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Yours faithfully, Oliver Kutsch

This study is useful for:

• Manufacturers and traders of agricultural films, cling films, shrink films, multilayer films, bags and sacks, containers, lids, insulation and sheathing, coatings, sporting and household goods, hygiene products, toys, medical engineering, construction elements, consumer goods, E&E products, profiles, tubes, bottles, etc.

• Producers of polyethylene (LDPE, LLDPE, and HDPE), polypropylene (PP), polyvinyl chloride (PVC), polyethylene terephthalate (PET), polystyrene (PS), expandable polystyrene (EPS), polyurethane (PUR), polyamide (PA), acrylonitrile butadiene styrene (ABS), polycarbonate (PC), polymethyl methacrylate (PMMA), polyoxymethylene (POM), and other plastics (SAN & PBT, fluoroplastics).

• Companies operating in the areas of flexible and rigid packaging, the construction industry, transportation, the electrical and electronics industry, and consumer goods.

• Executive board, strategic planning, corporate development, market research, marketing, sales, distribution & procurement

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In this brochure you will find the following information:

• An introduction on page 3
• A summary of the table of contents on page 4
• Following this, there are example pages from the study
• Please use the form on the last page to easily order your study or a free reading sample!
Plastics are indispensable in our everyday life. For the first time, the market research institute Ceresana analyzed the whole world market for all commercially important plastics in one big study. From standard products up to high-performance engineering materials, the most important plastic types are included:

- Polyethylene - LDPE
- Polyethylene LLDPE
- Polyethylene - HDPE
- Polypropylene (PP)
- Polyvinyl Chloride (PVC)
- Polyethylene Terephthalate (PET)
- Polystyrene (PS / EPS)
- Polyurethane (PUR)
- Acrylonitrile Butadiene Styrene (ABS)
- Other Engineering Plastics.

**Films Wrap up the World**
In 2016, the plastics sales markets flexible packaging, construction products, and rigid packaging dominated: These three segments account for about 65% of the total demand for plastics. The sales markets with the highest growth rates of more than 3% per year are, however, the segments transportation and electrical and electronics.

Flexible packaging such as bags and sacks as well as shrink and stretch films are mainly used for food packaging, but also as a secondary and tertiary packaging, for example for transportation. Plastic films may be used as shopping bags, trash can liners, mailing bags or as large bags for industrial and agricultural goods. Worldwide, about 60.8 million tonnes of plastics were utilized in flexible packaging in 2016. In civil engineering and building construction, plastics are mainly used for films, cables, pipes, profiles and covers, sheets, fastening elements such as dowels and screws, glazing, coatings, and membranes. 54.8 million tonnes of plastics were utilized for building applications in 2016. The Asia-Pacific region is by far the largest consumer.

**PP is the Top Seller**
PVC and PET might be more famous. However, the top-selling product of 2016 was polypropylene (PP): 23.4% market share. Polypropylene is a semi-crystalline thermoplastic polymer that is compatible with many processing technologies and used in a wide variety of applications. HDPE and LLDPE also belong to the types of plastics that were most frequently used. High density polyethylene (HDPE) is solid and hard. It is processed into films but also into rigid containers, pipes, and a variety of everyday household goods such as flacons, clothes pegs, and handles of dishwashing brushes. Both flexible as well as rigid products are made of linear low density polyethylene, oftentimes in blends with LDPE or HDPE. Like this, it can be used for example for thinner films. Furthermore, LLDPE is processed into multilayered packaging.

**Asia-Pacific is Major Consumer**
In 2016, the global plastics market reached a volume of over 263 million tonnes. According to the demand volume and price development for the individual types of plastics, Ceresana expects revenues to rise to about US dollar 560 billion until 2024. The data regarding quantities and revenues do not include synthetic fibers nor their use in paints and varnishes, adhesives and sealants. Synthetic resins such as epoxy, phenolic, melamine, and urea formaldehyde resin as well as silicones are not analyzed either. With a market share of over 51%, Asia-Pacific is the region with the largest plastics demand; North America, Western Europe, Eastern Europe, and South America follow. China and the USA are the major consumers of plastics worldwide. In this market report, Ceresana analyzes the development of every individual product type and application area in several regions and countries.
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Belgium (1)
France (2)
Germany (3)
Italy (2)
Spain (2)
Switzerland (1)
The Netherlands (2)

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Hungary (1)
Poland (2)
Romania (1)
Russia (5)
Turkey (1)

5.3 North America
Canada (1)
Mexico (4)
USA (9)

5.4 South America
Brazil (1)
Venezuela (1)

5.5 Asia-Pacific
China (6)
India (4)
Indonesia (1)
Japan (11)
Malaysia (1)
South Korea (7)
Taiwan (4)
Thailand (3)

5.6 Middle East
Iran (1)
Kuwait (1)
Qatar (1)
Saudi Arabia (3)

5.7 Africa
South Africa (2)
1.4 North America

1.4.3 Production

About X million tonnes were produced throughout North America in 2016. We expect output to increase to X million tonnes between 2016 and 2024; despite low growth rates, the USA will continue to dominate the North American market accounting for about X% of regional production.

Chapter 1: Extensive data for 7 regions and the world from 2008 to 2024:
- Demand
- Revenues
- Production

Graph: Production of plastics in North America from 2008 to 2024

<table>
<thead>
<tr>
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<td>1%</td>
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<tr>
<td>Others Applications</td>
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<td>1%</td>
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<td>Total</td>
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</tbody>
</table>

Table: Demand for plastics in Germany from 2008 to 2024 - split by major countries

Graph: Production of plastics in North America from 2008 to 2024

The German construction industry developed quite positively in 2016. The good economic situation due to rising employment figures and the low oil prices stimulated the demand and affected its development decisively. In 2017, we also expect another increase of growth in this branch despite the presumably rising raw material costs. Especially plastic packaging plays an increasingly important role. Regarding processing vol-

Chapter 2: Specific analyses and forecasts for 25 countries:
- Demand per product type (LDPE, LLDPE, HDPE, PP, PVC, PS, EPS, PET, ABS, PUR, other engineering plastics)
- Production per product type (LDPE, LLDPE, HDPE, PP, PVC, PS, EPS, PET, ABS, PUR, other engineering plastics)
- Demand volume per application areas
- Import, export & revenues

Graph: Revenues generated with plastics in Germany from 2008 to 2024, in billion USD and billion EUR

The German construction industry is expected to show a positive development for the next eight years, compared to the rest of Europe. The segment residential construction in particular is providing growth impulses. Reasons for the construction of new residential units are among others the high number of immigrants coming to Germany, a very low level of mortgage interests, as well as a stable labor market and rising incomes for private households. An indicator for the positive development of the construction industry is the rising number of construction permits in the past years. These have been increasing constantly. Completion of new residential constructions and renovations were also rising slightly in 2016. Almost 290,000 new residential units were completed that year. In 2016, the construction industry profited from the constant mild climate and the good order situation. We expect the demand for further buildings to continue to increase in the next years due to the immigration of refugees. Other than residential construction, commercial construction accounted for slight decreases in revenues in 2016.
3.1.3 Applications - Construction

The application construction includes all products made of plastics that are used in civil engineering and building construction. In addition to residential construction, plastics are utilized in office buildings, sports facilities, and department stores. Examples for the use of individual plastics in the construction industry are: films, cables, tubes, profiles and coverings, sheets and pipes, dowels, screws, glazing, mounting elements, coatings, and membranes.

In 2016, X million tonnes of plastics were utilized worldwide for the application area construction. Thus, consumption in this segment rose by X% p.a. since 2008. We forecast global demand for plastics in the X million tonnes in 2024.

4.3.6 Asia-Pacific - HDPE

Asia-Pacific processed X million tonnes of HDPE in 2016; compared to 2008, this corresponds to an average annual increase of X%. China was the largest regional sales market. India ranked second with a volume of X million tonnes, followed by South Korea. The largest growth market of the next eight years is China that will see market volume rise by X% p.a. until 2024. We expect total demand in Asia-Pacific to increase by, on average, X% p.a. to approx. X million tonnes in 2024.

Chapter 3: Detailed data & influential factors for the use in:
- Flexible Packaging
- Rigid Packaging
- Construction
- Transportation
- Electrical & Electronics
- Industrial Products
- Other Applications

Graph: Global demand for plastics in the segment construction from 2008 to 2024 – split by regions

Chapter 4: Demand per region & country split by product types:
- Polyethylene (LDPE, LLDPE & HDPE)
- Polypropylene (PP)
- Polystyrene (PS)
- Expandable Polystyrene (EPS)
- Polyethylene Terephthalate (PET)
- Acrylonitrile Butadiene Styrene (ABS)
- Polyurethane (PUR)
- Other Engineering Plastics

Chapter 5: Specific Information about Plastics

Trinseo S.A.
1000 Chesterbrook Boulevard
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Tel: +1 610 733 6736
Web: www.trinseo.com

Financial Key Data (in billion USD)

<table>
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<tr>
<th>Year</th>
<th>Revenue</th>
<th>Net Income</th>
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<tr>
<td>2013</td>
<td>3,97</td>
<td>0,13</td>
</tr>
<tr>
<td>2014</td>
<td>5,13</td>
<td>0,07</td>
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<tr>
<td>2015</td>
<td>6,03</td>
<td>-0,02</td>
</tr>
<tr>
<td>2016</td>
<td>5,31</td>
<td>-0,07</td>
</tr>
</tbody>
</table>

Combining four of its business segments in anticipation of forming an independent company, Bain Capital Evergreen Manager Holding SCA (Luxembourg) acquired Dow’s assets and established Styron LLC. The company was renamed in February 2015 to Trinseo S.A. The company employs nearly 2,200 people. Trinseo is listed on the New York Stock Exchange. Majority shareholder is Bain Capital which holds a controlling interest of about 76%. Public investors own the remaining shares.

In 2017, the company commenced the production of ABS resins in Zhangjiagang, China. In January 2017, Trinseo Holding B.V. announced, a wholly owned subsidiary of Trinseo, that it sold its 50 percent share in their Sumika Styron Polycarbonate (SSPC) joint venture to Sumitomo Chemical. Today, SSPC operates as a wholly owned subsidiary of Sumitomo Chemical and is renamed to Sumika Polycarbonate Limited. In October 2016, Trinseo announced that it will expand the capacity of its Solution-Styrene Butadiene Rubber (S-SBR) complex in Schkopau, Germany. The additional capacity is scheduled to be online in 2018. The majority of Trinseo facilities’ quality and environmental management systems are certified according to ISO 9001 and ISO 14001 standard.

Specific Information about Plastics

Product Details

Trinseo manufactures polyurethane (STYRON), ABS (MAGNUM), SAN (Tyril) and polycarbonate (CALIBRE) resins. Under the brand name STYRON, the company and the joint venture Americas Styrenics (equally owned by Trinseo and Chevron Phillips Chemical Company) produces polystyrene-universal resins, polystyrene resins with a high-impact strength as well as polystyrene of low flammability. Trinseo produces ABS resins, which are available under the Magnum ABS brand name. The product range consists of a variety of injection molding and extrusion grades, which are mainly targeted at the building & construction, automotive, consumer electronics, and sheet & profile extrusion industries.
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- Antioxidants - World
- Automotive Coatings - World
- 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
- 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
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- Polyethylene (HDPE) - World
- Polyethylene (LDPE) - World
- Polyethylene (LLDPE) - World
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- Polystyrene & Expandable PS - World
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- Printing Inks - World
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- Solvents - World
- Stabilizers - World
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- Synthetic Rubber - World
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- Titanium Dioxide - World
- Windows & Doors - Europe