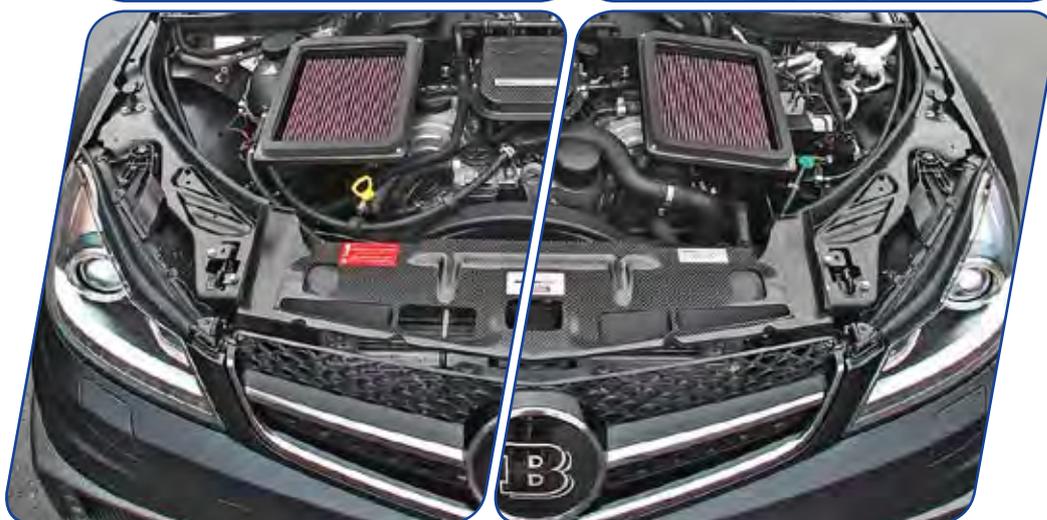


Market Study: Automotive Plastics



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- **Obtain a more detailed picture of your segment**
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- **Have a look at the future**
Find out if new investments and technologies are worthwhile and how to gain access to future markets. We also show possible market scenarios
- **Recognize opportunities and risks**
Identify opportunities and risks on your target markets in time

This study is useful for:

- Manufacturers and distributors of polypropylene (PP), polyethylene (LDPE, LLDPE, HDPE), polyurethane (PUR), acrylonitrile butadiene styrene (ABS), polyamide (PA), polyvinyl chloride (PVC), polycarbonate (PC), polymethyl methacrylate (PMMA), polyoxymethylene (POM), polybutylene terephthalate (PBT), styrene-acrylonitrile (SAN), fluoropolymers
- Producers of seats, upholstery, interior and exterior trim, dashboards, bumpers, lighting, door trim, battery casings, oil pans, cables, plugs, switches, casings of electronic devices, covers,...
- Manufacturers of auxiliaries and additives such as pigments, fillers, plasticizers
- Associations and institutes
- Executive board, technology and production, strategic planning, R&D, market research, marketing, sales and distribution, procurement

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 copy or a free reading sample!

With a global vehicle stock of already more than 1.2 billion vehicles as well as registrations of new vehicles of currently over 90 million units per year, the automotive industry constitutes a dynamically growing sales market for plastics. The replacement of metal, rubber, and glass by plastics reduces weight - but performance remains the same or is even improved. Examples for the application of plastics in the automotive industry are door trim, headlights, switches and handles, seating components, dashboard, windows, and also less visible parts such as plug connectors, battery casings, oil pans, fuel pumps, filter casings, or cooling water tanks.

Ceresana analyzed the market for plastics for this application area in particular: Global demand of the automotive industry for the plastic types PP, PE, PUR, ABS, PA, PVC, PC, PMMA & other plastics amounts to 15 million tonnes. This study registers all parts made of plastics that are produced by either suppliers or vehicle manufacturers themselves and are used in road vehicles. The application in passenger cars and commercial vehicles (trucks, transporters, buses, etc.), both for new productions and for spare parts is examined.

Ceresana has comprehensively analyzed the market for automotive plastics as a whole as well as the demand for individual types of plastics. Thus, the study offers, besides the demand volume of the individual plastic types, also information on the automotive application areas. The segments seats and upholstery, interior

trim, dashboard, bumpers and lighting, exterior trim, under the hood and fuel system, electric and electronics, and others are differentiated. The most important application area in 2015 was the segment under the hood including fuel systems with a demand of 2.6 million tonnes. The highest growth rate between 2015 and 2023 is forecast for the segment exterior trim that is likely to see market volume increase by 4.5% p.a.

The most commonly used plastic in automobiles is polypropylene (PP). This type of plastic accounted for about 28% of total demand. Over the past eight years, global demand for PP in the automotive industry rose by an average of 3.1% per year. The most important application area for PP in the production of vehicles is the segment bumpers / lighting - this segment accounted for about 30% of total demand in 2015. Products made of the polyethylene types HDPE, LDPE, and LLDPE are used in vehicles mainly under the hood and for fuel systems. Overall, this segment accounts for approx. 45% of demand with HDPE being the dominant product type. With a volume of almost 3 million tonnes, polyethylene ranks first, closely followed by polyurethane (PUR). However, global demand for PUR rose by, on average, 3.6% p.a. Especially, application for seats and upholstery set important impulses.

The Study in Brief:

Chapter 1 provides a presentation of the global market for plastics in the automotive in-

dustry – including forecasts up to 2023: Data on demand and revenues is analyzed in the regions Western Europe, Eastern Europe, North America, South America, Asia-Pacific, the Middle East, and Africa.

Chapter 2 provides market data for the 16 most important countries, that is, country-specific information on demand and revenues. Demand is analyzed in detail split by several application areas and product types.

Chapter 3 thoroughly examines the application areas for automotive plastics: seats / upholstery, interior trim, dashboard, E&E / others, bumpers / lighting, exterior trim, under the hood / fuel system. These sales markets are split by both the world regions and the most important countries.

Chapter 4 deals with demand for the particular types of plastics: polypropylene (PP), polyethylene (LDPE, LLDPE, HDPE), polyurethane (PUR), acrylonitrile butadiene styrene (ABS), polyamide (PA), polyvinyl chloride (PVC), polycarbonate (PC), polymethyl methacrylate (PMMA), as well as other types of plastics.

Chapter 5 provides profiles of the largest manufacturers of automotive plastics – clearly arranged according to contact details, turnover, profit, product range, production sites, and profile summary. Extensive profiles of 84 manufacturers are given, for example of Azoty, Celanese, CNOOC, INEOS, LG Chem, Lotte Chemical, Mitsubishi Chemical, NPC, Versalis, and SABIC.

1 Market Data

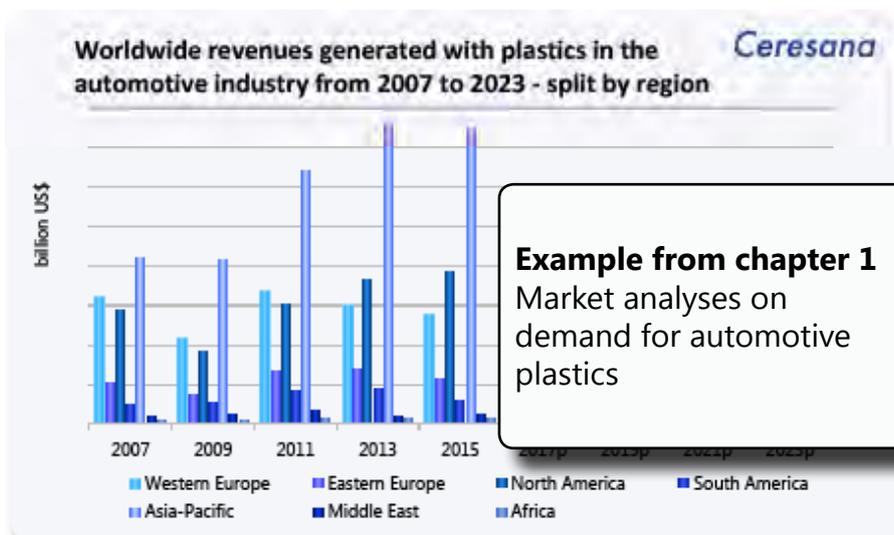
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1.2 Western Europe

In 2015, about X million tonnes of automotive plastics were consumed in Western Europe. Thus, demand fell by an average of X% p.a. since 2007. Until 2023, we expect total demand for plastics used in the automotive industry in Western Europe to increase by X% p.a. Given this below-average growth rate, Western Europe's share of global demand is likely to fall from X% in 2015 to X% in 2023. About EUR X billion were generated with the sale of automotive plastics in Western Europe in 2015. We forecast market value to increase by X% p.a. in the next eight years.

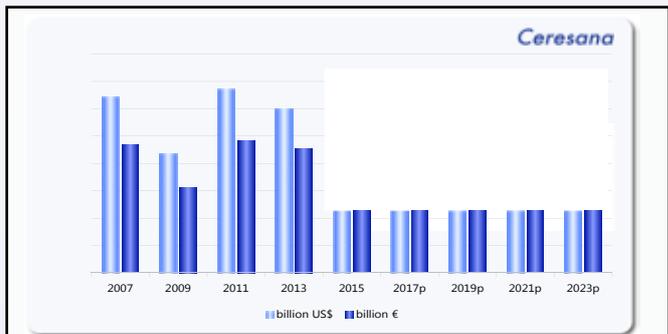


Graph: Demand for automotive plastics in Western Europe from 2007 to 2023

About X% of West European demand originated in Germany, followed by Spain and France. Demand in Italy and the United Kingdom is relatively low. The remaining West European countries (the Netherlands, Sweden, Austria, Portugal, Belgium, Denmark, Switzerland, Finland, Norway, and Ireland) reached an aggregated market share of X%. We forecast Germany to increase its share of the West European market until 2023. With X% p.a., this country is expected to develop at the highest growth rates during the next eight years.

Chapter 1: Demand & revenues from 2007 to 2023:

- Western Europe
- Eastern Europe
- North America
- South America
- Asia-Pacific
- Middle East/Africa



Graph: Revenues generated with automotive plastics in Western Europe from 2007 to 2023, in million USD and million EUR

in 1,000 tonnes	2007	2009	2011	2013	2015	2017p	2019p	2021p	2023p	2015 - 2023
Germany	X	X	X	X	X	X	X	X	X	X% p.a.
France	X	X	X	X	X	X	X	X	X	X% p.a.
United Kingdom	X	X	X	X	X	X	X	X	X	X% p.a.
Italy	X	X	X	X	X	X	X	X	X	X% p.a.
Spain	X	X	X	X	X	X	X	X	X	X% p.a.
Other	X	X	X	X	X	X	X	X	X	X% p.a.
Total	X	X% p.a.								

Table: Demand for automotive plastics in Western Europe from 2007 to 2023 – split by major countries

2.5.1 China

Demand for plastics used in the automotive industry in China in 2015 amounted almost X million tonnes; this development corresponds to an average increase of X% p.a. between 2007 and 2015. We expect demand in China to continue to rise by X % per year to approx. X million tonnes in 2023. At a dynamic growth rate, revenues rose to USD X billion in 2015. This value accounted for almost half of total Asian-Pacific revenues. Market value will rise to approx. USD X billion in 2023. This corresponds to a growth rate of an average of X % per year.

Demand in the segment under the hood / fuel system accounted for almost X tonnes which is the largest share of Chinese demand for plastics in 2015. Application in the segment interior trim ranked a close second. The highest relative increase between 2015 and 2023 is forecast for the application of plastics for exterior trim. Demand is projected to increase at an AAGR of X%.

in 1,000 tonnes	2007	2009	2011	2013	2015	2017p	2019p	2021p	2023p	2015 - 2023
Seats / Upholstery	X	X	X	X	X	X	X	X	X	X% p.a.
Interior Trim	X	X								
Dashboard	X	X								
E&E / Others	X	X								
Bumpers / Lighting	X	X								
Exterior Trim	X	X								
Under the Hood / Fuel System	X	X								
Total	X	X% p.a.								

Table: Demand for automotive plastics in China from 2007 to 2023 – split by applications

The Chinese Government enacted a reduction of sales taxes on small cars for the period from October 2015 to the end of 2016. This vehicle category accounts for the largest share of total new car sales and thus had a large impact on the renewed increase in passenger car sales. Demand for SUV increases more and more while the sales of

Chapter 2: Market data at a global level and of 16 countries:

- Demand and revenues
- Demand split by application
- Demand split by product types

commercial vehicles fell in 2015 but increased again in 2016. A high growth is registered by the market for so-called New Energy Vehicles. Sales of new energy vehicles increased considerably in 2015. Development of these electric vehicles is supported by the government and we forecast China to account for the worldwide largest sales market in this category very soon. Furthermore, we expect China, along with the USA, to constitute one of the major markets for autonomous vehicles.

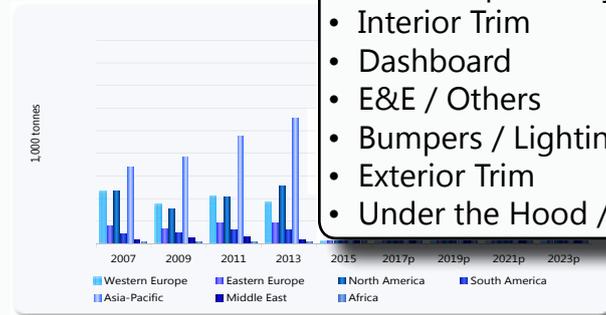
By far, the most important product is PP; in 2015, about X million tonnes of this product were processed. The second highest market volume of about X tonnes was registered by PE. We forecast the most dynamic development for PC and PE that will see market volume increase by X% p.a. and X% p.a. respectively between 2015 and 2023. In total, all products are likely to develop dynamically until 2023.

in 1,000 tonnes	2007	2009	2011	2013	2015	2017p	2019p	2021p	2023p	2015 - 2023
PP	X	X	X	X	X	X	X	X	X	X% p.a.
PE	X	X	X	X	X	X	X	X	X	X% p.a.
PUR	X	X	X	X	X	X	X	X	X	X% p.a.
ABS	X	X	X	X	X	X	X	X	X	X% p.a.
PA	X	X	X	X	X	X	X	X	X	X% p.a.
PVC	X	X	X	X	X	X	X	X	X	X% p.a.
PC	X	X	X	X	X	X	X	X	X	X% p.a.
PMMA	X	X	X	X	X	X	X	X	X	X% p.a.
Other	X	X	X	X	X	X	X	X	X	X% p.a.
Total	X	X% p.a.								

Table: Demand for automotive plastics in China from 2007 to 2023 – split by types of plastics

3.1.1 Seats / Upholstery

In 2015, X million tonnes of plastics were utilized worldwide in the segment seats and upholstery. Thus, demand for plastics used in the automotive industry in this application area rose at an average rate of X% p.a. since 2007. Given an expected X% p.a. increase, global demand for plastics used in this segment is projected to reach X million tonnes in 2023.



Graph: Worldwide demand for automotive plastics in the segment seats / upholstery from 2007 to 2023 – split by regions

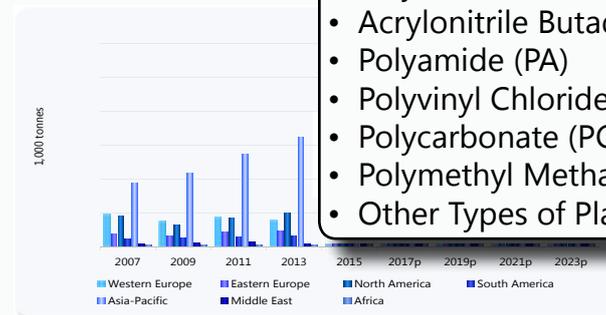
While we forecast demand in Western Europe to increase only slightly during the next eight years, consumption in all other regions will rise significantly by annual rates between X% to X%. Asia-Pacific processed X million tonnes of automotive plastics in 2015, accounting for the largest share of total demand. Processors in North America ranked second, followed by Western Europe. At a significant distance followed demand recorded in Eastern Europe and South America. We expect demand for plastics used for the production of seats and upholstery in the Middle East to develop most dynamically. This region is projected to increase demand by X% p.a. until 2023. South America and Asia-Pacific are also expected to see dynamic demand growth.

Chapter 3: Demand split by applications:

- Seats / Upholstery
- Interior Trim
- Dashboard
- E&E / Others
- Bumpers / Lighting
- Exterior Trim
- Under the Hood / Fuel System

4.4 Acrylonitrile Butadiene Styrene (ABS)

In 2015, about X million tonnes of acrylonitrile butadiene styrene (ABS) were processed in the automotive industry. In the past eight years, demand rose thus at an average rate of X% per year. Around X% of global demand for ABS in the automotive industry is accounted for by Asia-Pacific. North America ranked second, followed by Western Europe, Eastern Europe, South America, and the Middle East. Africa has the lowest market shares. The largest application area for ABS in the automotive industry is interior lighting with a market share of approx. X%.



Graph: Worldwide demand for ABS in the automotive industry from 2007 to 2023 – split by regions

The strongest relative increase during the next eight years is projected for the Middle East. Market volume in this region is likely to increase by an average of X% p.a. to approx. X tonnes in 2023. The least dynamic development is forecast for Western Europe; until 2023, market volume in this country will increase at an AAGR of only X%. Overall global demand for ABS in the automotive industry will rise by about X% p.a. to approx. X million tonnes until the end of our forecasting horizon.

Chapter 4: Demand split by types:

- Polypropylene (PP)
- Polyethylene (LDPE, LLDPE, HDPE)
- Polyurethane (PUR)
- Acrylonitrile Butadiene Styrene (ABS)
- Polyamide (PA)
- Polyvinyl Chloride (PVC)
- Polycarbonate (PC)
- Polymethyl Methacrylate (PMMA)
- Other Types of Plastics

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