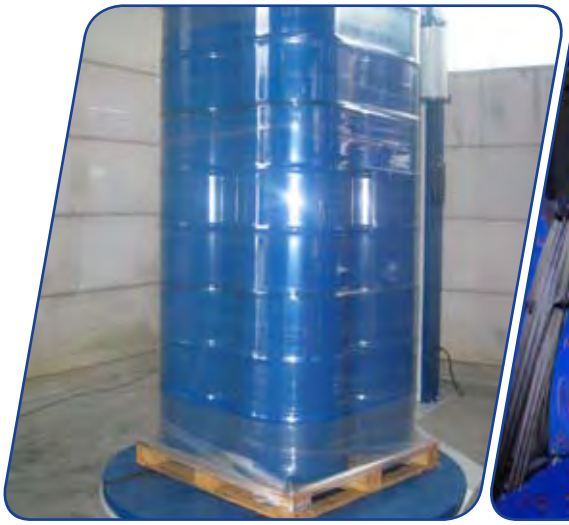
Market Study: Stabilizers (3rd ed.)



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Nowadays, information is available at the push of a button, always, and in overwhelming amounts. But what is the best way to find the crucial data amongst all that information? That is why several thousand companies use the knowledge of our employees. Based on their extensive experience, they provide decisive data for the benefit of their customers. The clearly arranged and practice-oriented studies of Ceresana offer precise analyses and well-founded forecasts - also for your markets!

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Yours faithfully, Oliver Kutsch

Our studies - Your benefits

- **Gain new customers**
  Our studies show who potential new customers are and where you can find them
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- **Improve your understanding of your competitors**
  Who exactly are your competitors - and what are their strengths and weaknesses
- **Obtain a more detailed picture of your segment**
  Learn which time is the best for entering or leaving a market
- **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 & risks on your target markets in time

This study is useful for:

- Producers, traders, and processors of stabilizers
- Producers of pipes, profiles, films, cables, floorings, plastic products for the medical sector, toys, textiles, and elastomers
- Manufacturers of auxiliary products and other additives, such as antioxidants, fillers, flame retardants, pigments
- 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:

Thermal and light stabilizers ensure safe production and processing of plastics and rubbers and protect products against premature aging and weathering. The market research company Ceresana analyzed the global market for these indispensable additives already for the third time. The analysts expect stabilizer revenues to increase to USD 5.1 billion until 2024.

The product types tin-based, lead-based, and calcium-based stabilizers as well as liquid mixed metals and other products are examined in detail in this study. Lead-based stabilizers are increasingly replaced by calcium- or tin-based products which leads to a shift of market shares of the particular product categories. Ceresana expects global consumption of calcium-based stabilizers to increase by 3.4% per year. Soon, lead-based stabilizers will vanish completely from the market in the European Union. But also in other regions, increasing demand for more environmentally friendly alternatives is perceivable.

From a global perspective, the most important application area for stabilizers is the plastics industry, the production and processing of PVC in particular. The most important sales market in 2016 was the production of pipes - 30% of global demand were processed in this sector. Producers of profiles ranked second at a considerable distance, followed by the segments cables and films. Sales volumes of products such as profiles, pipes, cables, films, and floorings is highly dependent on the development of the construction sector. As a result, the development of this industrial sector is of paramount importance to demand for stabilizers. Asia-Pacific is the largest market for stabilizers accounting for a share of 58%, followed by Western Europe. While application in pipes ranks first in Asia, the application profiles dominates the market in Western and Eastern Europe.

The Study in Brief:
Chapter 1 provides a presentation and analysis of the global market for stabilizers – including forecasts up to 2024: Demand for and revenues generated with stabilizers are provided for the world and each region.

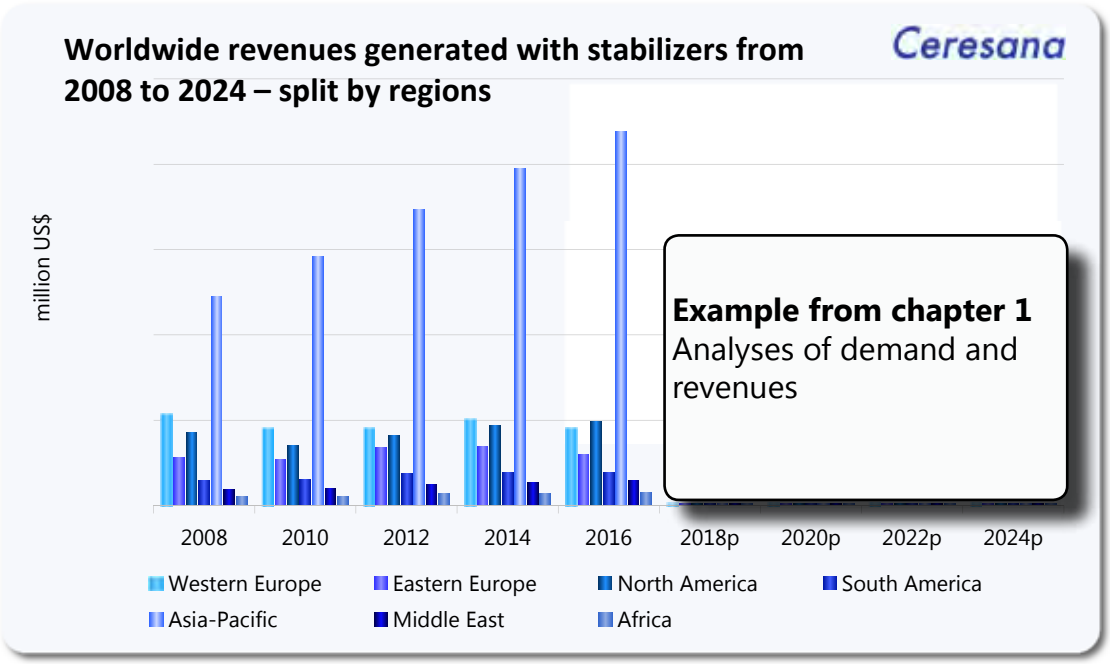
Chapter 2 examines the demand for and revenues generated with stabilizers as well as demand in the applications pipes, profiles, films, cables, floorings, and other plastic products and rubbers for 16 countries in more detail. Additionally, 90 important manufacturers of stabilizers are introduced.

Chapter 3 provides a substantiated analysis of individual applications of stabilizers: Data on demand development, split by the seven world regions Western Europe, Eastern Europe, North America, South America, Asia-Pacific, the Middle East, and Africa are given.

Chapter 4 analyzes the demand for individual products such as tin-, lead-, and calcium-based stabilizers as well as liquid metal soaps and other products. Demand is clearly arranged for each of the 16 analyzed countries and all world regions.

Chapter 5 provides profiles of the largest manufacturers of stabilizers, clearly arranged according to contact details, turnover, profit, product range, production sites, profile summary, products, and applications. Extensive profiles are given for the 90 largest manufacturers, including Adeka, Baerlocher, BASF, Cytec Industries, Ferro, Floridienne, NanYa Plastics, PMC Organometallix, and Songwon.

1 Market Data



2 Country Profiles

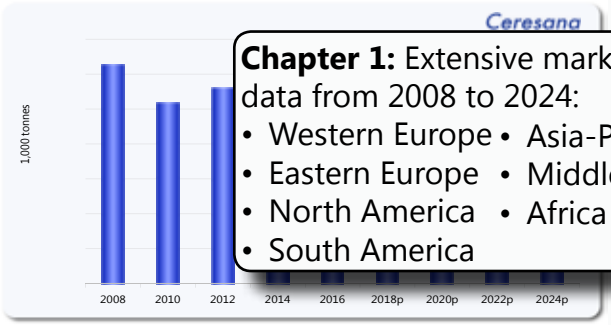
3 Applications

4 Products

5 Company Profiles

1.4.1 Demand - North America

Around XXX tonnes of stabilizers were processed in North America during 2016. The North American market is dominated by the USA that account for XX% of total regional demand for stabilizers.



Chapter 1: Extensive market data from 2008 to 2024:
- Western Europe
- Asia-Pacific
- Eastern Europe
- Middle East
- North America
- Africa
- South America

Graph: Demand for stabilizers in North America from 2008 to 2024

in 1,000 tonnes	2008	2010	2012	2014	2016	2018p	2020p	2022p	2024p	2016-2024
Canada	X	X	X	X	X	X	X	X	X	X% p.a.
Mexico	X	X	X	X	X	X	X	X	X	X% p.a.
USA	X	X	X	X	X	X	X	X	X	X% p.a.
Total	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X% p.a.**

Table: Demand for stabilizers in North America from 2008 to 2024 – split by major countries

We expect total North American demand to increase to approx. XXX tonnes during the next eight years. Given the below-average growth rate, North American share of global demand for stabilizers is likely to fall to about XX% in 2024.

2.1.1 Germany

Demand for stabilizers in Germany amounted to XXX tonnes in 2016. Thus, demand fell by an average of XX% p.a. since 2008. We expect market volume to increase at an average growth rate of XX% p.a., amounting to approx. XXX tonnes in 2024. Stabilizer revenues in Germany amounted to approx. EUR XXX million in 2016. Market value is projected to increase at an average rate of XX% p.a. until 2024.

The most important sales market for stabilizers in Germany in 2016 was the production of profiles. At a considerable distance, the application cables ranked second, followed by the segments films and pipes. Demand for stabilizers is projected to increase only slightly in all applications during the next eight years; growth rates are expected to be in the XX-XX% p.a. range.

Chapter 2: Specific analyses and forecasts for 16 countries:
- Revenues (in US dollars & euros)
- Total demand (in tonnes)
- Demand split by applications
- Demand split by product types
- Manufacturers of stabilizers

in 1.000 tonnes	2008									
Pipes	X									
Profiles	X									
Films	X									
Wires & Cables	X									
Flooring	X									
Other	X									
Total	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X% p.a.**

Table: Demand for stabilizers in Germany from 2008 to 2024 - split by applications

Since the construction industry includes pipes, profiles, cables, and floorings and therefore is a large application area of stabilizers, we take a closer look at the German construction industry in the following paragraph. While public construction continued to develop slowly at the beginning of 2014, it is mainly the residential construction and renovations that provided important growth impulses in the remainder of the year. Thereby, public structural engineering has been declining since 2010.. Private residential and commercial construction are the main growth motors. The construction industry is expected to show a positive development for the next eight years, compared to the rest of Europe. As already mentioned, 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. Completion of new residential constructions and renovations will be rising slightly also in 2015. Almost 250.000 new residential units were completed that year. We expect this value to increase again in 2016. Up to 290.000 new apartments could be possible. In the first quarter of 2016, the construction industry profited from the constant mild climate and the good order situation. We expect sales in the sector civil engineering to increase by 3.4% in 2016. The expansion of the power and gas networks in Germany has a positive effect on the demand for plastic pipes. The German transmission system in the segment gas supply is supposed to be extended by approx. 800 km until 2026.

Another application area of stabilizers are window profiles, among others for plastic windows. A circumstance beneficial to the consumption of energy efficient windows is the federal government's decision, adopted in 2010, to decrease primary consumption of energy by 20% compared to 2008 until the year 2020. Until 2050, it is to be reduced even further by 80%. In order to achieve this aim, efforts in energetic refurbishment of buildings will be doubled, from 1% per year to 2%, as roughly 40% of German energy consumption originate in the residential sector. This project is promoted by a variety of measures; between 2014 and 2015, for example, the federal government made subsidies of EUR 1.5 billion per year available. One reason for the energetic renovation rate is that it is not profitable for many house owners to invest since tenants are only willing to pay the rising rent prices caused by renovation in big cities and urban centers. Since we expect a rising renovation rate for the upcoming years, this will have a positive influence on demand for stabilizers in the segment profiles.

The majority of stabilizers used in Germany are calcium-based. The market volume amounted to XXX tonnes in 2016. The second highest demand was reported in the segment liquid and other stabilizers, whereas the lowest market volume was recorded for lead-based products. Germany will cease to use lead-based stabilizers within the next few years.

The European PVC industry entered a voluntary obligation called VinylPlus. In doing so, the participants support an increasing sustainable production and use of the plastic PVC until 2020. VinylPlus unites a large majority of leading companies of the PVC industry from 27 EU member states, Norway, and Switzerland. In regard to the use of stabilizers, there were significant shifts in the past years. Around the year 2000, it became clear that lead-based stabilizers do not comply with sustainability and that further regulatory measures are probable. Thus, more and more lead-based stabilizers were replaced by more sustainable alternatives in the past years and, starting 2016, the European industry will completely abstain from the use of lead-based stabilizers in new goods. Calcium-based stabilizers are frequently used as replacement. In Germany, as in the entire EU, stabilizers containing calcium are the first choice in the production of profiles, pipes, and cables. Lead-based stabilizers are only to some extent still used in profiles and pipes. Stabilizers based on tin are mainly used in the production of films and, to a small extent, pipes and other products. Liquid compounds are only used for films, floorings, and other products.

in 1.000 tonnes	2008	2010	2012	2014	2016	2018p	2020p	2022p	2024p	2016-2024
Tin	X	X	X	X	X	X	X	X	X	X% p.a.
Lead	X	X	X	X	X	X	X	X	X	X% p.a.
Calcium-based	X	X	X	X	X	X	X	X	X	X% p.a.
Liquid Mixed Metals & Others	X	X	X	X	X	X	X	X	X	X% p.a.
Total	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X% p.a.**

Table: Demand for stabilizers in Germany from 2008 to 2024 – split by types of stabilizers

3.6.1 Pipes - Asia-Pacific

In 2016, the Asian-Pacific pipe industry processed XXX tonnes of stabilizers. China generated a volume of approx. XXX tonnes in 2016, thus accounting for about XX% of total demand in Asia-Pacific. India ranked second, followed by Japan and South Korea. We forecast an average growth rate of XX% p.a. for India. Thus, this country is likely to see the most dynamic growth in this region until 2024. Processors in China will also increase consumption of stabilizers significantly. The ranking of major consumers in Asia-Pacific is unlikely to change until 2024. We forecast total consumption volume to increase by, on average, XX% p.a. over the next eight years and to amount to approx. XXX tonnes.

in 1.000 tonnes	2008	2010	2012	2014	2016	2018p	2020p	2022p	2024p	2016-2024
China	X	X	X	X						
India	X	X	X	X						
Japan	X	X	X	X						
South Korea	X	X	X	X						
Other	X	X	X	X						
Total	**X**	**X**	**X**	**X**						

Table: Demand for stabilizers in pipes in Asia-countries

Chapter 3: Demand split by applications:
- Pipes
- Profiles
- Films
- Wires & Cables
- Flooring
- Other Applications

3.6.3 Profiles

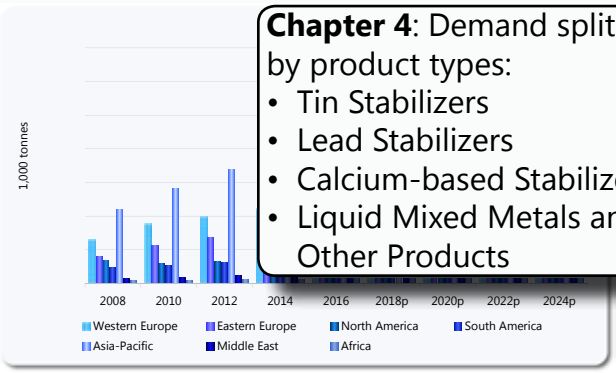
Asia-Pacific consumed XXX tonnes of stabilizers in the production of profiles in 2016. Again, the largest regional sales market in 2016 was China. Around XXX tonnes of stabilizers were processed in this country. India ranked second, followed by South Korea and Japan. While growth in China will only be surpassed by India recording a rise of XX% per year, we forecast demand in the industrialized countries Japan and South Korea to develop moderately. We expect total Asian-Pacific demand for stabilizers in this segment to increase by XX% p.a. to more than XXX tonnes in 2024.

4.3 Calcium-based Stabilizers

Solid metal salts are often referred to as "soaps". This group of stabilizers includes combinations of metal carboxylates (solid salts) and a range of lubricants and co-stabilizers (e.g. phenolic antioxidants, organo phosphites or zeolites). It is mainly calcium-zinc (Ca-Zn) stabilizers that are used as metals soaps such as stearates. Structure and function of Ca-Zn-stabilizers are similar to those of the formerly used cadmium stabilizers, which is why they have been replacing cadmium-based products ever since the 1980s. Special co-stabilizers had to be developed for durable products for outdoor applications in particular. Today, Ca-Zn-systems are used as replacement for lead in all important applications (PVC-U and PVC-P).

Most calcium-zinc stabilizers are based on metal carboxylates. Their zinc content normally falls in the 0.5 to 3 weight percent range, in automotive cables up to 10%. In order to improve their properties, especially heat resistance, color stability and weather resistance, they are blended with other elements (e.g. aluminum or magnesium), lubricants (e.g. paraffins, polyethylene waxes or ester waxes), and co-stabilizers (e.g. polyols, epoxidized soy bean oil, antioxidants or organo phosphites). These more complex stabilizers are more expensive than simple metal soaps, but are suitable for more exigent applications, e.g. cable protection or window profiles.

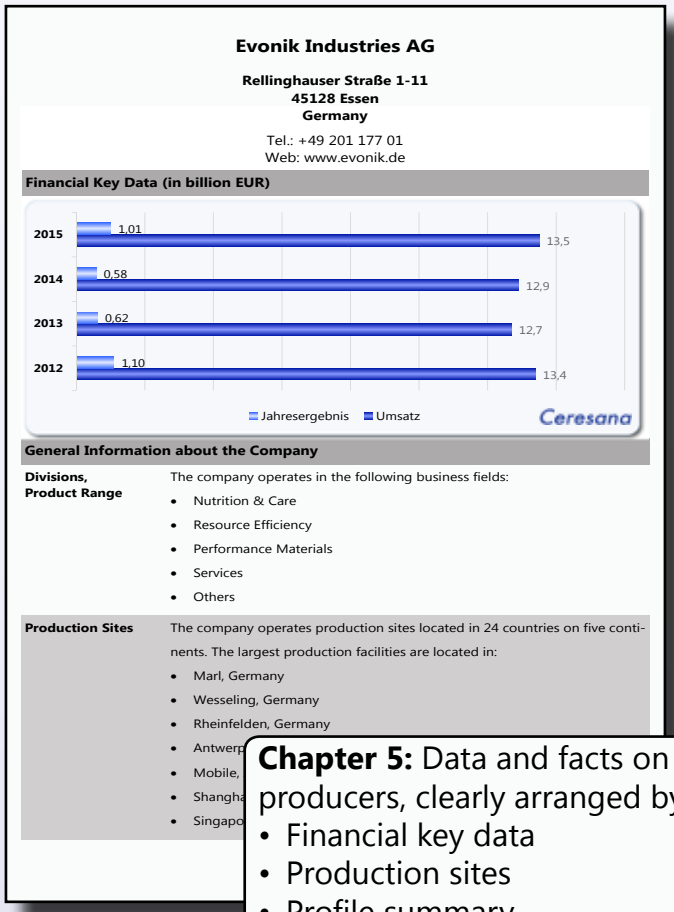
In 2016, about XXX tonnes of calcium-based stabilizers were processed worldwide. Thus, global demand rose by, on average, XX% p.a. in the past eight years. The worldwide largest consumer of stabilizers based on calcium compounds is Asia-Pacific that accounted for roughly XX% of global demand for this product in 2016. Western Europe ranked second with a volume of XXX tonnes. All other regions accounted for markedly smaller shares of global consumption. In the upcoming eight years, demand for calcium-based stabilizers will increase slightly in Western Europe and North America. Yet, we forecast the lowest growth rates of XX% p.a. and XX% p.a. respectively for these regions. On the contrary, we expect the most dynamic development to take place in the Middle East. Demand in this region will increase by, on average, XX% p.a. to approx. XXX tonnes in 2024. In total, about XXX tonnes of stabilizers based on calcium compounds will be processed worldwide in 2024, translating into an average increase of XX% p.a. when compared to 2016.



Graph: Worldwide demand for calcium-based stabilizers from 2008 to 2024 – split by regions

Chapter 4: Demand split by product types:
- Tin Stabilizers
- Lead Stabilizers
- Calcium-based Stabilizers
- Liquid Mixed Metals and Other Products

When used in PVC, calcium-zinc stabilizers offer high clarity, good mechanical and electrical properties, and excellent organoleptic characteristics. They are superior to lead stabilizers in regard to light and weather resistance and chalking occurs notably later. Accordingly, they are used in a wide variety of applications, from blood bags, toys, and food contact films to water pipes. Calcium-zinc stabilizers and tested co-stabilizers are regarded as non-toxic, have been cleared for food contact applications in the EU and can be used to replace the majority of other stabilizers, e.g. products based on lead or barium-zinc. If barium or cadmium is replaced by calcium, the loss of stability must be compensated for by higher concentrations of certain co-stabilizers; e.g., Cn-Zn systems require a phosphite content that is twice as high. Compared to lead-based systems, stabilizers based on calcium are more product specific, i.e. they often have to be tailor-made for the application in question.



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Financial Key Data (in billion EUR)

General Information about the Company

Divisions, Product Range

The company operates in the following business fields:

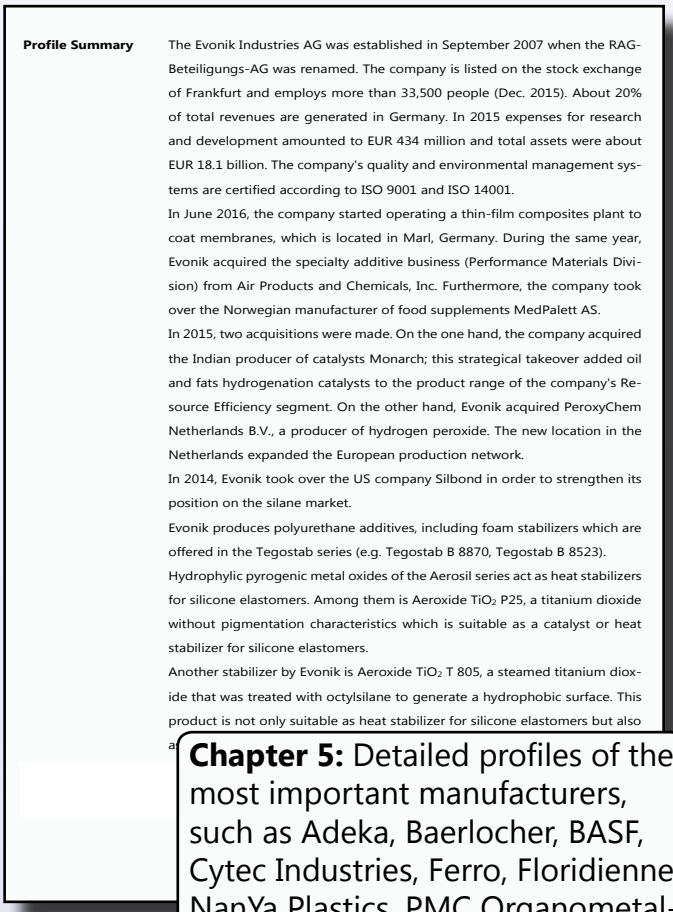
- Nutrition & Care
- Resource Efficiency
- Performance Materials
- Services
- Others

Production Sites

The company operates production sites located in 24 countries on five continents. The largest production facilities are located in:

- Marl, Germany
- Wesseling, Germany
- Rheinfelden, Germany
- Antwerp
- Mobile,
- Shangha
- Singapo

Chapter 5: Data and facts on 90 producers, clearly arranged by:
- Financial key data
- Production sites
- Profile summary
- Product details



Profile Summary

The Evonik Industries AG was established in September 2007 when the RAG-Beteiligungs-AG was renamed. The company is listed on the stock exchange of Frankfurt and employs more than 33,500 people (Dec. 2015). About 20% of total revenues are generated in Germany. In 2015 expenses for research and development amounted to EUR 434 million and total assets were about EUR 18.1 billion. The company's quality and environmental management systems are certified according to ISO 9001 and ISO 14001.

In June 2016, the company started operating a thin-film composites plant to coat membranes, which is located in Marl, Germany. During the same year, Evonik acquired the specialty additive business (Performance Materials Division) from Air Products and Chemicals, Inc. Furthermore, the company took over the Norwegian manufacturer of food supplements MedPalett AS.

In 2015, two acquisitions were made. On the one hand, the company acquired the Indian producer of catalysts Monarch; this strategical takeover added oil and fats hydrogenation catalysts to the product range of the company's Resource Efficiency segment. On the other hand, Evonik acquired PeroxyChem Netherlands B.V., a producer of hydrogen peroxide. The new location in the Netherlands expanded the European production network.

In 2014, Evonik took over the US company Silbond in order to strengthen its position on the silane market.

Evonik produces polyurethane additives, including foam stabilizers which are offered in the Tegostab series (e.g. Tegostab B 8870, Tegostab B 8523).

Hydrophylic pyrogenic metal oxides of the Aerosil series act as heat stabilizers for silicone elastomers. Among them is Aeroxide TiO_2 P25, a titanium dioxide without pigmentation characteristics which is suitable as a catalyst or heat stabilizer for silicone elastomers.

Another stabilizer by Evonik is Aeroxide TiO_2 T 805, a steamed titanium dioxide that was treated with octylsilane to generate a hydrophobic surface. This product is not only suitable as heat stabilizer for silicone elastomers but also a

Chapter 5: Detailed profiles of the most important manufacturers, such as Adeka, Baerlocher, BASF, Cytec Industries, Ferro, Floridienne, NanYa Plastics, PMC Organometallix, and Songwon.

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- ☐ Fillers
- ☐ Flame Retardants
- ☐ Flavors
- ☐ Fragrances
- ☐ Hydrofluoric Acid & Fluorochemicals
- ☐ Petrochemicals & Plastics - Iran
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- ☐ Propylene - China
- ☐ Propylene - USA
- ☐ Solvents
- ☐ Stabilizers
- ☐ Styrene
- ☐ Surfactants
- ☐ Titanium Dioxide
- ☐ Toluene
- ☐ Urea
- ☐ Xylene

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- ☐ Composites
- ☐ Compounds
- ☐ Engineering Plastics
- ☐ Expandable Polystyrene
- ☐ Masterbatches
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- ☐ Plastics - World
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- ☐ Polyethylene - LDPE
- ☐ Polyethylene - LLDPE
- ☐ Polypropylene
- ☐ Polystyrene
- ☐ Polyurethanes & Isocyanates
- ☐ Polyvinyl Chloride
- ☐ Silicones
- ☐ Synthetic Rubber
- ☐ Thermoplastic Elastomers

Industry

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- ☐ Adhesives - World
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- ☐ Bitumen - Europe
- ☐ Construction Plastics - World
- ☐ Doors & Windows - Europe
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- ☐ Insulation Materials - World
- ☐ Paints & Varnishes - Europe
- ☐ Paints & Varnishes - World
- ☐ Pipes - Europe
- ☐ Plastic Extrusion - World
- ☐ Plastic Injection - World
- ☐ Plastic Pipes - Europe
- ☐ Plastic Pipes - World
- ☐ Plastic Windows - World
- ☐ Printing Inks - World

Packaging

- ☐ Bags & Sacks - Europe
- ☐ Bags & Sacks - World
- ☐ Caps & Closures - Europe
- ☐ Corrugated, Solid Board & Carton - Eur.
- ☐ Flexible Packaging - Europe
- ☐ Food Packaging - Europe
- ☐ Labels - Europe
- ☐ Plastic Bottles - Europe
- ☐ Plastic Caps & Closures - Europe
- ☐ Plastic Caps & Closures - World
- ☐ Plastic Containers - World
- ☐ Plastic Films - Europe
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