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**GLOBAL VINYL ESTER**

**RESIN MARKET**

**FORECAST & OPPORTUNITIES, 2030**





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**MARKET INTELLIGENCE. CONSULTING**

**Executive Summary**

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, Dit B.V., Composites Universal Group, Dupont, Cabot Corporation, Owens Corning, Toray Industries, Inc, Teijin Limited.

**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 |

*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*

**2015-2020**

**CAGR**

**1.74% By Volume**

Global demand for Vinyl Ester resin in 2020 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 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 increase approximately from 47 thousand tonnes in 2021 to 291 thousand tonnes in 2030. Manufacturers 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%

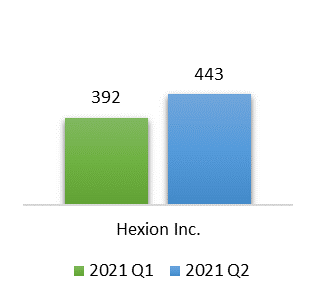
-7.60%

-12.10%

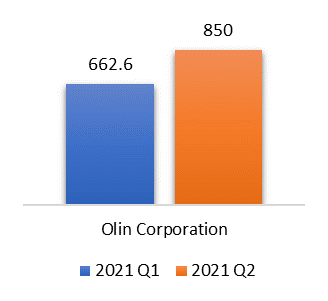
*Source: Annual Reports*

-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 for 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 in 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 Resins | 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** |

*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. (SSHP). 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.

*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 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 |
| 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 Industrial 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**  *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*

**2015**

**2020**

*Source: TechSci Research*

**3.1.3. Capacity By Location**

**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 |

*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 4: 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% |
| 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% |

*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.

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

**3.1.5. Demand By Application**

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 flexibilty 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.

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

*Source: TechSci Research*

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

**3.1.6. Demand By Type**

*Source: TechSci Research*

**Figure 3: Global Vinyl Ester Resin Market 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. 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 of vinly 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 ens users, which offers extended shelf life and adds improved flexibilty to fabricators. Some applications of novolac vinyl ester resin includes heat sheilds, 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 possesing 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 Market Share, By Sales Channel, By Volume, 2015–2030F**

*Source: TechSci Research*

The major sales channel for global vinyl ester resin market is the direct dales 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 manufatcurers, 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 Market Share, By Region, By Volume, 2021E & 2030F**

*Source: TechSci Research*

Region wise, Asia Pacific holds the major share of the market, with a share of 44.67% in 2021 which is expected to rise gradually during the forecast period to around 46% 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 22% 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.

**3.1.9. Sales By Company**

**Figure 6: 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 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**

*Source: TechSci Research*

Asia Pacific’s vinyl ester resin demand is anticipated to increase at a CAGR of 6.42% from the current demand of approximately 322 thousand tonnes to around 575 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 17.81 while imports stood at around 14 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 thouisand tonnes is anticipated to reach 102 thousand deficit 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.

**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 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.

**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)**

*Source: TechSci Research*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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, 2016-2020**

*Source: TechSci Research*

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

**3.2.1.1. Demand By Application**

*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.

**3.2.1.2. Demand By Type**

**Figure 25: 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 fiber 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.

**3.2.1.3. Demand By Sales Channel**

**Figure 26: Asia Pacific Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2020**

**3.2.1.4. India Vinyl Ester Resin Market**

*Source: TechSci Research*

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

*Source: TechSci Research*

India vinyl ester resin market is anticipated to reach 20.30 thousand tonnes in 2030, growing with a healthy CAGR of 7.66% 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 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

*Source: IBEF*

**Sector Wise Demand**

*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**

*Source: TechSci Research*

**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 Demand, By Application, By Volume, 2015–2030F**

**3.2.1.4.1. Demand By Application**

**Figure 30: India Vinyl Ester Resin Demand, 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 Demand, 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 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 favorable government policies and strong demand for vinyl ester resin in many European nations.

**Capacity, Production and Operating Efficiency**

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

*Source: TechSci Research*

.

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

*Source: TechSci Research*

*Source: TechSci Research*

|  |  |
| --- | --- |
| **Countries** | **Investment (USD Billion)**  **European Countries Real Estate Investment, 2020 (USD Billion)** |
| Germany | 57 |
| France | 28 |
| Netherlands | 14 |
| Spain | 12 |
| Italy | 9 |

*Source: TechSci Research*

**3.2.2.1. Demand By Application**

**Figure 10: 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.

**3.2.2.2. Demand By Type**

**Figure 11: 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.

**3.2.2.3. Demand By Sales Channel**

**Figure 12: Europe Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2020**

*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 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 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 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. 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.

**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. 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.

*Source: TechSci Research*

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

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

*Source: World Bank*

**3.2.3.1. Demand By Application**

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

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.

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

*Source: TechSci Research*

**3.2.3.2. Demand By Type**

**Figure 18: 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.

**Figure 19: North America Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2020**

**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 Demand, By Volume (Thousand Tonnes), 2015–2030F**

**2021E-2030F**

**CAGR**

**3.82% By Volume**

**2015-2020**

**CAGR**

**0.67% By Volume**

*Source: TechSci Research*

South America’s vinyl ester resin demand is anticipated to increase at a CAGR of approximately 3.82% and reach 23.76 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.

**Capacity, Production and Operating Efficiency**

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

*Source: TechSci Research*

*Source: TechSci Research*

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

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

**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*

**3.2.3.1. Demand By Application**

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

*Source: TechSci Research*

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

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

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

*Source: TechSci Research*

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

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.

*Source: TechSci Research*

**Figure 36: South America Vinyl Ester Resin Market Share, By Sales Channel, By Volume, 2015–2020**



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

**OUTLOOK**



**2021E-2030F**

**CAGR**

**3.57% By Volume**

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

**2015-2020**

**CAGR**

**1.86% By Volume**

*Source: TechSci Research*

MEA vinyl ester resin market is expected to grow at a CAGR of approximately 3.57% during the forecast period and is expected to reach around 88 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 29 thousand tonnes in 2030 as 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 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.

**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 |

*Source: TechSci Research*

**3.2.5.1. Demand By Application**

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

*Others include Défense, 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.

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

**3.2.5.2. Demand By Type**

*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.

**3.2.5.3. Demand By Sales Channel**

**Figure 43: Middle East & Africa Vinyl Ester Resin Demand, By Sales Channel, By Volume, 2015–2020**

*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 unparallel 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.

**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: 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.

**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% |

*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.

|  |  |
| --- | --- |
| **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 |

*Source: TechSci Research*

***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*

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

10x Lower

Latency

3x Spectral Efficiency

5x Energy Efficient

10x Lower IoT Power

***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 their market share. Showa Denko, a prominent palyer in the vinyl ester resin market, is continuously expanding its capacity to cater to the increasing demand in China.

*Source: TechSci Research*

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |

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

Vinyl ester resin market is witnessing the presence of various market players, which 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.’s product SWANCOR 901 is a Bisphenol-A type epoxy vinyl ester resin that is currently being researched for new applications. Vinyl ester resins’ properties of corrosion resistance and thermal resistance make them the best fit for industrial applications, such as lining system for tanks and pipes.

**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 packaging

*Source: TechSci Research*

Vinyl Ester Resins are a downstream product of Epoxy Resin. Most manufacturing companies have their in-house technology and R&D facilities to make formulations. Major reactions are carried out with the help of a batch reactor and blender, which can be outsourced. Generally, manufacturing process involves mixing feedstock material in a batch reactor and blending with an 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)**

*Source: TechSci Research*

Discussions on Vinyl Ether 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 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 FY2022 has also contributed to raise in 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 the 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/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/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** |

*Source: TechSci Research*

**3.11. 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.

**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 |

*Source: TechSci Research*

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 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 | United States |
| 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 |

*Source: TechSci Research*