

CHLOR-ALKALI SECTOR

November, 2019



Chlor-alkali industry is one of the largest electrochemical industry, the main products chlorine and caustic soda are imperative intermediates in chemical and allied industries.

One of the largest electrochemical industry

Main products being chlorine and caustic soda (sodium hydroxide), collectively called chlor-alkali chemicals

Highly energy extensive-with electricity and other utilities accounting for 40-50% of the production costs

Chlor-Alkali Products and End Uses

Chlorine	Caustic Soda	Soda Ash	Sodium Hydrosulphite	Hydrochloric Acid & Sodium Hypochlorite
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> PVC	<input type="checkbox"/> Textiles	<input type="checkbox"/> Glass	<input type="checkbox"/> Paper	<input type="checkbox"/> Purification and disinfection of water
<input type="checkbox"/> Water treatment	<input type="checkbox"/> Soaps and Detergents	<input type="checkbox"/> Soaps & detergents	<input type="checkbox"/> Textile	<input type="checkbox"/> Textile Bleaching
<input type="checkbox"/> Pulp and paper	<input type="checkbox"/> Paper & board	<input type="checkbox"/> Metallurgy	<input type="checkbox"/> Bleaching	<input type="checkbox"/> Pulp & paper
<input type="checkbox"/> Chlorinated intermediates	<input type="checkbox"/> Vegetable oil refining	<input type="checkbox"/> Pulp & paper	<input type="checkbox"/> Cosmetics	<input type="checkbox"/> Food processing
	<input type="checkbox"/> Food processing			
	<input type="checkbox"/> Steel/ metallurgy-sintering			
	<input type="checkbox"/> Alumina			

Global Overview

Projected to grow at an effective CAGR of 6.2%, from USD 97b in 2019 to USD 147.8b in 2026

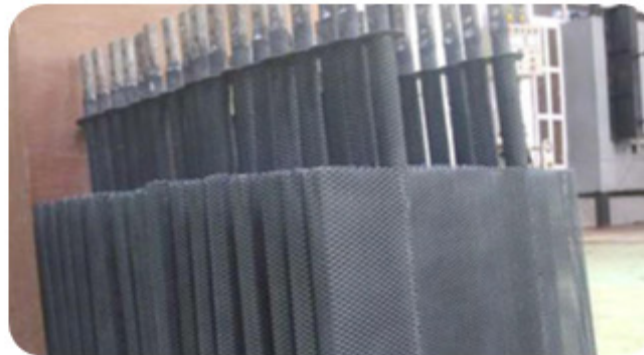
Asia-pacific is the leading region in ionic market, followed by North America and Europe

Across the globe, the demand for alkali chemicals is increasing owing to growth in volume consumption of alumina excessively requires caustic soda

Methods for the production of Chlor-Alkali



Mercury
Cell Process



Diaphragm
Cell Process



Membrane
Cell Process

Mercury Cell Process

- Negative electrode is made of flowing mercury
- The cell is made of PVC-lined steel and the positive electrode where chlorine is formed is made of graphite
- As the brine is usually re-circulated, solid salt is required to maintain the saturation of salt water
- The brine is first de-chlorinated and then purified by a precipitation-filtration process
- Extremely pure product

Diaphragm Cell Process

- A diaphragm separates cathode and anode, preventing the chlorine forming at the anode from re-mixing with the NaOH and the hydrogen formed at the cathode
- Produces alkali that is quite dilute
- Operates at lower voltage-but large amounts of steam are required if NaOH has to be evaporated to the commercial concentration of 50%

Membrane Cell Process

- Electrolysis cell is divided into two "rooms" by a cation permeable membrane acting as an ion exchanger
- Produces very pure NaOH at about 32% concentration
- Requires very pure brine

Mercury Cell Process

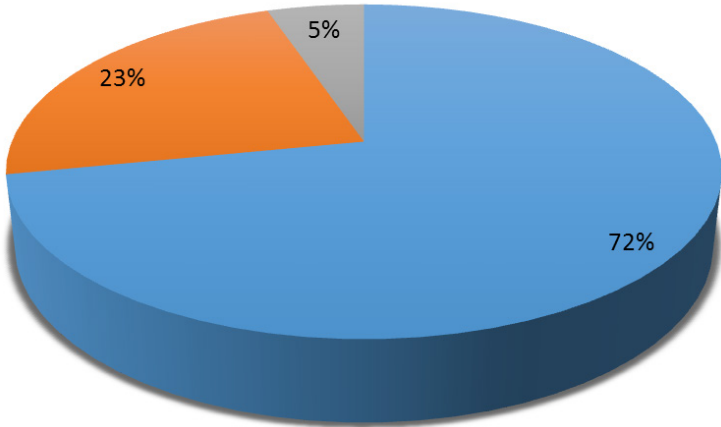
- Least energy-efficient of the three main technologies
- Use of mercury measures to prevent environmental contamination
- Mercury-based chlor-alkali production has been phased out and no longer used in Europe

Diaphragm Cell Process

- Operates at lower voltage
- Requires large amount of steam if NaOH has to be evaporated to the commercial concentration of 50%
- Not burdened with the problem of preventing mercury discharge into the environment

Membrane Cell Process

- Most energy –efficient
- Amount of steam needed to concentrate NaOH is relatively low

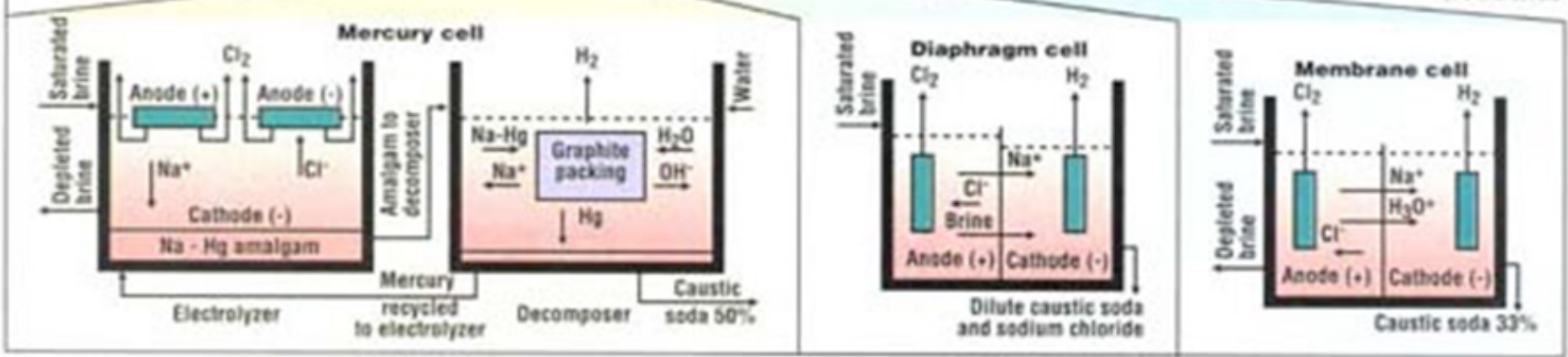


■ Membrane ■ Diaphragm ■ Mercury

COMPARING CHLOR-ALKALI CELLS			
	Mercury	Diaphragm	Membrane
Theoretical voltage	3.15	2.19	2.19
Current density, KA/m ²	8-13	0.9-2.6	3-5
Cell voltage	3.9-4.2	2.9-3.5	3.0-3.6
NaOH strength, wt. %	50	12	33
Electric energy usage, kWh/m.t. Cl ₂	3,360 @ 10 KA/m ²	2,720 @ 1.7 KA/m ²	2,650 @ 5 KA/m ²
Steam to concentrate to 50%, in kWh/m.t. Cl ₂	0	610	180

A comparison of the three types of cell designs used produce Cl₂, H₂ and NaOH in conventional chlor-alkali plants

EPIC Bureau



Caustic soda-a key product of Pakistan's Chlor-Alkali industry

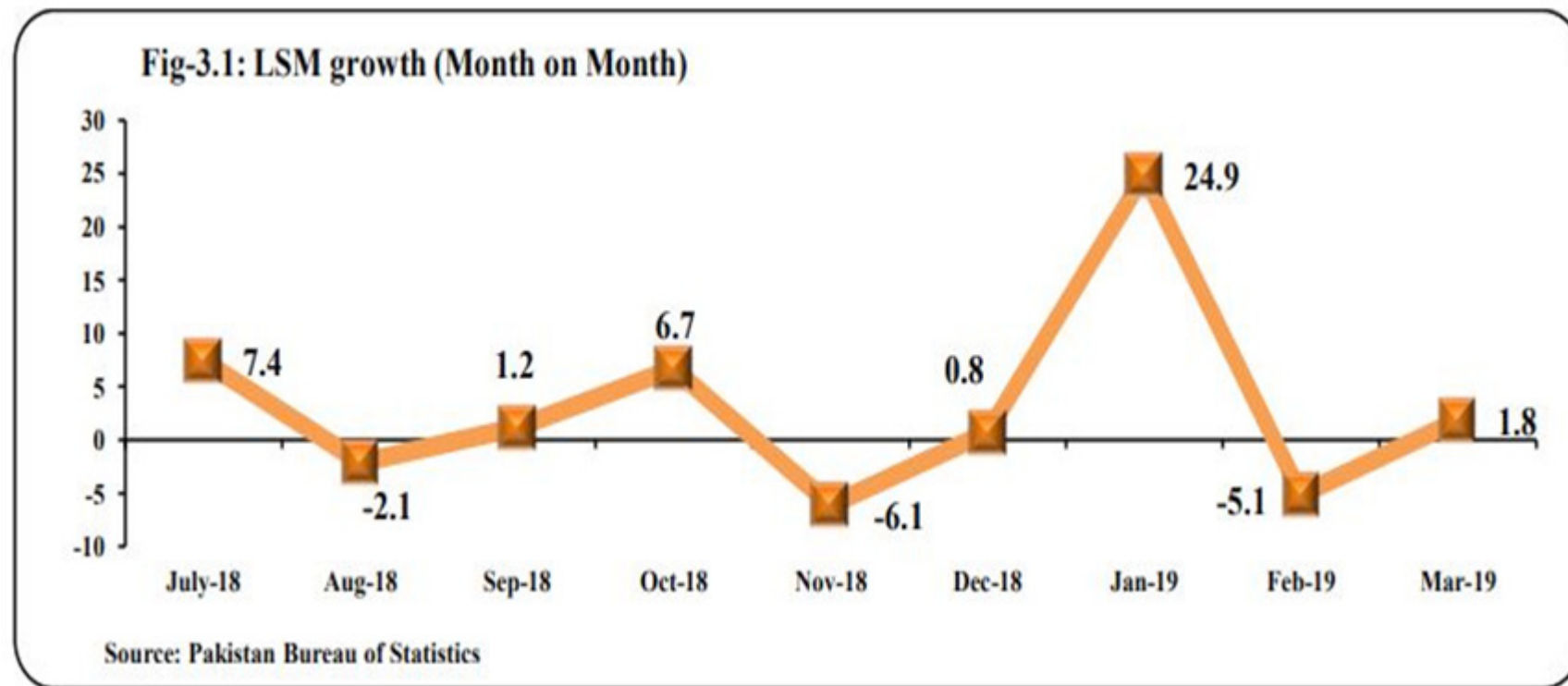
Biggest consumer of caustic soda is textile sector

Other sectors: Soaps and detergents, paper and board, vegetable oil refining, thermal power units and food processing

Rock salt (Northern Region) and sea salt (Southern Region)-main raw material

Demand for caustic soda is met entirely through domestic production

- Large Scale Manufacturing (LSM) has 78% share in manufacturing and 10.2% share in GDP
- LSM growth during July-March FY19 declined to 2.93% as compared to 6.33% in the same period last year

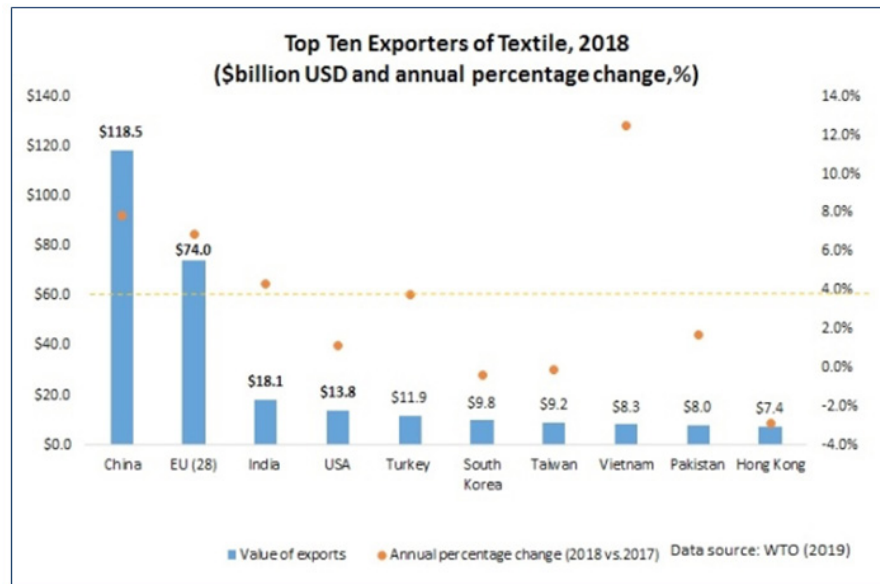


- Contribution of Chemicals in the LSM during the period ending July-March FY19 vis-à-vis July-March FY18 witnessed a decline of 3.94%.

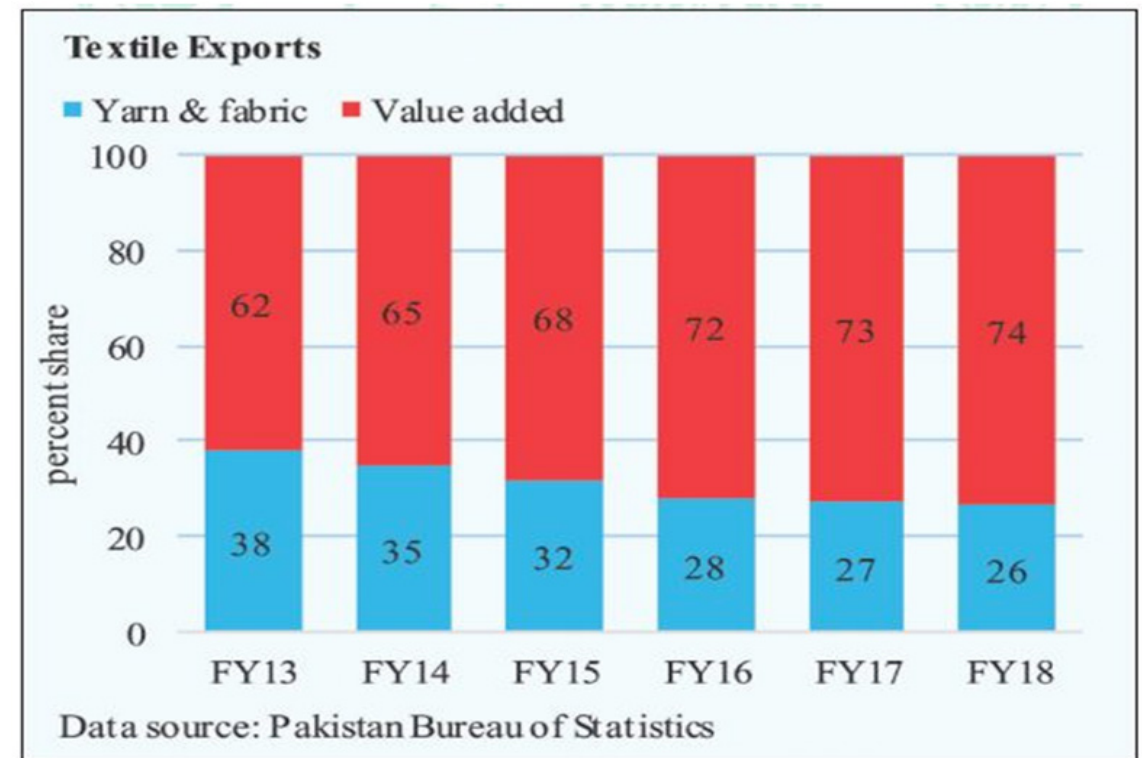
S#	Groups	Weights	% Change	
			July-March	
			2017-18	2018-19
1	Textile	20.915	0.54	-0.30
2	Food, Beverages & Tobacco	12.370	-0.76	-4.69
3	Coke & Petroleum Products	5.514	12.31	-6.00
4	Pharmaceuticals	3.620	4.50	-8.40
5	Chemicals	1.717	0.86	-3.94
6	Automobiles	4.613	18.90	-7.58
7	Iron & Steel Products	5.392	27.49	-11.00
8	Fertilizers	4.441	-8.30	4.50
9	Electronics	1.963	73.77	23.70
10	Leather Products	0.859	-6.83	0.97
11	Paper & Board	2.314	9.00	-3.86
12	Engineering Products	0.400	8.35	9.54
13	Rubber Products	0.262	6.51	3.47
14	Non-Metallic Mineral Products	5.364	12.32	-4.96
15	Wood Products	0.588	-19.71	15.21

Source: Pakistan Bureau Statistics

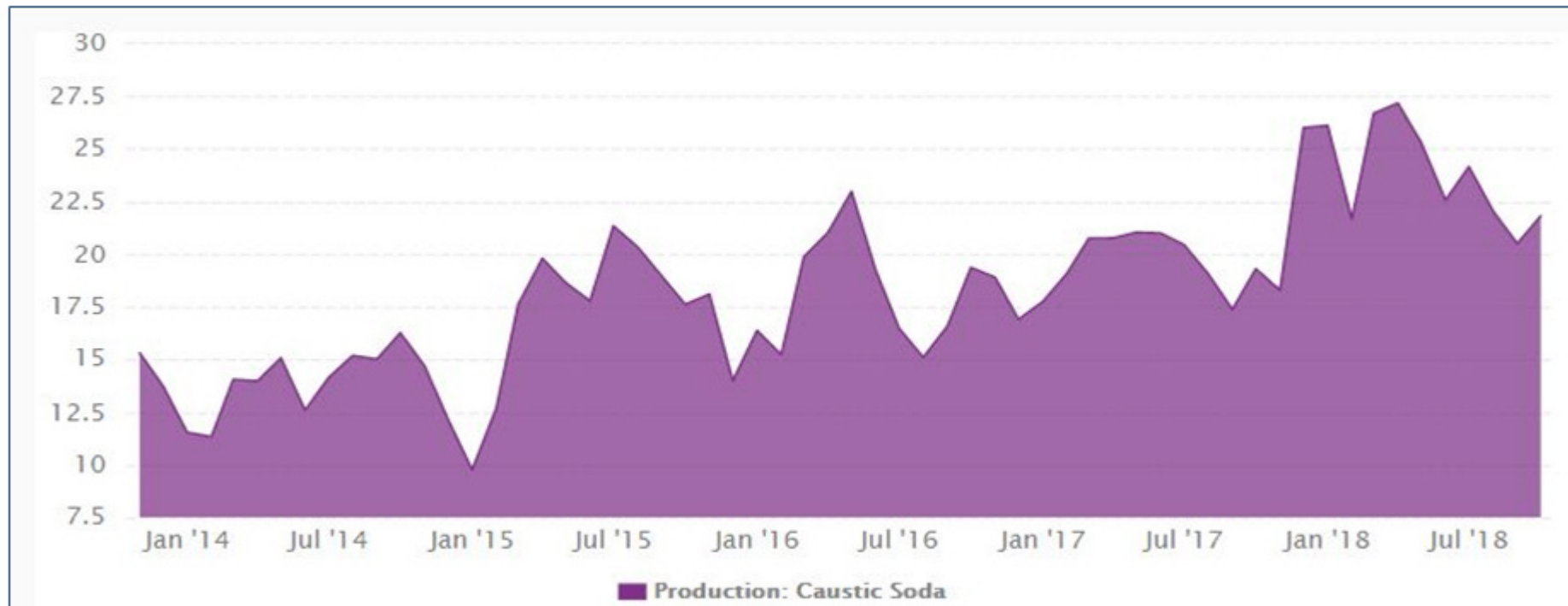
- The demand for caustic soda is highly dependent on the growth of the manufacturing sector, particularly textile sector



Source: World Trade Organization

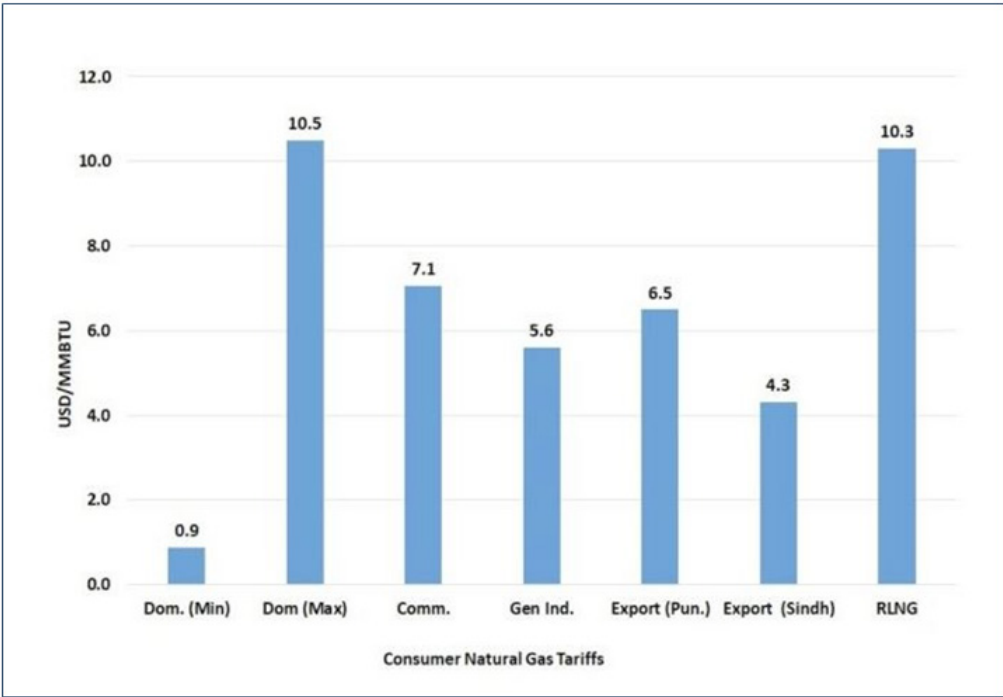


- Caustic soda production has increased over the years



Source: Pakistan Bureau of Statistics

- Power and Fuel cost which accounts for 50-60% of total cost of local production, has increased on a YoY basis. Higher tariffs on RLNG has also caused an increase in cost. However, the rise in power and fuel cost is passed on, thereby sustaining gross margins.
- The adverse impact of increase in power tariff has been curtailed to some extent through installation of IEM plants and diversification of revenue stream.

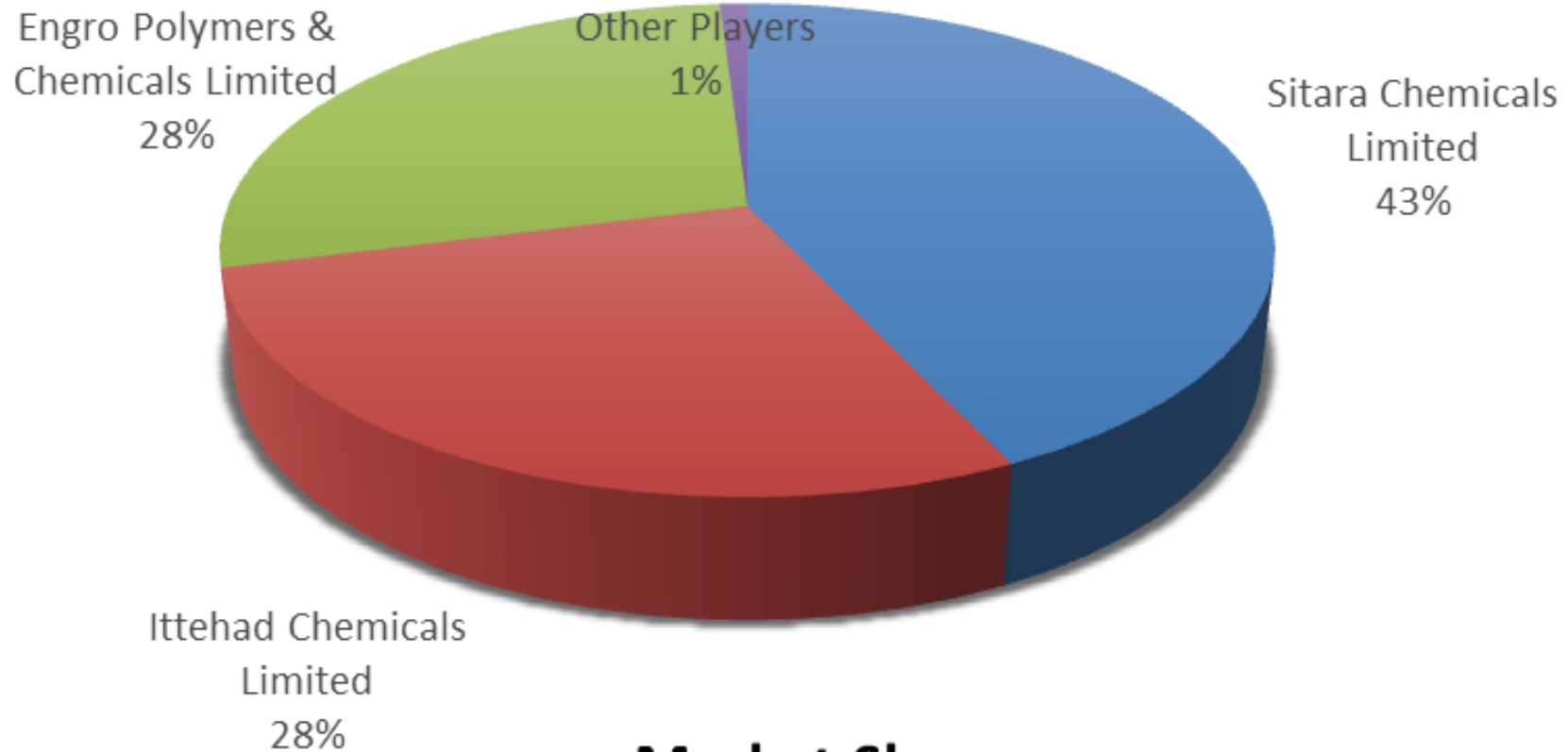


Source: Pakistan Bureau of Statistics (2019)

Gas Rates - Slabs	2019-20	2018-19		2017-18
	w.e.f 01-July-2019	w.e.f 01-Sep-2018	Effective on 01-July-2018	w.e.f 15-Dec-2016
Industrial Consumers (Other than GIDC Rs. 100 per MMBTU)	1,021	780	600	600
Captive Power (Other than GIDC Rs. 200 per MMBTU)	1,021	780	600	600

Gas Cost in Punjab - For All Industries (RLNG-Rs./mmbtu)	2019-20	2018-19	2017-18
	1,707	1,596	1,158

Major Players



Market Share



Capacities

Description	Sitara Chemical Industries Limited		Ittehad Chemical Industries Limited		Engro Polymer & Chemicals Limited	
Capacity in Tonnes	Capacity	Production	Capacity	Production	Capacity	Production
	At end-FY19	At end-FY19	At end-FY19	At end-FY19	At end-CY18	At end-CY18
Caustic Soda	202,950	145,122	180,000	101,135	106,000	104,940
Sodium Hypochlorite	66,000	42,514	49,500	23,652	20,000	N-A
Liquid Chlorine	11,550	9,772	13,200	8,866	94,000	N-A
Hydrochloric Acid	363,000	317,961	200,000	200,000	60,000	N-A

Financial Risk

Profitability

Rs. in millions	FY18	FY19	FY18	FY19	FY18	FY19
Company	SCIL		ICL		EPCL	
Company Ratings	A+/A-1	A+/A-1	A-/A-2	A-/A-2	-	AA-/A-1+
Net Sales	12,265	12,698	5,743	6,644	27,731	35,272
Gross Profit	2,633	2,760	963	1,379	6,065	8,736
Gross Margin(%)	21.5	21.7	16.8	20.8	21.9	24.8
Net Profit	1,086	885	415	405	2,049	4,917
Net Profit Margin(%)	8.9	7.0	7.2	6.1	7.4	13.9

Liquidity and Capitalization

Rs. in millions	FY18	FY19	FY18	FY19	FY18	FY19
Company	SCIL		ICL		EPCL	
Company Ratings	A+/A-1	A+/A-1	A-/A-2	A-/A-2	-	AA-/A-1+
FFO	1,799	1,738	669	946	5,212	8,820
ST Debt	3,525	4,333	1,176	1,380	0	0
LT Debt	2,020	2,776	1,382	1,986	8,750	7,500
Total Debt	5,545	7,109	2,558	3,366	8,750	7,500
Cash	80	102	94	110	680	1,359
FFO to Total Debt (x)	0.3	0.2	0.3	0.3	0.6	1.2
FFO to LT debt (x)	0.9	0.6	0.5	0.5	0.6	1.2
Leverage	1.0	1.2	1.5	1.8	1.1	0.5
Gearing	0.6	0.7	0.9	1.1	1.1	0.5
DSCR	1.6	1.7	1.2	1.6	5.7	7.1
Total Equity	10,637	14,619	3,710	4,004	7,720	16,743
Trade Debt	1,138	1,177	524	665	505	430

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