Paper in short

Paper: an ingenious material

Paper: an ingenious material

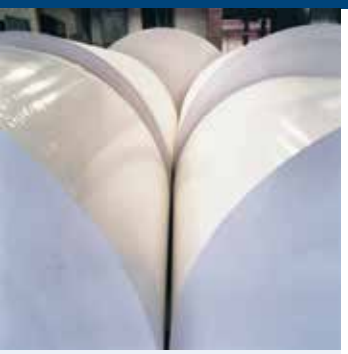
The pulp and paper industry

The role of paper has undergone significant changes along the centuries from its invention some 2000 years ago up to modern industrial production using high-tech machinery. Since paper today is a product that accompanies our every-day life in manifold ways, paper and board are definitely worthy of a closer look.

This industrial sector comprises manufacturers – some of them also converters – of pulp, paper and board. Overall approx. 3,000 different paper grades are being produced in Germany, thus forming a highly variegated portfolio that is typical of this line of business. Industrial structures range from global big corporations to SMEs that are in part family-owned.

With a production volume of some 23mt paper and board, the German paper industry leads the field in Europe and ranks fourth worldwide after China, the U.S.A and Japan. In a total of 160 enterprises, a workforce of approx. 40,000 generates a turnover of some € 14 billion.

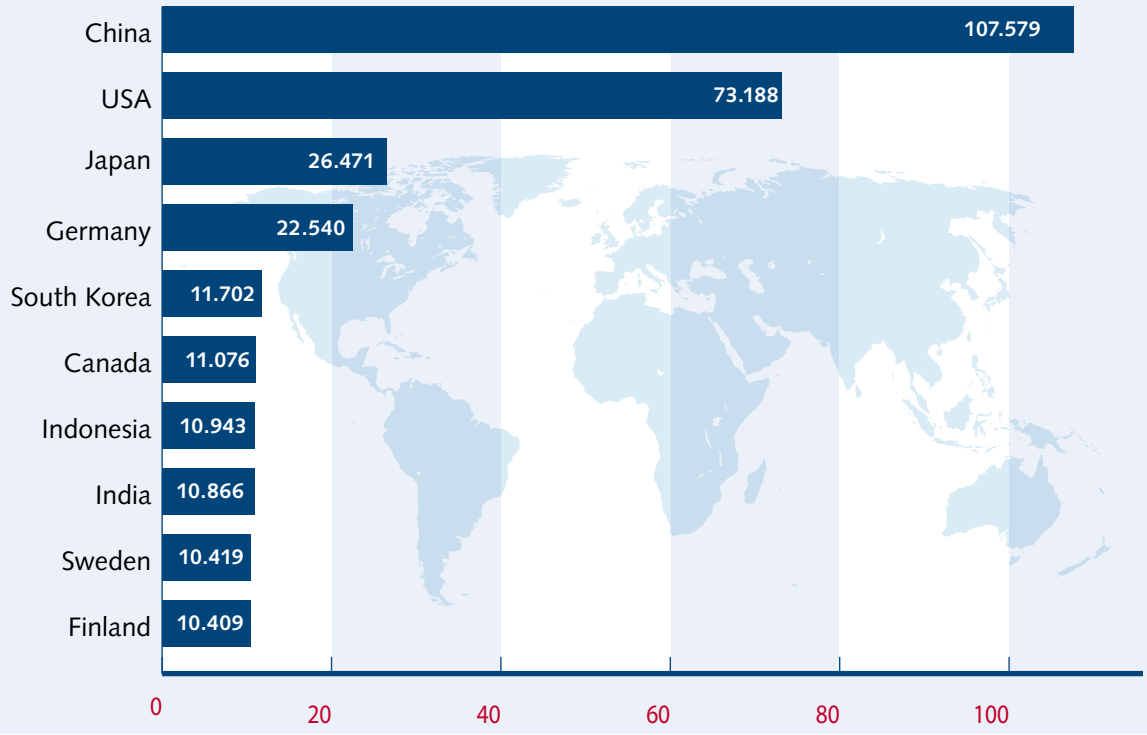
Figures and facts



The paper industry in Germany

- … employs a staff of some 40,000
- … produces approx. 23mt paper and board per year
- … manufactures about 3,000 different paper grades in 160 mills
- … is Europe's leading producer of paper, paperboard and board
- … ranks fourth worldwide – after China, U.S.A. and Japan
- … generates a sales volume of some € 14 billion
- … exports approx. 13mt paper and board

10 biggest paper and board producing countries



In 1.000 tons, 2014

Definitions of paper, board and paperboard

Grammage is the distinguishing feature for paper, paperboard and board – with overlapping boundaries:

- **paper:** < 170 g / m²
- **board:** > 170 g / m² — < ca. 600 g / m²
- **paperboard:** > 600 g / m²

High-Tech-Products
in a rich variety

The customer is king

Packaging papers

Graphic papers

Sanitary papers

Speciality papers

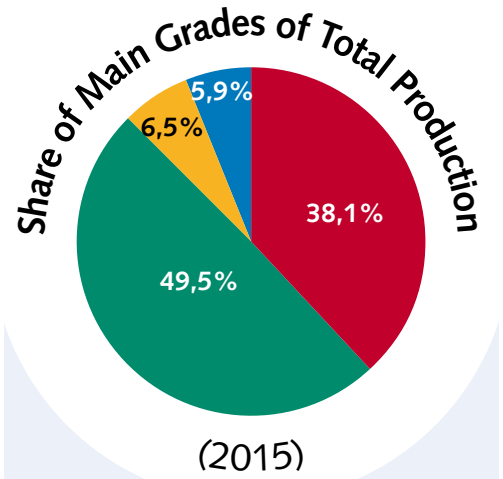
The paper industry supplies a great diversity of papers which are basically broken down according to four grade classes: packaging papers, graphic papers, sanitary papers and speciality papers. Across all these grades, the German paper industry is a global leader in terms of innovation and quality.

With a proportion of approx. 49 % of total production, **packaging papers** constitute the largest group. They comprise all types of paper used for packaging. Besides high-grade folding boxes for the cosmetics and pharmaceuticals industry, this grade class today increasingly includes corrugated boxes and corrugated board of the type employed, among others, in mail order business.

38 % fall to **graphic papers** which are defined as all papers capable of being printed or written on. Specifically, these are papers for newspapers, journals, magazines and books, stationery and inkjet papers. These products have to meet the specific requirements of the advertising and publishing industries in terms of breaking strength, good printability and brilliant colour reproduction.

Sanitary papers accounting for about 6 % of total production find application in the manufacture of toilet paper and of numerous other sanitary products such as paper hankies, kitchen towels, paper towels or cosmetic tissues.

The group of **speciality papers** encompasses a large variety of paper grades with distinctive properties. The spectrum ranges from electrical insulation papers – one of the most expensive grades – to roof board, board for the automotive industry and photo papers, filter papers and décor papers. Specialities, too, make up some 6 % of total production.



The formula for success: wood + water + energy

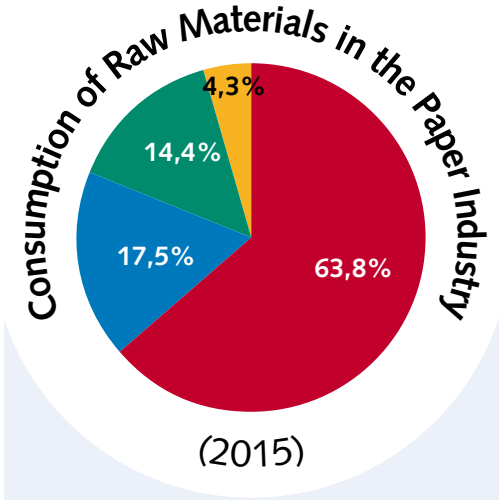
Paper and wood

Although paper for recycling is the quantitatively dominant raw material applied by the German paper industry, it is wood as a renewable resource which stands at the beginning of the value chain. This fact gives rise to a special responsibility of the paper industry to protect the forest ecosystem.

Wood is the basic resource for paper manufacturing. One fifth of the global wood harvest goes into paper production. In the majority of cases, paper is produced from wood obtained as a by-product from sawing mills. Additionally, thinning wood and plantation wood are employed. The paper industry fosters a sustainable utilisation of forests, equally taking ecological, economic and social criteria into account.

At the same time, the paper industry actively supports current endeavours towards a sustainable forest management – not least with a view to securing long-term wood supplies.

Depending on the desired properties of new papers, their production is either based on mechanical pulp or chemical pulp as primary fibre or paper for recycling as secondary fibre. A look at the overall paper cycle shows, however, that fresh fibre has to be added from time to time for quality reasons. Fibres repeatedly undergoing treatment cycles tend to lose their sheet forming capacity over time so that recycling cannot be continued indefinitely. Nevertheless, with a paper for recycling utilisation rate of 74 %, the German paper industry holds a top position in a recycling context.



Pulping of wood
If wood is to be used in paper manufacturing, it has first to be disintegrated into its fibres. Mechanical defibration processes yield mechanical pulp whereas chemical procedures give chemical pulp.

Sustainable forest management
Its objectives are forest care and the utilisation of woodland areas in a manner and to an extent which safeguards their biological diversity, productivity, rejuvenation capacity and vitality. In Germany and on an international scale today, forest lands can be certified. The paper industry specially supports PEFC (Programme for the Endorsement of Forest Certification Schemes) and FSC (Forest Stewardship Council) which belong to the most widely known systems.

Paper and water

Water use in paper production

The raw materials of the paper industry are gained by sustainable management employing

- … renewable wood
- … renewable energies in production processes
- … paper for recycling at a rate of about 70 % – which is a peak level internationally.

Water is indispensable for paper manufacturing. Its quality directly impacts the paper properties. Around 1950, production of 1 kg paper required as much as some 170 litres water. Today, this amount is down to an average 10 litres – a substantial reduction that has been achieved by maximum closure of mill water circuits. Drawn from waters in the vicinity, the requisite fresh water is recycled within papermills up to ten times before – after undergoing effective treatment – it is discharged. Production effluents are purified either in intra-mill or municipal treatment plants. In many cases, papermills take over the treatment of sewage from neighbouring municipalities.

Water use

in paper production

Pulping of raw materials
Mechanical pulp is obtained by grinding wood with water being added.
Chemical pulp is derived from cooking wood chips with addition of water and chemicals.
Paper for recycling treatment involves a defibration process in water and the removal of printing inks.

Stock preparation
Dilution of the heavy stock with water to obtain a pumpable slurry.

Stock proportioning
Addition of water in order to form an aqueous furnish (fibre-water mix 1:99) suitable for production.

Headbox and wire section
Application of the aqueous furnish to the paper machine wire. Excess water is drawn off or drained.

Press section
Removal of water from the fibre mat.

Drier section
Utilisation of the forming water vapour for heating the drying cylinders.

Coating section
(coated paper production) Application of a water soluble coating colour to the paper sheet surface.

Paper and energy

Energy inputs

Cogeneration of heat and energy Since both electricity and heated steam are required for paper manufacturing, papermills running in-house thermal power stations rely on the cogeneration principle – one of the most efficient concepts available for utilising primary energy. This option is being adopted by 72 % of all papermills in Germany, making the paper industry the only sector where this practice is implemented so consistently.

Paper and board producers in Germany spend an average 12 % of total production costs on energy. Accordingly, efficient energy use is decisive for the economic success of production sites. Apart from reasons of economy, an effective energy use is common sense under ecological aspects.

Thanks to the industry's high investments, energy levels per kilogram produced paper have been drastically decreased. By exploiting energy-efficient technologies, industrialists have been able to prevent energy demands from rising in the same measure as production volumes.
In Germany, for example, paper, paperboard and board manufacturers report an energy consumption level for 1 kg paper which was lower by about 2/3 in 2014 compared to the year 1965.

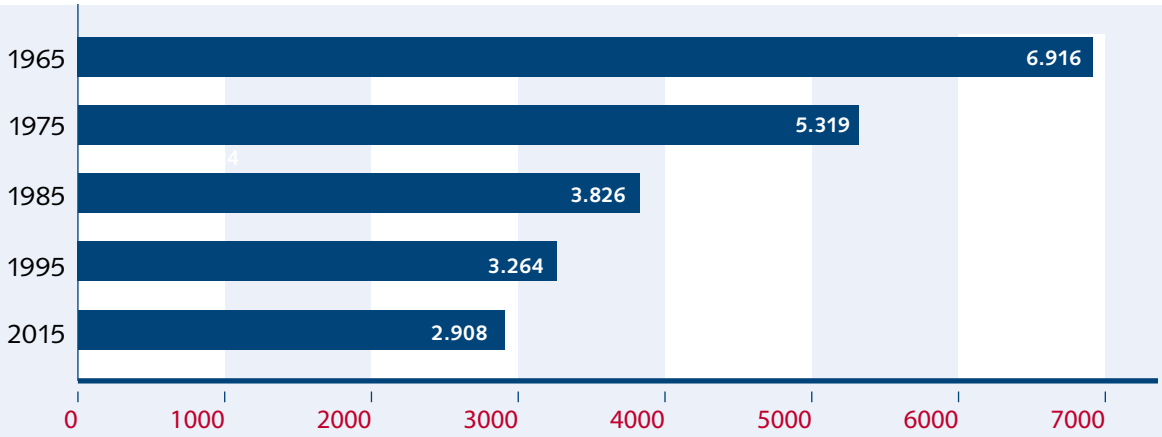
Since the '80s, the paper industry has been covering an ever-increasing share of its energy requirements via incineration

of solid wastes applying the **cogeneration principle**. Solid wastes include, e.g., *bark* obtained during wood preparation and chemical pulp production or *fibrous residues and rejects* from paper for recycling treatment and *dried effluent sludges* from waste water treatment plants.

The paper industry – like all other energy-intensive sectors – will remain dependent on reliable and affordable energy supplies also in the future.

Energy inputs

per ton of paper in kWh



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