Market Study: Styrene

In this study, Ceresana comprehensively analyzes and describes the development of the global market for styrene. The importance of styrene is reflected by the revenues: the market value amounted to about US$41.8 billion in 2012.

Diverse Applications for Styrene

About 40% of the styrene consumed worldwide in 2012 were processed into polystyrene (PS). PS is used in the manufacturing of food packaging as well as electrical and electronic devices. The global economy will continue to recover during the next few years and thus provide the general framework for a moderate increase of demand for this type of plastic. Ceresana forecasts global demand for styrene in the production of PS to rise by 2.3% per year.

The second largest sales market is the production of expandable polystyrene (EPS), which is used as insulation material in new residential units and the refurbishment of old buildings, among others. Styrene based engineering plastics such as acrylonitrile-butadiene-styrene (ABS) are used by, e.g., the automotive and electronics industry. According to the analyses of Ceresana, the production of ABS and EPS will provide the largest stimuli to growth in the future. Demand is projected to increase by 4.1% and 3.8% p.a. respectively until 2020.

Significant Potential in Emerging Countries

In the end, consumption of styrene depends on the demand of consumers for the different styrene based products. Thus, emerging countries exhibiting strong economic growth and a rising income offer a considerable potential. Conditions as propitious as these attract investment in the expansion of the downstream styrene industry. On the long term, this will lead to an establishing of an ever larger part of the value creation chain in these countries. As result, demand for styrene in some countries will rise significantly.

An example for a development of this kind was and is China. In the past eight years, demand for styrene in this country rose by 9.6% per year. Thus, China is the worldwide largest sales market, accounting for about 31.5% of market shares in 2012. The USA followed at a considerable distance, after demand for styrene fell by, on average, 1.9% p.a. since 2004.

Relocation of Styrene Production

Global production of styrene is increasingly relocating to emerging countries, while developed industrialized regions reduced capacities considerably in the last few years, especially Western Europe and the USA. This shift was triggered by a previous excessive increase of production capacity at a time when demand for styrene rose at less dynamic rates or even declined in the aftermath of the global economic crisis. An effect of this process was the decline of global capacity utilization to 75% in 2009.

While production capacities were relocated, degree of global capacity utilization rose again. This development is likely to continue; we forecast the highest relative increase of styrene production until 2020 to occur in South America and the Middle East. The production capacity in these countries with extensive crude oil resources will increase to approx. 4.8 million tonnes in 2020. Ceresana expects output in South America to increase by, on average, 13.4% p.a. during the next eight years.
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Chapter 1: Extensive market data regarding demand, revenues, production, and manufacturers for each region and the world from 2004 to 2020:
- Western Europe
- Eastern Europe
- North America
- South America
- Asia-Pacific
- Middle East / Africa

1.1.1 World – Demand

Worldwide consumption of styrene totaled X million tonnes in 2004. This graph lists the market volumes of styrene reported for the regions Western Europe, North America, South America, the years 2004 to 2020. At an average rate of X% per year, global demand rose to X million tonnes in 2012.

Graph: Worldwide styrene demand from 2004 to 2020 – split by region

In 2012, Asia-Pacific accounted for X% of total global demand for styrene (Graph). Due to above-average growth rates, consumption in this region will rise to approx. X million tonnes; market share will increase to roughly X% in 2020 accordingly. The second and third largest sales markets were Western Europe and North America, accounting for world market shares of X% and X% respectively in 2012. Eastern Europe and South America reached only small market shares in 2012, followed at a considerable distance by the Middle East and Africa. The two smallest sales markets are offering a significant potential and will develop at the worldwide highest growth rates. We expect demand for styrene to rise to approx. X million tonnes in 2020, constituting an AAGR of X%.

<table>
<thead>
<tr>
<th>Year</th>
<th>Western Europe</th>
<th>Eastern Europe</th>
<th>North America</th>
<th>South America</th>
<th>Asia-Pacific</th>
<th>Middle East / Africa</th>
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<tbody>
<tr>
<td>2004</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>2006</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2008</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2010</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2012</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2014</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2016</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2018</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2020</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Table: Styrene demand in 2004 to 2020 – split by regions

1.3.3 Eastern Europe – Production and Capacities

In 2004, about X tonnes of styrene were manufactured in Eastern Europe (Table). In 2009, however, positive development plummeted as a consequence of the global financial and economic crisis. Until 2012, production volume recovered slightly and amounted to X tonnes that year. For the upcoming eight years, we forecast a continuous increase of Eastern European styrene output at average rates of X% per year. Major producer of styrene in Eastern Europe is Russia (Table). More than X% of total Eastern European output originated in that country. Czechia ranked second at a considerable distance, followed by Poland. We forecast the Russian share of total regional output to continue to increase between 2012 and 2020.

<table>
<thead>
<tr>
<th>Country</th>
<th>Capacities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>X</td>
</tr>
<tr>
<td>Russia</td>
<td>X</td>
</tr>
<tr>
<td>Czechia</td>
<td>X</td>
</tr>
<tr>
<td>Turkey</td>
<td>X</td>
</tr>
<tr>
<td>Total</td>
<td>X</td>
</tr>
</tbody>
</table>

Table: Styrene production in Eastern Europe from 2004 to 2020 – split by major countries

Capacities

<table>
<thead>
<tr>
<th>Country</th>
<th>in 1,000 Tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>X X X X X X X X</td>
</tr>
<tr>
<td>Russia</td>
<td>X X X X X X X X</td>
</tr>
<tr>
<td>Czechia</td>
<td>X X X X X X X X</td>
</tr>
<tr>
<td>Turkey</td>
<td>X X X X X X X X</td>
</tr>
<tr>
<td>Total</td>
<td>X X X X X X X X</td>
</tr>
</tbody>
</table>

Table: Styrene capacity in Eastern Europe in 2012 – split by major countries
2.4.1 Demand and Revenues – India

In 2012, India processed more than X million tonnes of styrene. Compared to 2004, this corresponds to an average increase of X% per year. We forecast Indian demand for styrene to rise at an average rate of X% p.a. to X tonnes in 2020.

In 2012, the most important application area for styrene was the production of polyurethane. Processors in this segment utilized X tonnes, accounting for the by far largest share of total Indian styrene consumption (Table). ABS/SAN reported the second highest market volume, followed by the production of EPS.

### Table: Styrene demand from 2004 to 2020 - split by applications

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Polystyrene</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>EPS</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>ABS/SAN</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SBR/SBL</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Others</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Total</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>X% p.a.</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
</tr>
</tbody>
</table>

The major consumer of polystyrene is the electrical and electronics industry, followed by producers of packaging. So far, India has been satisfying a significant part of demand for electrical appliances and equipment by imports. Further increase of private consumption and the realization of programs to support the domestic industrial sector will offer significant growth opportunities to the Indian electronics industry.

**Revenues**

Revenues generated with styrene in India amounted to US$X billion in 2004 and increased by, on average, X% p.a. during the subsequent eight years. Revenues more than doubled to about US$X billion by 2012. We forecast a market value of approx. US$X billion to be reached in 2020. This development corresponds to an average increase of X% p.a. when compared to 2012.

### Graph: Worldwide styrene demand in EPS from 2004 to 2020 – split by region

Due to its technical properties such as low weight, rigidity, and formability, this material can be used in a wide range of different applications. It may be used as heat, cold, and sound insulation, in the packaging industry or in the manufacturing of recreational and sport products. EPS products are accounting for a significant share of total demand in Asia-Pacific and South America in particular. In the construction segment, EPS is predominantly used as thermal and sound insulation. Heat insulation in buildings prevents thermal stress and the accumulation of condensation water, improves room climate and comfort, helps to save energy, and reduces the emission of pollutants. We forecast total global consumption of styrene in the production of EPS to rise at average rates of X% p.a. to a volume of approx. X million tonnes in 2020.

The most important sales market for styrene was Asia-Pacific, processing more than X million tonnes in 2012, followed at a considerable distance by Western Europe. North America consumed only X tonnes of styrene in the manufacturing of EPS, less than Eastern Europe. Demand on the part of Asia-Pacific is likely to amount to X million tonnes in 2020.

3 Applications

3.1 World

3.1.1 Polystyrene (PS)

3.1.2 Expandable Polystyrene (EPS)

3.1.3 Acrylonitrile-Butadiene-Styrene (ABS)

3.1.4 Styrene-Acrylonitrile (SAN)

3.1.5 Styrene-Butadiene Rubber (SBR)

3.1.6 Styrene-Butadiene Latex (SBL)

3.1.7 Unsaturated Polyester Resins (UPR)

3.1.8 Other Applications (Styrene-butadiene block copolymers (SBS) and others)

3.2 Western Europe

3.3 Eastern Europe

3.4 North America

3.5 South America

3.6 Asia-Pacific

3.7 Middle East / Africa
Chapter 4: Extensive profiles for 67 manufacturers, including Sinopec, Styrolution, Total, Styron, Royal Dutch Shell, PetroChina, Formosa Plastics Group, SABIC, Americas Styrenics.

Note: The profiles are assigned to the country in which the company or holding is headquartered. Company profiles also include JVs and subsidiaries.

Chapter 4: Data and facts on major producers, clearly arranged by:
- Contact Details
- Turnover and Profit
- Product Range
- Production Sites and Capacities
- Profile Summary
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- Automotive Plastics - World
- Bags & Sacks - Europe
- Bags & Sacks - World
- Biocides - World
- Bioplastics - World
- Bitumen - Europe
- Butadiene - World
- Butadiene Rubber (BR) - World
- Caps & Closures - Europe
- Carbon Black - World
- Catalysts - World
- Chelating Agents - World
- Composites (CFRP & GFRP) - World
- Construction Plastics - World
- Corrugated/Solid Board/Carton - Europe
- Engineering Plastics - World
- Ethylene - World
- Expandable Polystyrene - World
- Fillers - Europe
- Fillers - World
- Flame Retardants - World
- Flexible Packaging - Europe
- Food Packaging - Europe
- Hydrofluoric Acid & Fluorochem. - World
- Insulation Material - Europe
- Insulation Material - World
- Labels - Europe
- Masterbatches - World
- Paints & Varnishes - World
- Paints & Varnishes - Europe
- Pigments - World
- Pipes - Europe
- Plastic Additives - World
- Plastic Bottles - Europe
- Plastic Caps & Closures - Europe
- Plastic Caps & Closures - World
- Plastic Containers - Europe
- Plastic Extrusion - World
- Plastic Films - Europe
- Plastic Films - World
- Plastic Injection - World
- Plastic Pipes - Europe
- Plastic Pipes - World
- Plastic Windows - World
- Plasticizers - World
- Plastics - Europe
- Plastics - World
- Polyamide (PA6 & PA66) - World
- Polyethylene (HDPE) - World
- Polyethylene (LDPE) - World
- Polyethylene (LLDPE) - World
- Polyethylene (PE) Pipes - World
- Polypropylene - World
- Polystyrene - World
- Polystyrene & Expandable PS - World
- Polyurethanes & Isocyanates - World
- Polycarbonate Chloride (PVC) - World
- Printing Inks - Europe
- Printing Inks - World
- Propylene - World
- PUR - Adhesives & Sealants - World
- PUR - Paints & Coatings - World
- PVC Pipes - World
- Rigid Metal Packaging - Europe
- Rigid Plastic Packaging - World
- Silicones - World
- Solvents - World
- Stabilizers - World
- Styrene - World
- Styrene-Butadiene Rubber (SBR) - World
- Surfactants - World
- Synthetic Rubber - World
- Thermoplastic Elastomers - World
- Titanium Dioxide - World
- Windows & Doors - Europe