



GLOBAL VINYL ESTER RESIN MARKET FORECAST & OPPORTUNITIES, 2030

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MARKET INTELLIGENCE. CONSULTING

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from NOW to NEXT

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1. Executive Summary

1.1 Overview of the Company

Established: 1973

Headquarter: Maharashtra, India

Business Description:

- Reliance Industries Limited is Indian based, one of well-known brands involved in manufacturing and sales of diverse range of products including polymers, aromatics, elastomers etc. globally.
- The company cater customers and various industries viz., healthcare, automotive, packaging etc across over 70 countries worldwide.
- The company's total production capacity of PE, PP and PVC is 2.3, 2.9 and 0.7 million MT per annum as of 2019.
- The company exported 1.1 million MT of polymers globally in 2019.
- The company has 6 state-of-the-art manufacturing facilities for polymers production.

1.2 Brief Profile of Board of Directors:

Mukesh Ambani: Mr. Mukesh D. Ambani (DIN 00001695) is a Chemical Engineer from the Institute of Chemical Technology, Mumbai (erstwhile the University Department of Chemical Technology, University of

Mumbai). He pursued an MBA from Stanford University in the US. He has been on the Board of Reliance since 1977.

Nita M. Ambani: Mrs. Nita M. Ambani (DIN 03115198) is a Commerce Graduate from Mumbai University and a diploma holder in Early Childhood Education.

Hital R. Meswani: Mr. Hital R. Meswani (DIN 00001623) is a Management & Technology graduate from the University of Pennsylvania (UPenn) in the USA.

Nikhil R. Meswani: Nikhil Meswani is an Executive Director on the Board of Reliance. A chemical engineer from the University Institute of Chemical Technology (UICCT) Mumbai, he joined Reliance in 1986.

P.M.S. Prasad: PMS Prasad is an Executive Director at Reliance and one of the longest serving members on the Board and the company.

P.K. Kapil: PK Kapil is an Executive Director on the Board of Reliance. With experience spanning four decades, he is a driving force in the HSE, Technology, Reliability and Operations of all manufacturing sites.

R.A. Mashelkar: R.A. Mashelkar is an independent Director on the Board of Reliance. An eminent scientist and champion of the Innovation Movement in India, he is the Chairman of Reliance Innovation Council.

Adil Zainulbhai: Adil Zainulbhai is an

independent Director on the Board of Reliance. One of the world's foremost consultants, he is a mechanical engineering graduate from IIT and holds an MBA from Harvard.

Mansingh L. Bhakta: Mansingh Bhakta is an independent Director on the Board of Reliance. An advocate par excellence, he has almost six decades of experience.

Dipak C. Jain: Dipak Jain is an independent Director on the Board of Reliance. One of the world's top educationalists, he is a former Dean of Kellogg School of Management and INSEAD.

Dharam Vir Kapur: Dharam Vir Kapur is an independent Director on the Board of Reliance. A technology, industrial development, and project implementation expert, he has a long and illustrious career in

the Indian government.

Mahesh P. Modi: Mahesh Modi is an independent Director on the Board of Reliance. He has in-depth management experience in the petrochemical, telecommunications, energy, and insurance industries.

Yogendra P. Trivedi: Yogendra Trivedi is an independent Director on the Board of Reliance. He is an expert in the fields of economics, politics, education, sports, and social and professional services.

Ashok Misra: Ashok Misra is an independent Director on the Board of Reliance. An IIT Director from 2000-2008, Misra was the driving force behind its transformation into a leading research and development institute.

1.3 Brief Project summary & Key Highlights of The Project

India has emerged as a leading economy in world and has an average growth rate of around 7% in last decade. The manufacturing sector plays a crucial role in Indian Economy and chemical manufacturing amongst it is a crucial sector which spread its roots across wide range of end use industries. According to index of Industrial

production (IIP) the chemical industry already returning to pre-Covid level, the industry is expected to grow at a CAGR of about 9.2% by 2025.

In terms of Manufacturing Competency, India is the fifth largest producer of cars and textiles. Also, as per Consumer Electronics

and Appliance Manufacturers Association (CEAMA) electronic production constitute around 3% of Global Electronic production.

Epoxy resin is a reactive polymer or prepolymer containing epoxide group. Vinyl ester resin is a resin produced by esterification of epoxy resin with acrylic or methacrylic acids. This compound possesses various properties such as corrosion resistance, high thermal stability, high mechanical strength, high chemical and environmental resistance, durability, adhesion etc. owing to these properties, epoxy resins find application in several areas including paints and coatings, adhesives, composites, electronic encapsulation, and others.

Major end use industries for epoxy resins include building and construction, automotive, general industrial, consumer goods, wind power, aerospace, marine, etc.

Factors Driving the growth of Epoxy Resin and Vinyl Ester Resin.

- To make India a global hub for Electronic Manufacturing with Government incentive schemes like Modified Incentive Special Scheme (M-SIPS) and Electronic Development Fund (EDF).
- Global shifts in trade policies owing to US-China trade war and Global shift in sentiments due to Covid-19 pandemic and looking for another Manufacturing Hub in Asia Pacific.
- National Infrastructure Pipeline (NIP) unveiled by central government has an investment budget of 1.4 USD trillion targeting 24% on renewable energy, 19% on road & highway, 16% on urban infrastructure and 13% on railway.
- Under the smart city mission, total of 5,956 housing projects is to be completed by 2025.

2. Product Profile

With the growing fiber reinforced composites market in the Asia Pacific, the demand is high for predictable and cohesive vinyl ester resin and polyester resin systems. The experience of composites in quality infrastructure over the last 30 years has provided the boulders for new corrosion infrastructure applications that shall apply to Asian as well as global markets.

The usage of fiberglass reinforced underground gasoline storage tanks has been successful in the last quarter century. Power station pipes, some as large as 4.9 meters in diameter, have been performing well without any problem. The recently developed composite products include sewer liners, short span bridges for handling pedestrian bridges, regular road traffic, water covers for water treatment plants.

Vinyl ester resin composites have achieved a remarkable degree of commercial acceptance in a variety of applications like infrastructure, chemical and marine industry. Initially, isophthalic resins such as Vipel® F701 and the robust version Vipel® F737 were widely used, but lately, vinyl esters such as Vipel® F016 have played a significant role in these industries.

Composite materials are the combination of two or more materials possessing different properties formed without undergoing dissolution or blending into each other. One

material is the matrix in which the other material is spread into the dispersed phase. Hence the resulting material has properties of both the parent materials. There are various types of composite materials such as Glass Fiber Composites, Carbon Fiber Composites, Natural Fiber Composites, etc. The global composite industry is expected to grow at a CAGR of more than 7% during the upcoming years. The major market segment for composite industry remains the glass fiber composite which have application in wind energy, construction, and infrastructure, automotive, etc.

The fastest growing consumer of the fiber reinforced plastics has been the wind energy industry in the world. The challenges related to production are intensified as the scale of wind turbines continues to climb. AOC is producing range of closed mould resins for wind blade composites, including, isophthalic and orthophthalic polyester, bisphenol-A epoxy-based vinyl ester, and general-purpose polyester. High elongation, high-performance vinyl ester resin has been providing the extended cycle time for polyester and the strength of epoxy.

Polyester and Vinyl Ester Resins are among the most commonly used matrix resins to create polymer composites. The formulations of Vinyl ester have been providing increased corrosion resistance and have a broad range

of heat distortion, available strength, and shrinkage characteristics. The automotive and transportation industry is expected to drive the demand for composite materials. As the strength-to-weight ratio of most composites is higher than that of steel and aluminum. Vinyl ester resin stands serve as the intermediate chemical of epoxy and polyester in terms of mechanical properties and price.

The availability of the substitute, ammonia-based composites and epoxy resin is anticipated to be the major threat to vinyl ester resin. The geo-political conditions of the region also majorly affect the production of the product due to disruption of supply chain. For instance, in USA hurricanes are frequent

which affects the production and disrupts the supply chain.

Vinyl ester resin market futuristic growth looks attractive with opportunities in the marine, renewables, construction, and majorly in pipes & tanks. Due to their excellent properties, the market for vinyl ester resin looks positive. Different manufacturing companies are investing in producing vinyl ester resin.

Region wise, APAC holds the major share of composite materials market. Major companies operating in composite industry are Mitsubishi Chemical Corporation, 3M, Dupont, Ditz B.V., Composites Universal Group, Dupont, Cabot Corporation, Owens Corning, Toray Industries, Inc, Teijin Limited.

3. Market Outlook and Relevance of the Project

3.1. Demand Supply Outlook – Global Vinyl Ester Resin Market

Table 1: Global Vinyl Ester Resin Demand-Supply Scenario, 2015-2030F (Thousands Tonnes)

Parameters	2015	2020	2021E	2025F	2030F
Total Installed Capacity	938	985	1020	1025	1030
Total Production	733	759	808	866	929
Total Demand/Consumption	677.49	739.49	789.09	1026.25	1367.33
Total Demand (Y-O-Y Growth Rate, %)	3.87%	-7.14%	6.71%	6.42%	5.58%
Demand – Supply Gap	0.00	0.00	19.23	-159.81	-438.76

Source: TechSci Research

In 2020, the global vinyl ester resin industry

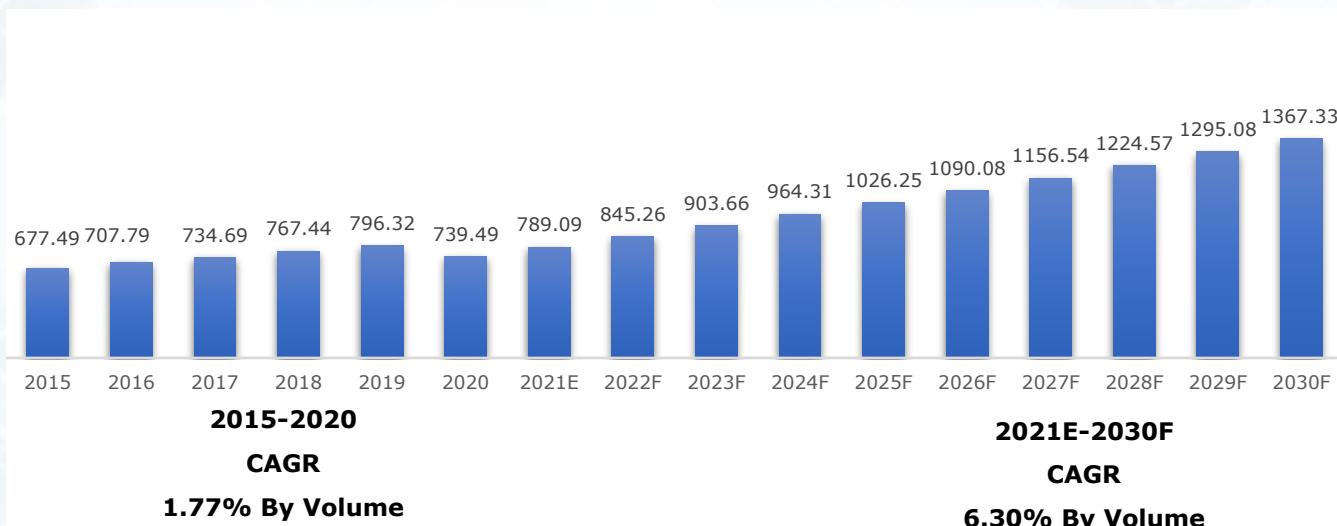
witnessed a degrowth of around -7.14% in

2020 as compared to preceding year on account of COVID-19 outbreak worldwide. The improvement in overall demand by year end was witnessed following the upsurge in demand for vinyl ester used in pipes and tanks application. The demand from the marine and renewables sector has also shown an upward trend contributing to the increase in demand. Owing to its superior properties, including high viscosity index, crack resistance, resistance to high temperature and others, the total demand of vinyl ester is anticipated to reach 1367 thousand tonnes. The demand-supply gap of VER is estimated to be around 19.23 thousand tonnes in 2021E which is further expected to expand in forthcoming years on account of lack of increase in total production across the country in recent years. This is further being pushed by flooding

demand across various developing countries such as China, India, and others.

China and the United States have major vinyl ester resin producing capacities across the globe. Further, more capacities are expected to be commissioned in the Asia Pacific region to meet the ongoing global demand. AOC Resins, INEOS Composites, Swancor Holding, Showa Denko are leading global suppliers of vinyl ester resin with a broad range of product portfolios. Some of the major players are focusing on expanding their existing capacities and on mergers & acquisitions to grab a substantial share in the market. Such as, in 2019, INEOS, one of the leading players completed the acquisition of composite business of Ashland Composites.

Figure 1: Global Vinyl Ester Resin Market Size, By Volume (Thousand Tonnes), 2015–2030F



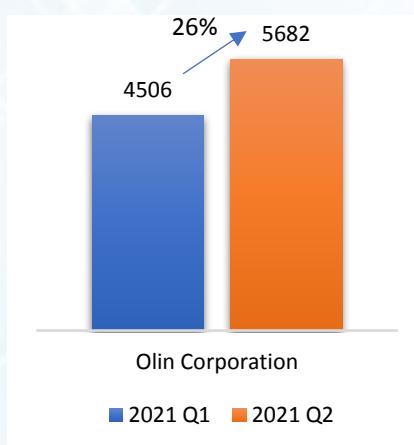
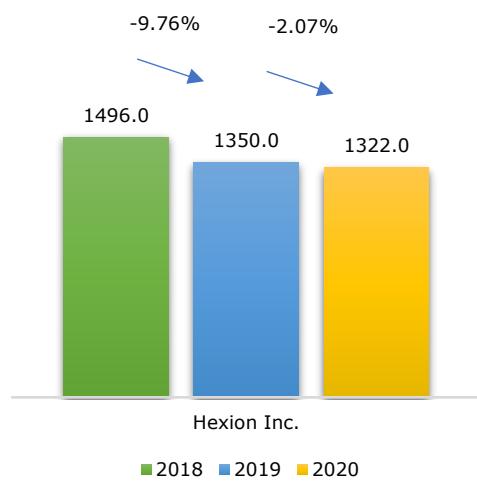
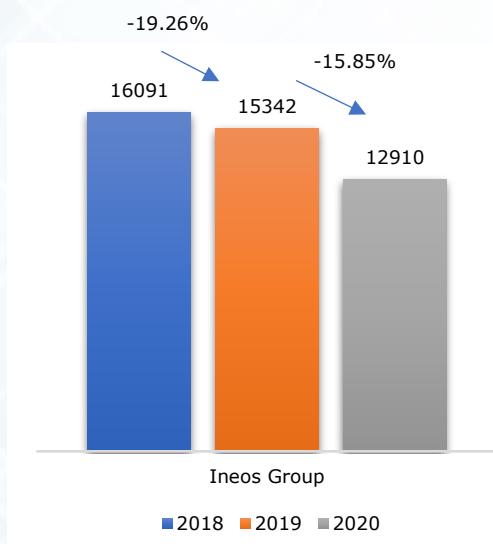
Source: TechSci Research

Global demand for Vinyl Ester resin in 2020 stood at around 739 thousand tonnes and is expected to grow at a CAGR of 6.30% to reach approximately 1367 thousand tonnes in 2030. The Increase in demand is led by strong demand for excellent chemical and thermal resistant material in downstream applications such as semiconductor encapsulation, electronics and communication, construction, and automobile industries. Moreover, the operating efficiency of producers varies from

approximately 81% to 92%. However, in 2020 COVID-2019 impacted the demand for Vinyl Ester Resin as major industries were shut down. It would take three years for the vinyl ester resin industry to revive from the impact of COVID-19 as major global construction projects have been delayed by various economies and companies. Further, the demand supply gap is expected to gradually increase year by year to 438 thousand tonnes in 2030. Manufacturers are ramping up their capacity expansion to meet the growing demand supply gap.

Revenue Analysis of Leading Global VER Resin Manufacturers, By Value (USD Million), 2018-

2020



Source: Annual Reports

Through revenue analysis of global vinyl ester resin manufacturers, the revenues of major players have been declining since 2018 due to decrease in the prices of vinyl ester resin and disruption in the supply chain management. Due to COVID-19, the demand and prices of epoxy further reduced which affected the revenues of companies. Through quarterly revenue analysis, the revenues of companies have been rising due to increasing demand for vinyl ester resin and

Source: Annual Reports

increasing prices of the resin. The betterment of supply chain management and rising demand from various end user industries contributed to the increasing market for vinyl ester resin. Companies have been noticing the rise in their revenue quarterly, especially through vinyl ester resin. As shown in the graph, INEOS Group and Hexion Inc. both witnessed the increase in revenues by 26% and 13%, respectively from Q1 2021 to Q2 2021.

3.1.1. Capacity By Company

Table 2: Global Vinyl Ester Resin Capacity, By Company (Thousand Tonnes), 2015-2030F

Co., Ltd.										
Sewon Chemical	1	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Innovative Resins Pvt. Ltd.	1	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Orson Chemicals	1	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Crystic Resins India Private Limited	1	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Satyen Polymers Pvt Ltd.	1	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Mechemco Resins Pvt Ltd	1	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Moras Chemicals India Pvt. Ltd	1	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Ashland Global Holdings Inc.	1	55.00	55.00	60.00	60.00	60.00	0.00	0.00	0.00	0.00
Others		232.28	232.28	232.28	234.28	234.28	234.28	239.28	239.28	244.28
Total		938.12	938.12	953.12	965.12	980.12	985.12	1020.12	1025.12	1030.12

Source: TechSci Research

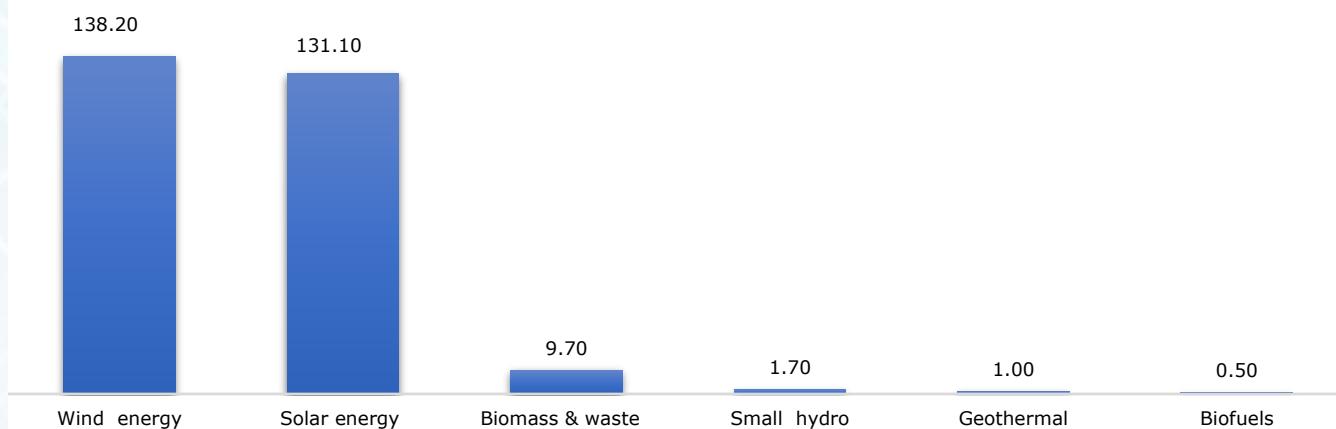
The current global capacity of Vinyl Ester resin is approximately 985 thousand tonnes and is expected to reach around 1030 thousand tonnes by 2030. This increase in capacity is led by robust rise in demand for vinyl ester resins. Major manufacturing company like INEOS Composites had acquired the Ashland's composite business

in 2019. Ashland has 25 MTPA facility in Germany and 30 MTPA facility in United States. Similarly, in 2020, Showa Denko K.K, a Japanese Vinyl Ester Resin producer expanded its VER production line to almost double of its existing capacity through its Chinese subsidiary Shanghai Showa Highpolymer Co., Ltd. (SSH). Also, in 2014

Chinese Vinyl Ester resin market leader Sino Polymer Co. Ltd announced strategic cooperation with Europe's Nord Composites under which Nord Composites would produce Sino Polymer's MFE brand of VER

in its plant located in Italy. Also, Nord Composites had been authorized to do business with MFE brand of VER in France, Italy, and United Kingdom markets.

Global Investment in Renewable Energy Capacity by Sector in 2019 (USD Billion)



Source: UNEP, Frankfurt School-UNEP Centre

3.1.2. Production By Company

Table 3: Global Vinyl Ester Resin Production, By Company (Thousand Tonnes), 2015-2030F

Company	2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
AOC Resins	117.20	117.51	118.91	119.26	119.90	111.91	112.61	120.31	128.01
INEOS Composites	28.58	29.60	31.20	32.00	32.69	81.09	81.49	88.99	97.81
Swancor Holding Co. Ltd.	43.89	47.15	50.15	50.77	60.08	55.71	58.51	63.05	66.91
Scott Bader Company Ltd.	43.53	45.02	45.74	46.38	46.95	45.07	71.17	75.02	80.67

Company	2018	2017	2016	2015	2014	2013	2012	2011	2010
Showa Denk K.K.	45.29	45.87	46.06	46.18	46.93	44.84	46.02	47.31	49.82
Polynt-Reichhold	32.83	32.97	33.05	41.20	41.35	39.83	39.80	42.26	43.05
Eternal Chemical (China) Co. Ltd.	30.90	31.45	32.03	31.98	36.24	34.23	35.39	43.07	46.27
Sino Polymer	30.44	30.93	31.40	31.58	31.59	29.10	30.96	32.05	33.43
DIC Corporation	25.56	25.75	25.89	26.04	26.34	25.35	25.90	26.80	27.89
Hexion Inc.	23.82	24.31	24.49	24.38	25.04	23.90	24.86	25.11	25.42
Poliya	22.48	24.47	24.70	24.90	24.95	23.68	24.61	25.72	27.22
Allnex Group	15.15	16.08	16.84	16.36	16.54	15.70	17.20	17.80	19.40
Interplastic Corporation	15.44	15.80	15.96	15.92	16.29	14.85	15.65	16.40	18.00
Reinhold Gmb	14.97	15.03	14.90	15.16	15.23	14.45	14.28	15.38	15.51
Saudi Arabi Industrial Resins Ltd.	14.91	15.25	14.99	15.33	15.67	14.42	14.58	16.00	18.00
En Chua Chemical Industries Co. Ltd.	7.22	7.40	7.60	8.08	8.46	7.31	7.69	8.68	9.27
Sewon Chemical	2.44	2.56	2.59	2.62	2.65	2.53	2.62	2.76	2.88
Innovative Resins Pvt. Ltd	1.36	1.38	1.45	1.50	1.53	1.43	1.33	1.51	1.63
Orson Chemicals	0.56	0.57	0.60	0.62	0.63	0.59	0.55	0.62	0.67
Crystic Resin India Private Limited	0.46	0.45	0.47	0.48	0.52	0.49	0.42	0.48	0.55

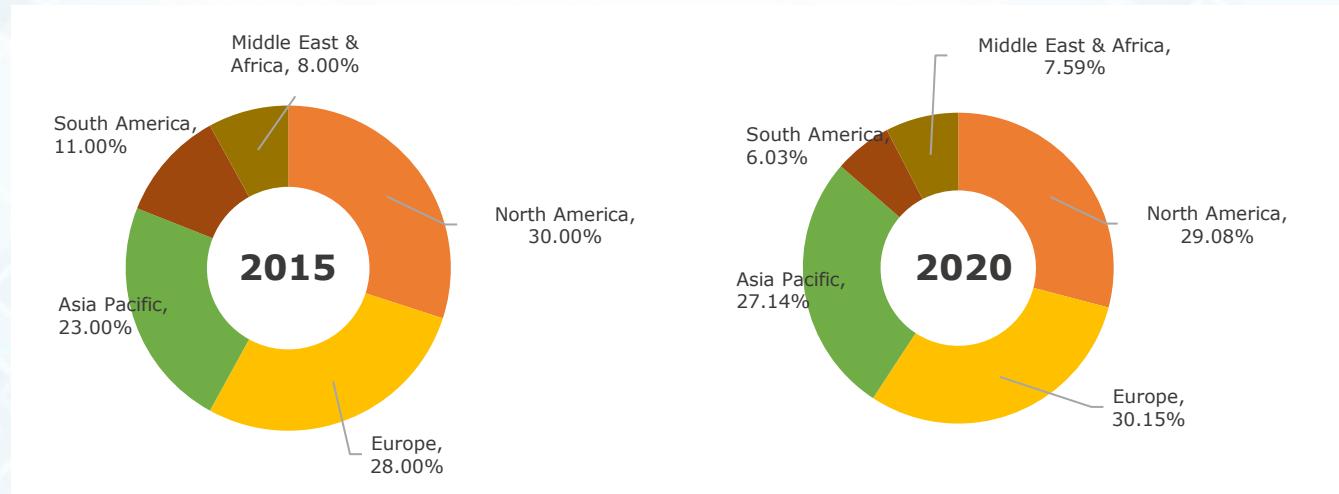
Satyen Polymers Pvt Ltd.	0.44	0.44	0.45	0.46	0.50	0.47	0.41	0.46	0.54
Mechemco Resins Pvt Ltd	0.29	0.31	0.31	0.33	0.34	0.31	0.32	0.36	0.38
Moras Chemicals India Pvt. Ltd.	0.32	0.31	0.32	0.32	0.30	0.29	0.30	0.31	0.33
Ashland Global Holdings Inc.	44.71	45.26	49.34	50.10	50.55	0.00	0.00	0.00	0.00
Others	170.54	174.61	186.17	188.22	191.06	171.25	181.67	195.99	214.90
Total	733.33	750.47	775.59	790.16	812.33	758.81	808.32	866.43	928.57

Source: TechSci Research

The current global production of Vinyl Ester Resin is at about 759 thousand tonnes and is expected to reach around 929 thousand tonnes in 2030. The increase in production is mainly led by solid demand for vinyl ester resin in downstream fiber reinforced plastic (FRP) applications. Asia Pacific region holds approximately 44% of the total production capacity, which can be attributed to the presence of major players like Jinling AOC Resins Co., Ltd., Showa Denko K.K., Sino Polymer, INEOS Composites, among others.

In 2020, the COVID-19 pandemic affected the production as major plants were shut due to lockdown measures. The total production value in 2020 saw a decline of approximately 8% as compared to the 2019 production level. However, approximately 7% growth in production is expected in 2021 due to increasing demand of vinyl ester resin globally. Global players such as INEOS Composites, Interplastic Corporation, AOC, LLC are strongly investing in their production capacity to meet the growing demand.

Global Advanced Composites Market Share, By Region, By Value, 2015 & 2020



Source: TechSci Research

Source: TechSci Research

3.1.3. Capacity By Location

Table 4: Global Vinyl Ester Resin Capacity By Location, By Company (Thousands Tonnes), 2015-2030F

	Korea	gu, Daejeon	Chemical									
Asia Pacific	South Korea	Others	Others	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Asia Pacific	South Korea	Total	Total	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Asia Pacific	Singapore	Sgx Centre 1	Showa High Polymer Singapore Pte Ltd	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Asia Pacific	Singapore	Others	Others	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Asia Pacific	Singapore	Total	Total	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Asia Pacific	Taiwan	Kaohsiung	Eternal Materials Co.,Ltd. Luchu Plant	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Asia Pacific	Taiwan	Changhua	En Chuan Chemical Industries Co., Ltd.	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Asia Pacific	Taiwan	Nantou	Swancor Holding Co., Ltd.	60.00	60.00	60.00	60.00	70.00	70.00	70.00	70.00	70.00
Asia Pacific	Taiwan	Others	Others	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Asia Pacific	Taiwan	Total	Total	105.00	105.00	105.00	105.00	115.00	115.00	115.00	115.00	115.00
Asia Pacific	Malaysia	Changshu Jiangsu Province	Eternal Materials (malaysia) sdn.Bhd.	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Asia Pacific	Malaysia	Others	Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asia Pacific	Malaysia	Total	Total	10.00	10.00	10.00	10.00	15.00	15.00	15.00	20.00	20.00
Asia Pacific	Rest of APAC	Total	Total	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Asia Pacific	Asia Pacific	Total	Total	427.12	427.12	427.12	427.12	442.12	442.12	477.12	482.12	487.12



America												
North America	Mexico	Total	Total	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
North America	North America	Total	Total	200.00	200.00	215.00	225.00	225.00	225.00	225.00	225.00	225.00
MEA	UAE	Dubai	Scott Bader Company Ltd.	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
MEA	UAE	Others	Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MEA	UAE	Total	Total	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
MEA	Saudi Arabia	Jubail	Saudi Arabia Industrial Resins Ltd	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
MEA	Saudi Arabia	Others	Others	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
MEA	Saudi Arabia	Total	Total	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
MEA	Turkey	Istanbul	Poliya	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
MEA	Turkey	Others	Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MEA	Turkey	Total	Total	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
MEA	Rest of MEA	Total	Total	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
MEA	MEA		Total	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00
Global	Global	Total	Total	938.12	938.12	953.12	965.12	980.12	985.12	1020.12	1025.12	1030.12

Source: TechSci Research

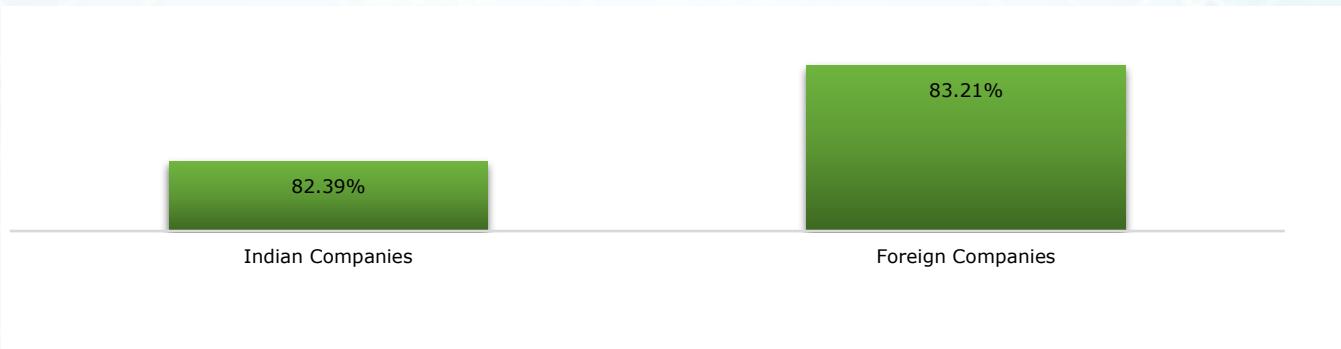
The majority of vinyl ester capacities are strategically located in China. Rising industrialization and urbanization in developing nations such as India and China will influence the vinyl ester resin producers to expand their capacity in the Asia Pacific region. Also, favorable government policies

for renewable energy like wind and solar energy influences major vinyl ester producers to setup their capacities in these countries. On the other hand, Capacities located in developed nations of Western Europe and North America will show a moderate growth in expansion due to the market slowly reaching

to its maturity in these regions. Also, government regulations to commercialize capacity is more stringent in these regions compared to Asia Pacific. In India, most of the demand for vinyl ester resin is met through import as currently most of the companies are operating at low capacity. North America is

the second-largest supplier of vinyl ester resins, led by the United States. In the United States, major producers are AOC LLC, INEOS Composites, and Polynt-Reichhold. In 2019, INEOS Composites acquired Ashland's composite business, becoming one of the largest producers of the chemical.

Average Operating efficiency of Indian Companies versus Foreign Companies, 2015 – 2030F



Source: TechSci Research

3.1. 4. Operating Efficiency By Company

Table 5: Global Vinyl Ester Resin Operating Efficiency, By Company, 2015-2030F

Company	2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
AOC Resins	86.81%	87.04%	82.01%	82.25%	82.69%	77.18%	77.66%	78.14%	78.14%
INEOS Composites	71.45%	74.00%	78.00%	80.00%	81.72%	77.23%	77.60%	81.20%	81.81%
Swancor Holding Co., Ltd.	73.15%	78.58%	83.58%	84.61%	85.83%	79.58%	83.58%	85.87%	87.97%
Showa Denko K.K.	79.15%	81.85%	83.16%	84.32%	85.36%	81.95%	83.73%	85.43%	85.43%
Scott Bader Company Ltd.	82.35%	83.39%	83.75%	83.96%	85.33%	81.53%	83.67%	84.40%	84.52%
Polynt-Reichhold	81.33%	81.70%	81.90%	81.81%	82.11%	79.10%	79.02%	82.91%	83.25%

Company Name	Revenue Growth (%)	Profit Margin (%)	Market Share (%)	Net Income (%)	EPS (%)	ROE (%)	Debt-to-Equity Ratio	EPS Growth (%)	Dividend Yield (%)
Eternal Chemical (China) Co., Ltd.	77.25%	78.63%	80.08%	79.96%	80.54%	76.07%	78.64%	80.87%	83.75%
Sino Polymer	80.09%	81.40%	82.62%	83.11%	83.13%	76.59%	81.49%	81.97%	83.11%
Poliya	85.21%	85.82%	86.30%	86.81%	87.81%	84.50%	86.35%	87.77%	87.79%
Hexion Inc.	79.42%	81.03%	81.64%	81.26%	83.46%	79.67%	82.87%	83.08%	83.29%
DIC Corporation	74.94%	81.55%	82.32%	83.00%	83.18%	78.94%	82.03%	82.74%	82.74%
Saudi Arabia Industrial Resins Ltd.	75.73%	80.40%	84.18%	81.79%	82.72%	78.49%	86.00%	87.00%	87.00%
Reinhold GmbH	77.22%	79.02%	79.82%	79.62%	81.43%	74.23%	78.23%	80.00%	80.00%
Interplastic Corporation	74.84%	75.16%	74.49%	75.81%	76.14%	72.26%	71.39%	76.52%	76.64%
Allnex Group	74.53%	76.23%	74.93%	76.63%	78.33%	72.12%	72.92%	74.00%	77.00%
En Chuan Chemical Industries Co. Ltd.	72.23%	74.04%	75.96%	80.77%	84.62%	73.08%	76.92%	80.77%	84.62%
Sewon Chemical	81.20%	85.32%	86.28%	87.23%	88.20%	84.33%	87.33%	89.00%	89.00%
Innovative Resins Pvt. Ltd.	75.55%	76.58%	80.58%	83.28%	84.86%	79.72%	73.62%	77.63%	82.23%
Orson Chemicals	77.93%	78.96%	82.96%	85.66%	87.24%	82.10%	76.00%	80.01%	84.61%
Crystic Resins India Private Limited	76.53%	75.55%	77.50%	79.45%	86.53%	81.40%	70.67%	74.58%	76.53%
Satyen Polymers Pvt.	74.15%	73.17%	75.12%	77.07%	84.15%	79.02%	68.29%	72.20%	74.15%

Ltd.									
Mechemco Resins Pvt Ltd	72.51%	77.28%	78.06%	82.00%	84.50%	76.40%	80.22%	85.00%	86.90%
Moras Chemicals India Pvt. Ltd.	87.53%	85.55%	89.20%	89.85%	83.74%	79.39%	82.54%	82.74%	82.74%
Ashland Global Holdings Inc.	81.29%	82.28%	82.23%	83.51%	84.25%	0.00%	0.00%	0.00%	0.00%

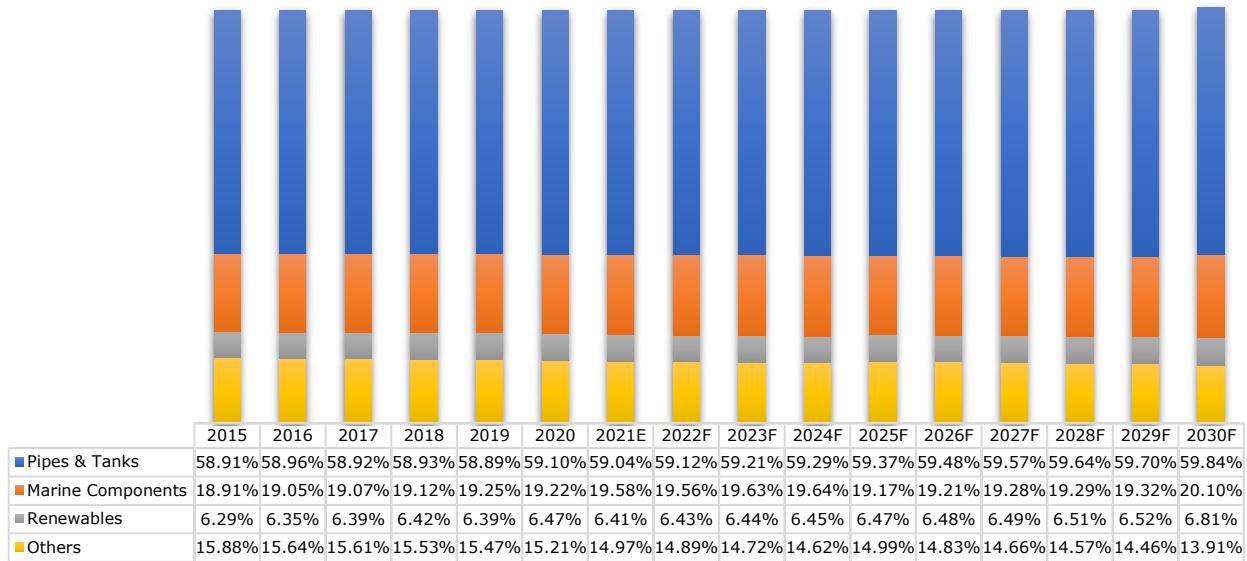
Source: TechSci Research

The operating efficiency of the vinyl ester resin lies between the range of 80-90% at present. It is expected to increase further due to rising demand and the need to increase the production of pipes & tanks. There was a slight decrease in the operating rates of 2020 compared to 2019 due to the supply chain disruptions and lockdown constraints faced by companies during the coronavirus pandemic. Globally, companies are producing at high

operating rates in 2021 than last year due to increasing demand for the chemical from the pipes & tanks industry, construction sector, marine industry, and renewable energy industry. Moreover, rising investment in the defense sector by major economies drove the companies to operate at higher efficiency. Other factors supporting operating rates are increasing investment in renewable energy sources like wind and solar energy in emerging economies in the Asia Pacific.

3.1.5. Demand By Application

Figure 2: Global Vinyl Ester Resin Demand, By Application, By Volume, 2015–2030F



Others include Défense, Aerospace, Electrical and electronics etc.

Source: TechSci Research

Pipes and Tanks serve as the primary application of vinyl ester resin which contributes to around 59% of the total demand due to its excellent properties of corrosion, chemical, and thermal resistance. The rising demand from the renewable sectors such as wind energy also serves as the major driving factor for the vinyl ester resin market. The demand from marine components where it is used as the coating material to prevent corrosion also contributes to the increasing demand. The chemical is used in various industries due to its excellent chemical and corrosion resistance and low permeability. It is also being majorly used in materials for pipe linings, steel and concrete linings, secondary

containment, and to fabricate FRP (Fiberglass Reinforced Plastics) storage tanks. The chemical stands somewhere between epoxies and polyester in terms of mechanical properties and price. The major advantage of vinyl ester resin is that they offer better resistance to moisture absorption and hydrolytic attack than polyester. Vinyl ester resin prevents the hydrolysis induced osmotic blistering by the formation of skin between the gel coat and the glass/polyester laminate or over the gel coat. It can be used for the entire lamination of boats which provides greater flexibility and toughness than polyester. One of the fastest growing consumers of fiber reinforced plastics in the world is the wind

energy sector. Major companies like AOC, Reichhold, INEOS produce a range of closed mould resins for wind blade composites including bisphenol A epoxy based vinyl ester resin, orthophthalic and isophthalic polyester and general purpose polyester. These resins are modified to deal with a range of processing, performance and cost requirements. For instance, DSM has

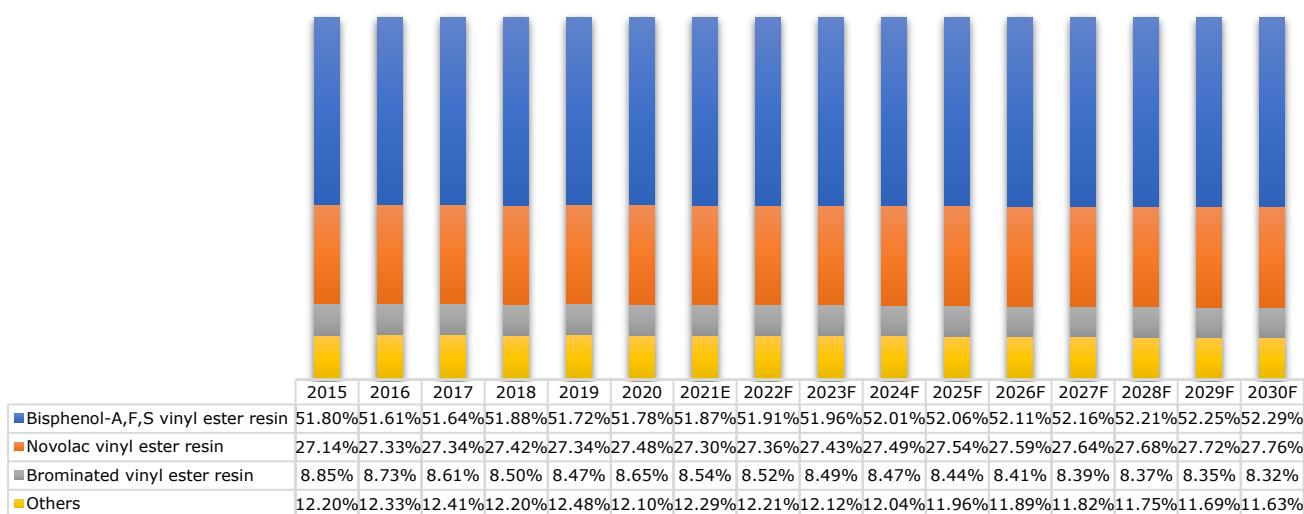
developed a range of low viscous vinyl ester resin for the production of wind turbine blades. Other applications include defense, aerospace and electrical & electronics, where it is extensively used as the coating material providing resistance from moisture, chemicals and heat. It also contributes to the strength and stiffness of the parts.

Global Advanced Composites Production, By Volume, 2016-2025F (Million Tonnes)



3.1.6. Demand By Type

Figure 3: Global Vinyl Ester Resin Demand, By Type, By Volume, 2015–2030F



Others include Urethane Modified vinyl ester resin, Elastomer Modified vinyl ester resin etc.

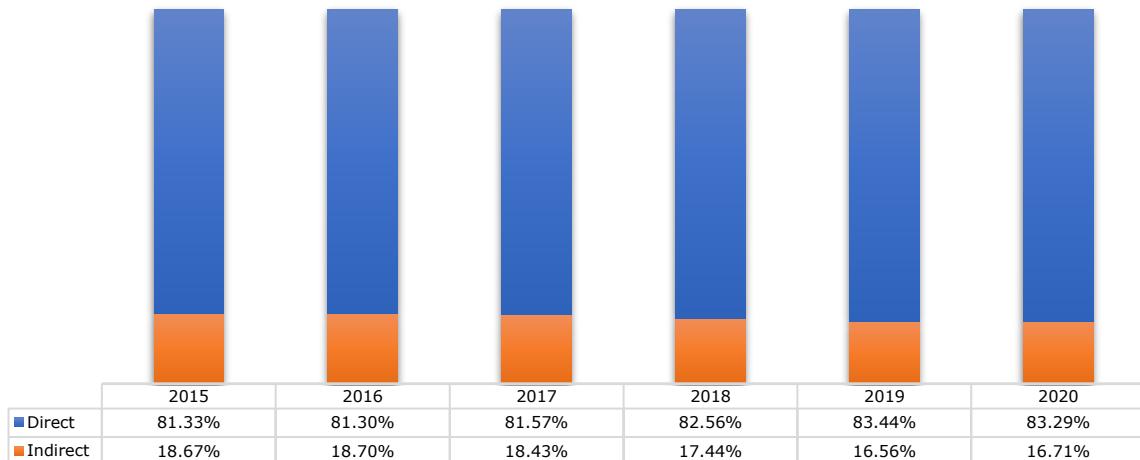
Source: TechSci Research

Vinyl Ester Resin is mainly of three types namely Bisphenol A, F, S Vinyl Ester Resin, Novolac Vinyl Ester Resin, and Brominated Vinyl Ester Resin. Out of the three, Bisphenol A, F, S Vinyl Ester Resin dominate the global market with a market share of more than 50% in 2020. As Bisphenol A has been banned in Europe, the demand for Bisphenol A Vinyl Ester Resin is expected to gradually decrease as Bisphenol A will be replaced by Bisphenol F and S. The Bisphenol- A type vinyl ester resin contributes to around 50% of the global vinyl ester resin types due to its excellent properties of corrosion resistance to a variety of alkalis, organic and inorganic salts, salt solutions and oxidizing chemicals, etc. It is majorly used in domestic and commercial portable water applications in both piping and tanks. Moreover, its applications in spray-up, hand lay-up and filament winding applications and its capability of adapting to most other methods of fabrication with no additional modifications makes it most relevant among different types of vinyl ester resin. Novolac vinyl ester resin contributes to around 27%

which has been specially modified for improved fabrication properties. It provides improved product quality and fabrication efficiency to end users, which offers extended shelf life and adds improved flexibility to fabricators. Some applications of novolac vinyl ester resin include heat shields, resistance coatings, parts for flue gas desulfurization, chimney liners, and other structural composite components where high heat resistance is required. The Brominated vinyl ester resins are flame retardant and provide corrosion resistance from a wide variety of acidic and alkaline environments. Novolac based vinyl ester resin, despite possessing better properties than Bisphenol A vinyl ester resin, holds less share than Bisphenol A as the technology to manufacture is quite complex, expensive, requires particular infrastructure, raw materials, & above all expertise. Others include urethane and elastomer modified vinyl ester resins which are modified with many unique features, providing exceptional characteristics. The elastomer modified may also be used as a primer on carbon steel, high density PVC foam and other dissimilar substrates.

3.1.7. Demand By Sales Channel

Figure 4: Global Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2030F



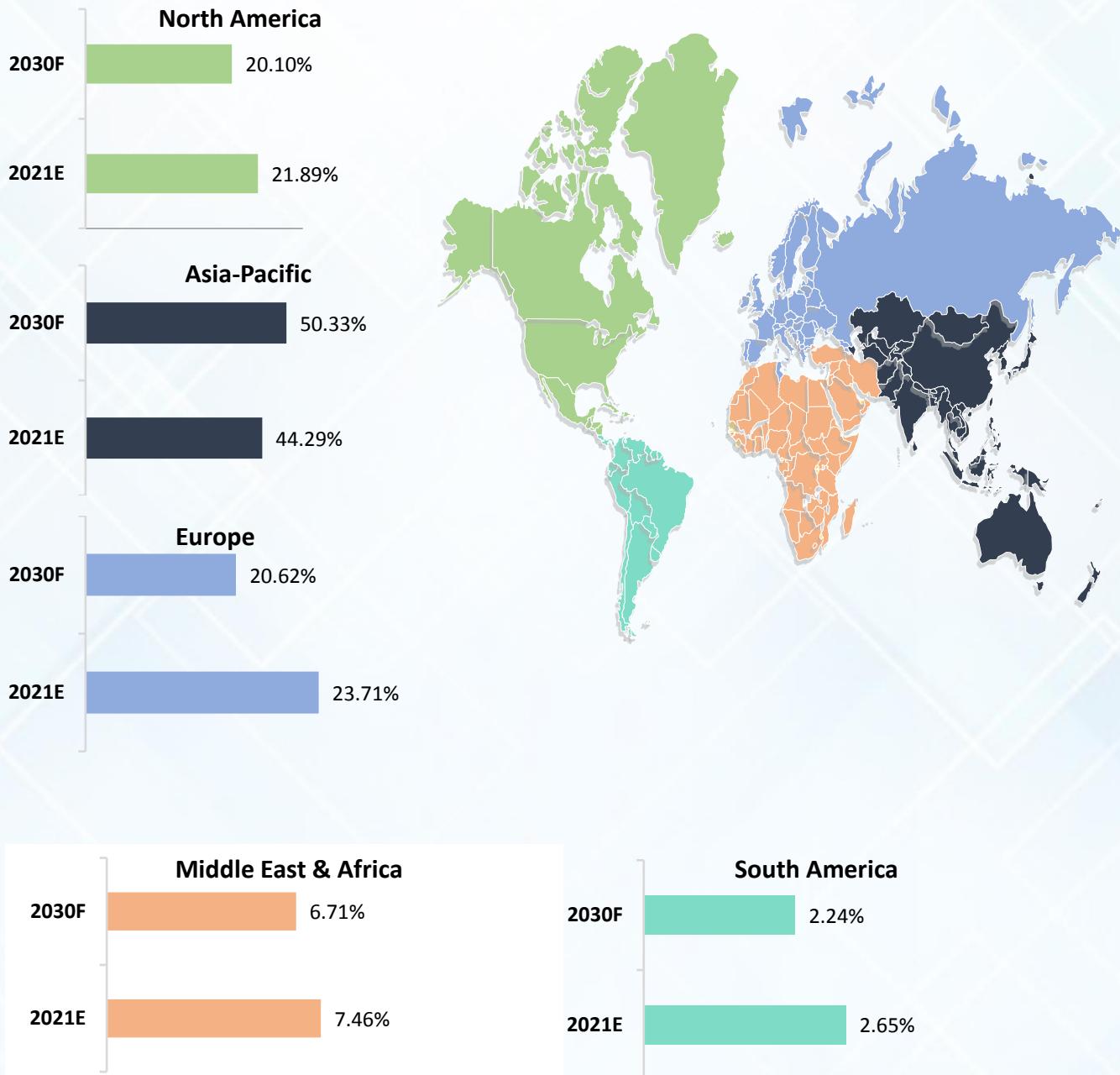
Source: TechSci Research

The major sales channel for global vinyl ester resin market is the direct sales channel with a market share of around 81% in 2015, which has been gradually growing since then and was estimated to be around 83% in 2020. As the Vinyl Ester Resin has major application in areas like wind energy, automotive, etc., companies prefer direct sales channel over indirect sales channel in order to reduce their logistics costs. For captive epoxy resin

manufacturers, the percentage margin through direct sales stands at 24.56%, which includes sales through company websites, direct export and direct sales while the margin through indirect sales stands at 27.33%, which includes sales through distributor or retailer including transportation charges and distributor share. For non captive epoxy resin manufacturers, the margin through direct sales stands at 20.41%, while through indirect sales it stands at 23.33%.

3.1.8. Demand By Region

Figure 5: Global Vinyl Ester Resin Demand, By Region, By Volume, 2021E & 2030F



Source: TechSci Research

Region wise, Asia Pacific holds the major share of the market, with a share of 44.29% in 2021 which is expected to rise gradually during the forecast period to around 50% in 2030. Vinyl Ester Resin has major

applications in areas like wind energy, automotive, and others. Asia Pacific being home to world's major population, is expected to have high energy demand in the forecast period. With the countries moving

towards more and more sustainable energy solutions, the demand for wind energy is expected to grow exponentially in the Asia Pacific during the forecast period, hence the region will keep the lion's share of global market for Vinyl Ester Resin. North America and Europe have a respective demand share of around 20% each in 2021. Asia Pacific,

owing to the high demand from various industries in China, such as chemical, water & wastewater treatment, construction, and renewables, is anticipated to be the fastest growing region. The increasing demand for FGD systems that use vinyl ester linings for protection from corrosion also contributed to the growing market for vinyl ester.

3.1.8.1. Demand By Country- Asia Pacific

Figure 6: Asia Pacific Vinyl Ester Resin Demand, By Country, By Volume, 2015 - 2030F

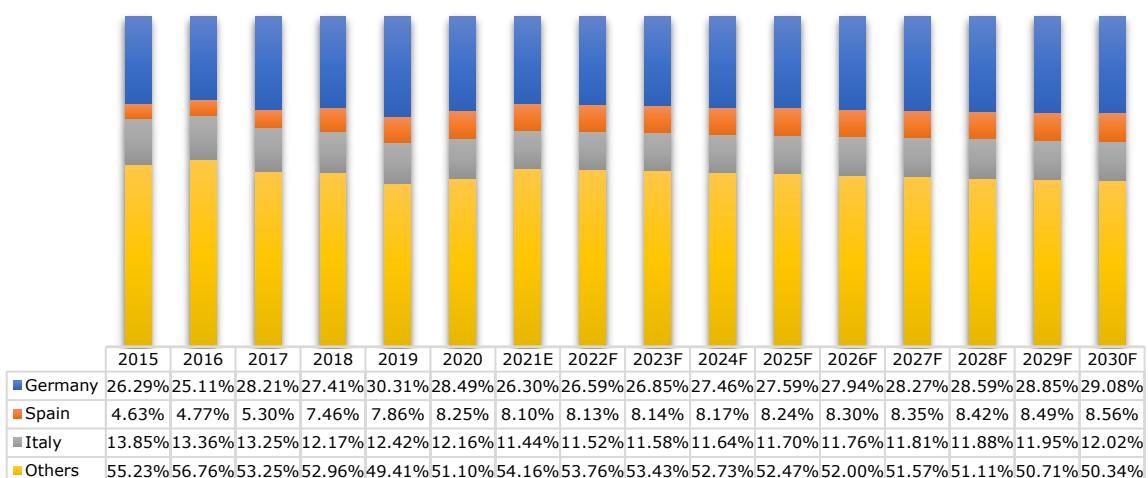


Others include Taiwan, Japan, Indonesia etc.

Source: TechSci Research

3.1.8.2. Demand By Country- Europe

Figure 7: Europe Vinyl Ester Resin Demand, By Country, By Volume, 2015 - 2030F

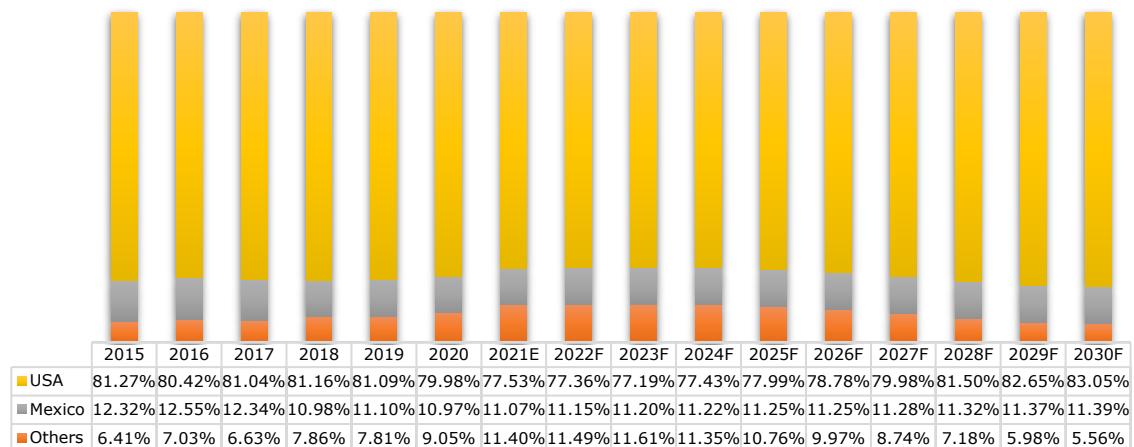


Others include UK, Russia, Belgium, Netherlands etc.

Source: TechSci Research

3.1.8.3. Demand By Country- North America

Figure 8: North America Vinyl Ester Resin Demand, By Country, By Volume, 2015 - 2030F

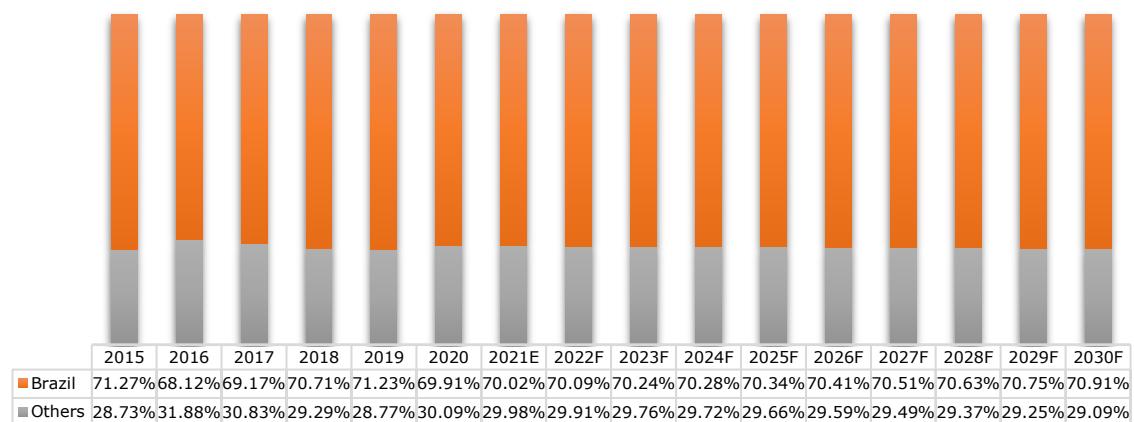


Others include Canada, Carribean Islands etc.

Source: TechSci Research

3.1.8.4. Demand By Country- South America

Figure 9: South America Vinyl Ester Resin Demand, By Country, By Volume, 2015 - 2030F

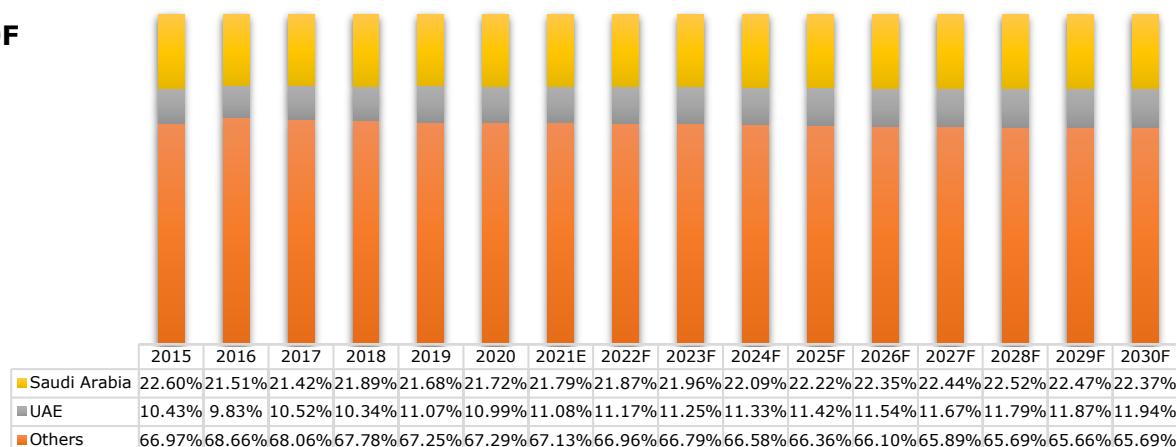


Others include Argentina, Columbia etc.

Source: TechSci Research

3.1.8.5. Demand By Country- Middle East & Africa

Figure 10: Middle East & Africa Vinyl Ester Resin Demand, By Country, By Volume, 2015 - 2030F

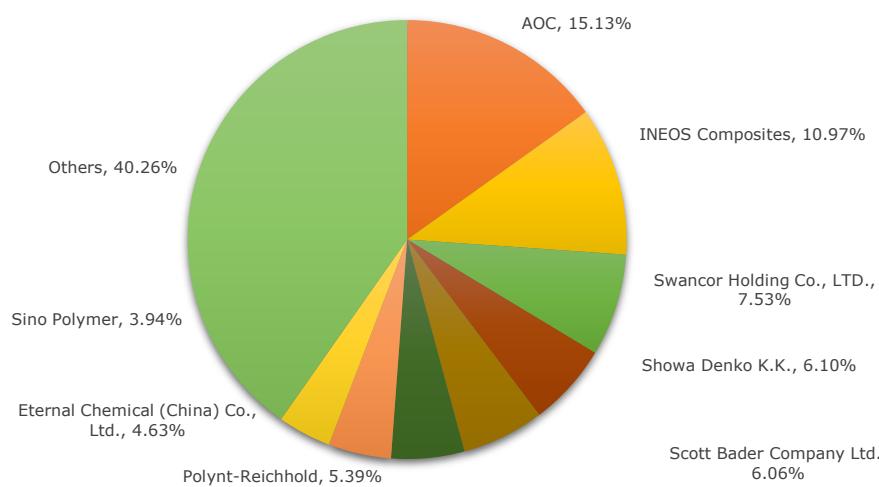


Others include South Africa, Iran, Egypt, Turkey etc.

Source: TechSci Research

3.1.9. Sales By Company

Figure 11: Global Vinyl Ester Resin Sales, By Company, By Volume, 2020



Others include Poliya, Hexion Inc., DIC Corporation, Saudi Arabia Industrial Resins Ltd., Reinhold GmbH, Interplastic Corporatio, Allnex Group, Sewon Chemical, Innovative Resins Pvt. Ltd., Orson Chemicals etc.

Source: TechSci Research

Top 8 companies control around 60% share in the global Vinyl Ester Resin market. AOC is leading the market, followed by INEOS Composites and Swancor Holding Co., Ltd.

The company has been providing styrene free vinyl ester resins to end users and is also being consequently developing its styrene free resin technology which marks it as an

essential element in its innovation strategy. The styrene free resin provides significant benefits which outweighs the higher resin cost including close to zero smell during resin handling such as in hand lay-up operation, in relining installation and reduces safety risk in industrial factories which is simplified permitting process, minimizes emissions from moulded components and improves resin functional performance. AOC, the leader in composites market, has been able to bring novel styrene free resins to commercial sales in the last twenty years and has also partnered with various companies to develop out of the box solutions which may

bring both sustainability and performance. INEOS Composites and Swancor Holding Co., Ltd. also holds the major share in the global vinyl ester resin market. INEOS Composites provides high quality vinyl ester products such as AME™, Arotran™, Derakane™, Derakane™ Signia™, Hetron™. Most of the Indian companies such as Mechemco resins Pvt Ltd., Innovative Resins Pvt. Ltd. etc. manufacture vinyl ester of INEOS's vinyl ester quality. The major drivers identified for their growth are robust supply chain management clubbed with proposed expansion plans for upcoming Vinyl Ester Resin manufacturing facilities.

ASIA PACIFIC VINYL ESTER RESIN DEMAND SUPPLY OUTLOOK



3.2.1. Asia Pacific Demand Supply Outlook

Figure 12: Asia Pacific Vinyl Ester Resin Demand, By Volume (Thousand Tonnes), 2015–2030F



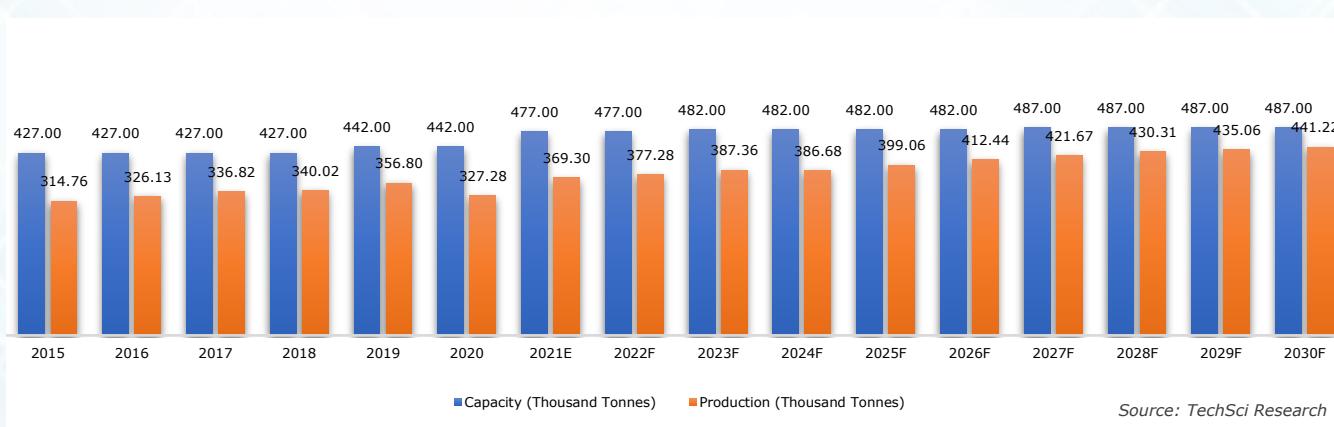
Source: TechSci Research

Asia Pacific's vinyl ester resin demand is anticipated to increase at a CAGR of 7.82% from the current demand of approximately 322 thousand tonnes to around 688 thousand tonnes in 2030. Exports are higher than imports due to the presence of major vinyl ester resin producers in the region. Total export in 2020 stood at around 23 while imports stood at around 24 thousand tonnes. Increasing export is attributed to the increasing demand for vinyl ester resin from fiber reinforced plastic (FRP) application in the pipe and tank industry. The average operating rate in the Asia Pacific region varies from around 78% to 84% and is expected to reach 94% in 2030. In 2021, the demand supply gap is in surplus with 27 thousand tonnes anticipated to reach 102 thousand deficits by 2030 creating an opportunity to enter into the market. However, several manufacturers are

investing heavily in capacity expansion to meet the growing demand for vinyl ester resin in the region.

3.2.1.1. Capacity, Production

Figure 13: Asia Pacific Vinyl Ester Resin Capacity & Production (Thousand Tonnes), 2015-2030F

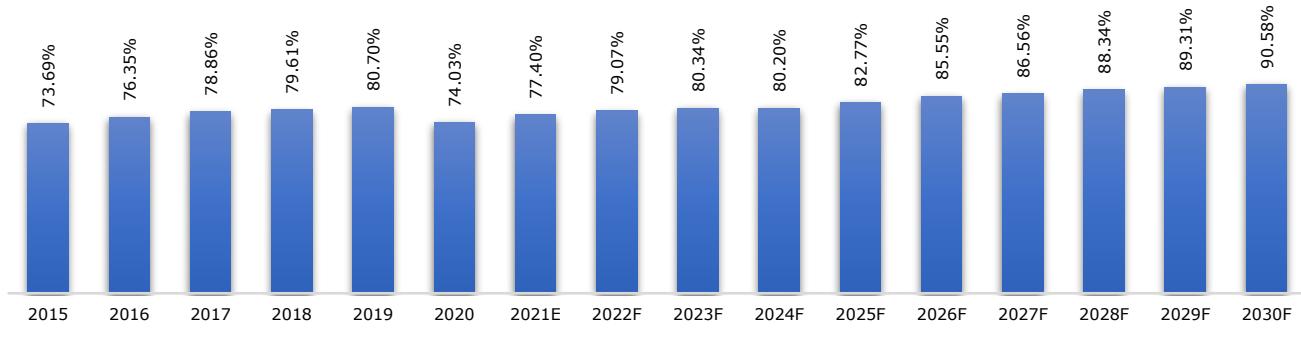


The current Asia Pacific capacity of Vinyl Ester resin stood at around 442 thousand tonnes in 2020 and is expected to reach approximately 487 thousand tonnes by 2030. The dominant players in the Asia Pacific vinyl ester resin market includes Swancor Holding Co., LTD., Jinling AOC Resins Co., Ltd., INEOS Composites, Showa Denko K.K. which holds around 46% of total Asia Pacific capacity. Manufacturers are adding new capacities to meet the growing demand for vinyl ester resin in the region. In 2020, Japanese Vinyl Ester Resin producer, Showa Denko K.K completed its expansion of VER production line to almost double of its existing capacity through its Chinese

subsidiary Shanghai Showa Highpolymer Co., Ltd. (SSHP). New players are also entering the vinyl ester resin market due to its increasing demand from fiber reinforced plastics (FRP) application, paints and coating and marine industry, among others. Furthermore, government of India's "Make in India" initiative to give impetus to composite industry by increasing the per capita consumption of fiber reinforced plastics (FRP) products is going to attract investors for capacity addition of vinyl ester resin to meet the customer demand.

3.2.1.2. Operating Efficiency

Figure 14: Asia Pacific Vinyl Ester Resin Operating Efficiency (Percentage), 2015-2030F



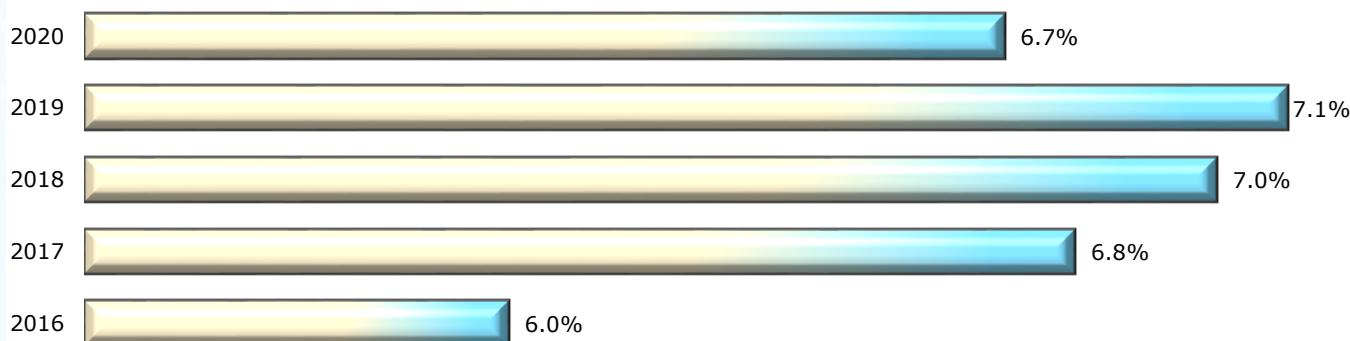
Source: TechSci Research

Asia-Pacific Refinery Throughput, By Country, 2016-2020 ('000 Barrels per Day)

Country	2016	2017	2018	2019	2020
China	9,599	10,155	10,684	11,084	9,452
India	4,462	4,475	4,561	4,930	3,802
Japan	3,453	3,289	3,258	3,280	2,963
South Korea	2,484	2,516	2,784	2,928	2,349
Indonesia	822	848	836	885	802
Rest of Asia-Pacific	4,756	4,582	4,685	4,736	4,136

Source: TechSci Research

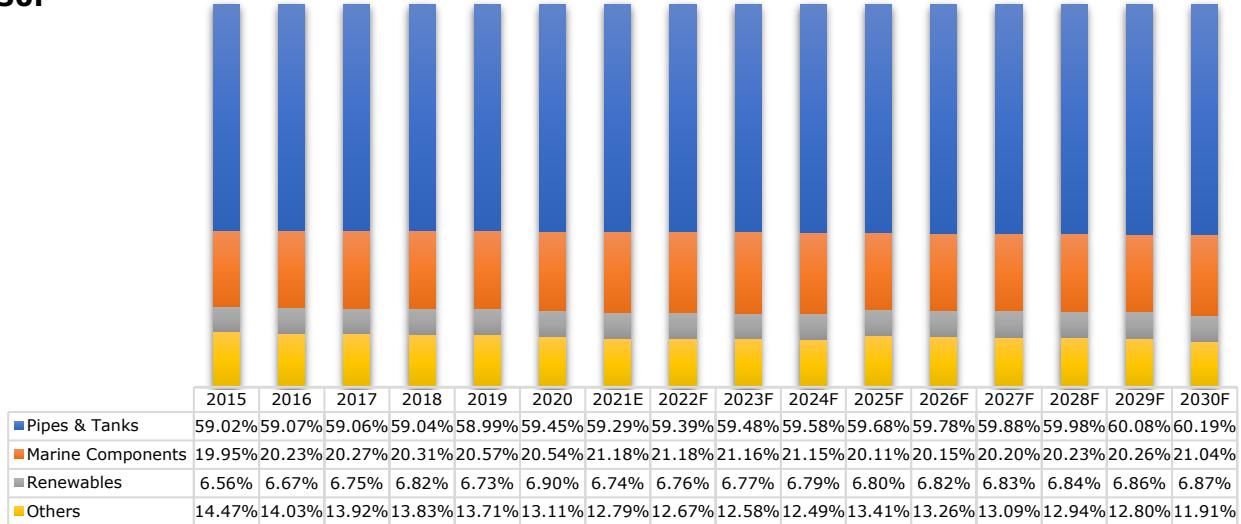
China IIP (Index of Industrial Production) Growth Rate, 2016-2020



Source: TechSci Research

3.2.1.3. Demand By Application

Figure 15: Asia Pacific Vinyl Ester Resin Demand, By Application, By Volume, 2015–2030F



Others include Défense, Aerospace, Electrical and electronics etc.

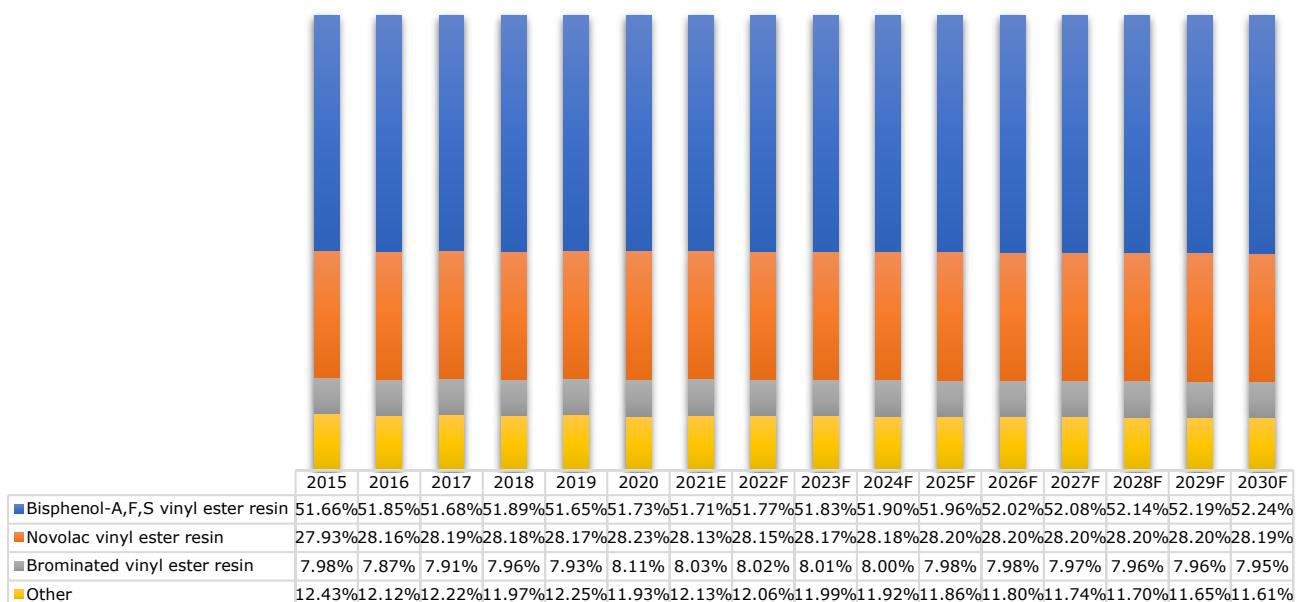
Source: TechSci Research

Pipes and Tanks constitutes the major share amongst the applications of vinyl ester resin, possessing around 60% of the total regional demand followed by marine components and renewables around 20% and 6%, respectively. The region will be noticing huge investment in renewable energy sector like wind and solar energy further increasing the

market for the product. Increasing industrialization and rising investments in defense sector has further increased the market for vinyl ester. The use of vinyl ester resin in electrical & electronics industry in China due to established industry in the country also stimulated the demand in the region.

3.2.1.4. Demand By Type

Figure 16: Asia Pacific Vinyl Ester Resin Demand, By Type, By Volume, 2015–2030F



Others include Urethane Modified vinyl ester resin, Elastomer Modified vinyl ester resin, etc.

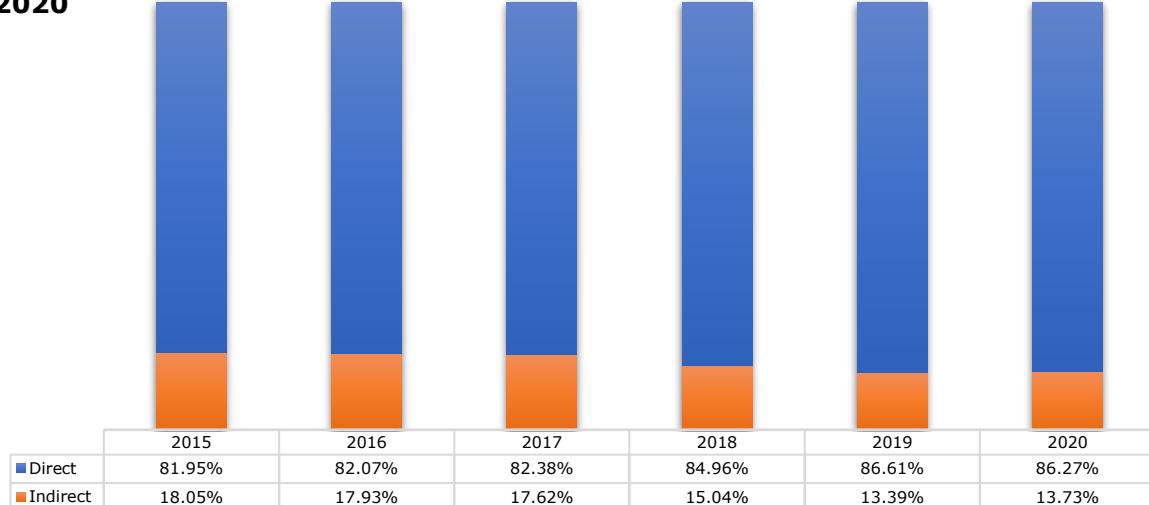
Source: TechSci Research

Bisphenol- A type of vinyl ester occupies around 52% share in the market followed by Novolac and Brominated, contributing to around 28% and 8%, respectively. Bisphenol- A vinyl ester resin provides resistance against a wide variety of bleaches, alkalis, and organic compounds and is therefore used in the chemical processing industry. The resin also provides toughness and superior elongation to fibre reinforced

plastic (FRP) equipment with less cracking and better impact resistance. Increasing industrialization coupled with various government initiatives to increase investment in the renewable energy sector is anticipated to boost the market for vinyl ester in the forecast period.

3.2.1.5. Demand By Sales Channel

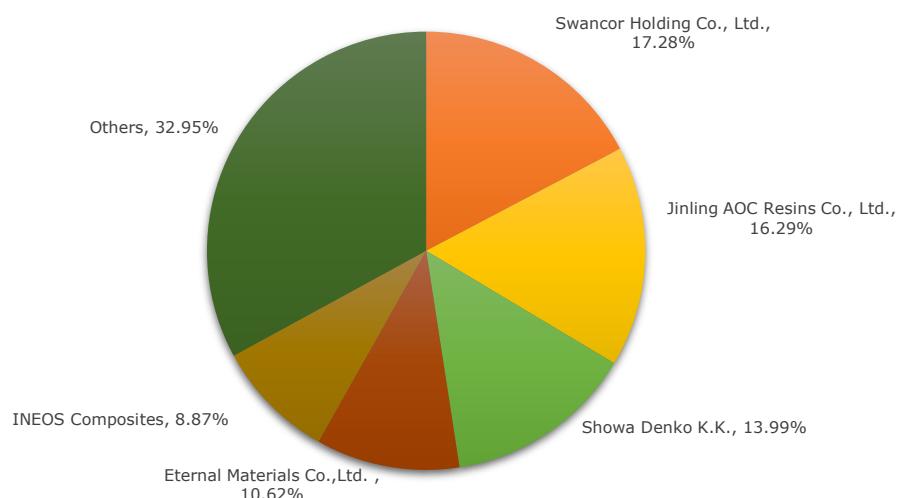
Figure 17: Asia Pacific Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2020



Source: TechSci Research

3.2.1.6. Sales By Company

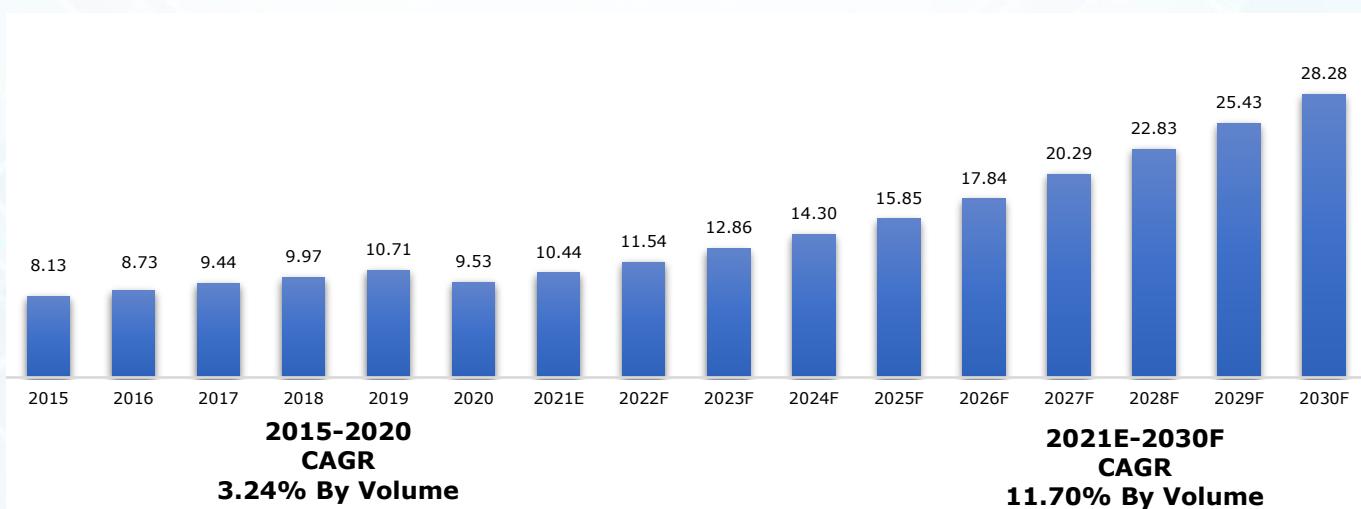
Figure 18: Asia Pacific Vinyl Ester Resin Sales, By Company, By Volume, 2020



Source: TechSci Research

3.2.2. India Vinyl Ester Resin Demand Supply Outlook

Figure 19: India Vinyl Ester Resin Demand, By Volume (Thousand Tonnes), 2015–2030F



India vinyl ester resin market is anticipated to reach 28.28 thousand tonnes in 2030, growing with a healthy CAGR of 11.70% for the forecast period. The demand stood at 9.53 thousand tonnes in 2020 showing degrowth from the preceding year due to the COVID-19 outbreak. Further, the gap between demand and supply is anticipated to

increase from 7 thousand tonnes in 2020 to 24 thousand tonnes in 2030 due to no major capacity expansions by companies in the country. Majorly the companies are operating at efficiency between 77% to 92%. However, in 2020 due to COVID-19, the demand for Vinyl Ester Resin was impacted as major industries were shutdown.

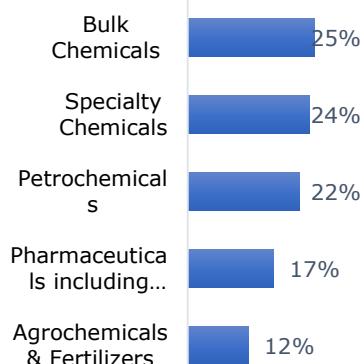
India Construction Sector Market Size, By Value, 2015-2025F (USD Million)



Source: TechSci Research

Demographic Dividends, low per capita consumption, increasing export demand and government initiatives are key growth drivers

Sector Wise Demand



Top 10 FDI Destinations in World

6th among top manufacturing countries

Most competitive economy in South Asia



Source: IBEF

100% FDI automatic route in manufacturing

Major labor reforms have been implemented to improve ease of doing business

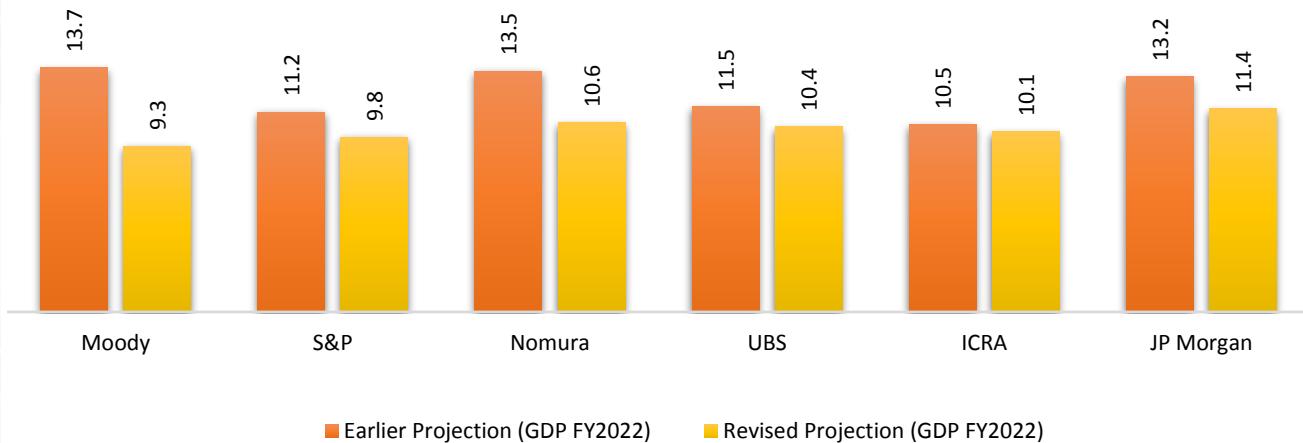
Large base of entrepreneurs, more than 20000 start-ups

1.19 Trillion USD pipeline infrastructure to be completed by 2025

Aggressive corporate tax cuts and removal of dividend distribution tax

Source: TechSci Research

India's GDP Forecast for 2022, By Rating Agency (Percentage)



Source: Press Release by Rating Agencies

State-wise installed capacity of Wind Energy Power Generation as on 31.07.2021.

States	Wind Power (MW)
Tamil Nadu	9717.04
Gujarat	8782.12
Maharashtra	5012.83
Karnataka	4938.60
Rajasthan	4326.82
Andhra Pradesh	4096.65
Madhya Pradesh	2519.89
Telangana	128.10
Kerala	62.50

Source: TechSci Research

India has unique advantage in catering to domestic as well as Global Vinyl Ester Resin Market

Low Cost

- Over the past decade, India has gained a unique advantage by mastering low-cost manufacturing of paints & coatings, composites (driven by availability of labor, tax benefits, etc.)

Manpower & Production Capacity

- India has sufficient availability of technically trained manpower and unutilized production capacity to fulfil local as well as global Vinyl Ester Resin (LER, SER) demand.

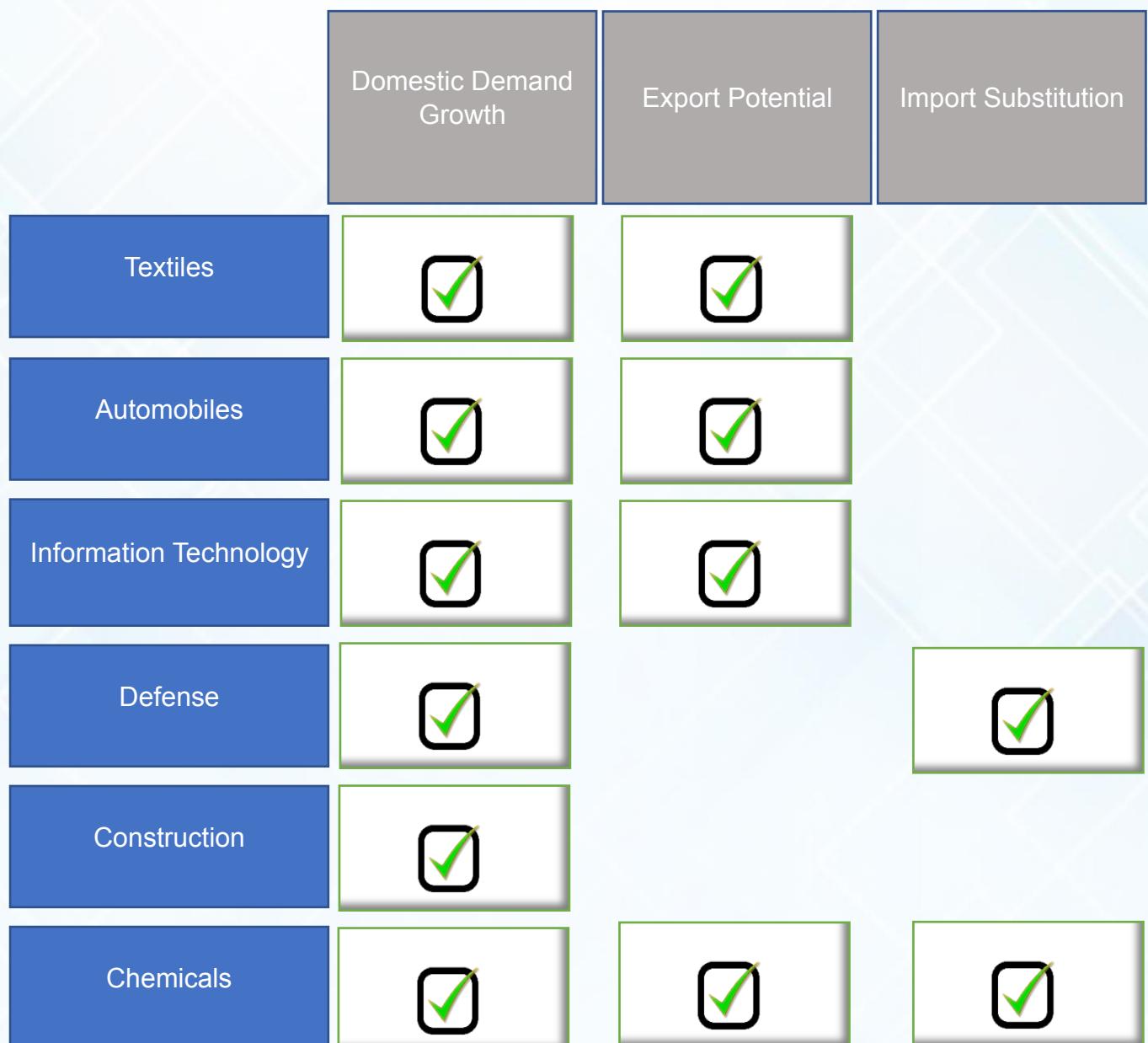
Impact of COVID-19

- Post COVID, many global manufacturers are contemplating shifting their production from China to India and other countries to reduce heavy reliance on China.

Government Focus

- The Indian government has launched various schemes (Make in India, Start-up India, Production Linked Incentive Scheme, etc.) in the past decade, which will play a crucial role in transforming India into a global manufacturing hub.

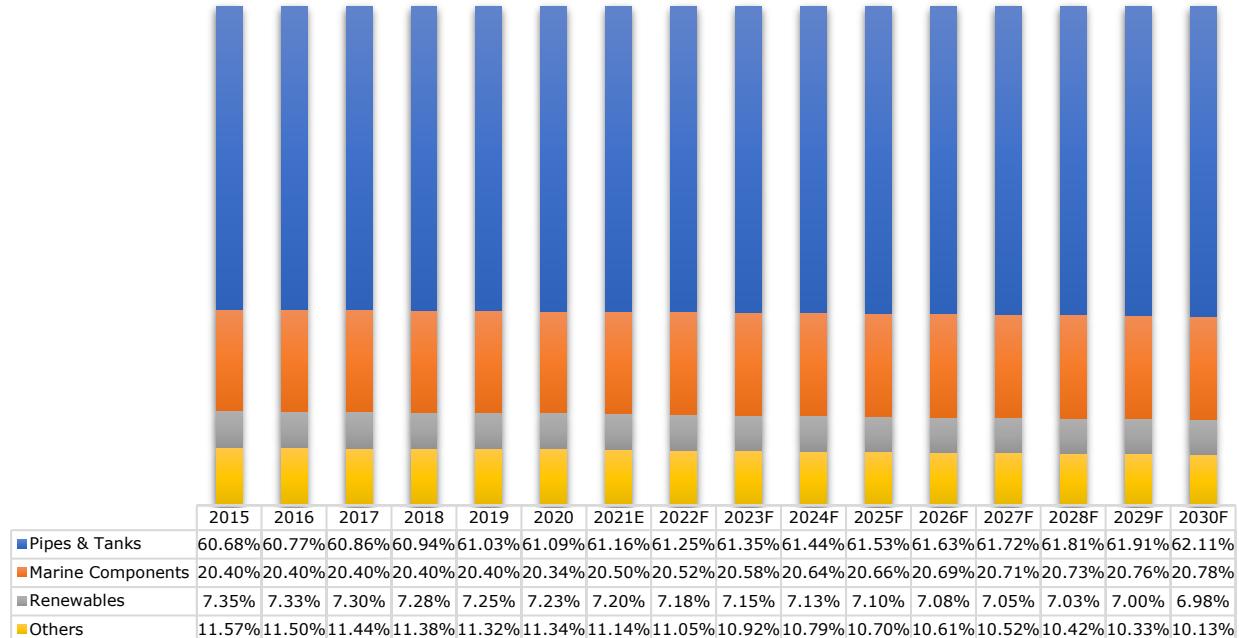
The Indian Chemical Industry has Triple Growth Drivers



Source: TechSci Research

3.2.2.1. Demand By Application

Figure 20: India Vinyl Ester Resin Demand, By Application, By Volume, 2015–2030F

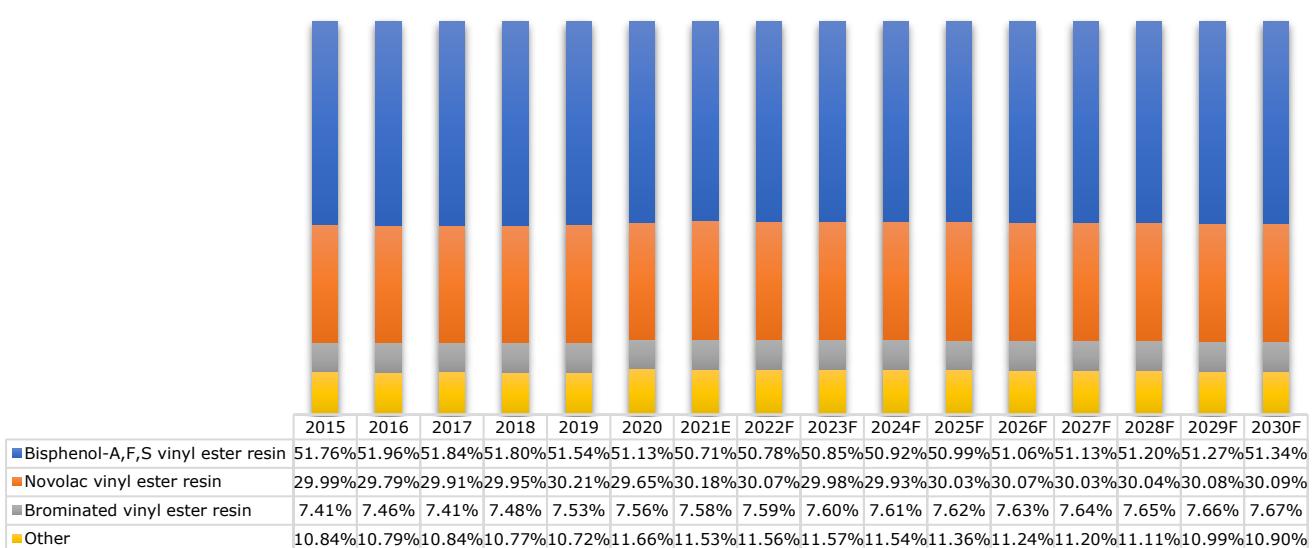


Others include Défense, Aerospace, Electrical and electronics, etc.

Source: TechSci Research

3.2.2.2. Demand By Type

Figure 21: India Vinyl Ester Resin Demand, By Type, By Volume, 2015–2030F



Others include Urethane Modified vinyl ester resin, Elastomer Modified vinyl ester resin, etc.

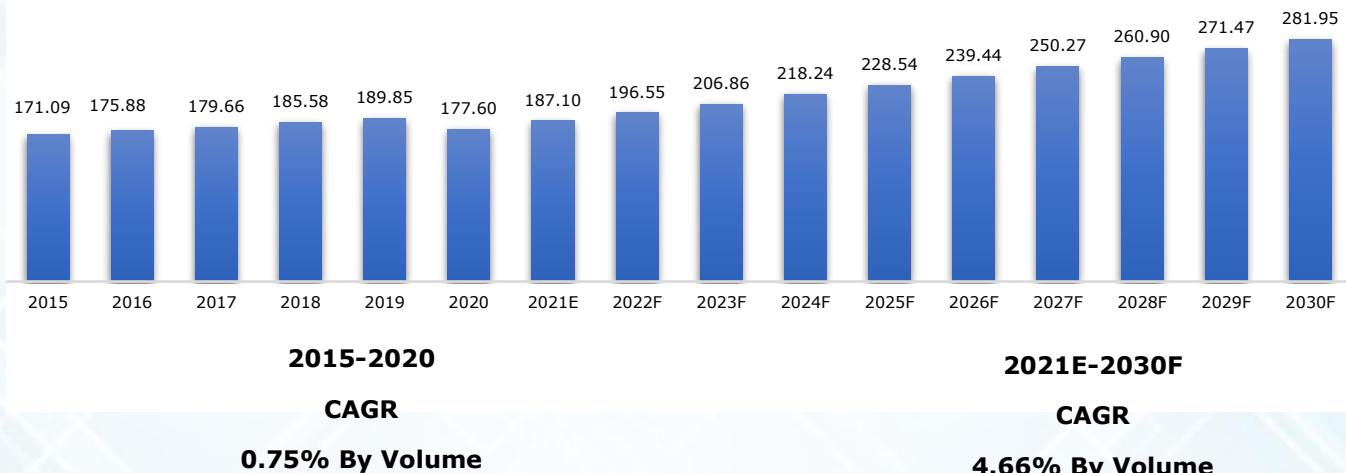
Source: TechSci Research

EUROPE VINYL ESTER RESIN DEMAND SUPPLY OUTLOOK



3.2.3. Europe Vinyl Ester Resin Demand Supply Outlook

Figure 22: Europe Vinyl Ester Resin Demand, By Volume (Thousand Tonnes), 2015–2030F



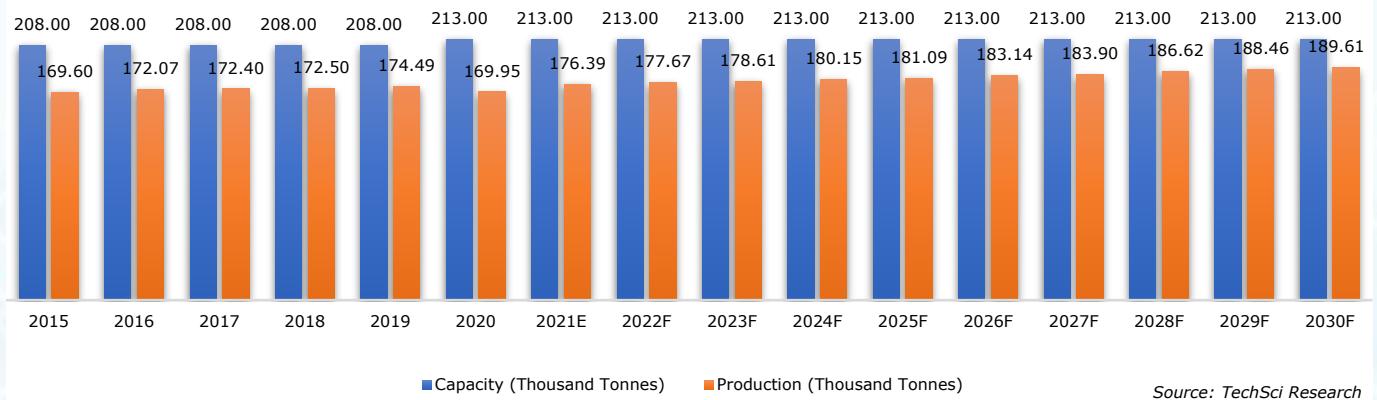
Source: TechSci Research

Europe current capacity of vinyl ester resin stood at 177 thousand tonnes in 2020. Major vinyl ester resin players in Europe include INEOS Composites, Hexion Inc, Scott Bader Company Ltd., and AOC among others. These companies hold approximately 52% share of total capacity in Europe as of 2020. Further, INEOS Composites acquired Ashland Holdings resin business in 2019, including a 40 MTPA facility in Germany and 70 MTPA facility in the United States. Another major player Scott Bader Company

Ltd has 15 MTPA capacity in France as well as 20 MTPA Capacity in United Kingdom. Further, Scott Bader made strategic investment of more than 1.2 million Euro in 2017 to add capacity addition for its composite business led by strong demand of Scott Bader products from its customer. Many new players are expected to enter Europe vinyl ester resin market due to favourable government policies and strong demand for vinyl ester resin in many European nations.

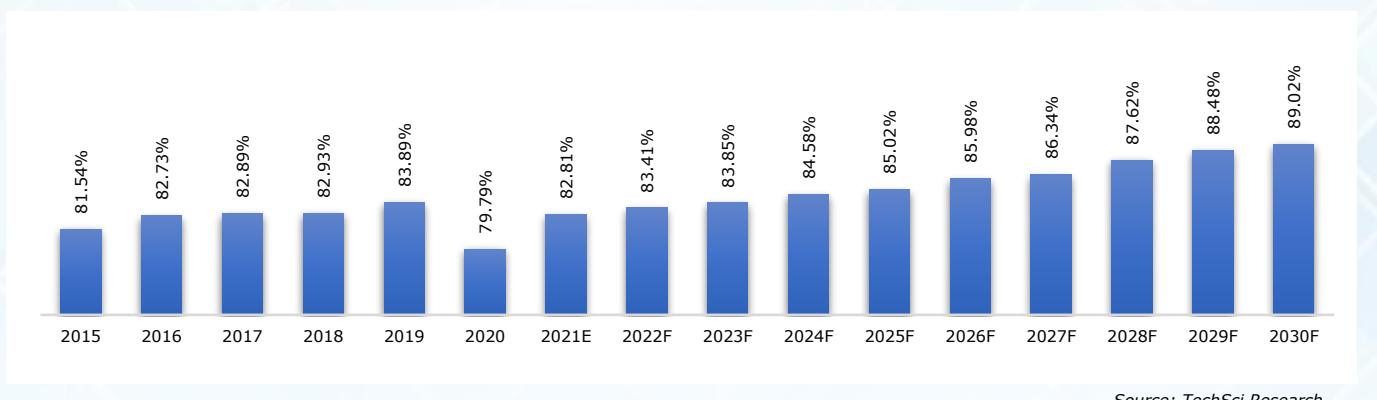
3.2.3.1. Capacity, Production

Figure 23: Europe Vinyl Ester Resin Capacity & Production (Thousand Tonnes), 2015-2030F



3.2.3.2. Operating Efficiency

Figure 24: Europe Vinyl Ester Resin Operating Efficiency (Percentage), 2015-2030F



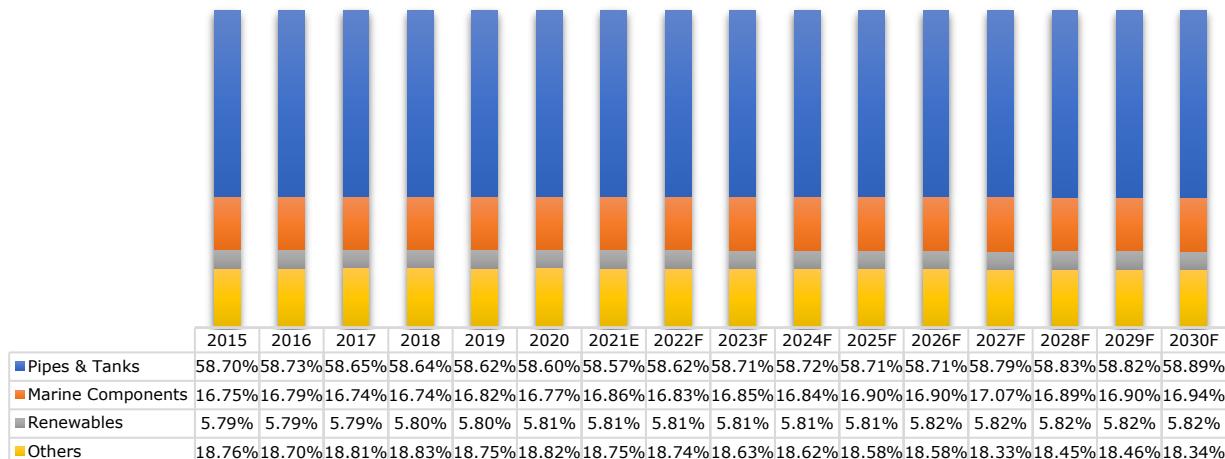
European Countries Real Estate Investment, 2020 (USD Billion)

Countries	Investment (USD Billion)
Germany	57
France	28
Netherlands	14
Spain	12
Italy	9

Source: TechSci Research

3.2.3.3. Demand By Application

Figure 25: Europe Vinyl Ester Resin Demand, By Application, By Volume, 2015–2030F



Others include Défense, Aerospace, Electrical and electronics etc.

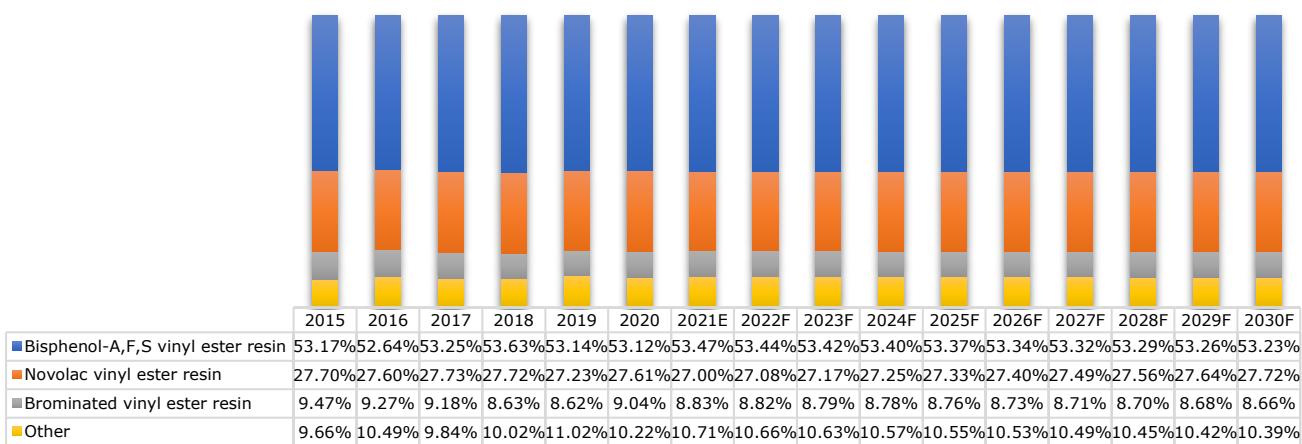
Source: TechSci Research

Europe vinyl ester resin market by application is dominated by pipes and tanks with a share of around 58%. It is used as a coating material that protects the industrial pipes and tanks from various chemicals and heat. Marine components and renewables together contribute to around 22% of the total

demand. Vinyl ester resin is employed as a lining over marine components, providing resistance from alkalis, acids, heat, and other chemicals. The growing investments in the renewable sector such as wind and solar energy in the region have also contributed to the rising market for vinyl ester resin.

3.2.3.4. Demand By Type

Figure 26: Europe Vinyl Ester Resin Demand, By Type, By Volume, 2015–2030F



Others include Urethane Modified vinyl ester resin, Elastomer Modified vinyl ester resin etc.

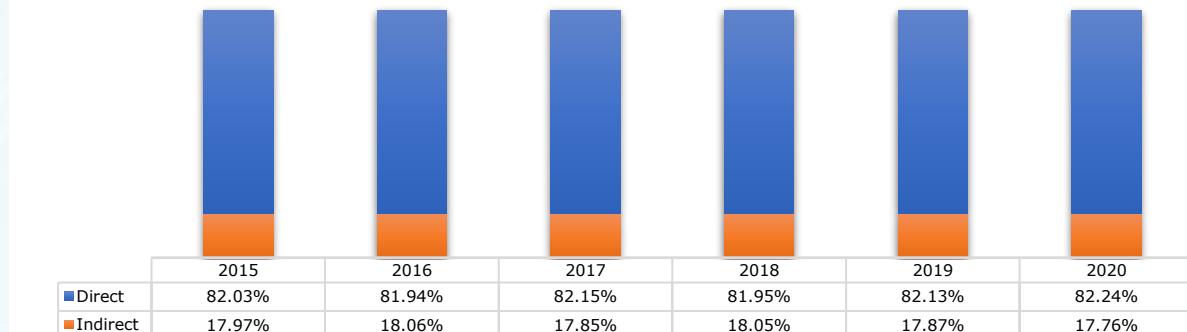
Source: TechSci Research

Europe vinyl ester resin type is dominated by Bisphenol-A, F, S due to its extensive use in the pipes and tanks industry where it is used as a coating material in tankers preventing them from corrosion, chemicals, and heat. Novolac and Brominated vinyl ester resin together contributes to around 35% share of the total regional demand. Increasing

industrialization and rising investments in the renewable sector increased the market for bisphenol- A, F, S vinyl ester in the region. Major vinyl ester resin producers in the region manufacture Bisphenol- F because Bisphenol- A has been banned due to its carcinogenic property

3.2.3.5. Demand By Sales Channel

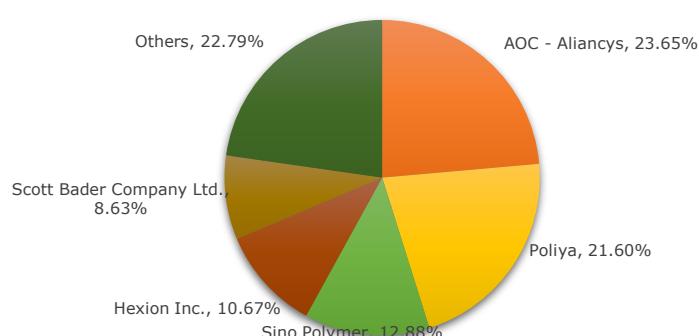
Figure 27: Europe Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2020



Source: TechSci Research

3.2.3.6. Sales By Company

Figure 28: Europe Vinyl Ester Resin Sales, By Company, By Volume, 2020



Others include Polyt S.p.A., Reinhold GmbH, Ashland Global Holdings Inc., Allnex group, etc.

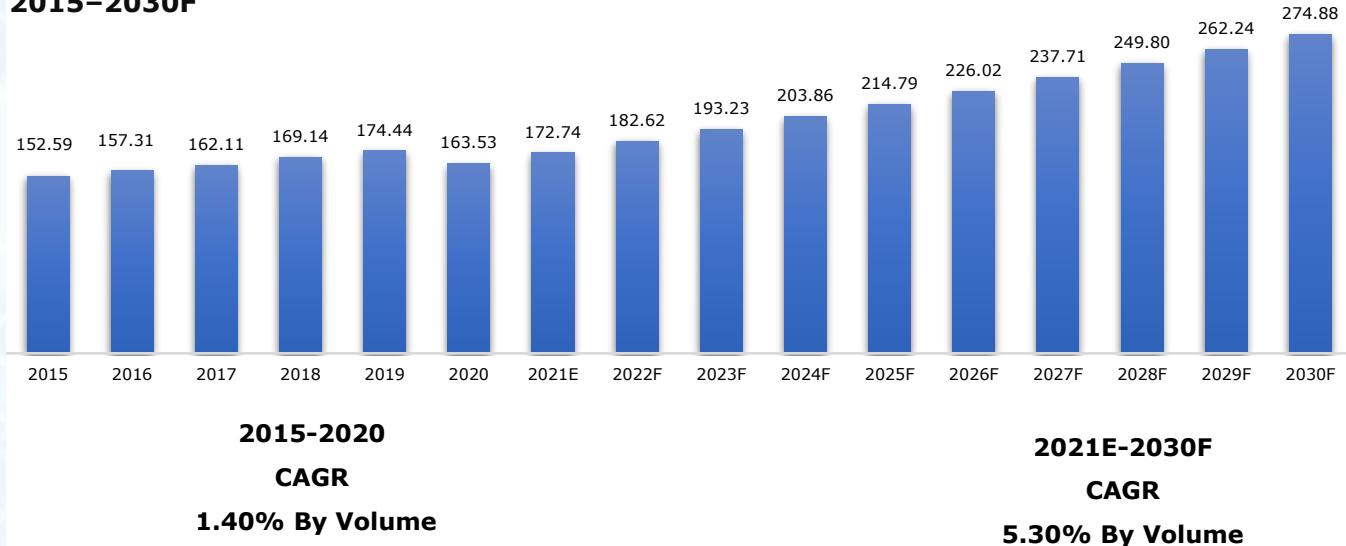
Source: TechSci Research

NORTH AMERICA VINYL ESTER RESIN DEMAND SUPPLY OUTLOOK



3.2.4. North America Vinyl Ester Resin Demand Supply Outlook

**Figure 29: North America Vinyl Ester Resin Demand, By Volume (Thousand Tonnes),
2015–2030F**



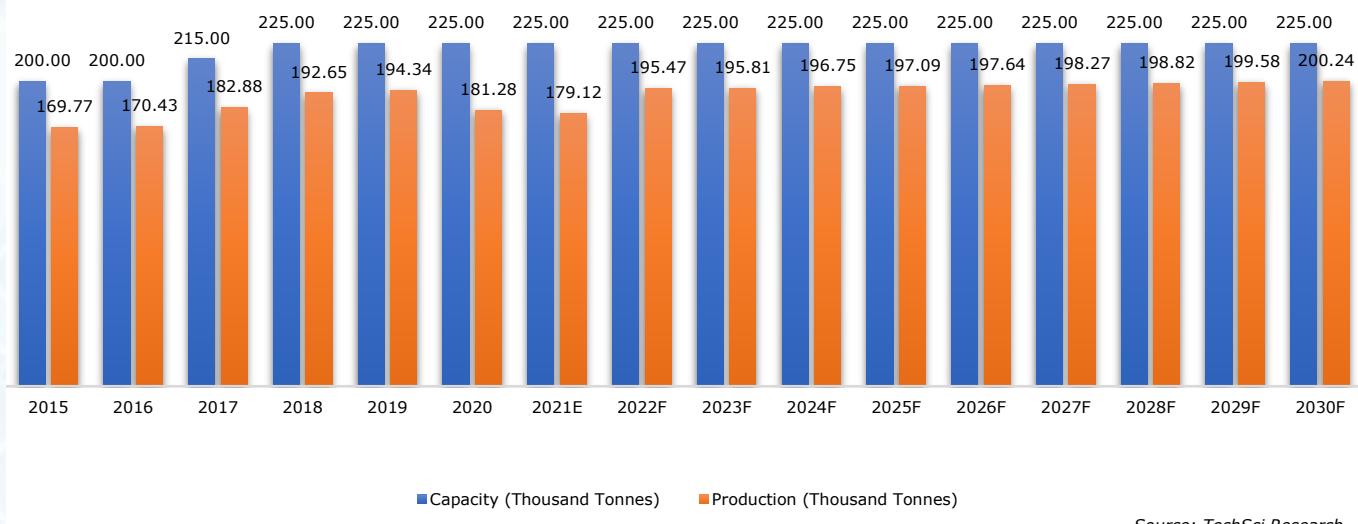
Source: TechSci Research

North America's demand for vinyl ester resin stood at approximately 163 thousand tonnes as of 2020. The demand is anticipated to increase at a CAGR of approximately 5.30% during the forecast period to reach around 274 thousand tonnes in 2030. This increase in demand is attributed to growing infrastructure projects and increasing investment in renewable energy sector. Import in 2020 stood at around 4.5 thousand tonnes while export remained approximately 3.70 thousand tonnes in the same year. Europe and Asia are major suppliers of vinyl

ester resin to North America. Average operating rate in North America region varies from around 87% to 90%. In 2021, the demand supply gap is in surplus with 6 thousand tonnes is anticipated to reach 74 thousand tonnes in deficit by 2030 creating an opportunity to enter into the market. However, several manufacturers are investing heavily in capacity expansion and new technology development to meet the growing demand for vinyl ester resin in the region.

3.2.4.1. Capacity, Production

Figure 30: North America Vinyl Ester Resin Capacity & Production (Thousand Tonnes), 2015-2030F



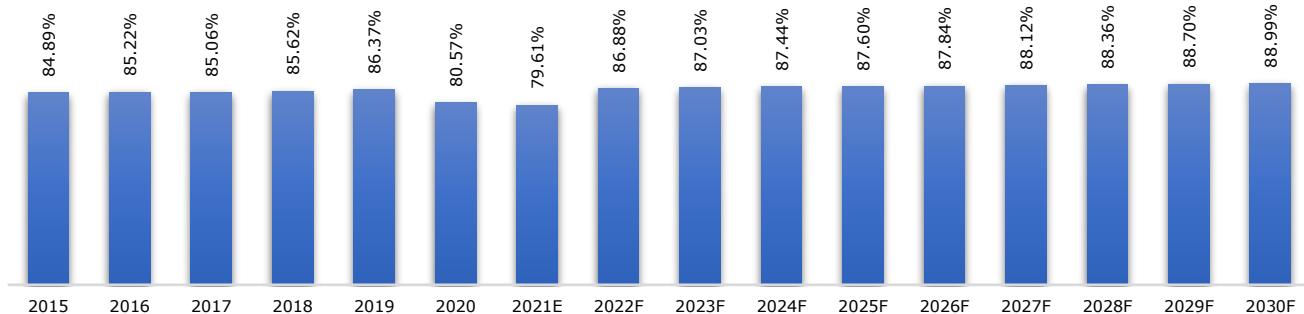
Source: TechSci Research

North America's vinyl ester resin capacity stood approximately 225 thousand tonnes as of 2020 which accounts for nearly 25% of world's capacity. These players hold close to 81% share of region's total capacity. Polynt Group after acquisition of CCP composites in 2014 made further investment to merge its business with Reichold in 2017 to become Polynt-Reichold Group with significant global presence in North America, Europe, and Asia

regions. Additionally, Polynt-Reichold Group is strongly investing in new technology development to meet the growing customer demand for its products. Furthermore, Interplastic Corporation has been making associations with industry organizations such as American Composites Manufacturers Association (ACMA) to gain industry expertise in the vinyl ester resin business.

3.2.4.2. Operating Efficiency

Figure 31: North America Vinyl Ester Resin Operating Efficiency (Percentage), 2015–2030F



Source: TechSci Research

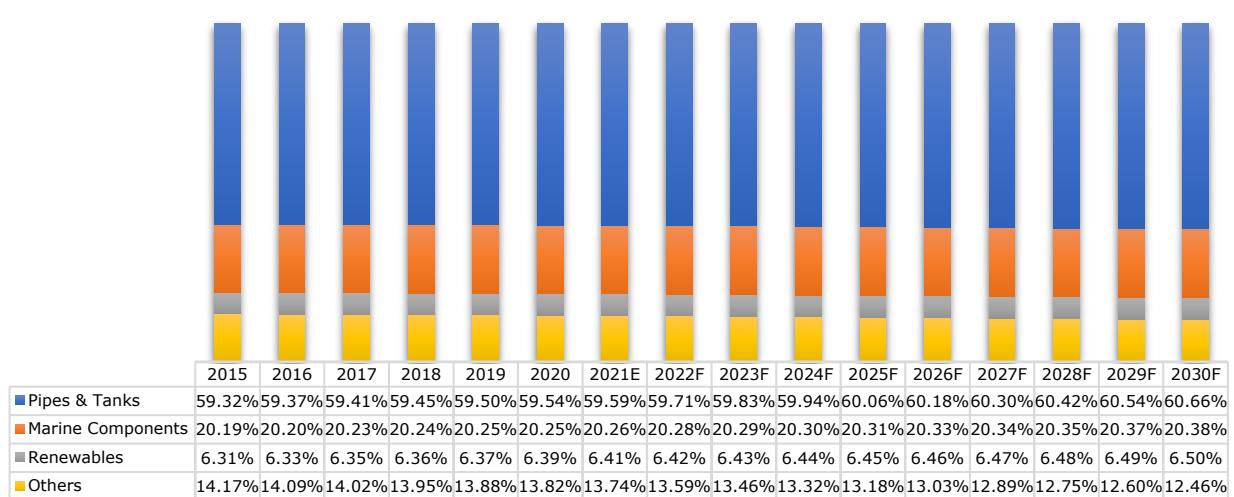
North America GDP at Current Prices, 2015–2020 (USD Trillion)



Source: World Bank

3.2.4.3. Demand By Application

Figure 32: North America Vinyl Ester Resin Demand, By Application, By Volume, 2015–2030F



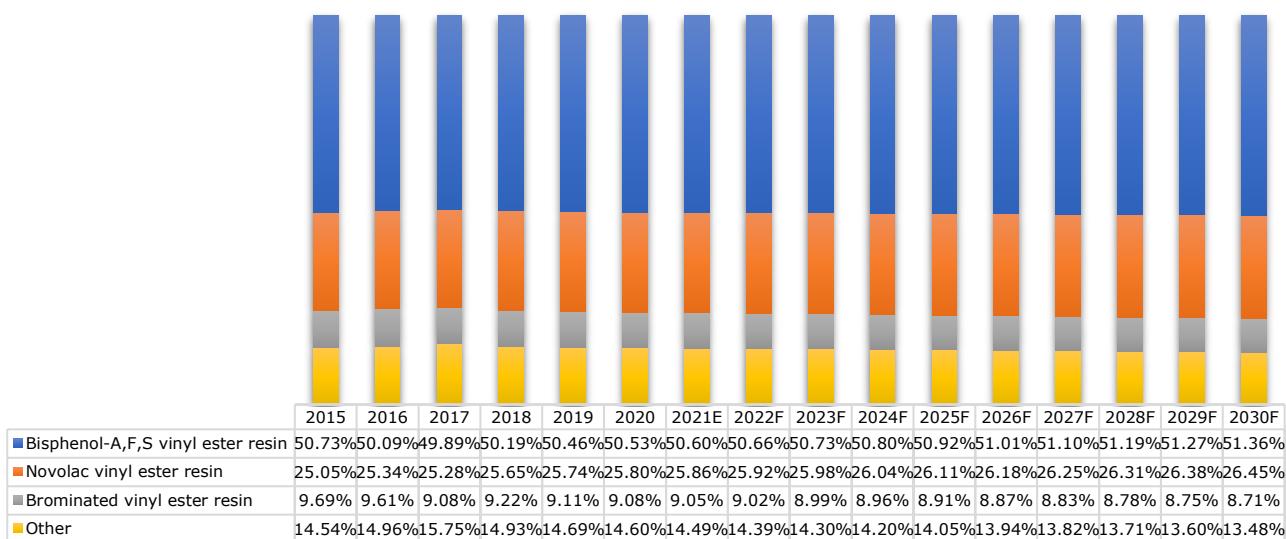
Source: TechSci Research

Pipes and Tanks emerged as the major application of vinyl ester in the region due to its property of providing resistance against various chemicals and heat to industrial tanks, pipes as well as pipes and tanks used in water and wastewater treatment. It also provides superior mechanical properties to industrial tankers and pipes. The lining over marine components provides good surface profile reducing post cure on finished parts. In renewable sector like wind energy it

provides excellent strength, toughness, and chemical resistance over a broad range of temperatures. Marine components and renewables together constitute around 26% of regional demand. The growing marine industry and increasing demand for renewable energy in the region has also helped the market of the product to surge in recent years and is anticipated to further boost the market growth in the region.

3.2.4.4. Demand By Type

Figure 33: North America Vinyl Ester Resin Demand, By Type, By Volume, 2015–2030F



Others include Urethane Modified vinyl ester resin, Elastomer Modified vinyl ester resin etc.

Source: TechSci Research

North America vinyl ester resin market by type is dominated by Bisphenol-A, F, S vinyl ester which constitutes of around 50% share due to their extensive use in the pipes and

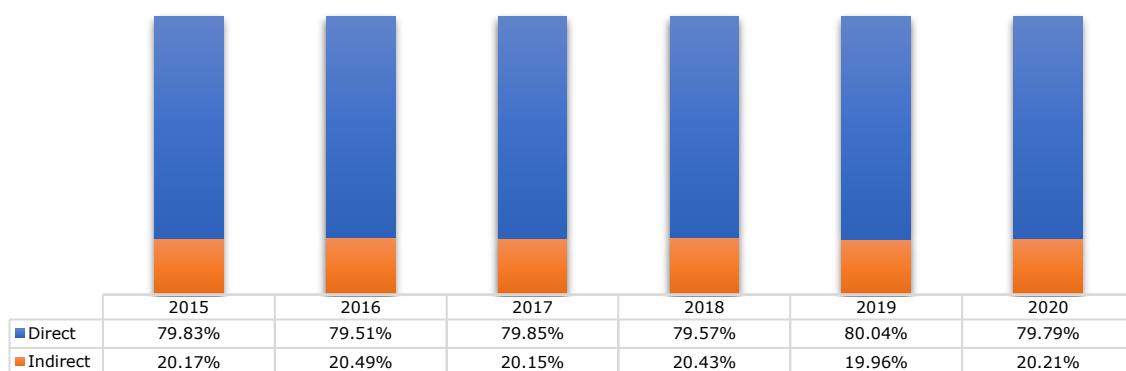
tanks industry. These resins are employed as a coating material to provide resistance to corrosion, various chemicals, and heat. Novolac and Brominated vinyl ester resins

together contribute to around 35% share of the total region. Moreover, increasing industrialization and rising investments in the renewable sector have contributed to the growth of bisphenol- A, F, S vinyl ester

market in the region. Brominated vinyl ester resin is suitable for mouldings that are subjected to particularly high static or dynamic loads.

3.2.4.5. Demand By Sales Channel

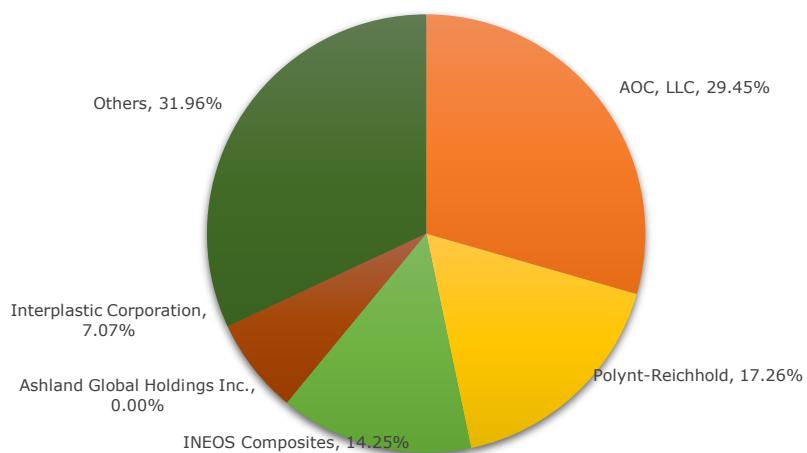
Figure 34: North America Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2020



Source: TechSci Research

3.2.4.6. Sales By Company

Figure 35: North America Vinyl Ester Resin Sales, By Company, By Volume, 2020



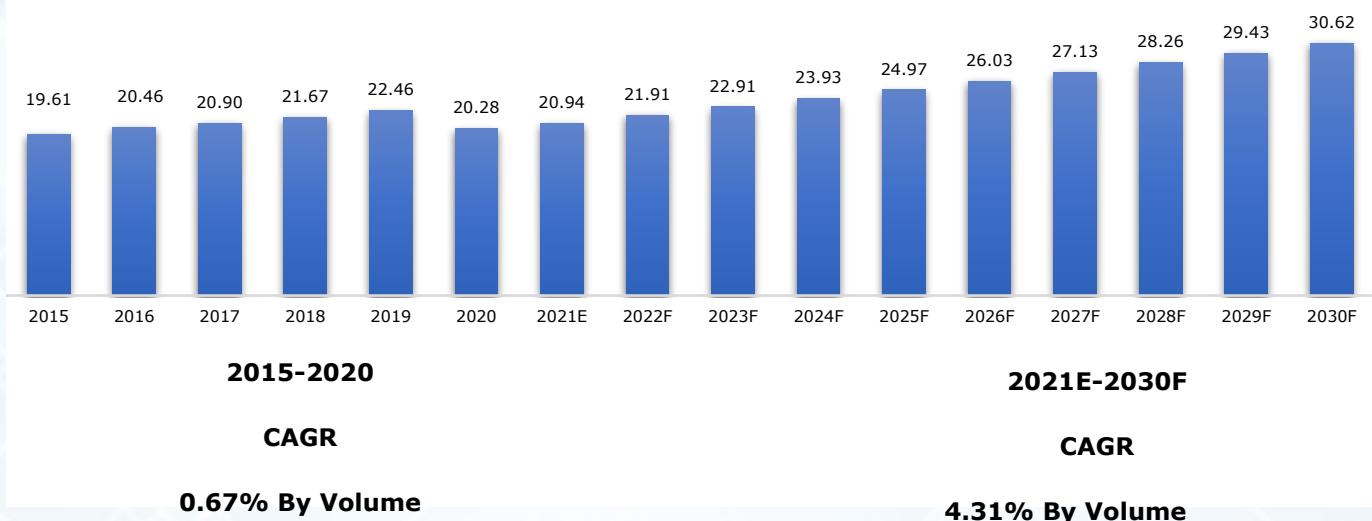
Source: TechSci Research

SOUTH AMERICA VINYL ESTER RESIN MARKET OUTLOOK



3.2.5. South America Vinyl Ester Resin Demand Supply Outlook

Figure 36: South America Vinyl Ester Resin Demand, By Volume (Thousand Tonnes), 2015–2030F

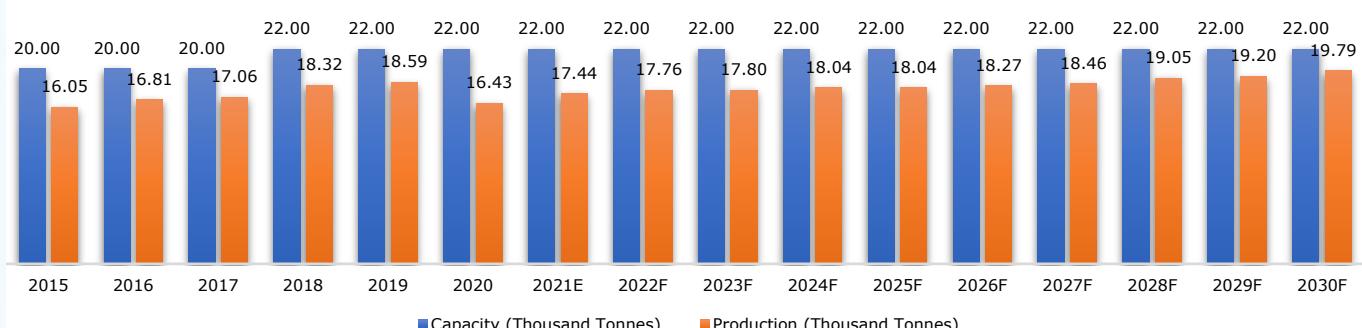


South America's vinyl ester resin demand is anticipated to increase at a CAGR of approximately 4.31% and reach 30 thousand tonnes by 2030 from 20.28 thousand tonnes in 2020. This increase in demand is led by strong demand growth in fiber reinforced plastics (FRP), marine components and wind energy sector. Rising industrialization and urbanization have also contributed to the rising demand of the product in the region.

The increase in demand in industrial applications where it is used as a lining system for water treatment, air pollution, chemical processing and mineral processing providing resistance from corrosion stimulated the market of vinyl ester resin in the region. The gap between demand and supply has gradually been increasing year by year to 10 thousand tonnes in 2030 due to no major capacity expansions in the region.

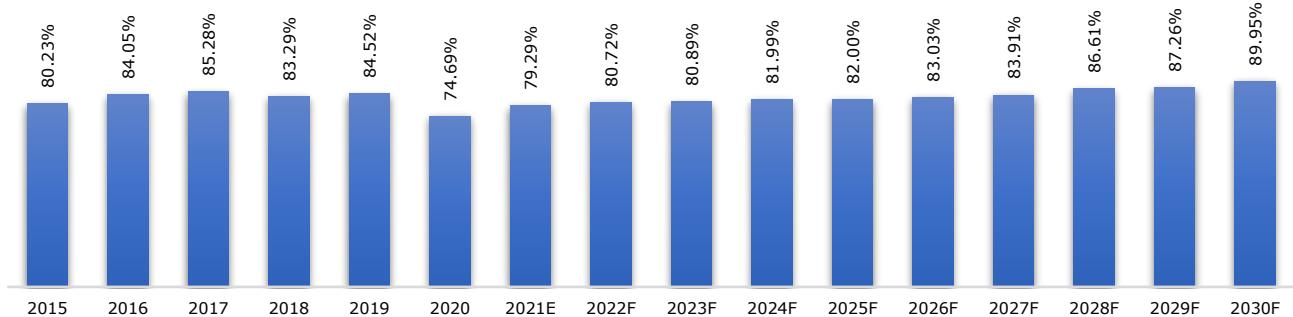
3.2.5.1. Capacity, Production

Figure 37: South America Vinyl Ester Resin Capacity & Production (Thousand Tonnes), 2015–2030F



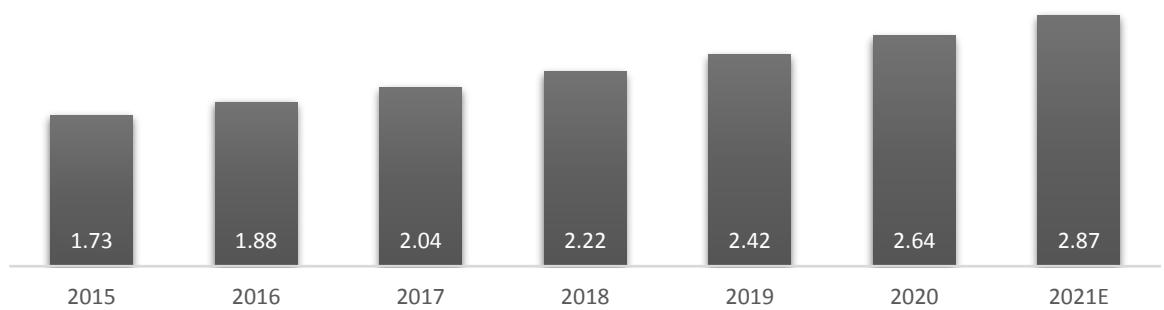
3.2.5.2. Operating Efficiency

Figure 38: South America Vinyl Ester Resin Operating Efficiency (Percentage), 2015-2030F



Source: TechSci Research

South America Advanced Composites Market Size, By Value, 2015-2021E (USD Billion)



Source: TechSci Research

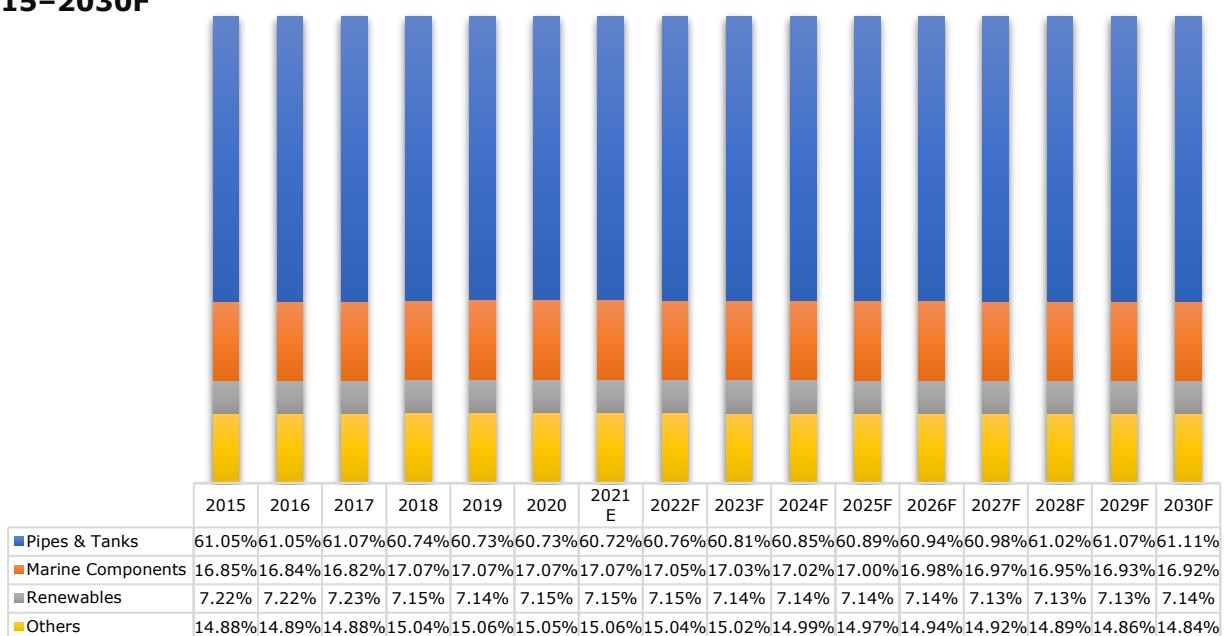
Brazil Residential, Commercial & Green Building Market Size, By Value, 2025F (USD Billion)

Segment	2025F
Residential Building	328.0
Commercial Building	47.5
Residential Green Building	34.0
Commercial Green Building	3.9

Source: TechSci Research

3.2.5.3. Demand By Application

Figure 39: South America Vinyl Ester Resin Demand, By Application, By Volume, 2015–2030F



Others include Défense, Aerospace, Electrical and electronics etc.

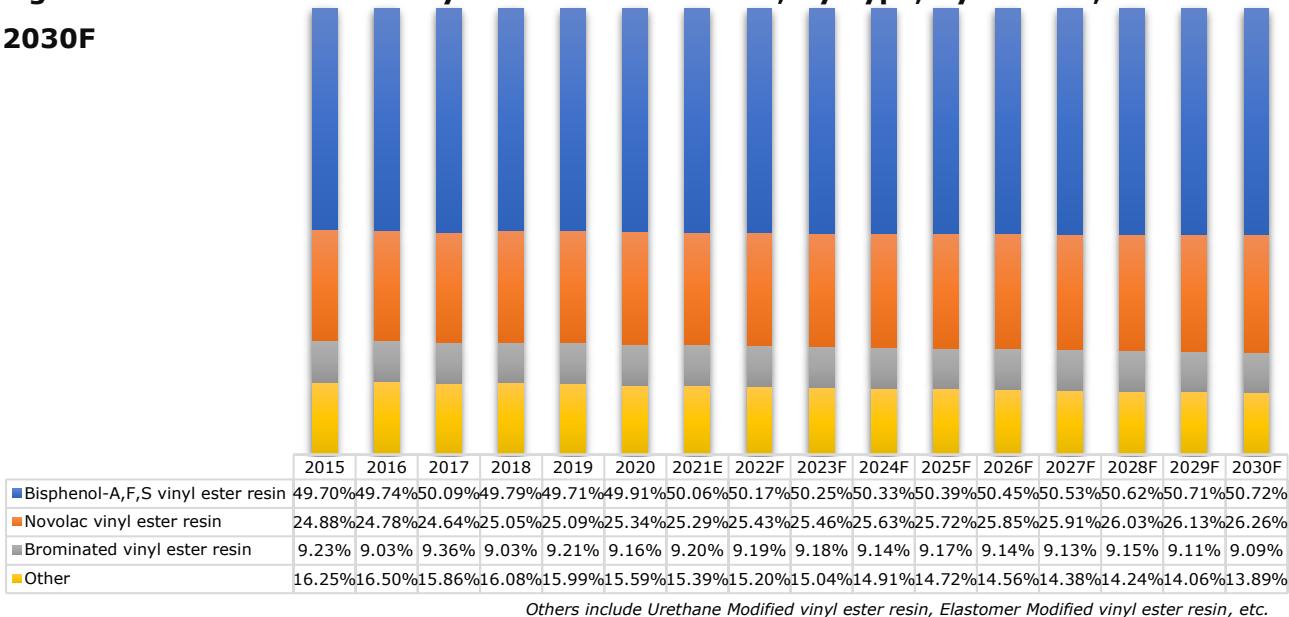
Source: TechSci Research

The pipes and tanks are the major demanding application in the region due to increasing demand from industries where it is used as lining over tankers or chimneys. The increasing demand for renewable energy like wind and solar energy in the region helped the market of the product to surge in recent years and is anticipated to further increase the market in the region. Furthermore, the demand from the marine sector stimulated

the market for the product in the region. South America market has been observing growing demand from the marine industry aided by upcoming new projects with energy efficient solutions. Further, growing investments in renewables has contributed to the growth of the market for vinyl ester resins. Due to its property of low water absorption, vinyl ester resin is preferred over unsaturated polyester resin in the region's

3.2.5.4. Demand By Type

Figure 40: South America Vinyl Ester Resin Demand, By Type, By Volume, 2015–2030F



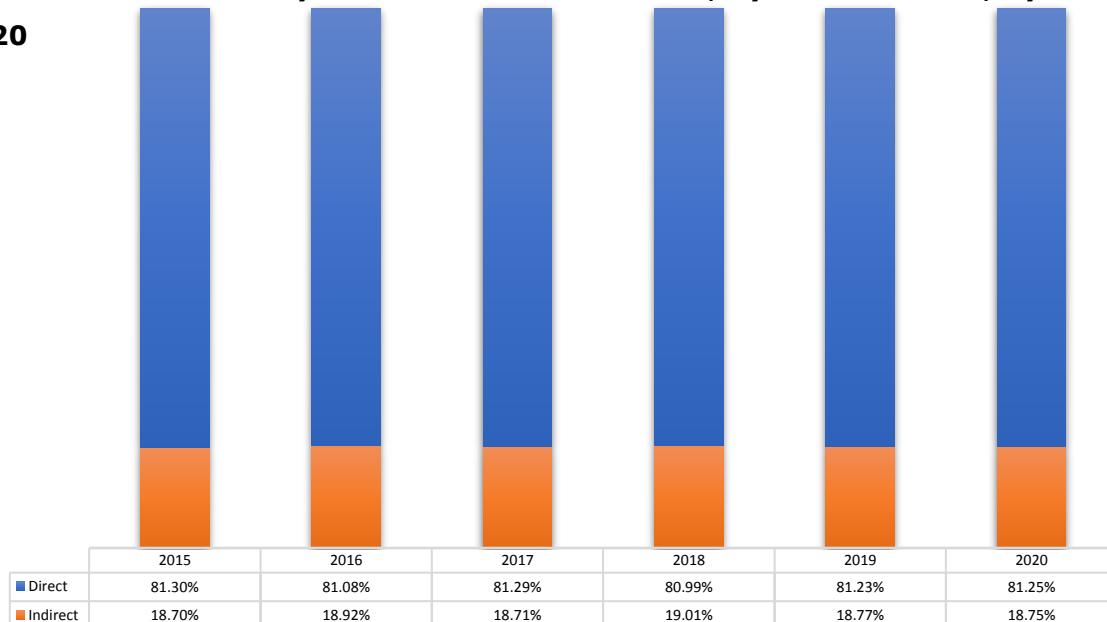
Source: TechSci Research

The demand for Bisphenol- A, F, S dominates the vinyl ester resin market in South America due to their increasing demand in chemical industry. Bisphenol- A,

F, S cover approximately 50% of the total demand for vinyl ester resins in South America followed by Novolac vinyl ester resin.

3.2.5.5. Demand By Sales Channel

Figure 41: South America Vinyl Ester Resin Market Share, By Sales Channel, By Volume, 2015–2020



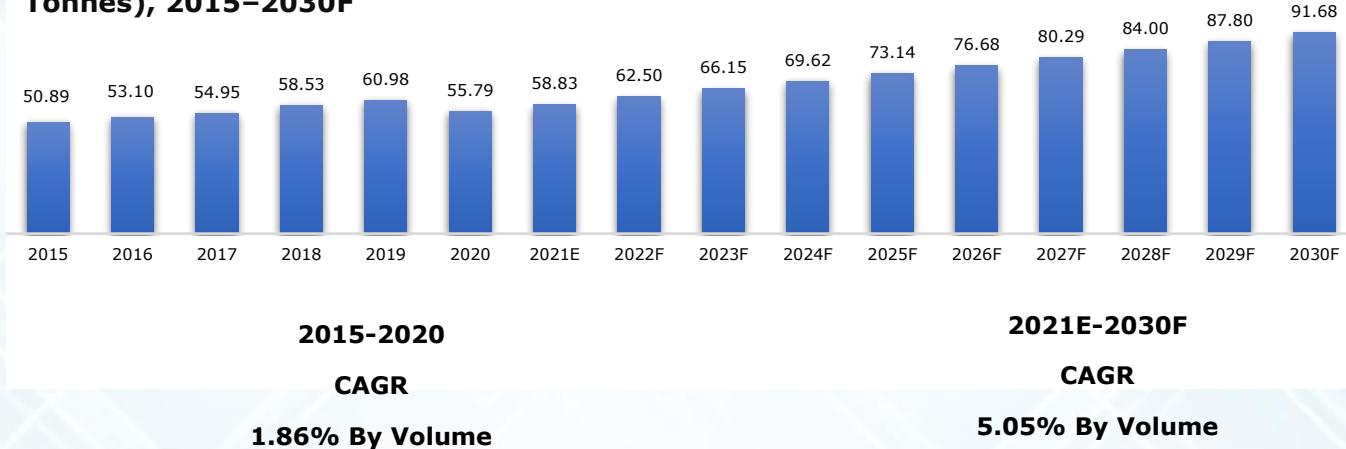
Source: TechSci Research

MIDDLE EAST & AFRICA VINYL ESTER RESIN MARKET OUTLOOK



3.2.6. Middle East & Africa Vinyl Ester Resin Demand Supply Outlook

Figure 42: Middle East & Africa Vinyl Ester Resin Demand, By Volume (Thousand Tonnes), 2015–2030F



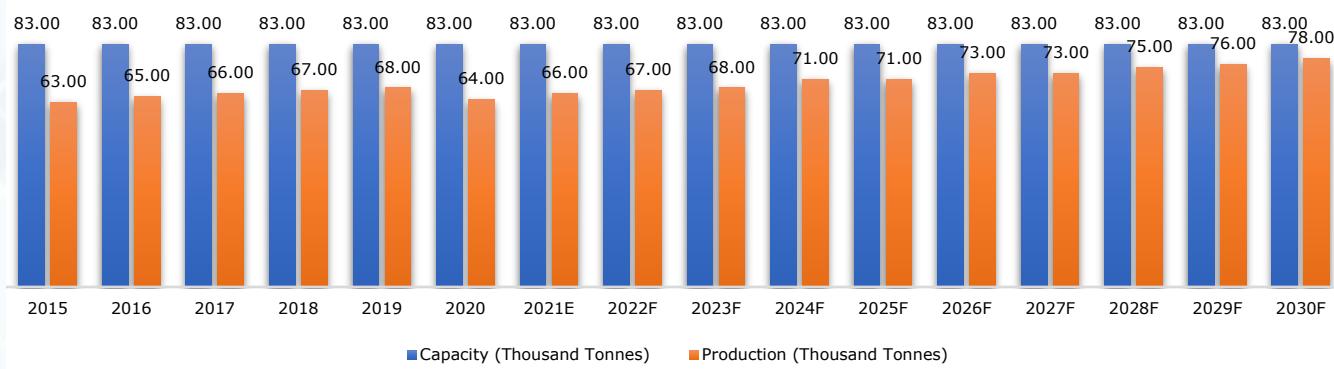
Source: TechSci Research

MEA vinyl ester resin market is expected to grow at a CAGR of approximately 5.05% during the forecast period and is expected to reach around 91 thousand tonnes in 2030 from around 55 thousand tonnes in 2020. Since very small number of players are manufacturing vinyl ester resin in MEA, imports are higher than exports. Total import in 2020 stood at around 2.15 thousand tonnes while total export stood at around 0.30 thousand tonnes. However, there was

decrease in import demand in 2020 as compared to 2019 due to the COVID-19 pandemic. Average operating rate in MEA region varies from around 79% to 80% and is expected to reach 93% in 2030. Though demand supply gap is expected to reach approximately 13 thousand tonnes in 2030 as companies are ramping up production and investing into capacity addition to meet the demand supply gap in the region.

3.2.6.1. Capacity, Production

Figure 43: Middle East & Africa Vinyl Ester Resin Capacity & Production (Thousand Tonnes), 2015–2030F



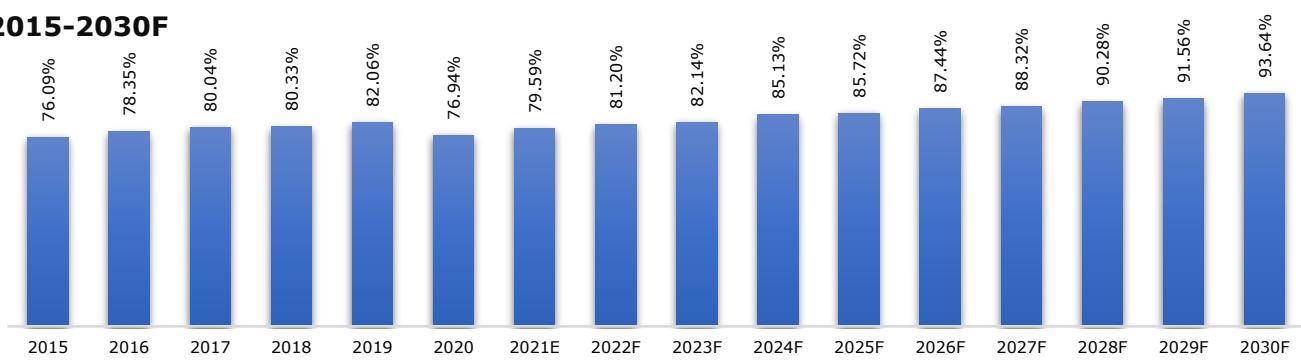
Source: TechSci Research

Total capacity of vinyl ester resin in MEA region stood at around 83 thousand tonnes as of 2020. The major vinyl ester resin producers include Scott Bader Company Ltd., Saudi Arabia Industrial Resins Ltd., and Poliya. These companies hold 66% share of total capacity in MEA region. Scott Bader is market leader in composite business with customer base in Middle East, North Africa, Central & West Africa, and the Far East Regions. There has been no major capacity expansion in MEA region as of 2020

however, many new players are expected to invest into capacity addition to tap the growing demand of vinyl ester resins led by strong growth in automotive and renewable sectors. The major demand in the region comes from pipes and tanks applications where it is used as a lining system as it is chemical, corrosion and thermal resistance. The demand from renewables and marine industry also contributes to the increasing demand for vinyl ester resins.

3.2.6.2. Operating Efficiency

Figure 44: Middle East & Africa Vinyl Ester Resin Operating Efficiency (Percentage), 2015-2030F



Source: TechSci Research

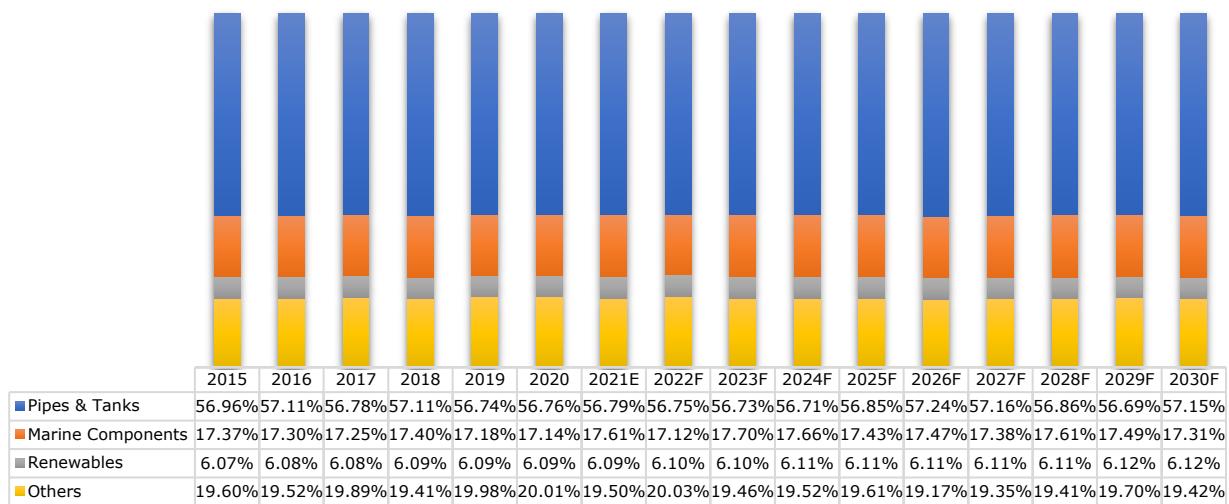
Projects Planned and Underway in Middle East Region, By Sector, By Value, as of 2020 (USD Million)

S. No.	Sector	Value (USD Million)
1.	Construction	80,080
2.	Oil & Gas	67,036
3.	Power	29,019
4.	Water	8,732

Source: TechSci Research

3.2.6.3. Demand By Application

Figure 45: Middle East & Africa Vinyl Ester Resin Demand, By Application, By Volume, 2015–2030F



Others include Defense, Aerospace, Electrical and electronics etc.

Source: TechSci Research

Vinyl ester resin is used for variety of applications including industrial tanks and pipes, pultruded profiles, and corrosion resistant. It is also used in marine

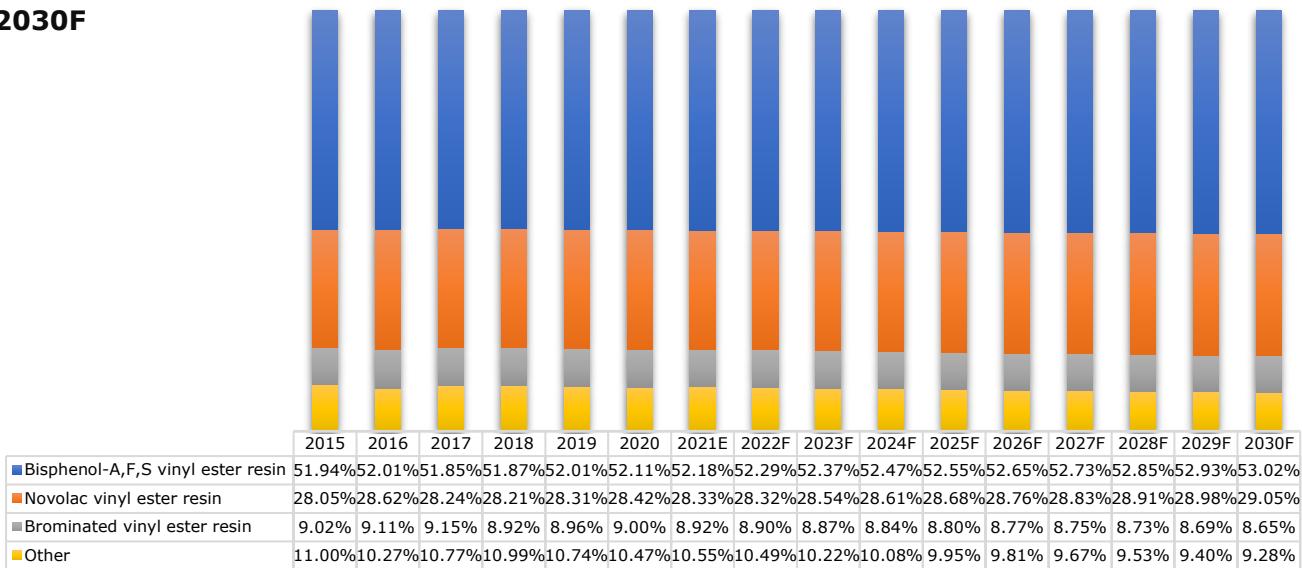
components and automotive vehicles. Pipes and tanks application dominates the vinyl ester resin market due to its usage as a coating material over industrial tanks, pipes,

and chimneys. With the increasing industrialization and rising investment in construction sector, the demand for vinyl ester resin has increased and is anticipated to further surge in the forecast period. The

rising marine industry and rising investment in renewable energy like wind and solar is also expected to contribute to the market growth.

3.2.6.4. Demand By Type

Figure 46: Middle East & Africa Vinyl Ester Resin Demand, By Type, By Volume, 2015–2030F



Others include Urethane Modified vinyl ester resin, Elastomer Modified vinyl ester resin, etc.

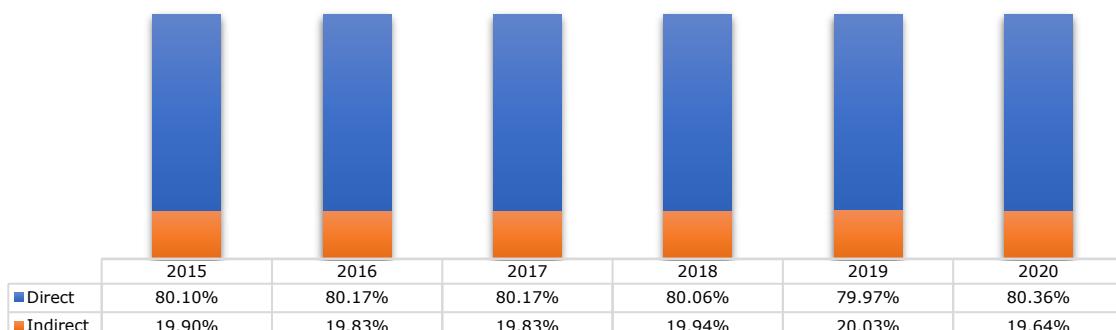
Source: TechSci Research

The most demanding vinyl ester resin type is Bisphenol- A, F, S due to its extensive use in industrial tanks, pipes and chimneys, water and wastewater treatment plant pipes and tanks. The Bisphenol- A, F, S holds the maximum share of approximately 52% followed by Novolac and Brominated vinyl

ester resins, which hold the share of around 28% and 9%, respectively. With the increase in industrial activities and growing investment in infrastructure development and renewable energy, there has been an increase in the growth of bisphenol- A and novolac market.

3.2.6.5. Demand By Sales Channel

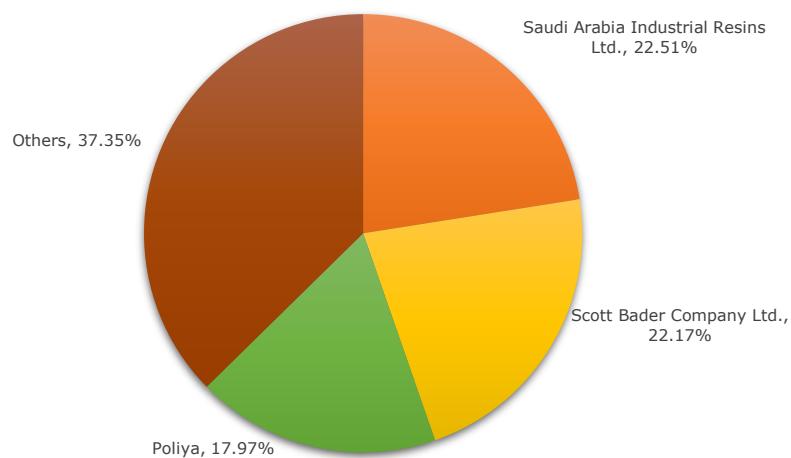
Figure 47: Middle East & Africa Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2020



Source: TechSci Research

3.2.6.6. Sales By Company

Figure 48: Middle East & Africa Vinyl Ester Resin Sales, By Company, By Volume, 2020



Others include Imports

Source: TechSci Research

3.3. MARKET DYNAMICS

Market Drivers

Government support in India to increase per capita consumption of FRP composites

Driven by strong demand from various end use industries such as wind energy,

transportation, electrical and electronics, defense, aerospace, pipes and tanks, construction and marine, the composite industry, also known as fiber-reinforced plastics (FRP) industry, will also be

supporting government's 'Make in India' initiative giving a big push to future market of vinyl ester resin. The per capita consumption of composites in China and the United States

has been 2.8 kg and 11.4 kg, respectively in 2021. The per capita consumption in India stood at 0.36 kg in 2021, which is the lowest.

Growing usage as Lining System in Industrial Applications

Vinyl ester resin lining systems are used in a number of industrial applications like water treatment, chemical processing, and air pollution control and mineral processing as they provide unparalleled corrosion resistance to fiberglass reinforced plastic tanks, ducting,

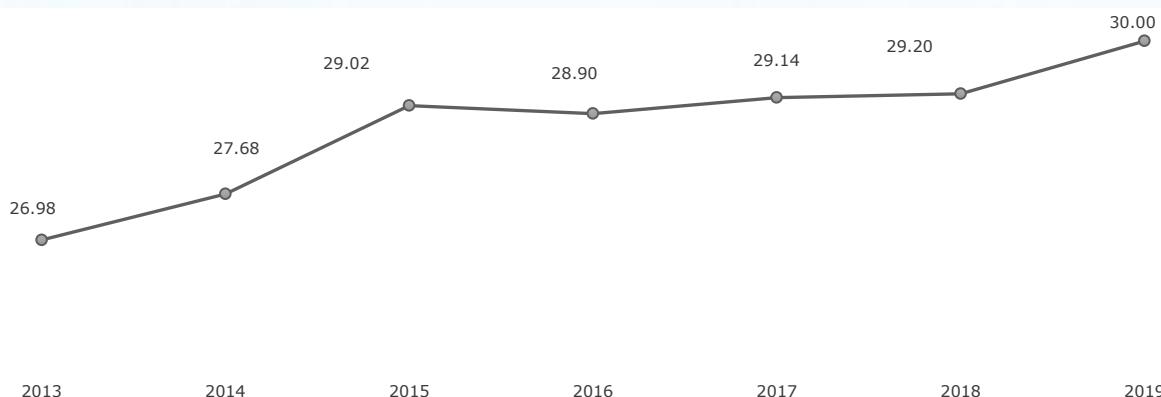
stacks & chimneys, scrubbers, pipes and other components. Therefore, vinyl ester resin liners fit best for the most challenging industrial environments due to their properties like high heat resistance, exceptional durability and minimal maintenance requirements.

Robust Growth of Construction Sector

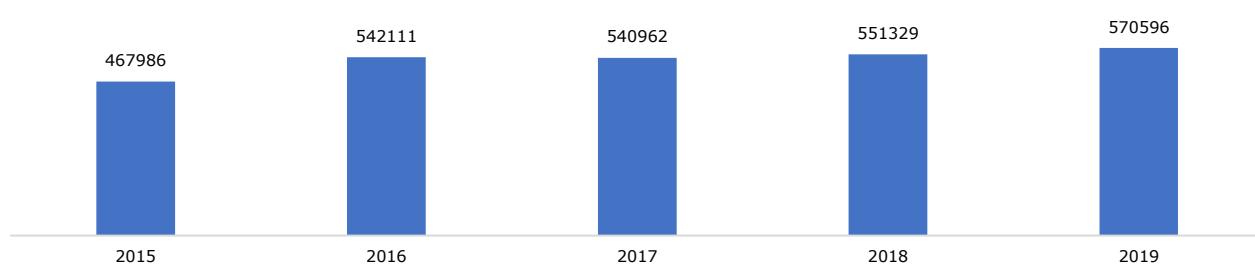
With rising urban population and public and private sector investments in construction projects, the overall construction market is witnessing rapid growth. The demand for vinyl ester resins in building & construction industry has been rising over the last few

years owing to their varied types including Bisphenol, Novolac and Brominated. Robust growth in construction sector in Japan coupled with the implementation of favourable government policies to support infrastructure development are the primary factors expected to influence the demand.

APAC Construction Sector Contribution to GDP, 2013-2019, (%)



Japan Total Construction Investments, By Value (USD Million), 2015-2019



Source: Bank of Japan

Aging Infrastructure

The aging infrastructure is driving opportunities for building materials including VER based FRP tanks. Most of the

infrastructure such as roads, water supply and sewerage systems constructed in developed nations are 30-40 years old. The government and local civic bodies incur huge maintenance cost hence there is an urgent need for repair of these systems.

Europe Percentage of Infrastructure that is minimum 50 years old, 2018, 2023 & 2033

	2018	2023	2033
Highway Bridges	Approx. 25%	Approx. 39%	Approx. 63%
Tunnels	Approx. 20%	Approx. 27%	Approx. 42%
River Management Facilities	Approx. 32%	Approx. 42%	Approx. 62%
Sewage Pipes	Approx. 4%	Approx. 8%	Approx. 21%

Source: TechSci Research

Market Challenges

Fragmented market of composites industry in China and India

The fragmented composite industry in India and China consists of around 15000 stakeholders in the value chain including small, mid-sized and large players. Also, the lack of awareness among end-user industries is the major challenge for the

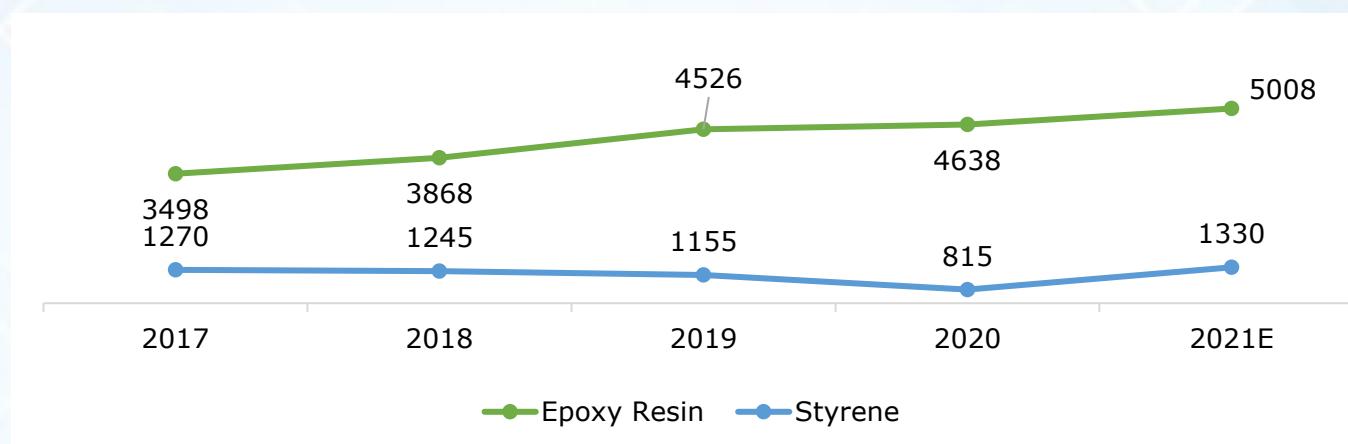
growth of vinyl ester which also impacts the margin of the industry. Lack of regulatory framework, absence of a recycling policy and standardization of end-use products are some of the major challenges for the composites industry. Global composites market is highly fragmented with more than 1000 mid and small regional players operating in the market.

High Volatility in Raw Material Prices

Styrene, epoxy resin, methacrylic acid, etc., are few of the raw materials majorly used in the production of construction sealants and bonding such as butyl rubber, acrylic urethane, silicone rubber sealant, etc. Over

the years, raw materials used in sealants industry have observed price fluctuations globally. Diligently working on product selling prices to react to changes in raw material cost and simultaneously maintaining market share is a key challenge for construction sealants producers

Styrene and Epoxy Resin Prices, 2017-2021E (USD per Ton)



Source: TechSci Research

3.4. MARKET TRENDS & DEVELOPMENTS

Capacity Expansion by Existing Players in APAC Region

With growing demand for Vinyl Ester Resin in various sector such as wind energy, transportation, electrical and electronics, defense, aerospace, pipes and tanks,

construction and marine, companies have started investing in expanding manufacturing facilities. Moreover, companies are increasingly focusing on developing nations like China and India, due to availability of cheap labor in these countries. For instance, Showa Denko Group completes expansion

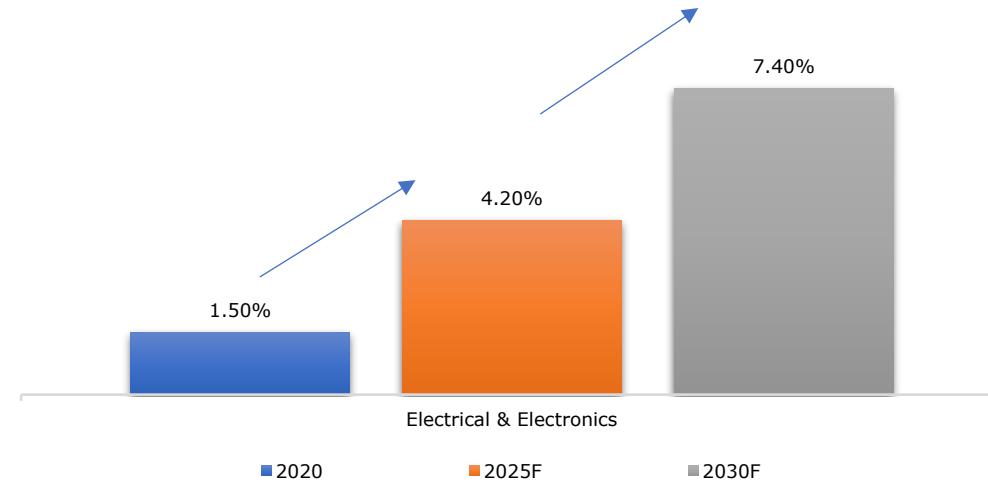
of lines to produce vinyl ester in Shanghai due to increasing demand of the product in electronic parts such as Liquid Crystal Displays (LCDs) and touch panels on account of the progress in telecommunication technologies.

Emerging applications

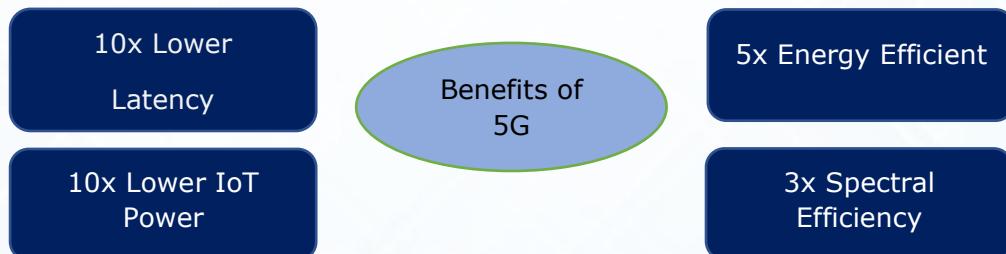
The emerging application of vinyl ester resin is in electronics and telecommunication due to its use in the process to produce electronic parts including LCDs and touch panels, which has been rapidly increasing in APAC region mainly in China. Moreover, its application in pipes and tanks, marine

industry, defense, transportation, etc. has been rapidly increasing due to its excellent corrosion resistance and chemical resistance properties. Vinyl Ester resins' usage in the making of pipes and tanks also adds to their increasing demand. Growing utilization of Vinyl Ester Resins in electronics and telecommunications is likely to increase its foothold in the market over coming years.

Electrical & Electronics Industry Market Share in Vinyl Ester Resin Applications, 2020, 2025F and 2030F



The future wave in the telecom industry is the 5G network, which covers less distance than the existing 4G network. In India, the Ministry of Telecommunications and The Telecom Regulatory Authority of India (TRAI) plans to



Mergers and Acquisitions

Merger & acquisition activities are becoming prevalent in the vinyl ester resin market globally. In 2019, INEOS Composites acquired Ashland Composites. Additionally,

implement 5G in the coming years. With this implementation, usage of VVER for the telecom industry is expected to register strong growth in the coming years.

Polynt and Reichhold also had a merger in the same year to expand and increase their market share. Showa Denko, a prominent player in the vinyl ester resin market, is continuously expanding its capacity to cater to the increasing demand in China.

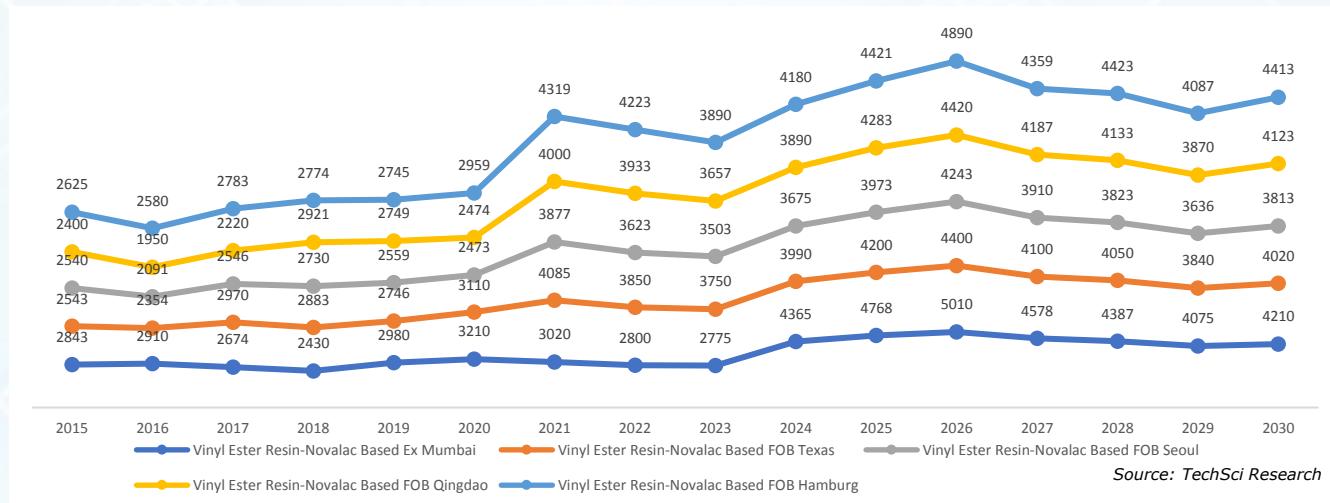
Mergers & Acquisitions in Vinyl Ester Resin Industry			
S.No.	Target Company	Acquirer / Merged Entity	Year
1	Mar-Bal Inc	Chagrin Falls, Ohio	2020
2	Ashland Global Holdings Inc.	INEOS Enterprise	2019
3	Aliancys & AOC Resin	CVC Capital Partners	2018
4	Polynt	Reichhold Group	2017
5	Kemrock Industries Ltd	Reliance Industries Ltd	2018

3.5. Pricing Analysis

Discussions on Vinyl Ester Resins (VER) remained firm since the beginning of 2021 following the pickup in market activities as the economy significantly rebounded from COVID-19 repercussions. However, the increment has been marginal yet consistent due to constraint fluctuations in base Novolac costs. There has not been an adverse impact of the second wave of Covid in India, as the

demand remained consistent from packaging sector amidst favourable consumer sentiments. Thus, after showcasing a marginal dullness in May, prices again revived in June, following the resumption in market activities across the nation. Besides, soaring freight cost along several trade routes since the beginning FY2022 has also contributed to raise in values at times of prevalent demand pattern.

Figure 50: Global Vinyl Ester Resin Yearly Prices, 2015-2030 (USD/Tonne)



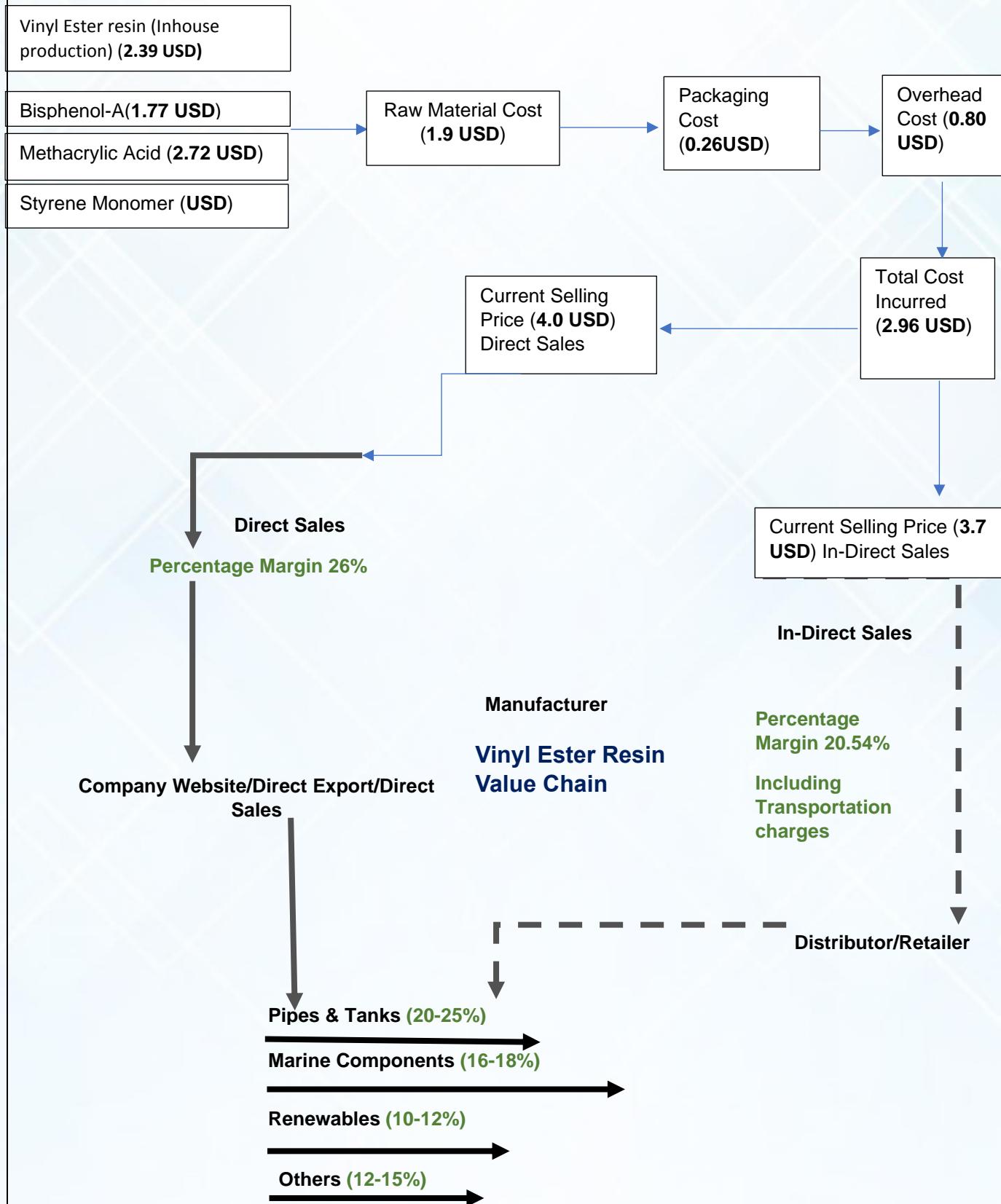
Source: TechSci Research

Sharp fall in values of upstream crude in 2016 hampered the performance of the overall chemical and petrochemical sector leading to a drop in prices of Vinyl Ester Resins (VER) along with various other products. Its market fundamentals revived significantly in FY17 following sharp rebound in market activities. However, in FY19 and

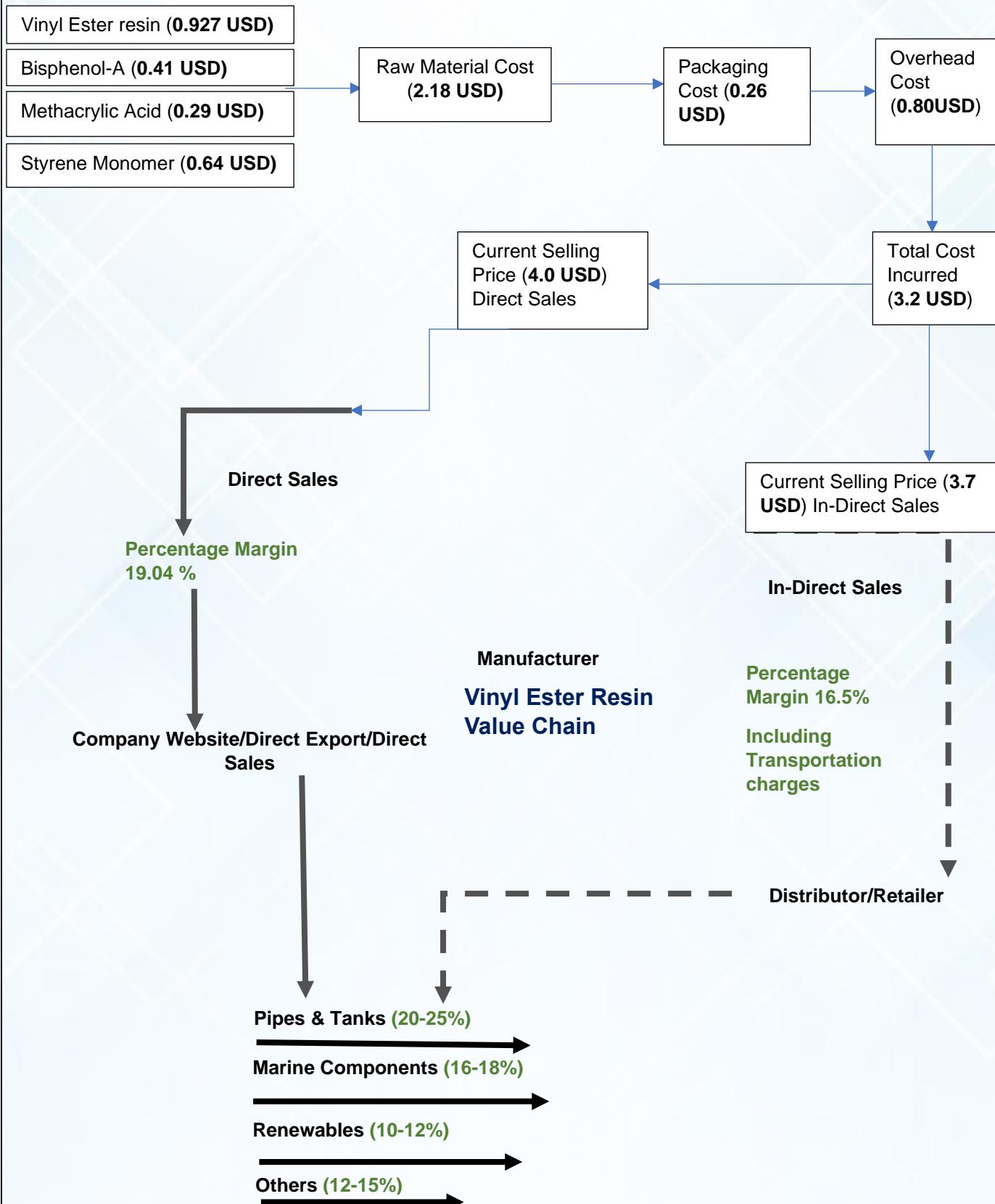
FY20 prices remained in a stable to narrow range amidst the uncertainty prevailing from stable feedstock and muted demand pattern. In FY21, VER witnessed a marginal dive again, due to ground-breaking fall in crude values and devastating hit on the global economy in the wake of the Covid outbreak.

3.6. Value Chain Analysis

Value Flow for Captive Vinyl Ester Resin Manufacturer



Value Flow Analysis for Non-Captive Vinyl Ester Resin Manufacturer



3.7. Customer Analysis

Year	Product Description	Customer / Distributor Name	Destination Country	Plant Location	Supplier Name	Shipment Origin	Annual Off-take Quantity (Tonnes)	Price (USD/Tonns)	Incoterms
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Reichhold India Private Limited	India	Tianjin	Reichhold Polymers Tianjin	China	2,634.48	3.78	Delivered At Place – Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Carborundum Universal Limited	India	Nantou	Swancor Ind M Sdn Bhd	Malaysia/Taiwan	588.17	2.23	Delivered At Place – Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Orson Chemicals	India	Nantou	Swancor Ind M Sdn Bhd	Malaysia/Taiwan	1,052.25	2.56	Delivered At Place – Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Sunrise Industries India Ltd	India	Jiangsu	Jinling Acrylic Resins Co Ltd	China/Thailand	369.60	3.52	Delivered At Place – Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Rex Resins India	India	Kaohsiung	Eternal Materials Co Ltd	Taiwan	34.20	2.10	Delivered At Place – Tax and Duties

2020	Bisphenol-a Type Epoxy	Vibrant Specialties	India	N/A	Synthomer Trading Limited	France	40.50	2.21	Delivered At Place – Tax and Duties	Vinyl Ester Resin
2020	Novolac Vinyl Ester Resin	Chemical Process Equipment	India	Benicarlós Pvt Ltd	Ineos Composite	Spain	471.97	5.74	Delivered At Place – Tax and Duties	
2020	Bisphenol-a Type Epoxy	Nagase India Private Limited	India	Kawasaki	Showa Highpolymer Singapore Pte Ltd	Japan	243.81	3.01	Delivered At Place – Tax and Duties	Vinyl Ester Resin
2020	Bisphenol-a Type Epoxy	Dakle Industrial Plastics	India	N/A	Z To Order NA	Taiwan	32.00	2.31	Delivered At Place – Tax and Duties	Vinyl Ester Resin
2020	Bisphenol-a Type Epoxy	Basf India Limited	India	Dubai	Basf Construction Chemicals Uae Llc	United Arab Emirates	24.27	11.26	Delivered At Place – Tax and Duties	Vinyl Ester Resin
2020	Bisphenol-a Type Epoxy	Apex Printing Sleeves India Private Limited	India	Collierville	M S Aoc Llc	United States of America, Poland	28.03	7.09	Delivered At Place – Tax and Duties	Vinyl Ester Resin
2020	Bisphenol-a Type Epoxy	Devi Polymers Private Ltd	India	Kaohsiung	Eternal Materials Co Ltd	Taiwan	9.20	2.33	Delivered At Place –	

	Vinyl Ester Resin								Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Emerald Performance Chemical Private Limited	India	Kaohsiung	Eternal Materials Co Ltd	Taiwan	2.00	2.04	Delivered At Place – Tax and Duties
2020	Novolac Vinyl Ester Resin	Mahindra Cie Automotiv e Limited	India	Nantou	M S Swancor Highpolym er Co Ltd	Taiwan	3.10	2.78	Delivered At Place – Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Epp Composite Pvt Ltd	India	Kaohsiung	Eternal Materials Co Ltd	Taiwan	48.00	3.18	Delivered At Place – Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Hindustan Zinc Limited	India	N/A	China Nonferrous Metal Industrys Foreign Engineeri	China	5.00	7.11	Delivered At Place – Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Jrd Polymer Pvt Ltd	India	Collierville	Aliancys Ag	France	16.05	3.87	Delivered At Place – Tax and Duties
2020	Bisphenol-a Type Epoxy Vinyl Ester Resin	Kalinga Inceptum Private Limited	India	Kaohsiung	Eternal Materials Co Ltd	Taiwan	2.06	2.94	Delivered At Place – Tax and Duties

2020	Novolac Vinyl Ester Resin	Mahindra Cie Automotiv e Limited	India	Nantou	M S Swancor Highpolym er Co Ltd	Taiwan	3.10	2.78		Delivered At Place – Tax and Duties
2020	Bisphenol- a Type Epoxy Vinyl Ester Resin	Future Pipe Industries	Egypt	Kaohsiung	Eternal Materials Co Ltd	Taiwan	600.00	2.73		Delivered At Place – Tax and Duties
2020	Bisphenol- a Type Epoxy Vinyl Ester Resin	Saudi Arabian AMIANITI Company	Saudi Arabia	Shanghai	Sino Polymer	China	1,440.00	5.83		Delivered At Place – Tax and Duties
2020	Bisphenol- a Type Epoxy Vinyl Ester Resin	B A F F Polymech Pvt Ltd	Sri Lanka	Dubai	Scott Bader Middle East Ltd	United Arab Emirates	7.61	4.50		Delivered At Place – Tax and Duties
2020	Bisphenol- a Type Epoxy Vinyl Ester Resin	Edgeng Pvt Ltd	Sri Lanka	Sungei Kadut	Wee Tee Tong Chemicals Pte Ltd	Singapore	3.00	2.58		Delivered At Place – Tax and Duties
2020	Bisphenol- a Type Epoxy Vinyl Ester Resin	Bin Tariq (Pvt) Limited	Pakistan	Shanghai	Changzho u Pro-tech Trade Co.,Ltd,	China	14.40	2.37		Delivered At Place – Tax and Duties
2020	Bisphenol- a Type Epoxy	Fiber Craft Inds.	Pakistan	Al Jubail	Saudi Industrial Resins Limited	Saudi Arabia	12.30	3.20		Delivered At Place – Tax and Duties

	Vinyl Ester Resin										
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Source: TechSci Research

3.8. Global Foreign Trade Analysis

Table 6: Global Vinyl Ester Resin Trade Dynamics – Import (Thousand Tonnes), 2015-2020

Country	2015		2016		2017		2018		2019		2020	
Import	Value	Volume										
United States	25.63	12.83	32.61	15.03	30.15	15.03	42.94	17.95	28.04	14.81	26.91	16.82
China	5.12	2.73	35.81	17.05	50.05	24.06	38.05	19.92	35.91	19.92	20.05	11.71
Brazil	6.42	3.15	13.55	6.1	12.88	6.7	15.03	7.25	14.91	7.30	12.91	6.95
India	5.16	2.44	8.12	4.05	11.21	5.91	6.22	3.05	8.94	4.15	9.15	6.70
Mexico	3.05	1.52	6.42	3.21	8.25	4.20	6.21	3.05	7.25	3.77	9.21	5.62
Turkey	2.15	1.05	4.15	2.82	6.43	3.25	5.62	2.85	6.21	3.05	5.10	3.92
South Africa	5.12	2.50	5.12	2.73	4.21	2.12	5.21	2.62	5.53	2.91	4.73	2.84
Russia	2.44	1.73	4.41	2.73	3.21	1.56	4.15	1.82	5.25	2.81	5.12	2.82
Indonesia	5.81	3.05	3.12	1.55	3.04	1.22	2.63	1.73	5.05	2.54	3.57	2.05
Vietnam	10.25	5.4	2.84	1.50	1.26	0.63	3.05	1.44	1.83	1.00	2.44	1.44
Others	109.66	89.57	109.68	65.33	70.75	52.99	91.44	52.99	125.89	59.12	151.36	45.10
Total	180.91	125.99	225.83	122.12	201.44	117.69	220.55	114.67	244.81	121.38	250.55	105.97

Others Argentina, Iran, Qatar etc.

Source: TechSci Research

Table 7: Global Vinyl Ester Resin Trade Dynamics – Export (Thousand Tonnes), 2015-2020

Country	2015						2018		2019		2020	
	Export	Value	Volume	Value								
South Korea	22.73	11.04	15.09	8.41	15.38	9.18	15.59	9.20	11.04	6.33	11.82	6.53
Germany	26.13	12.02	28.10	12.16	23.63	15.66	35.37	13.65	41.97	16.11	37.58	15.48
Spain	19.32	9.20	16.55	9.30	19.75	12.88	24.57	10.53	25.69	14.45	25.65	14.70
China	17.74	7.68	22.24	7.77	23.84	10.54	21.06	7.61	28.95	12.27	25.91	10.14
Japan	13.54	6.39	12.12	6.46	11.94	8.25	13.61	6.35	13.68	7.95	13.19	7.12
Netherlands	6.12	2.36	5.16	2.39	5.68	3.28	6.70	2.73	6.85	3.50	6.58	3.64
USA	4.42	2.16	3.52	2.18	4.14	2.84	5.84	2.62	5.61	3.37	5.00	3.25
Poland	6.73	3.00	5.20	3.03	5.92	4.06	6.57	2.77	5.43	2.87	4.92	2.71
Saudi Arabia	5.39	2.37	6.56	2.40	9.23	3.30	8.54	3.03	9.63	3.34	6.36	2.53
Taiwan	3.87	1.95	4.72	1.97	5.59	2.65	6.15	2.37	6.74	2.65	6.70	2.38
Others	117.15	67.82	121.74	66.06	111.80	45.05	90.85	53.81	71.07	48.54	69.80	37.49
Total	243.15	125.99	241.01	122.12	236.89	117.69	234.86	114.67	226.64	121.38	213.51	105.97

Others Finland, Turkey, Russia etc

Source: TechSci Research

3.9. Global Demand-Supply Gap

Demand Supply Scenario

The overall market for Vinyl Ester Resin is currently in a surplus situation in APAC region because the consumption of Vinyl Ester is still high among downstream manufacturers. However, companies are currently operating at lower rates due to uncertainty in demand potential owing to the current pandemic situation. But estimated demand supply gap in APAC region till 2025

may generate the need for capacity addition or running plants at 100% capacities to overcome the demand supply gap.

Major demand for Vinyl Ester Resin in Europe comes from pipes and tanks, and renewables. Major producers such as AOC, and INEOS Composites produce and use Vinyl Ester Resin in various forms. In Europe, most of the vinyl ester resins are used in renewable energy sector, especially in Wind Energy sector.

Consequently, Vinyl Ester Resin has increasingly been manufactured by unsaturated polyester resins manufacturing companies across Europe as an alternative to other compounds. Thus, demand for Vinyl Ester Resin has recently taken an exponential pace in the European market. However, on the supply side, the European market is still dependent on Asia-Pacific region for Vinyl Ester Resin. It is estimated that in 2020, half of the demand for Vinyl

Ester Resin in Europe will be catered through imports.

In North America, Vinyl Ester Resin is used in the production of pipes and tanks. In 2020, many players, including AOC, revamped their total production significantly in the United States during year-end. AOC manufactures Vinyl ester resin for thermal, corrosion, and chemical resistance applications in pipes, tanks, and marine components. It is also used as a lining system in industries to protect pipes and tanks from corrosion and various chemicals.

**Table 8: Global Vinyl Ester Resin Demand Supply Analysis, By Volume, 2015-2030F
(Thousand Tonnes)**

		2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
Global	Capacity	938	938	953	965	980	985	1020	1025	1030
	Production	733	750	776	790	812	759	808	866	929
	Import	125.99	122.12	117.69	114.67	121.38	105.97	0.00	0.00	0.00
	Export	125.99	122.12	117.69	114.67	121.38	105.97	0.00	0.00	0.00
	Total Demand	677.49	707.79	734.69	767.44	796.32	739.49	789.09	1026.25	1367.33
	Y-O-Y Growth (%)	4.32%	4.47%	3.80%	4.46%	3.76%	-7.14%	6.71%	6.42%	5.58%
	Demand Supply Gap	0.00	0.00	0.00	0.00	0.00	0.00	19.23	-159.81	-438.76

Source: TechSci Research

Table 9: Asia Pacific Vinyl Ester Resin Demand Supply Analysis, By Volume, 2015-2030F (Thousand Tonnes)

		2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
Asia Pacific	Capacity	427	427	427	427	442	442	477	482	487
	Production	315	326	337	340	357	327	369	399	441
	Import	13.76	14.96	15.38	23.81	28.83	24.55	0.00	0.00	0.00
	Export	38.91	33.53	28.44	24.50	29.91	23.00	0.00	0.00	0.00
	Total Demand	283.31	301.03	317.07	332.53	348.58	322.29	349.49	484.81	688.20
	Y-O-Y Growth (%)	6.12%	6.26%	5.33%	4.88%	4.83%	-7.54%	8.44%	8.06%	6.84%
	Demand Supply Gap	0.00	0.00	0.00	0.00	0.00	0.00	27.90	-32.22	-102.63

Source: TechSci Research

Table 10: Europe Vinyl Ester Resin Demand Supply Analysis, By Volume, 2015-2030F (Thousand Tonnes)

		2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
Europe	Capacity	208	208	208	208	208	213	213	213	213
	Production	169.60	172.07	172.40	172.50	174.49	169.95	176.39	181.09	189.61
	Import	33.25	35.72	37.43	40.56	44.73	35.61	0.00	0.00	0.00
	Export	28.05	28.15	26.40	23.71	25.55	24.25	0.00	0.00	0.00
	Total Demand	171.09	175.88	179.66	185.58	189.85	177.60	187.10	228.54	281.95
	Y-O-Y Growth (%)	2.02%	2.80%	2.15%	3.30%	2.30%	-6.45%	5.35%	4.72%	3.86%
	Demand Supply Gap	0.00	0.00	0.00	0.00	0.00	0.00	-10.70	-47.45	-92.34

Source: TechSci Research

Table 11: North America Vinyl Ester Resin Demand Supply Analysis, By Volume, 2015-2030F (Thousand Tonnes)

		2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
North America	Capacity	200.00	200.00	215.00	225.00	225.00	225.00	225.00	225.00	225.00
	Production	169.77	170.43	182.88	192.65	194.34	181.28	179.12	197.09	200.24
	Import	18.34	22.81	18.05	20.25	21.93	21.72	0.00	0.00	0.00
	Export	32.13	32.52	35.16	39.91	37.94	35.84	0.00	0.00	0.00
	Total Demand	152.59	157.31	162.11	169.14	174.44	163.53	172.74	214.79	274.88
	Y-O-Y Growth (%)	3.04%	3.10%	3.05%	4.34%	3.14%	-6.25%	5.63%	5.36%	4.82%
	Demand Supply Gap	0.00	0.00	0.00	0.00	0.00	0.00	6.38	-17.69	-74.65

Source: TechSci Research

Table 12: South America Vinyl Ester Resin Demand Supply Analysis, By Volume, 2015-2030F (Thousand Tonnes)

		2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
South America	Capacity	20	20	20	22	22	22	22	22	22
	Production	16	17	17	18	19	16	17	18	20
	Import	9.34	9.46	9.67	9.73	10.31	9.21	0.00	0.00	0.00
	Export	5.45	5.47	5.48	6.02	6.07	5.03	0.00	0.00	0.00
	Total Demand	19.61	20.46	20.90	21.67	22.46	20.28	20.94	24.97	30.62
	Y-O-Y Growth (%)	3.24%	4.33%	2.15%	3.64%	3.68%	-9.71%	3.23%	4.32%	4.05%
	Demand Supply Gap	0.00	0.00	0.00	0.00	0.00	0.00	-3.49	-6.93	-10.83

Source: TechSci Research

Table 13: Middle East & Africa Vinyl Ester Resin Demand Supply Analysis, By Volume, 2015-2030F (Thousand Tonnes)

		2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
Middle East & Africa	Capacity	83	83	83	83	83	83	83	83	83
	Production	63	65	66	67	68	64	66	71	78
	Import	10.45	11.82	12.05	13.72	16.15	11.05	0.00	0.00	0.00
	Export	21.45	22.45	22.21	20.53	21.91	17.84	0.00	0.00	0.00
	Total Demand	50.89	53.10	54.95	58.53	60.98	55.79	58.83	73.14	91.68
	Y-O-Y Growth (%)	3.64%	4.33%	3.49%	6.51%	4.20%	-8.51%	5.45%	5.05%	4.42%
	Demand Supply Gap	0.00	0.00	0.00	0.00	0.00	0.00	7.23	-1.99	-13.96

Source: TechSci Research

Table 14: India Vinyl Ester Resin Demand Supply Analysis, By Volume, 2015-2030F (Thousand Tonnes)

		2015	2016	2017	2018	2019	2020	2021E	2025F	2030F
India	Capacity	4.12	4.12	4.12	4.12	4.12	4.12	4.12	4.12	4.12
	Production	3.18	3.20	3.31	3.40	3.50	3.27	3.07	3.44	3.78
	Import	5.4	6.1	6.7	7.3	7.9	6.7	0.00	0.00	0.00
	Export	0.4	0.5	0.6	0.6	0.6	0.4	0.00	0.00	0.00
	Total Demand	8.13	8.73	9.44	9.97	10.71	9.53	10.44	15.85	28.28
	Y-O-Y Growth (%)	7.02%	7.41%	8.05%	5.62%	7.46%	-10.99%	9.55%	10.86%	11.21%
	Demand Supply Gap	0.00	0.00	0.00	0.00	0.00	0.00	-7.38	-12.41	-24.50

Source: TechSci Research

Global Vinyl Ester Resin Demand Supply Gap Analysis

Figure 51: Global Vinyl Ester Resin Demand, Forecasted Year on Year Growth, 2020-2030F (Thousand Tonnes)

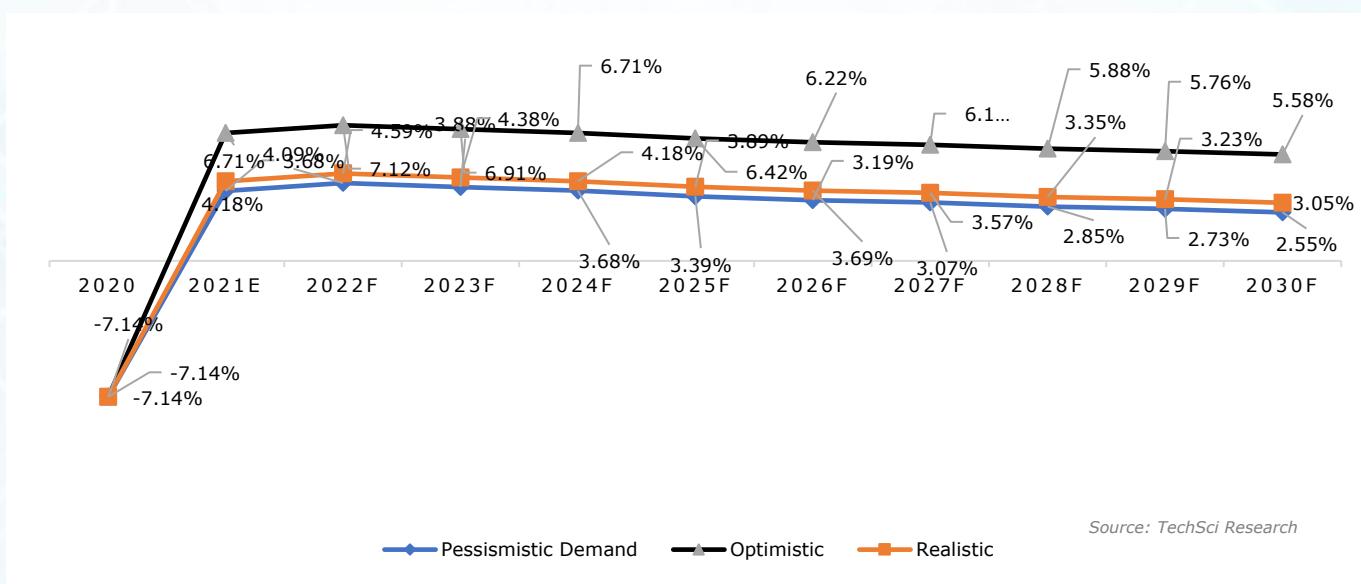


Table 15: Global Vinyl Ester Resin Demand, By Volume, 2020-2030F (Thousand Tonnes)

Demand Scenario	2020	2021E	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
Pessimistic	739.49	789.09	845.26	903.66	964.31	1026.25	1090.08	1156.54	1224.57	1295.08	1367.33
Realistic	739.49	770.39	805.73	841.01	876.18	910.29	943.88	977.54	1010.32	1042.93	1074.73
Optimistic	739.49	766.69	798.03	828.98	859.50	888.67	917.01	945.14	972.10	998.62	1024.07

Source: TechSci Research

Figure 52: India Vinyl Ester Resin Demand, Forecasted Year on Year Growth, 2020-2030F (Thousand Tonnes)

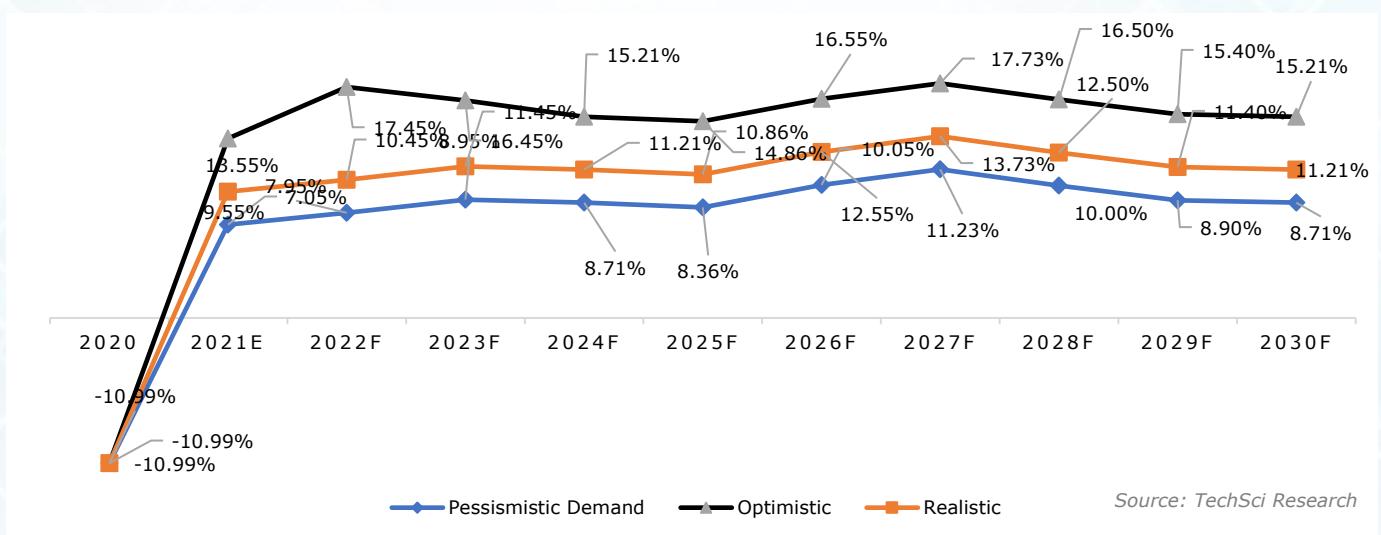


Table 16: India Vinyl Ester Resin Demand, By Volume, 2020-2030F (Thousand Tonnes)

Demand Scenario	2020	2021E	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
Pessimistic	9.53	10.21	11.02	12.00	13.05	14.14	15.56	17.31	19.04	20.73	22.54
Realistic	9.53	10.44	11.54	12.86	14.30	15.85	17.84	20.29	22.83	25.43	28.28
Optimistic	9.53	10.83	12.71	14.81	17.06	19.59	22.84	26.88	31.32	36.14	41.64

Source: TechSci Research

With no major capacity expansions in India, the demand supply gap is anticipated to increase from 7 thousand tonnes in 2021 to 24 thousand tonnes in 2030, considering the realistic growth. However, the realistic demand is anticipated to reach approximately 28 thousand tonnes in 2030

owing to its demanding applications in various end user industries. Considering the optimistic growth, the demand is anticipated to reach approximately 41 thousand tonnes in 2030 growing with a healthy CAGR of 16.15% for the forecasted period.