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**GLOBAL VINYL ESTER**

**RESIN MARKET**

**FORECAST & OPPORTUNITIES, 2030**





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**MARKET INTELLIGENCE. CONSULTING**

**Executive Summary**

With the growth of fiber reinforced composites in the Asian markets, the demand is high for cohesive and predictable polyester resin and vinyl ester resin systems. Quality infrastructure composite experience over the last 30 years has provided the steppingstones for new corrosion infrastructure applications that should be adaptable to the Asian market, and indeed, the global market.

Fiberglass reinforced underground gasoline storage tanks have been used successfully for the last quarter century. Power station intake and output pipes, some as large as 4.9 meters in diameter, continue to perform without problems. More recently developed composite products include short span bridges for handling regular road traffic, pedestrian bridges, sewer liners and water covers for water treatment plants.

Vinyl ester resin composites have achieved a remarkable degree of commercial acceptance in a variety of infrastructure applications. In the beginning, 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 an important role.

Composite materials are formed by combination of two or more materials with different properties, without undergoing dissolution or blending into each other. Basically, 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 Fibre Composites, Carbon Fibre Composites, Natural Fibre 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 fibre composite which have application in wind energy, construction, and infrastructure, automotive etc.

The wind energy industry is one of the fastest-growing consumers of fibre reinforced plastics in the world. Production challenges are compounded as the scale of wind turbines continues to climb. AOC produces a range of closed mould resins for wind blade composites, including bisphenol-A epoxy-based vinyl ester, isophthalic and orthophthalic polyester and general-purpose polyester. High-performance, high elongation vinyl ester resin provides the strength of epoxy and the cycle time of polyester.

Polyester and Vinyl Ester Resins are among the most commonly used matrix resins to create polymer composites. Vinyl ester formulations provide enhanced corrosion resistance and have a wide range of available strength, heat distortion, and shrinkage characteristics. The automotive and transportation industry is expected to drive the demand of composite materials. As the strength-to-weight ratio of most composites is higher than that of steel and aluminum. The chemical stands somewhere between polyester and epoxies in terms of price and mechanical properties.

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

**Chapter 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 (Thousand Tonnes)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameters** | **2015** | **2020** | **2021E** | **2025F** | **2030F** |
| **Total installed Capacity** | 938 | 985 | 1020 | 1025 | 1030 |
| **Total Production** | 711.63 | 758.81 | 808.32 | 866.43 | 928.57 |
| **Total Demand/ Consumption** | 670.58 | 753.98 | 775.78 | 918.11 | 1237.02 |
| **Total Demand (Y-O-Y Growth Rate, %)** | 0.00% | -7.11% | 2.89% | 5.26% | 6.57% |
| **Demand – Supply Gap** | 0.00 | 0.00 | 47.32 | -35.68 | -291.05 |

In 2020, the global vinyl ester resin industry witnesses a de-growth of around -7.11% in 2020 as compared to preceding year on account of COVID-19 outbreak worldwide. The improve in overall demand by year end was witnessed following upsurge in demand of vinyl ester being used in pipes and tanks application. The demand from marine and renewables sector has also shown upward trend contributing to the increase in demand. Owing to its superior properties which includes high viscosity index, crack resistance, resistance to high temperature and others, the total demand is anticipated to reach 1224 thousand tonnes. The demand-supply gap of VER estimated to be around 47.3 thousand tonnes in 2021E which is further expected to expand in forthcoming years on account of lack of significant increase of total production across the country in recent years which is further being pushed by flooding demand across various developing countries such as China, India, and others.

China and USA contribute to the major vinyl ester resin producing capacities across the globe. Further, more capacities are expected to be commissioned in Asia Pacific region to meet the ongoing demand across the globe. AOC, INEOS Composites, Swancor Holding, Showa Denko are leading global supplier of vinyl ester resin with broad range of product portfolio. Some of the major players are focusing on expanding their existing capacities and further focusing on merger & acquisition to grab the substantial share in the market to conquer pouring in demand. Such as, in 2019, INEOS, one of the leading players have 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*

**2015-2020**

**CAGR**

**1.74% By Volume**

Global demand of Vinyl Ester resin in 2020 is stood at around 753 thousand tonnes and is expected to grow at a CAGR of 5.30% to reach approximately 1237 thousand tonnes in 2030. The Increase in demand is led by strong demand of excellent chemical and thermal resistant material in downstream applications such as semiconductor encapsulation, electronics, and communication, construction, and automobile industries. Moreover, Operating efficiency of producers varies from approximately 81% to 92%. However, in 2020 COVID-2019 impacted the demand of Vinyl Ester Resin as major industries were shut. It would take three years for vinyl ester resin industry to revive from the impact of COVID-19 as major construction projects globally have been delayed by various economies and companies. Further, demand supply gap is expected to increase approximately from 47 thousand tonnes in 2021 to 291 thousand tonnes in 2030. Manufactures are ramping up their capacity expansion to meet the growing demand supply gap.

**Revenue Analysis of leading Global Epoxy Resin Manufacturers, By Value (USD Million), 2018-2020**

-2.26%

-0.90%

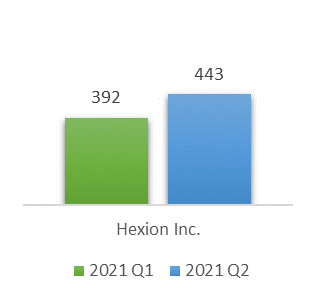
-7.60%

-12.10%

*Source: Annual Reports*

-2.07%

-9.76%



13%



28%

*Source: Annual Reports*

*Source: Annual Reports*

Through revenue analysis of global epoxy resin manufacturers, the revenues of major players have been declining since 2018 due to decrease in the prices of epoxy 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 of the epoxy resins and 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 epoxy resin which serves as the raw material for vinyl ester resin. As shown in the graph, Olin Corporation and Hexion Inc. both witnessed the increase revenues by 28% and 13%, respectively from Q1 2021 to Q2 2021.

**3.1.1. Capacity By Company**

**Table 1: Global Vinyl Ester Resin Capacity, By Company (Thousand Tonnes), 2015-2030F (Continued)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Company** | **Plants** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021E** | **2025F** | **2030F** |
| AOC – Aliancys | 3 | 135.00 | 135.00 | 145.00 | 145.00 | 145.00 | 145.00 | 145.00 | 145.00 | 145.00 |
| INEOS Composites | 3 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 105.00 | 105.00 | 105.00 | 105.00 |
| Swancor Holding Co., Ltd. | 1 | 60.00 | 60.00 | 60.00 | 60.00 | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 |
| Scott Bader Company Ltd. | 3 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 |
| Showa Denko K.K. | 3 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 | 55.00 | 85.00 | 85.00 | 85.00 |
| Polynt-Reichhold | 3 | 40.36 | 40.36 | 40.36 | 50.36 | 50.36 | 50.36 | 50.36 | 50.36 | 50.36 |
| Eternal Chemical (China) Co., Ltd. | 3 | 40.00 | 40.00 | 40.00 | 40.00 | 45.00 | 45.00 | 45.00 | 50.00 | 50.00 |
| Sino Polymer | 2 | 38.00 | 38.00 | 38.00 | 38.00 | 38.00 | 38.00 | 38.00 | 38.00 | 38.00 |
| DIC Corporation | 1 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| Hexion Inc. | 1 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| Poliya | 2 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| Allnex Group | 1 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Interplastic Corporation | 1 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Reinhold Gmbh | 1 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Saudi Arabia Industria Resins Ltd. | 1 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| En Chuan Chemical Industries Co., Ltd. | 1 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 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** |

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 of vinyl ester resin. 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 USA. Similarly, in 2020, Showa Denko K.K, Japanese Vinyl Ester Resin Producer had completed its expansion of VER production line to almost double of its existing capacity through its Chinese subsidiary Shanghai Showa Highpolymer Co., Ltd. (SSHP). Also, in 2014 Chinese Vinyl Ester resin market leader Sino Polymer Co. Ltd announced strategy cooperation with Europe’s Nord Composites under which Nord Composite would produce Sino Polymer’s MFE brand of VER in its plant located in Italy as well as Nord Composites had been authorized to do business with MFE brand of VER in France, Italy, and UK markets. Further, Several Manufacturers are Planning to invest strongly in Vinyl Ester Resin capacity expansion owing to its increasing applications in pipe & tanks, electronics & communication, and marine applications. Major manufacturers like AOC, Swancor Holding Co., Ltd., Showa Denko K.K. etc. have increased or have plans to increase their capacity owing to the rising demand from end user industries.

*Source: UNEP, Frankfurt School-UNEP Centre*

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

**3.1.2. Production By Company**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Company** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021E** | **2025F** | **2030F** |
| AOC - Aliancys | 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 |
| Showa Denko K.K. | 43.53 | 45.02 | 45.74 | 46.38 | 46.95 | 45.07 | 71.17 | 75.02 | 80.67 |
| Scott Bader Company Ltd. | 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 |
| Poliya | 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 |
| DIC Corporation | 22.48 | 24.47 | 24.70 | 24.90 | 24.95 | 23.68 | 24.61 | 25.72 | 27.22 |
| Saudi Arabia Industria Resins Ltd. | 15.15 | 16.08 | 16.84 | 16.36 | 16.54 | 15.70 | 17.20 | 17.80 | 19.40 |
| Reinhold Gmbh | 15.44 | 15.80 | 15.96 | 15.92 | 16.29 | 14.85 | 15.65 | 16.40 | 18.00 |
| Interplastic Corporation | 14.97 | 15.03 | 14.90 | 15.16 | 15.23 | 14.45 | 14.28 | 15.38 | 15.51 |
| Allnex Group | 14.91 | 15.25 | 14.99 | 15.33 | 15.67 | 14.42 | 14.58 | 16.00 | 18.00 |
| En Chuan 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 |
| Satyen Polymers Pvt. Ltd. | 0.46 | 0.45 | 0.47 | 0.48 | 0.52 | 0.49 | 0.42 | 0.48 | 0.55 |
| Crystic Resins India Private Limited | 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** |

The Current Global Production of Vinyl Ester Resin Stood at around 758 thousand tonnes and is expected to reach around 928 thousand tonnes. The Increase in production is led by mainly strong demand of vinyl ester resin in downstream fibre reinforced plastic (FRP) applications. Asia pacific region holds approximately 44 % of the total production capacity contributed by major players Jinling AOC Resins Co., Ltd., SHOWA DENKO K.K., Sino Polymer, INEOS Composites among others. In 2020, COVID-19 pandemic affected the production as major plants were shut due to lockdown measures. Total production value in 2020 saw a decline of approximately 8% as compared to 2019 production level. However, it is expected that in 2021, approximately 7% production growth is expected owing to pent up demand created by covid shutdowns in 2020. 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**

**2020**

**2015**

*Source: TechSci Research*

*Source: TechSci Research*

**3.1.3. Capacity By Location / Country**

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Region** | **Country** | **Location** | **Company** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021E** | **2025F** | **2030F** |
| Asia Pacific | India | Silvassa, Dadra And Nagar Haveli | Orson Chemicals | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 |
| Asia Pacific | India | Pune, Maharashtra | Reichhold India Pvt. Ltd. | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 |
| Asia Pacific | India | Valsad, Gujarat | Moras Chemicals India Pvt. Ltd. | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 |
| Asia Pacific | India | Bhiwadi, Rajasthan | Innovative Resins Pvt. Ltd. | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 |
| Asia Pacific | India | Dombivli, Maharashtra | Mechemco Resins Pvt Ltd | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| Asia Pacific | India | Mumbai, Maharashtra | Satyen Polymers Pvt. Ltd. | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 |
| Asia Pacific | India | Faridabad, Harayana | Crystic Resins India Private Limited | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 |
| Asia Pacific | India | Total | Total | 4.12 | 4.12 | 4.12 | 4.12 | 4.12 | 4.12 | 4.12 | 4.12 | 4.12 |
| Asia Pacific | China | Jiangsu | INEOS Composites | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| Asia Pacific | China | Shanghai | Sino Polymer | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Asia Pacific | China | Jiangsu | Eternal Chemical (China) Co., Ltd. | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Asia Pacific | China | Shanghai | Showa High Polymer Singapore Pte Ltd | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 50.00 | 50.00 | 50.00 |
| Asia Pacific | China | Jiangsu | Jinling AOC Resins Co., Ltd. | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 |
| Asia Pacific | China | Others | Others | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 30.00 | 30.00 | 35.00 |
| Asia Pacific | China | Total | Total | 185.00 | 185.00 | 185.00 | 185.00 | 185.00 | 185.00 | 220.00 | 220.00 | 225.00 |
| Asia Pacific | Japan | Itabashi-ku, Tokyo | DIC Corporation | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| Asia Pacific | Japan | Kawasaki | Showa Denko K.K. | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Asia Pacific | Japan | Others | Others | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Asia Pacific | Japan | Total | Total | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 |
| Asia Pacific | South Korea | Daedeok-gu, Daejeon | Sewon Chemical | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 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. Lu-chu 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 |
| Europe | Germany | Marl | Ashland Global Holdings Inc. | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Europe | Germany | Marl | INEOS Composites | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| Europe | Germany | Frankfurt | Allnex Group | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Europe | Germany | Dusslinge | Reinhold Gmbh | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Europe | Germany | Others | Others | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Europe | Germany | Total | Total | 75.00 | 75.00 | 75.00 | 75.00 | 75.00 | 80.00 | 80.00 | 80.00 | 80.00 |
| Europe | France | Drocourt | Scott Bader Company Ltd. | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Europe | France | Others | Others | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Europe | France | Total | Total | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Europe | Italy | Monfalcone | Sino Polymer | 18.00 | 18.00 | 18.00 | 18.00 | 18.00 | 18.00 | 18.00 | 18.00 | 18.00 |
| Europe | Italy | Brembate Sopra | Polynt S.P.A. | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Europe | Italy | Others | Others | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Europe | Italy | Total | Total | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 |
| Europe | Switzerland | Schaffhausen | AOC - Aliancys | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Europe | Switzerland | Others | Others | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Europe | Switzerland | Total | Total | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Europe | Netherlands | Ohio | Hexion Inc. | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| Europe | Netherlands | Others | Others | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Europe | Netherlands | Total | Total | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| Europe | Russia | Pisticci | Poliya | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Europe | Russia | Others | Others | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Europe | Russia | Total | Total | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Europe | United Kingdom | Wollaston | Scott Bader Company Ltd. | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Europe | United Kingdom | Others | Others | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Europe | United Kingdom | Total | Total | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| Europe | Rest of Europe | Total | Total | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| Europe | Europe | Total | Total | 208.00 | 208.00 | 208.00 | 208.00 | 208.00 | 213.00 | 213.00 | 213.00 | 213.00 |
| North America | USA | Pittsburgh | INEOS Composites | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 35.00 | 35.00 | 35.00 | 35.00 |
| North America | USA | Houston | Polynt-reichhold | 35.00 | 35.00 | 35.00 | 45.00 | 45.00 | 45.00 | 45.00 | 45.00 | 45.00 |
| North America | USA | Minnesota, | Interplastic Corporation | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| North America | USA | California | AOC, LLC | 60.00 | 60.00 | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 |
| North America | USA | Wilmington | Ashland Global Holdings Inc. | 30.00 | 30.00 | 35.00 | 35.00 | 35.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| North America | USA | Others | Others | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| North America | USA | Total | Total | 185.00 | 185.00 | 200.00 | 210.00 | 210.00 | 210.00 | 210.00 | 210.00 | 210.00 |
| North America | Canada | Others | Others | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| North America | Canada | Total | Total | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| North America | Mexico | Others | Others | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 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 |

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 the capacity in this region. Also, favorable government policies for renewables like wind and solar energy influences major vinyl ester producers to setup capacity in these countries. On the other hand, Capacities located in developed nations of Western European and North American countries will show a moderate growth in expansion due to the market slowly reaching to its maturity in these regions. Also, government regulation to commercialize capacity is more stringent in these regions compared to Asia Pacific. In India, most of the demand of 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 resin market, led by the United States. In USA, major prodsucers are AOC, LLC, INEOS Composites and Polynt-Reichhold. In 2019, INEOS Composites acquired the Ashland’s composite business becoming one of the largest producers of the chemical.

**Average operating efficiency of Indian Companies versus Outside Indian Companies, 2015 – 2030F**

**3.1. 4. Operating Efficiency By Company**

**Table 4: Global Vinyl Ester Resin Operating Efficiency, By Company (Thousand Tonnes), 2015-2030F**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Company** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021E** | **2025F** | **2030F** |
| AOC - Aliancys | 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% |
| 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 Industria 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. Ltd. | 74.15% | 73.17% | 75.12% | 77.07% | 84.15% | 79.02% | 68.29% | 72.20% | 74.15% |
| 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% |

The operating efficiency of the vinyl ester resin lies between the range of 80-90% at present and it is expected to further increase due to rising demand and the need to increase the production of Pipes & Tanks and renewables Industry. There was a slight decrease in the operating rates of 2020 as 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 compared to last year due to increasing demand for the chemical from the pipes & tanks industry, construction sector, marine industry, and renewables like wind energy. Moreover, rising investment in defense sector by major economies drove the companies to operate at higher efficiency. Other factors supporting operating rates are increasing investment in renewables like wind and solar energy in emerging economies in the Asia Pacific.

**Figure 2: Global Vinyl Ester Resin Market Share, By Application, By Volume, 2015–2030F**

**3.1.5. Demand By Application**

Pipes and Tanks serves as the major application of vinyl ester resin which contributes around 59% of the total demand due to its excellent properties of corrosion, chemical and thermal resistance. The rising demand from renewable sector such as wind energy also serves as the major driving factor for the vinly ester resin market. The demand from marine components where it is used as the coating material which prevents the material from corrosion and various chemicals also contributes to the increasind demand. The chemical is used in various industries deu 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 ( Fibreglass Reinforced Plastics) storage tanks. The chemical stands somewhere between polyester and epoxies in terms of price and mechanical properties. Its major advantage is that they offer better resistance to moisture absorption and hydrolytic attack than polyester. It forms skin between the gel coat and the glass/polyester laminate or over the gel coat which prevents the hydrolysis induced osmotic blistering. It can be used for the entire lamination of boats which provides greater flexibilty and toughness than polyester. The wind energy is one of the fastest growing consumers of fibre reinforced plastics in the world. Major companies like AOC, Reichhold, INEOS produces 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 includes defense, aerospace and electrical & electronics where it is exrtensively used as the coating material providing resistance from moisture, chemicals and heat. It also contributes to the strenght and stiffness of the parts.

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

*Source: TechSci Research*

**Global Advanced Composites Production, By Volume, 2016-2020 (Million Tons)**

*Source: TechSci Research*

**3.1.6. Demand By Type**

**Figure 3: Global Vinyl Ester Resin Market Share, 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 dominates the global market with a market share of more than 50% in 2020. As Bisphenol A has been banned in Europe, the demand of 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 around 50% of the sglobal 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 potable water applications in both piping and tanks. Morevover, 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. Novolac vinyl ester resin contributes around 27% which has been specially modified for improved fabrication properties. It provides end-user improved product quality and fabrication efficiency which offers extended shelf life and adds improved flexibilty to fabricators. Some applications for novolac vinyl ester resin includes heat sheilds, resistance coatings, parts for flue gas desulfurization, chimney liners, and other structural composite componenets where high heat resistance is required. Brominated vinyl ester resin are flame restardant brominated vinyl ester resin which provides corrosion resistance to a wide variety of alkaline and acidic environments. Novolac based vinyl ester resin, despite of possesing better properties than Bisphenol A vinyl ester resin, holds less share than Bisphenol A as its technology to manufacture is quite complex, expensive, requires particular infrastructure, raw materials, & above all expertise. Other chemistry includes urethane and elastomer modified vinyl ester resin which are modified with many unique features providing exceptional characteristics such as elastomer modified may also be used as a primer on carbon steel, high density PVC foam and other dissimilar subtrates.

**3.1.7. Demand By Sales Channel**

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

The major sales channel for Global Vinyl Ester Resin Market is the Direct Sales Channel with a market share of around 83% in 2020 which has been gradually growing since 2015 to 2020 with a market share of around 81% in 2015. 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 manufacturer, 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 manufatcurer, the margin through direct sales stands at 20.41% while the through indirect sales it stands at 23.33%.

**3.1.8. Demand By Region**

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

Region wise, Asia Pacific holds the major share of Global demand for Vinyl Ester Resin with a market share of 44.67% in 2021 which is expected to rise gradually during the forecast period to around 46% in 2030. Vinyl Ester Resin has major application in areas like wind energy, automotive, and other areas having a demand of high-performance materials having chemical resistance properties. Asia pacific being home to world’s major population, is expected to have high demand of energy 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 Asia pacific during the forecast period hence the region will keep the lion’s share of global demand for Vinyl Ester Resin. North America and Europe have a respective demand share of around 22% each. 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 which use vinyl ester linings for protection from corrosion due to environmental regulations on harmful emissions also contributed to the increasing market for vinyl ester.

**Figure 6: Global Vinyl Ester Resin Market Share, By Company, By Volume, 2020**

**3.1.9. Sales By Company**

*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 global Vinyl Ester Resin market. AOC is leading the market followed by INEOS Composites and Swancor Holding Co., LTD. The company has been providing the end user customers or consumers with styrene free vinyl ester resins 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, in industrial factories it reduces safety risk which is simplified permitting process, minimizes emissions from moulded components and improvement in 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 is also being 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 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. manufactures 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 MARKET OUTLOOK**



**3.2.1. Asia Pacific Demand Supply Outlook**

**Figure 21: Asia Pacific Vinyl Ester Resin Market Size, By Volume (Thousand Tonnes), 2015–2030F**

**2015-2020**

**CAGR**

**2.61% By Volume**

**2021E-2030F**

**CAGR**

**6.46% By Volume**

Asia Pacific’s vinyl ester resin demand is anticipated to increase at a CAGR of around 6% from approximately current demand of 322 thousand tonnes to around 575 thousand tonnes in 2030. Exports are higher as compared to imports due to presence of major vinyl ester resin producers in the region. Total export in 2020 stood at around 17.81 while import stood at around 14 thousand tonnes. Increasing export is attributed to mainly increasing demand of vinyl ester resin from fiber reinforced plastic (FRP) application in pipe and tank industry. Average operating rate in Asia pacific region varies from around 78% to 84% and is expected to reach 94% in 2030. Demand supply gap is expected to reach 92 thousand tonnes in 2030 from 19.04 thousand tonnes in 2022. However, several manufacturers are investing heavily in capacity expansion to meet the growing demand of vinyl ester resin in the region.

**Capacity, Production and Operating Efficiency**

**Figure 22: 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 and is expected to reach approximately 487 thousand tonnes. The major dominant player in Asia Pacific vinyl ester resin includes Swancor Holding Co., LTD., Jinling AOC Resins Co., Ltd., INEOS Composites, Showa which holds around 46% of total Asia Pacific capacity. Manufacturers are adding new capacities to meet the growing demand of vinyl ester resin in the region. in 2020, Showa Denko K.K, Japanese Vinyl Ester Resin Producer had 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.

**Figure 23: Asia Pacific Vinyl Ester Resin Production Operating Rate (Percentage), 2015-2030F**

**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 | 3802 |
| **Japan** | 3,453 | 3,289 | 3,258 | 3,280 | 2963 |
| **South Korea** | 2,484 | 2,516 | 2,784 | 2,928 | 2349 |
| **Indonesia** | 822 | 848 | 836 | 885 | 802 |
| **Rest of Asia-Pacific** | 4,756 | 4,582 | 4,685 | 4,736 | 4136 |

**Figure 20: China IIP Growth Rate, 2013-2017**

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

*Source: TechSci Research*

**3.2.1.1. Demand By Application**

**Figure 24: Asia Pacific Vinyl Ester Resin Market Share, By Application, By Volume, 2015–2030F**

**3.2.1.2. Demand By Type**

**Figure 25: Asia Pacific Vinyl Ester Resin Market Share, By Type, By Volume, 2015–2030F**

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

*Source: TechSci Research*

**3.2.1.3. Demand By Sales Channel**

*Source: TechSci Research*

**Figure 26: Asia Pacific Vinyl Ester Resin Market Share, By Sales Channel, By Volume, 2015–2030F**

**3.2.1.4. India Vinyl Ester Resin Market**

**Figure 28: India Vinyl Ester Resin Market Size, By Volume (Thousand Tonnes), 2015–2030F**

*Source: TechSci Research*

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

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

*Source: IBEF*

**Sector Wise Demand**

*Source: Press Release by Rating Agencies*

**India’s GDP Forecast for FY2022, By Rating Agency (Percentage)**

**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 |

**India has unique advantage in catering to domestic as well as Global Epoxy Resin Markets**

**The Indian Chemical Industry has Triple Growth Drivers**

Automobiles

Textiles

Information Technology

Defense

Construction

Chemicals

Domestic Demand Growth

Import Substitution

Export Potential



*Source: TechSci Research*

**Figure 29: India Vinyl Ester Resin Market Share, By Application, By Volume, 2015–2030F**

**3.2.1.4.1. Demand By Application**

**Figure 30: India Vinyl Ester Resin Market Share, By Type, By Volume, 2015–2030F**

**3.2.1.4.2. Demand By Type**

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

*Source: TechSci Research*

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

*Source: TechSci Research*



**EUROPE**

**VINYL ESTER RESIN MARKET OUTLOOK**



**3.2.2. Europe Demand Supply Outlook**

**Figure 7: Europe Vinyl Ester Resin Market Size, By Volume (Thousand Tonnes), 2015–2030F**

**2021E-2030F**

**CAGR**

**4.26% By Volume**

**2015-2020**

**CAGR**

**0.75% By Volume**

*Source: TechSci Research*

Europe current capacity of vinyl ester resin stood at 177 thousand tonnes. Major vinyl ester resin player in Europe includes 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. Ashland has 40 MTPA facility in Germany and 70 MTPA facility in USA which has now become INEOS Composites business. 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 of the vinyl ester resin led by growing demand of renewable energy such as wind energy, solar energy which has vinyl ester resin application.

**Figure 8: Europe Vinyl Ester Resin Capacity & Production (Thousand Tonnes), 2015-2030F**

**Capacity, Production and Operating Efficiency**

*Source: TechSci Research*

Europe’s current capacity of vinyl ester resin stood at 213 thousand tonnes. Major vinyl ester resin player in Europe includes 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. Ashland has 40 MTPA facility in Germany and 70 MTPA facility in USA which has now become INEOS Composites business. 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 of the vinyl ester resin led by growing demand of renewable energy such as wind energy, solar energy which has vinyl ester resin application.

**Figure 9: Europe Vinyl Ester Resin Production Operating Rate (Percentage), 2015-2030F**

*Source: TechSci Research*

*Source: TechSci Research*

**European Countries Real Estate Investment, 2020 (USD Billion)**

|  |  |
| --- | --- |
| **Countries** | **Investment (USD Billion)** |
| Germany | 57 |
| France | 28 |
| Netherland | 14 |
| Spain | 12 |
| Italy | 9 |

**3.2.2.1. Demand By Application**

**Figure 10: Europe Vinyl Ester Resin Market Share, 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 12: Europe Vinyl Ester Resin Market Share, By Sales Channel, By Volume, 2015–2030F**

**3.2.2.3. Demand By Sales Channel**

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

*Source: TechSci Research*

**Figure 11: Europe Vinyl Ester Resin Market Share, By Type, By Volume, 2015–2030F**

*Source: TechSci Research*



**NORTH AMERICA VINYL ESTER RESIN MARKET OUTLOOK**



**3.2.3. North America Demand Supply Outlook**

**Figure 14: North America Vinyl Ester Resin Market Size, By Volume (Thousand Tonnes), 2015–2030F**

*Source: TechSci Research*

North America’s demand of vinyl ester resin stood approximately 163 thousand tonnes as of 2020. Demand is anticipated to increase at a CAGR of approximately 4.92% during the forecast period to reach around 280 thousand tonnes in 2030. This increase in demand is attributed to growing infrastructure projects and increasing investment in renewable energies. 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 supplier of vinyl ester resin in North America. Average operating rate in North America region varies from around 87% to 90%. Demand supply gap is expected to reach 158 thousand tonnes in 2030 from approximately 3.38 thousand tonnes in 2021. However, several manufacturers are investing heavily in capacity expansion and new technology development to meet the growing demand of vinyl ester resin in the region.

**Capacity, Production and Operating Efficiency**

**Figure 15: 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 worlds capacity. North America market is dominated by five players. They are INEOS Composites, Polynt-Reichhold, Interplastic Corporation, AOC – Aliancys and Ashland Global Holdings Inc. However, in 2019 INEOS Composites acquired the Ashland’s Vinyl ester resin business. Ashland has 70 MTPA facility in USA which has now become the INEOS composites’s business. 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 of its product. Furthermore, Interplastic Corporation has been making associations with industry organization such as American Composites Manufacturing Associations (ACMA) to gain industry expertise in the composite business.

*Source: TechSci Research*

**Figure 16: North America Vinyl Ester Resin Production Operating Rate (Percentage), 2015-2030F**

**North America GDP at Current Prices, 2013-2020F (USD Trillion)**

*Source: World Bank*

**3.2.3.1. Demand By Application**

**Figure 17: North America Vinyl Ester Resin Market Share, By Application, By Volume, 2015–2030F**

**Figure 18: North America Vinyl Ester Resin Market Share, By Type, By Volume, 2015–2030F**

**3.2.3.2. Demand By Type**

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

*Source: TechSci Research*

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

*Source: TechSci Research*

**Figure 19: North America Vinyl Ester Resin Market Share, By Sales Channel, By Volume, 2015–2030F**

**3.2.3.3. Demand By Sales Channel**

*Source: TechSci Research*



**SOUTH AMERICA VINYL ESTER RESIN MARKET**

**OUTLOOK**



**Figure 31: South America Vinyl Ester Resin Market Size, By Volume (Thousand Tonnes), 2015–2030F**

**2021E-2030F**

**CAGR**

**3.82% By Volume**

**2015-2020**

**CAGR**

**0.67% By Volume**

South America’s vinyl ester resin demand is anticipated to increase at a CAGR of approximately 3.82% and reach approximately 23.76 thousand tonnes by 2030 from 20.28 thousand tonnes in 2020. This increase in demand is led by strong demand growth in fibre reinforced plastics (FRP), marine components and wind energy. Rising industrialization and urbanization in the region contributed to the rising demand of the product. The increase in demand in industrial applications where it is used as a lining system for water treatment, air pollution, chemical processing and to mineral processing providing resistance from corrosion.

**Capacity, Production and Operating Efficiency**

**Figure 32: South America Vinyl Ester Resin Capacity & Production (Thousand Tonnes), 2015-2030F**

**Figure 33: South America Vinyl Ester Resin Production Operating Rate (Percentage), 2015-2030F**

**South America Advanced Composites Market Size, By Value, 2015-2025F (USD Billion)**

**Brazil Residential, Commercial & Green Building Market Size, By Value, 2030F (USD Billion)**

|  |  |
| --- | --- |
| **Segment** | **2025F** |
| Residential Building | 328.0 |
| Commercial Building | 47.5 |
| Residential Green Building | 34.0 |
| Commercial Green Building | 3.9 |

**Figure 34: South America Vinyl Ester Resin Market Share, By Application, By Volume, 2015–2030F**

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

*Source: TechSci Research*

**Figure 35: South America Vinyl Ester Resin Market Share, By Type, By Volume, 2015–2030F**

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

*Source: TechSci Research*

*Source: TechSci Research*

**Figure 36: South America Vinyl Ester Resin Market Share, By Sales Channel, By Volume, 2015–2030F**



**MIDDLE EAST & AFRICA VINYL ESTER RESIN MARKET**

**OUTLOOK**



**2021E-2030F**

**CAGR**

**3.57% By Volume**

**Figure 38: Middle East & Africa Vinyl Ester Resin Market Size, By Volume (Thousand Tonnes), 2015–2030F**

**2015-2020**

**CAGR**

**1.86% By Volume**

*Source: TechSci Research*

MEA’s demand of vinyl ester resin is expected to grow at a CAGR of approximately 3.57% during the forecast period and expected to reach around 88 thousand tonnes in 2030 from 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 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 29 thousand tonnes in 2030, companies are ramping up production and investing into capacity addition to meet the demand supply gap in the region.

**Figure 39: Middle East & Africa Vinyl Ester Resin Capacity & Production (Thousand Tonnes), 2015-2030F**

**Capacity, Production and Operating Efficiency**

*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 producer includes Scott Bader Company Ltd., Saudi Arabia Industria 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 is 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 resin led by strong growth in automotive, renewable sectors. The major demand in the region comes from pipes and tanks applications where it is used as a lining system making it chemical, corrosion and thermal resistance. The demand from renewables and marine also contributes to the increasing demand of vinyl ester resin.

**Figure 40: Middle East & Africa Vinyl Ester Resin Production Operating Rate (Percentage), 2015-2030F**

*Source: TechSci Research*

**Table 10: 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 |
| 5. | Chemical | 565 |
| 6. | Industrial | 250 |

**3.2.5.1. Demand By Application**

**Figure 41: Middle East & Africa Vinyl Ester Resin Market Share, By Application, By Volume, 2015–2030F**

**3.2.5.2. Demand By Type**

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

*Source: TechSci Research*

**Figure 42: Middle East & Africa Vinyl Ester Resin Market Share, By Type, By Volume, 2015–2030F**

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

*Source: TechSci Research*

**3.2.5.3. Demand By Sales Channel**

**Figure 43: Middle East & Africa Vinyl Ester Resin Market Share, By Sales Channel, By Volume, 2015–2030F**

*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’ initiatives giving big push to future market of vinyl ester resin. In 2021, per capita consumption of composites in United States and China is 11.4 kg and 2.8 kg, respectively. The per capita consumption in India stood at 0.36 kg which is among the lowest.

***Growing usage as Lining System in Industrial Applications***

In number of industrial applications, vinyl ester resin lining systems are used for water treatment, chemical processing, and air pollution control, to mineral processing which provides unparallel corrosion resistance in fiberglass reinforces 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 its properties of 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 resin in building & construction industry has been rising over the last few years owing to their varied Types including pipes and tanks. Robust growth in construction sector in Japan coupled with implementation of favourable government policies to support construction and infrastructure growth are the primary factors expected to influence the demand.

**Figure 22: APAC Construction Sector Contribution to GDP, 2013-2019, (%)**

*Source: World Bank*

**Figure 23: Japan Total Construction Investments, By Value (USD Million), 2015-2019**

*Source: TechSci Estimates*

***Ageing Infrastructure***

The ageing infrastructure is driving opportunities for building materials including VER based FRP tanks. Most of the infrastructure such as roads, water supply and sewerage system were 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.

**Table 3: 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% |

**Market Challenges**

***Fragmented market of composites industry in China and India***

The fragmented composite industry in India and China which consist of around 15000 stakeholders in the value chain including small, mid-sized and large players across these two countries. 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 operate in the market.

|  |  |
| --- | --- |
| **Composite Manufacturers** | |
| Teijin Ltd. | PPG Industries, Inc. |
| Toray Industries, Inc. | Huntsman Corporation LLC |
| Owens Corning | SGL Group |
| Reliance Composites | Hexcel Corporation |
| Crest Composites | DuPont |
| Momentive Performance Materials, Inc | Weyerhaeuser Company |

***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)**

**3.5. 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 due to availability of cheap labor such as China and India. 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 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, defence, transportation etc. has been rapidly increasing due to its excellent corrosion resistance and chemical resistance properties thereby increasing the use of vinyl ester as corrosion resistance inner lining material. Vinyl Ester resins usage in the making of pipes and tanks also adds to the increasing demand due to increasing population, industrialization, and urbanization. Growing utilization of Vinyl Ester Resin in electronics and telecommunications is likely to increase its foothold in the market over coming years.

***Mergers and Acquisitions***

Merger & acquisition activities are becoming prevalent in the vinyl ester resin market globally. In 2019, INEOS Composites acquired Ashland Composites. Additionally, Polynt and Reichhold also had a merger in the same year to expand and increase its market share. Showa Denko, which is stronger in the market of vinyl ester resin, is continuously expanding its capacity to cater the increasing demand in China.

***Growing Focus towards Research & Development***

Composites market is witnessing presence of various market players which in turn has resulted in growing focus towards the research and development activities for new applications such as pipes and tanks and marine. For instance, Swancor Holdings Ltd. product SWANCOR 901 is a Bisphenol-A type epoxy vinyl ester resin which is currently being researched for new applications. Vinyl ester resin properties of corrosion resistance and thermal resistance makes them the best fit for industrial applications which is used as lining system for tanks and pipes.

AOC research- https://www.aoc-resins.com/pdf/tech\_cr\_Next\_Gen\_Novolac\_Epoxy\_VE.pdf

**3.5. Technology Evaluation**

**Process Flow Diagram**

Reactor

Temp :140°C

Time :4-6 Hr

Epoxy Resin

Bisphenol-A

Methacrylic Acid, Additives

Styrene Monomer

Blender

Temp:70°C

Time:2-4 Hr

Finished Products ready for packing

Vinyl Ester Resins are downstream product of Epoxy Resin. Mostly manufacturing companies have their in-house technology and R&D facilities to make formulations. Major reactions are carried out with the help of batch reactor and blender which can be outsourced. Generally Manufacturing process involves mixing of feedstock material in batch reactor and blending with organic solvent such as styrene monomer. There is no technology licensor for the product.

**3.6. Pricing Analysis**

**India Vinyl Ester Resin Monthly Prices, January 2018 Onwards (USD/Tonne)**

Discussions of Vinyl Ether Resins (VER) remained firm since the beginning of 2021 following the pickup in market activities as the economy significantly rebounded from Covid repercussions. However, the increment has been marginal yet consistent due to constraint fluctuations in base Novolac costs. There has not been an adverse impact on the second wave of Covid in India, as the demand remained consistent from packaging sector amidst favorable 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 FY 2022 has also contributed to raise its values at times of prevalent demand pattern.

**India Vinyl Ether Resin Yearly Prices, July 2010 Onwards (INR/Tonne)**

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 wake of the Covid outbreak.

**3.9. Customer Analysis**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Product Description** | **Customer / Distributor Name** | **Destination Country** | **Plant Location** | **Supplier Name** | **Shipment Origin** | **Annual Off-take Quantity (Tonnes)** | **Price (USD/Tonnes)** | **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/China** | **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 Aoc 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** | **Kaohsiung** | **Eternal Materials Co Ltd** | **Taiwan** | **34.20** | **2.10** | **Delivered At Place – Tax And Duties** |
| **2020** | **Bisphenol-a Type Epoxy Vinyl Ester Resin** | **Vibrant Specialities** | **India** | **N/A** | **Synthomer Trading Limited** | **France** | **40.50** | **2.21** | **Delivered At Place – Tax And Duties** |
| **2020** | **Novolac Vinyl Ester Resin** | **Chemical Process Equipments Pvt Ltd** | **India** | **Benicarló** | **Ineos Composites** | **Spain** | **471.97** | **5.74** | **Delivered At Place – Tax And Duties** |
| **2020** | **Bisphenol-a Type Epoxy Vinyl Ester Resin** | **Nagase India Private Limited** | **India** | **Kawasaki** | **Showa Highpolymer Singapore Pte Ltd** | **Japan** | **243.81** | **3.01** | **Delivered At Place – Tax And Duties** |
| **2020** | **Bisphenol-a Type Epoxy Vinyl Ester Resin** | **Dakle Industrial Plastics** | **India** | **N/A** | **Z To Order NA** | **Taiwan** | **32.00** | **2.31** | **Delivered At Place – Tax And Duties** |
| **2020** | **Bisphenol-a Type Epoxy Vinyl Ester Resin** | **Basf India Limited** | **India** | **Dubai** | **Basf Construction Chemicals Uae Llc** | **United Arab Emirates** | **24.27** | **11.26** | **Delivered At Place – Tax And Duties** |
| **2020** | **Bisphenol-a Type Epoxy Vinyl Ester Resin** | **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** |
| **2020** | **Bisphenol-a Type Epoxy Vinyl Ester Resin** | **Devi Polymers Private Ltd** | **India** | **Kaohsiung** | **Eternal Materials Co Ltd** | **Taiwan** | **9.20** | **2.33** | **Delivered At Place – 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 Automotive Limited** | **India** | **Nantou** | **M S Swancor Highpolymer Co Ltd** | **Taiwan** | **3.10** | **2.78** | **Delivered At Place – Tax And Duties** |
| **2020** | **Bisphenol-a Type Epoxy Vinyl Ester Resin** | **Epp Composites 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 Automotive Limited** | **India** | **Nantou** | **M S Swancor Highpolymer 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 AMIANTIT 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** | **Changzhou Pro-tech Trade Co.,Ltd,** | **China** | **14.40** | **2.37** | **Delivered At Place – Tax And Duties** |
| **2020** | **Bisphenol-a Type Epoxy Vinyl Ester Resin** | **Fiber Craft Inds.** | **Pakistan** | **Al Jubail** | **Saudi Industrial Resins Limited** | **Saudi Arabia** | **12.30** | **3.20** | **Delivered At Place – Tax And Duties** |

**3.11. Global Demand-Supply Gap**

**Demand Supply Scenario**

The overall market for Vinyl Ester Resin is currently in surplus situation in APAC region because downstream manufacturers are still consuming Vinyl Ester. However, companies are currently operating at lower rates due to uncertainty in demand potential owing to 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 supply gap.

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

Consequently, Vinyl Ester Resin, has increasingly been used manufactured by Unsaturated polyester resins manufacturer companies across Europe as an alternative to other compounds. Thus, demand for Vinyl Ester Resin has recently taken an exponential pace in European market. However, on the supply side, 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 from Europe will be catered through imports.

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

**3.12. Suggested Capacities (Ideal Product Mix and capacity recommendation)**

|  |  |  |
| --- | --- | --- |
| **Chemistry** | **Product** | **Suggested Capacity** |
| Vinyl Ester Resin | Bisphenol – A vinyl ester resin,  Novolac Vinyl Ester Resin,  Brominated Vinyl Ester Resin | 30,000 Tonnes Per Annum |

The suggested capacity is around 30 KTPA as in 2025 the demand supply gap is anticipated to reach 10 KTPA on account of which Reliance shall be using 15 KTPA for captive consumption, producing XVR 6811 Vinyl esters which is Bisphenol Epoxy Vinyl Ester for Pultrusion which shall be utilised in the manufacturing of wind turbine blades, nose cones and its nacelle covers at Vadodara Composite Division FRP Product along with support structures for Solar Panels to cater the renewable energy industry demands. The remaining around 15 KTPA shall be utilising for non-captive which includes direct export and catering to domestic demand.

**Target EXIM Countries**

|  |  |
| --- | --- |
| **Region** | **Deficit Countries** |
| North America | USA |
| Mexico |
| APAC | Bangladesh |
| Pakistan |
| Australia |
| Indonesia |
| Middle East & Africa | UAE |
| Turkey |
| Iran |
| Pakistan |
| South Africa |
| Egypt |
| Algeria |
| Israel |
| South America | Brazil |
| Europe | European Union |
| Russia |
| Poland |
| Czech Republic |
| Portugal |
| Greece |
| Croatia |
| Sweden |