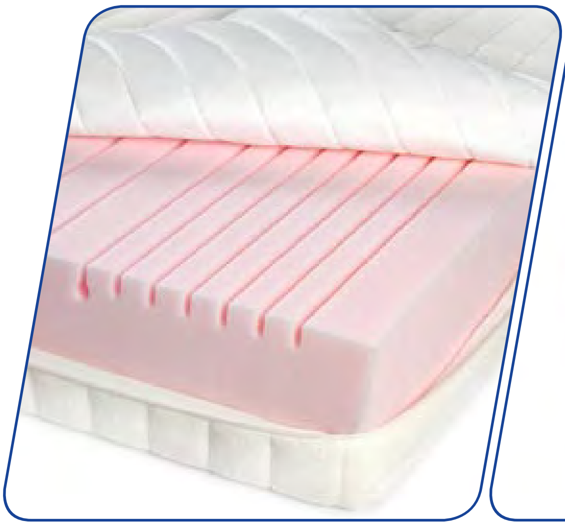
Market Study: Polyurethanes and Isocyanates (MDI & TDI) [2nd edition]





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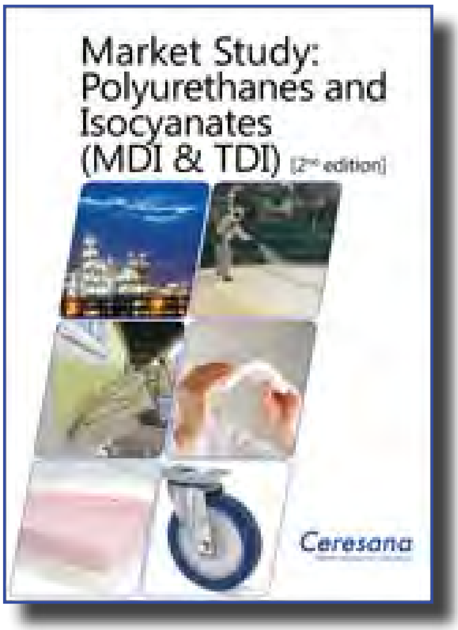
- **Have a look at the future**
  Find out if new investments and technologies are worthwhile and how to gain access to future markets. We also show possible market scenarios
- **Recognize opportunities and risks**
  Identify opportunities and risks on your target markets in time

This study is useful for:

- Manufacturers and traders of polyurethanes (PUR), toluene diisocyanate (TDI), and methylene diphenyl diisocyanate (MDI)
- Producers of furniture, mattresses, foam-based products, cushions, insulating material, spray foam, coatings, varnishes, adhesives, binders, sealants, and rubber
- Manufacturers of auxiliaries and additives
- 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!



Polyurethane - Development Dynamics Due to Versatility

Polyurethane (PUR) is characterized by its longevity, versatility and dimensional stability. Due to its positive characteristics, this plastics is suitable for various application areas: from construction to foams for furniture and bedding, in transportation as well as in the production of paints, coatings, adhesives and sealants.

In 2014, a worldwide turnover of US$ 50 billion was achieved with PUR. The market research institute Ceresana expects annual revenues to increase by 4.8% p.a. to approximately US$ 74 billion until 2022.

Growth Market Construction Industry

A significant influencing factor for the PUR production is the increasing focus on energy efficiency. Reasons therefore are the climate change, the increasing mobility and the necessity for conserving of resources. Especially in the segment of construction, which is the largest application area of Polyurethane, this leads to an increased use as insulation. Here, the country specific measurements of government aid for an increase in energy efficiency is a major influencing factor. Ceresana expects that globally, the demand in the construction segment will rise by 4.6% p.a. in the future.

TDI vs. MDI

In order to create a full transparency of the PUR market, the analysts of Ceresana examined the two primary products methylene diphenyl diisocyanate (MDI) and toluene diisocyanate (TDI) as well. Due to the different application areas of TDI and MDI based PUR, the demand for PUR, MDI, and TDI will be split by respective applications in detail.

MDI based PUR generated almost 55% of the annual PUR demand in 2014. Additionally, its annual growth of 4.2% will be above the one of TDI. This is a result of the positive development of the construction industry where MDI based PUR is dominant and the weaker development of furniture and bedding which is the most important sales market for TDI.

The Study in Brief:

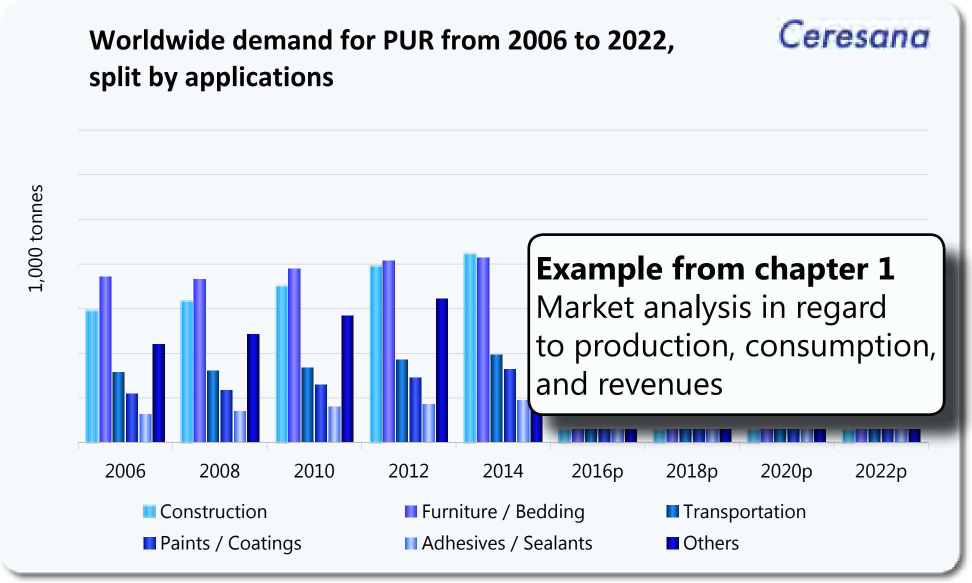
Chapter 1 is a description and analysis of the global PUR market. Development of demand, revenues, and production are explained in detail. Demand will be split by MDI and TDI based polyurethane.

This report offers a comprehensive overview over development expected for 20 individual countries and 7 regions as well as global market dynamics. Additionally, demand for the isocyanates MDI and TDI as well as their present and prospective capacities are taken into consideration.

Chapter 2 examines the 20 largest countries of the market in more detail: Detailed information is given regarding demand, revenues, production, trade, and demand for isocyanates. Demand for PUR, MDI, and TDI is analyzed explicitly and is split by respective areas of application in detail.

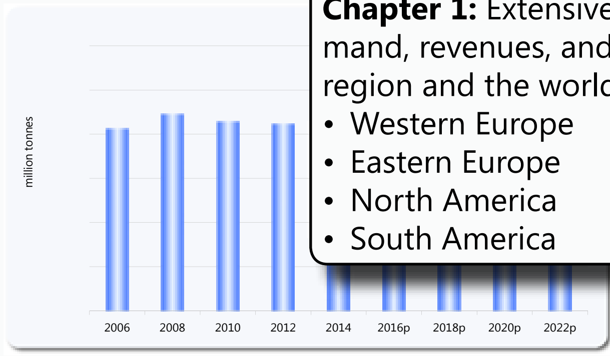
Chapter 3: The areas of application of PUR are analyzed in detail: Data on demand development is split by the 7 regions Western Europe, Eastern Europe, North America, South America, Asia-Pacific, the Middle East, and Africa. Also, consumption figures for the 20 most important countries in each region will be given. Included in the considered application areas are construction, furniture/ bedding, transportation, paints & coatings, adhesives & sealants, other applications (rubber, leisure and sports goods, electrics and electronics, textiles, packaging).

Chapter 4 provides a useful list of producers that manufacture MDI and TDI, clearly arranged according to contact details, turnover, profit, product range, production sites, profile summary, productspecific information as well as existing and future capacities of individual production sites. Comprehensive profiles are given of 23 producers, e.g. BASF SE, Chemtura Corporation, Sadara Chemical Company, Sumitomo Chemical Co., The Dow Chemical Company, Vencorex Holding SAS, and Wanhua Chemical Group Co.


Worldwide demand for PUR from 2006 to 2022, split by applications
Ceresana
1,000 tonnes
2006
2008
2010
2012
2014
2016p
2018p
2020p
2022p
Construction
Furniture / Bedding
Transportation
Paints / Coatings
Adhesives / Sealants
Others
Example from chapter 1
Market analysis in regard to production, consumption, and revenues

1.2.2 Production

About X million tonnes of PUR were produced in Western Europe in 2014. Accounting for a share of X % of total Western European output in 2014, Germany is the largest producer of PUR in this region. Beglium and Italy ranked second and third respectively. We expect output in Germany to continue to increase by X % p.a. until 2022 while development in Italy and France is anticipated to be less dynamic.



Graph: Production of PUR in Western Europe from 2006 to 2022

1.2.3 Isocyanates (MDI/TDI)

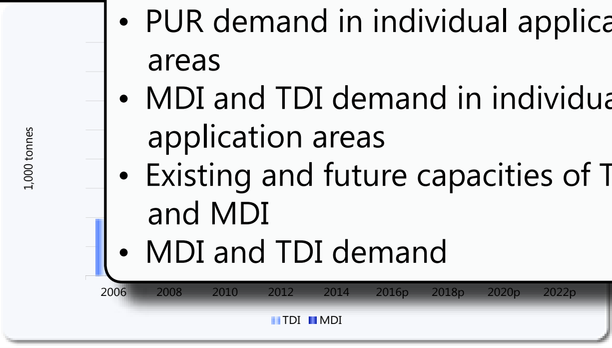
Between 2006 and 2014, demand for MDI rose from X million tonnes to X million tonnes. By far the largest sales market that year was Germany. In the upcoming eight year period, MDI consumption in this region is likely to increase by, on average, X % p.a. to approx. X million tonnes. The Western European demand for TDI rose from X tonnes in 2006 to X tonnes in 2014. The largest sales market that year was Italy. Demand for TDI is projected to increase at accelerated rates of X % p.a. to approx. X tonnes.

Chapter 1: Extensive market data on demand, revenues, and production for each region and the world from 2006 to 2022:

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

Chapter 2: Specific analyses and forecasts for 20 individual countries:

- Production, revenues, and trade of PUR
- PUR demand in individual application areas
- MDI and TDI demand in individual application areas
- Existing and future capacities of TDI and MDI
- MDI and TDI demand

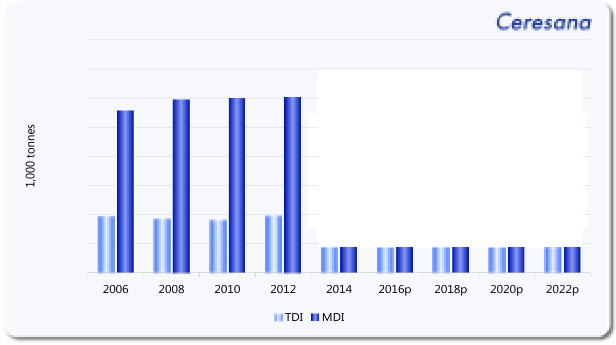


Graph: MDI and TDI demand in Western Europe from 2006 to 2022

Production capacity of MDI in Western Europe totaled about X million tonnes in 2014. New capacities in Germany will be X tonnes p.a. starting 2016. Total production capacity of TDI in Western Europe amounts X tonnes p.a. Starting 2016 the TDI capacity in Western Europe will decrease by X tonnes p.a.

Country	in tonnes
Germany	XXX
Belgium	XXX
The Netherlands	XXX
Spain	XXX
Portugal	XXX
Total	**XXX**

Table: MDI capacity in Western Europe during 2014 - split by countries



Graph: MDI and TDI demand in Western Europe from 2006 to 2022

Production capacity of MDI in Western Europe totaled about X million tonnes in 2014. New capacities in Germany will be X tonnes p.a. starting 2016. Total production capacity of TDI in Western Europe amounts X tonnes p.a. Starting 2016 the TDI capacity in Western Europe will decrease by X tonnes p.a.

Country	in tonnes
Germany	XXX
Belgium	XXX
The Netherlands	XXX
Spain	XXX
Portugal	XXX
Total	**XXX**

Table: MDI capacity in Western Europe during 2014 - split by countries

largest emitter of CO_2, the segment of energy efficient building in particular is likely to become more important. Thus, the government adopted climate related aims in its 12th five-year plan, which was to be fulfilled until the end of 2015, to increase energy efficiency. Also in its 13th five-year plan which comes into effect in the beginning of 2016 increase of energy efficiency is envisaged. Also, legal requirements in regard to energy efficiency of new buildings rose considerably in the previous years. Yet, demand for new buildings decreased in 2015. One reason for this is the anti-corruption policy of the government. The government tries to boost the residential construction by lowering the loan interests. The increasingly widespread demand for energy efficiency as well as the ongoing urbanization have a positive effect on the construction industry nevertheless and therefore, also on the demand for polyurethane.

in 1,000 tonnes	2006	2008	2010	2012	2014	2016p	2018p	2020p	2022p	2014-2022
Construction	X	X	X	X	X	X	X	X	X	X % p.a.
Furniture/ Bedding	X	X	X	X	X	X	X	X	X	X % p.a.
Transportation	X	X	X	X	X	X	X	X	X	X % p.a.
Paints and Coatings	X	X	X	X	X	X	X	X	X	X % p.a.
Adhesives/ Sealants	X	X	X	X	X	X	X	X	X	X % p.a.
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: PUR demand in China from 2006 to 2022 – split by application areas

Production of Furniture and Bedding ranked second in the demand for PU. Reporting a market volume of X million tonnes, the segment of furniture and bedding accounted for the largest part of TDI-based PUR consumption. We forecast the highest relative increase between 2014 and 2022 for the segment construction industry and transportation. Demand is projected to increase at rates of X % p.a. and X % p.a. respectively.

In China, a constant production growth rate in the segment transportation was perceivable in the past years. In 2013, 22.12 million vehicles were produced, in 2014 this number rose to 23.72 million. China presents the worldwide largest transportation market. The growing number of production is due to the growing domestic demand for cars. The segment of commercial vehicles registered a slight decrease in 2014 compared to the previous year. Since the used car trade is growing the demand for new cars will decrease in the future. In the medium term, growth will be considerably weaker. A reason for this is the less strong economic development and the fact that individual vehicle circulation will probably be restricted in major cities due to the enormous air pollution. However, the continuously growing numbers of production in the transportation segment have positive effects on the demand for polyurethane in the automotive construction.

in 1,000 tonnes	2006	2008	2010	2012	2014	2016p	2018p	2020p	2022p	2014-2022
Construction	X	X	X	X	X	X	X	X	X	X % p.a.
Furniture/ Bedding	X	X	X	X	X	X	X	X	X	X % p.a.
Transportation	X	X	X	X	X	X	X	X	X	X % p.a.
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 PUR based on MDI in China from 2006 to 2022 – split by application areas

3.1.1 Construction

In 2014, X million tonnes of PUR were demanded worldwide for application in the construction industry. Given an expected X % p.a. increase, global demand for PUR used in the construction segment will amount to approx. X million tonnes in 2022.

The most important application of PUR in the construction industry is the insulation of buildings. Given their longevity and comparatively low prices, polyurethanes are a very good option for insulating applications. They help to increase energy efficiency of buildings and to reduce CO_2 emissions. In colder climates, polyurethanes contain the warmth within the building and in warmer climates they contribute to maintaining lower temperatures inside. Usually, walls, roofs, pipes, and floors are insulated. Advantageous properties of polyurethanes are their longevity and moderate space requirements. Sp

and modernizatio

order to improve

Chapter 3: Detailed data and influential factors on the use of PUR in:

- Construction
- Furniture / Bedding
- Transportation
- Paints & Coatings
- Adhesives & Sealants
- Other applications (leisure and sports goods, rubber, electrics and electronics, textiles, packaging)

Graph: Worldwide PUR demand in Construction from 2006 to 2022 – split by region

Chemtura Corporation

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Web: www.chemtura.com

Financial Key Data				
(in billion USD)	**2011**	**2012**	**2013**	**2014**
Revenues	2.18	2.20	2.23	2.19
Net profit	0.12	0.10	-0.18	0.76

General Information About the Company

Divisions, Product Range	The company operates in the following business fields: Industrial Performance Products • Petroleum Additives: performance components for lubricant additives, basestocks for synthetic lubricants and finished lubricants, performance calcium sulfonate special lubricants as well as liquids based on phosphate and polyolester • Urethane: development and manufacture of hot cast elastomer prepoly-mers Industrial Engineered Products • Great Lakes Solutions: development and marketing of bromine and bromine-based products • Organometallic Specialties: development and marketing of organo-metallic compounds for use in catalysts, surface treatment and pharma-
Production Sites	The

Chapter 4: Data and facts on major producers, clearly arranged by:

- Contact details
- Turnover and profit
- Production sites
- Profile summary
- Product details

Profile Summary	Chemtura is a manufacturer of specialty chemicals and was founded in 2005 by the merger of Crompton Corp. and the Great Lakes Chemical Corp. The company's headquarter is in the USA. It is listed on the New York Stock Exchange and has about 2,700 employees (December 31, 2014). Chemtura has subsidiaries all over the world and sells products in over 80 countries. About 43% of 2014 revenues were generated in the USA and Canada, 29% in Europe and Africa, 20% in Asia-Pacific and 8% in Latin America. In 2014, Chemtura sold its AgroSolutions business to Platform Specialty Products Corporation for about USD1 trillion. The company's main sales markets are Packaging, Civil Engineering and Building Construction, Automotive, General Industry, and Durable Goods. All production sites in the USA are ISO 14001 certified.
Specific Information About MDI & TDI	
Product Details	Chemtura produces MDI through its joint venture Rubicon LLC. The urethane-based products are used in industry, printing rolls, mining, oil and gas machinery and equipment, mechanical goods, industrial tires and wheels, electronic devices, processing equipment, and in a variety of other application areas.
Associated Companies	Joint venture:
Production Plant - MDI	
Geismar, LA, USA	
Total Capacity (Current)	
Production Plant - MDI	
xxx	
xxx	
Total Capacity (2018)	

Chapter 4: In-depth profiles for the largest manufacturers, including BASF SE, Chemtura Corporation, Sadara Chemical Company, Sumitomo Chemical Co., The Dow Chemical Company, Vencorex Holding SAS, and Wanhua Chemical Group Co. (The profiles are assigned to the country in which the company is headquartered and include JVs and subsidiaries.)

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