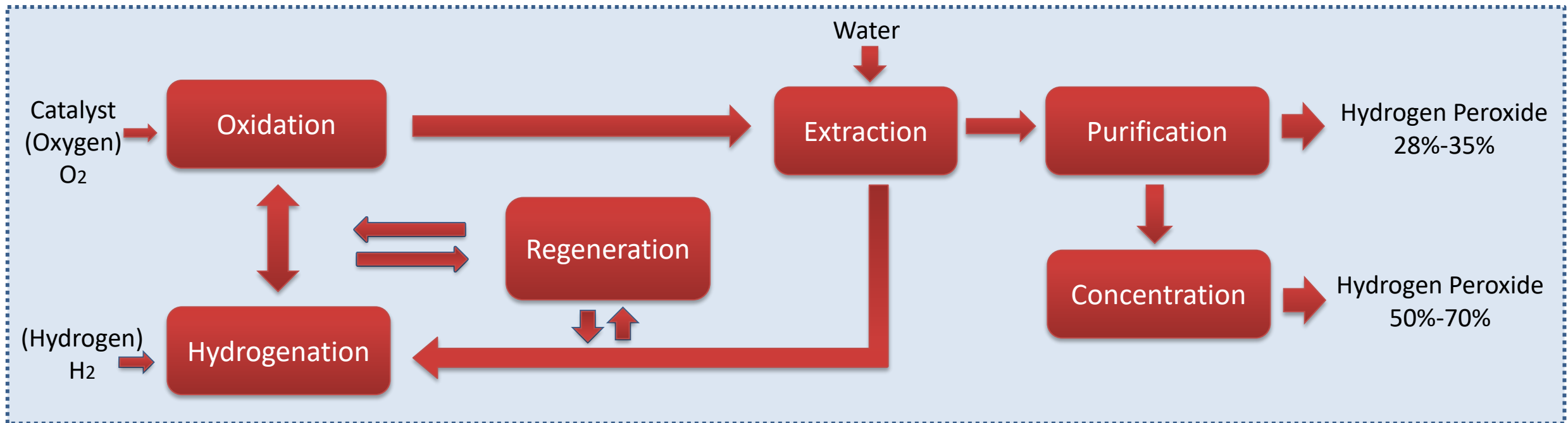
## Soda Ash Margins

- Demand for soda ash has almost reached the capacity available in the country. Soda ash is 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.





## Hydrogen Peroxide Process

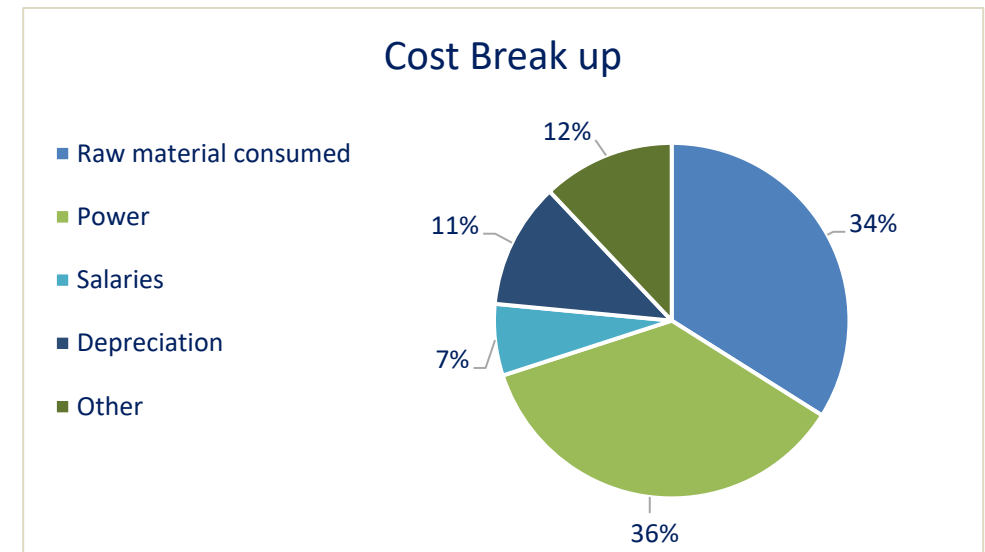
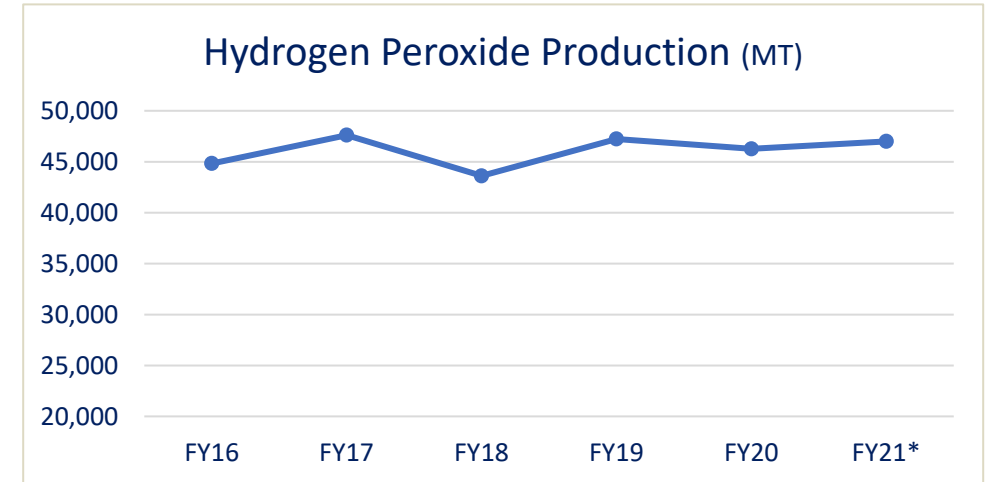


- Palladium catalyses the reaction between H<sub>2</sub> and anthraquinone to create anthrahydroquinone.
- The palladium catalyst is filtered out of the solution.
- The solution is oxidized by blowing air through the solution, forming the H<sub>2</sub>O<sub>2</sub> (Hydrogen Peroxide).
- The hydrogen peroxide is removed in a liquid-liquid extraction column and concentrated by vacuum distillation.



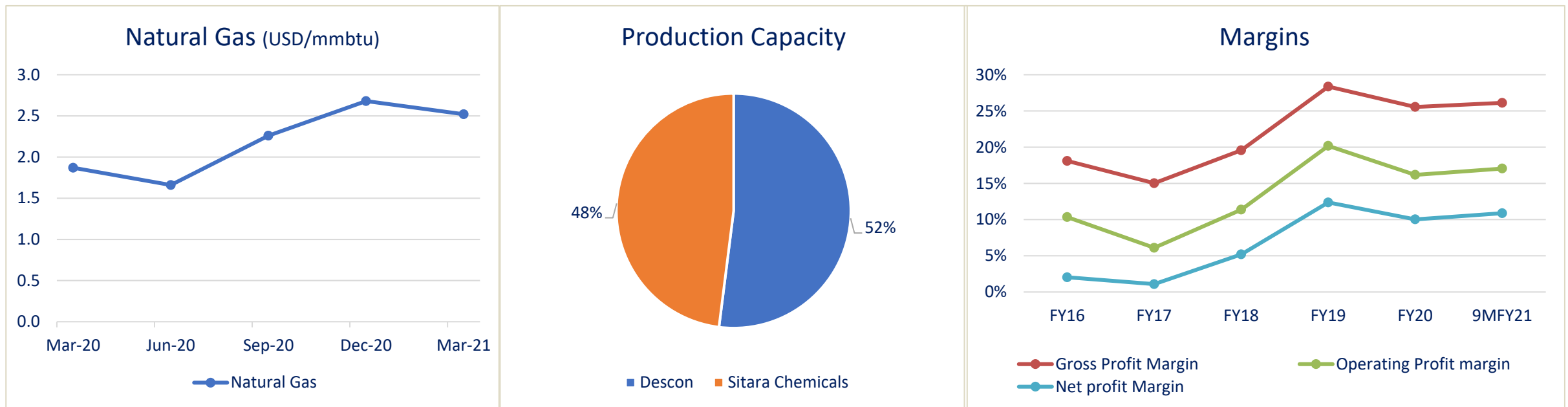
## Supply and Demand | Hydrogen Peroxide

- **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.
- The 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 accounts for ~36% of cost of production of which ~25% is natural gas followed by electricity making up rest of the 11%.
- 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.



## Hydrogen Peroxide Margin

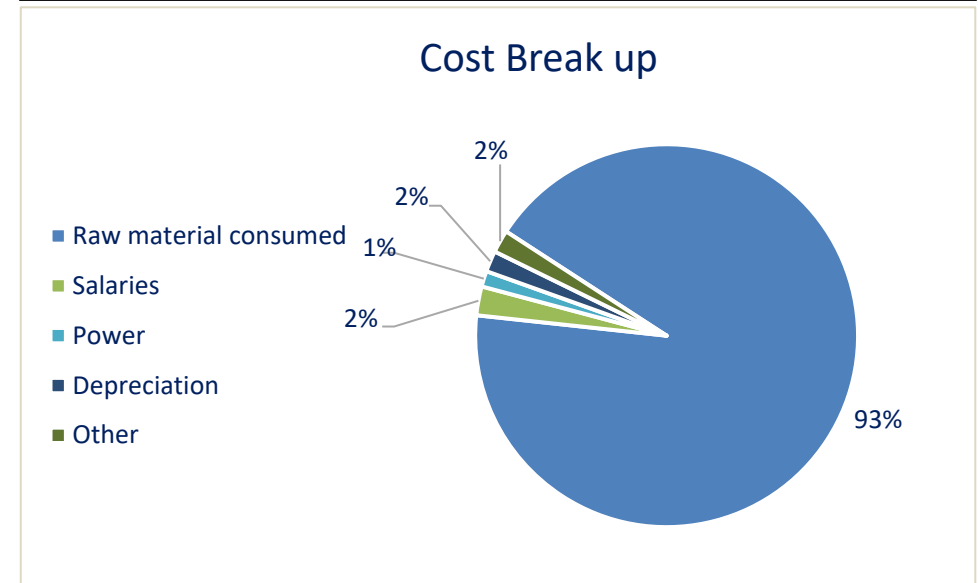
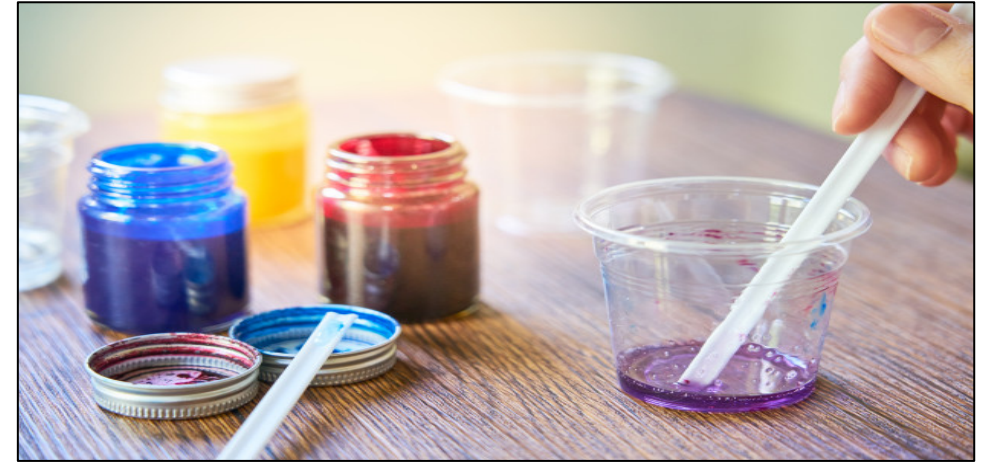
- There are two players in hydrogen peroxide segment Descon Oxychem Limited (DOL) and Sitara Chemicals Limited (SPL), having a total capacity production of ~58,000MT. During FY20, ~16% of the local demand was met through imports. Considering the demand-supply gap, both players had announced capacity expansion in FY18. DOL successfully completed its production enhancement whereas, SPL production enhancement is underway. Moreover, EPCL is entering the market with an estimated production capacity of ~28kMT in FY22.
- Hydrogen peroxide is a high margin segment. Moreover, due to less competitive nature of the sector, the ability of the companies to pass on impact of increased cost to customers is high.





## Supply and Demand | Resins

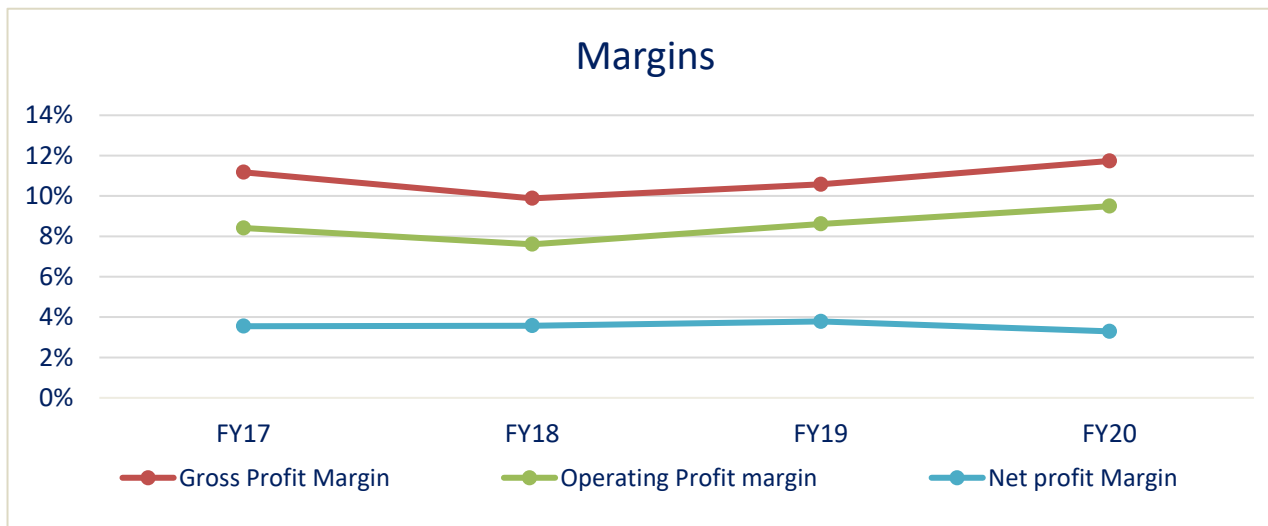
- **Resin:** Resin includes production of chemical emulsions, which comprise adhesive emulsions, homo polymer, co polymer cross linking agent, acrylates-based emulsion dispersion, pure acrylates emulsion and styrene modified acrylates emulsion.
- Resins are primarily used in the coating and paint industry and drive its 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, quality and specific use for the industry. The raw materials of the 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 ~55,000MT.
- The growth is dependent upon the overall economic growth with major contribution coming from coating and paints and textile, expected to grow 15% and 5%, respectively, going forward.





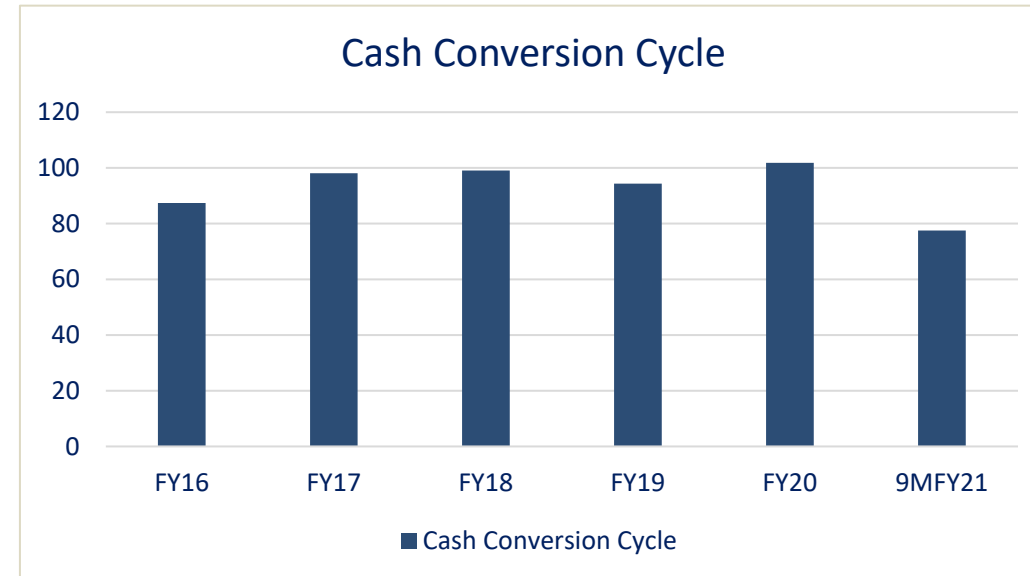
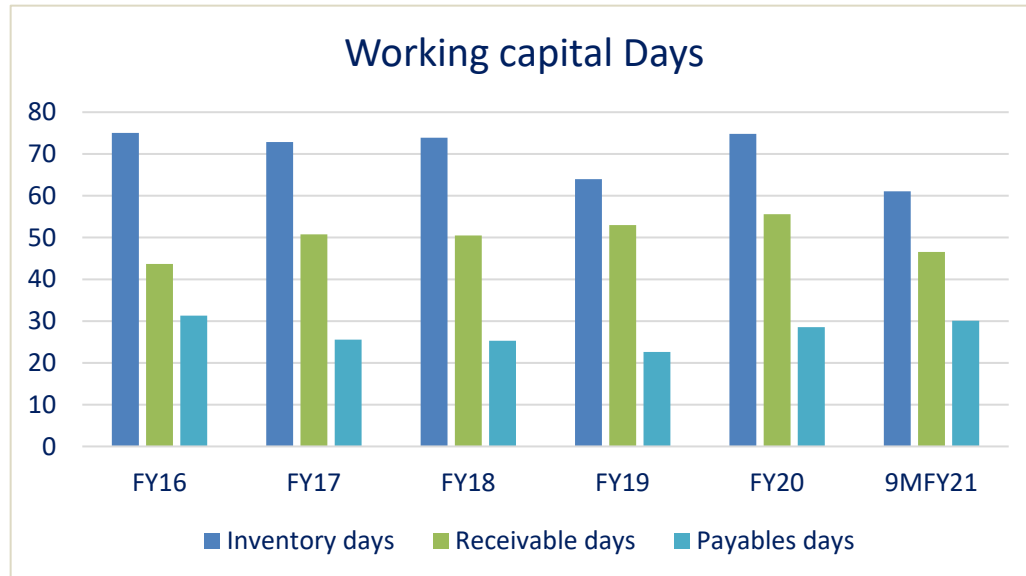
## Resins Margins

- 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 consist mixing different raw materials at certain quantities to make resin of different quality and grade. Because of simplicity in the production process, the industry is very competitive and margins are relatively on the lower side.
- During FY20, COVID-19 outbreak and associated lockdown hindered the growth of the market. However, now with almost all the sectors operating at reasonable utilization, the demand is returning to pre-covid levels.
- As ~92% of the total cost of production constitutes of raw material, passing any increase in cost to consumers to maintain margins remains challenging due to competitive nature of the segment.



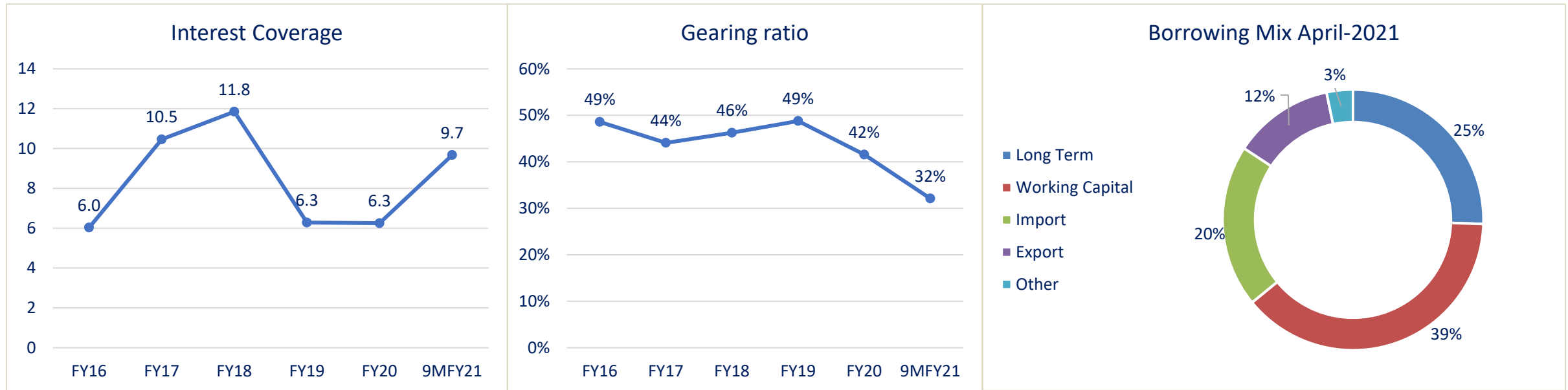
## Financial Risk | Working Capital

- Working capital of the sector is characterized by high inventory and receivable days. Receivable and inventory days both declined during July-MarFY21. The improvement was mainly due to improving industry conditions and recovery from the impact of COVID-19 in the last 4QFY20.
- With the decrease in inventory and receivable days overall cash conversion cycle of the company also decreased to ~78 days in 9MFY21 from ~102 days in FY20. Cash conversion cycle of the sector is expected to improve in coming periods with increased demand and improvement in economic activity.



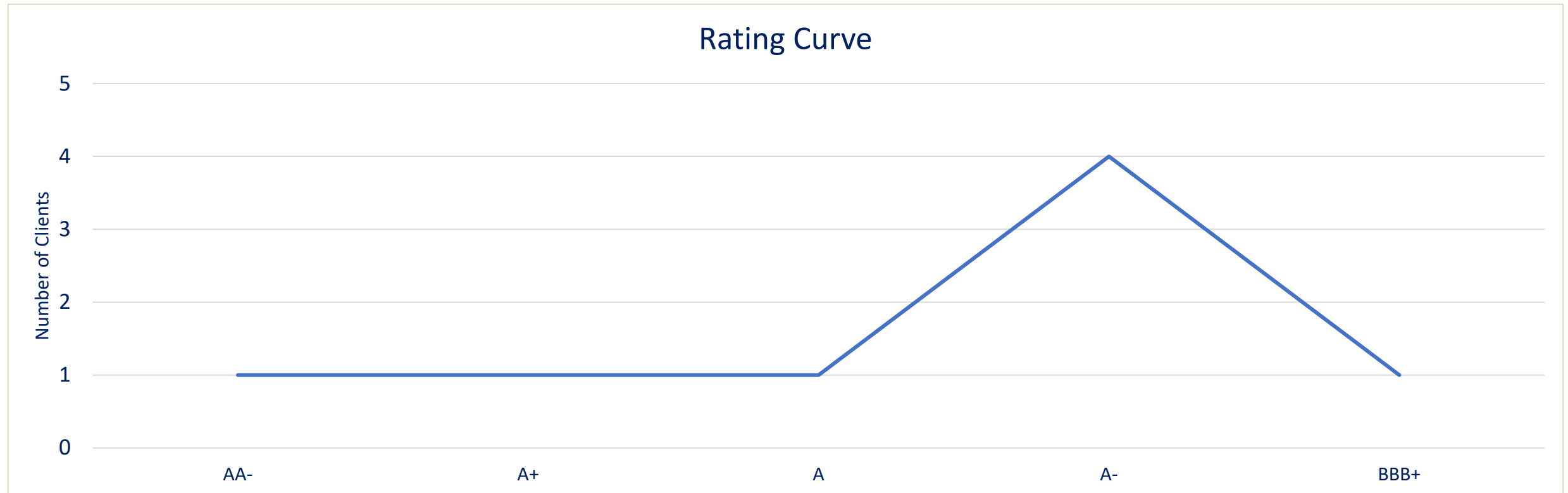
## Financial Risk | Borrowing

- Total sector borrowing stood at ~50bln as of 10FY21 (FY20: PKR~71bln) with significant decline of ~42% since June-2020 . Long term Borrowing comprises ~25%, mainly used to finance expansion projects. Considering the high working capital needs, borrowing to finance working capital constitutes ~39% of the total sector’s borrowings.
- With decline in overall debt, the gearing ratio also reduced to ~32% as of 9MFY21 indicating moderate gearing risk profile for the industry. Interest coverage improved to ~9.7x from ~6.3x. The gearing ratio is expected to increase in the future as chemical companies sight their eyes towards future expansion projects. Despite increase in borrowing financial risk profile of the sector is expected to remain strong.



## Rating Curve

- PACRA rates 8 players of the chemical industry.
- Rating bandwidth of sector is from AA- to BBB+.





## Duties & Taxes

- The duty structure is designed to support local industries.

### FY21 Duties and Taxes:

| HSD Code  | Product            | Custom Duty | Sales Tax | Income Tax | Additional Custom Duty | Regulatory Duty |
|-----------|--------------------|-------------|-----------|------------|------------------------|-----------------|
| 3904.2200 | Polyvinyl Chloride | 20%         | 17%       | 11%        | 7%                     | 0%              |
| 2815.1100 | Caustic Soda       | 20%         | 17%       | 11%        | 7%                     | 0%              |
| 2836.2000 | Soda Ash           | 20%         | 17%       | 11%        | 2%                     | 0%              |
| 2847.0000 | Hydrogen Peroxide  | 11%         | 17%       | 11%        | 2%                     | 5%              |



## 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

### SUBSTITUTES



- **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 | Multiple Producers
- **Soda Ash** | Low | Two Players
- **HPO** | Low | Two Players
- **Resin** | High | Multiple producers



## 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

Strengths

Weaknesses

- 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

Threats

Opportunities

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

## Outlook | Positive

- The chemical sector is essential for 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 of Pakistan during FY21, the chemical sector has also performed well during the same period. As the economy is projected to grow by ~5% in FY22 with significant growth expected in Large Scale Manufacturing concern industries as well as Small and Medium Enterprises, the demand of chemical products is also expected to remain strong during the period.
- Except some chemicals, raw material for many basic chemicals is available locally. But as 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. Thus exposed the sector to exchange rate risk and change in international prices of oil, gas, coal and allied products which are imported. But considering the high demand and low competition the cost is easily transferrable to consumers.
- Growth and margins are promising for majority segments of the industry and further expansion plans are in play by many players. EPCL expanded its PVC production capacity by ~100,000MT in 3QFY21 and is expanding further into the hydrogen peroxide market with planned capacity of ~28,000MT expected to be completed within a span of two years.
- With improved economic activity and increased demand the working capital management of the sector has also improved in 9MFY21. Moreover, the overall debt of the sector has been decreased significantly and thus resulted in reduced gearing ratio of the sector. With strong interest coverage and moderate gearing ratio the financial risk profile of the sector is considered strong.
- Improved economic activity will support demand and stable exchange rate will improve the sustainability of profit margins. Overall chemical sector is expected to perform well in coming periods.



## Bibliography

- PACRA Internal Database
- Pakistan Chemicals Members Association
- Pakistan Bureau of Statistics
- State Bank of Pakistan
- The Economic Survey of Pakistan
- Federal Board of Revenue
- International Council of Chemical Associations
- Chemical and Engineering News
- Badische Anilin und Soda Fabrik
- Pakistan Stock Exchange
- Vinyl.org.au
- Elixir Publishers
- Eurochlor.org

|  |                                     |  |   |
|--|-------------------------------------|--|---|
| <b>Research Analysts</b>   | <b>Saniya Tauseef<br/>Team Lead</b> | <b>Muhammad Nadeem Sheikh<br/>ACCA, CFA<br/>Supervising Senior</b> | <b>Zohaib Khalid<br/>Research Analyst</b> |
| <b>Email: <a href="mailto:nadeem.sheikh@pacra.com">nadeem.sheikh@pacra.com</a></b><br><b>Contact Number: +92 42 35869504</b> |                                     |  |   |

## DISCLAIMER

PACRA has used due care in preparation of this document. Our information has been obtained from sources we consider to be reliable but its accuracy or completeness is not guaranteed. The information in this document may be copied or otherwise reproduced, in whole or in part, provided the source is duly acknowledged. The presentation should not be relied upon as professional advice.