



Sustainability at Trevira

How Trevira operates in an environmentally friendly way, makes sparing use of resources, and accepts social responsibility.

Contents (1)

1. Sustainability in context
 - 1.1 The enterprise Trevira
 - 1.2 Indices
 - 1.3 The challenge

2. Quality management and certificates
 - 2.1 How Trevira accepts the challenge
 - 2.2 Certification of the Trevira sites
 - 2.3 Product certification: Oekotex Standard 100
 - 2.4 Quality management exemplified by „responsible care“

3. Ecology
 - 3.1 What Trevira does to avoid toxic substances
 - 3.1.1 Maintaining clean water
 - 3.1.2 Maintaining clean air

Contents (2)

3. Ecology

3.2 What Trevira does to use resources sparingly

3.2.1 Water, land and crude oil in comparison:

Consumption of water, land use, consumption of crude oil

3.2.2 Conserving water and energy

3.2.3 Ecobalance, exemplified by the life cycle of Trevira CS

3.2.4 Energy balance exemplified by Trevira CS

3.2.5 Ecobalance, exemplified by Trevira Bioactive

3.3 What Trevira does to recycle residual substances

4. Social aspects

4.1 Code of Conduct

4.2 Company suggestion scheme

4.3 Health & safety at work

4.4 Social commitment

5. Outlook: the way is the goal



Sustainability in context

1.1 The enterprise Trevira

- Trevira is an innovative European manufacturer of high quality polyester fibre specialties for the automotive industry, for home textiles, functional clothing, hygiene products and for technical applications.
- Trevira was established in 1956 as the fibre division of Farbwerke Höchst AG. The company became independent in 1998. It has customers in the textile industry throughout the world, with focus in Europe.
- Annual production capacity of Trevira is 120,000 t staple fibres & filaments, and 10,000 t polyester chips (sale to third parties).
- Through the systematic expansion of its specialty portfolio Trevira is securing for itself a long-term position of strength in the market and is thus well prepared for sustained entrepreneurial operations.

Sustainability in context **1.2 Indices**

- Production plants / sites:
 - Bobingen / Germany (main offices)
 - Guben / Germany
 - Hattersheim / Germany
(Marketing & Sales)
 - Zielona Góra / Poland



- Trevira achieved in the business year 2009 an annual turnover of some 210 million euros.
- Trevira has worldwide some 1,400 employees. (Status 01.01.2010).

Sustainability in context **1.3 The challenge**

- Due to climatic change the sustainable, environmentally compatible operation of industrial enterprises is increasingly becoming a focus of public attention.
- Chemical concerns are being measured by the degree to which they credibly practise and communicate safety and environmental protection.
- Business partners and customers are more and more demanding where at all possible „green“ products, with which the end consumer can have a „good feeling“:
 - Products that are manufactured with a sparing use of resources
 - Products that can be disposed of in a way that is harmless to the environment
 - Products that are easy care and kind to the skin

Fabric developments
Trevira





Quality management and certificates

2.1 How Trevira accepts this challenge

- As a manufacturer of man-made fibres Trevira assumes the special responsibility to put a high degree of health and safety at work in place and not to endanger the health of employees, nearby residents and customers.
- Operating with foresight and care, from product development through the choice of materials used, through to the further development of manufacturing processes, this is company policy in practice.
- Internal and external audit procedures ensure that actions which impact on the environment and society are taken in full awareness of the company's responsibility and that the policy is systematically implemented.
 - The Trevira Management Process (TMP) is an internal instrument to guide the company and achieve sustained economic success.
 - It comprises the areas quality, protection of the environment and health and safety at work.
 - Continuous improvements ensue with the „ongoing improvement process“ (KVP), a component within the TMP.

Qualitymanagement and certificates **2.2 Certifying the Trevira sites**

- All german Trevira sites are certified by the DQS Gesellschaft for certification of management systems to DIN ISO 14001 and 9001.
- The Zielona Gora site in Poland has been in operation since June 2006. Certification to DIN ISO 9001 is scheduled for 2010.





Quality management and certificates

2.3 Product certification: Oeko-Tex Standard 100

- The award is made by the International Association for Research and Testing in the Field of Textile Ecology (Oeko-Tex).
The Association consists of twelve textile institutes in twelve countries.
- The compliance with the Oeko-Tex 100 Standards guarantees the maintenance of given critical values for harmful substances such as for instance formaldehyde, heavy metals, pesticide residues or organic chlorine compounds.
- Since the introduction of the Oeko-Tex Standard 100 in 1992 Trevira products have been certified accordingly.
Textiles with this grading are also suitable for babywear.





Quality management and certificates

2.4 Quality management exemplified by Responsible Care

- As a manufacturer of man-made fibres Trevira is committed to the „Responsible Care Initiative“ of the Association of the Chemical Industry - Verband der Chemischen Industrie (VCI).
- The aim of the Responsible Care programme is to achieve ongoing improvement in protection of the environment, plant safety and in safeguarding the health of consumers and employees – independently of the requirements of the law.
- This fundamental concept also moulds the company policy of Trevira:
New products are sustainable when they are more environmentally friendly, „greener“, than traditional products – from manufacture through the consumption stage to disposal/recycling.
- Trevira has contributed towards production of the Responsible Care Reports since 1996.





Sustainability in context **Responsible Care**

The international programme **Responsible Care** started at the end of the eighties. In 1991 the Association of the German Chemical Industry (VCI) expanded its existing guidelines Chemistry and Environment into a German Responsible Care programme.

In February 2006 the International Council of Chemical Associations (ICCA) presented its new Responsible Care Global Charter at the international chemical conference of the UN in Dubai.

There 150 states agreed a strategy on global handling of chemicals which extends into the year 2020. In a letter to the ICCA Kofi Annan gave an express welcome to the Global Charter, describing it as an example to other sectors.

In the 2007 agenda that has been adopted a special place will be accorded to dialogue with the public on product responsibility in the supply chain.



Ecology

3.1 What Trevira does to avoid toxic substances

Trevira constantly reviews the necessity to use toxic and intensively migrating substances in its manufacturing processes. Where at all possible, the use of such substances is avoided.

- The number and volume of chemicals required is reduced to a minimum during storage and in actual use.
- Dangerous chemicals are wherever possible replaced by less hazardous products and ones that are more environmentally friendly.
- Hazardous waste materials are where possible recycled: chemicals are sent for external processing.



Ecology

3.1 What Trevira does to avoid toxic substances

3.1.1 Maintaining clean water (1)

- Trevira does not employ any finishing materials that can be easily washed out.
- No biozides are used to conserve the fibre lubricant and those used are in the main biologically easily degradable. They are mostly returned into the production cycle or are sent for external processing (disposal of special waste).
- Separate waste water systems:
Diverting cool and rain water through a separation pool enables even the slightest contamination to be identified (e.g. street dirt). Foul water is conducted separately. In this way the effect on treatment plants is kept to a minimum.
- No environmentally doubtful APEOs (alkylphenolethoxylates) are used in fibres* and filaments.

*Special case: T.132



Ecology

Alkylphenolethoxylate

Alkylphenolethoxylates

(APEOs) belong to the tenside chemical compounds that may lower surface tension due to their structure.

Alongside detergents and cleaning agents, important fields of application for tensides include its use as an auxiliary material in the manufacture of synthetics.

The degeneration products of APEOs, so-called alkylphenoles,

as they for instance occur in the treatment of effluent, are harmful to the environment. They have high aquatic toxicity, an oestrogene effect and accumulate in biological systems. As a result of these properties, intensive efforts have been made for many years to cut APEO emissions.



Ecology

Chemical oxygen demand (COD)

The **Chemical Oxygen Demand (COD)** is a measurement for the total of all organic substances in water, including those not easily degradable. COD measures how much oxygen is consumed in the effluent from chemical digestive and cleaning processes.

High values, i.e. high consumption of oxygen, mean that effluent has not been sufficiently well treated.



Ecology

3.1 What Trevira does to avoid toxic substances

3.1.1 Maintaining clean water (2)

Trevira is well prepared for any disruption:

- Trevira employs dual cycle cooling systems fitted with a heat exchanger as safety barrier. In this way it is possible to exclude totally any contamination of the environment in the event of any malfunction.
- Trevira operates a filtration pool to separate out contaminated cooling or surface water in the event of malfunction.
- Trevira has at its disposal a separate system for production effluent, with holding pools for use in the event of accident.



Ecology

3.1. What Trevira does to avoid toxic substances

3.1.2 Maintaining clean air

- Trevira arranges where possible for raw materials to be delivered in an environmentally friendly manner – by rail. For the despatch of goods the company has own connecting lines at its disposal.
- In negotiations with hauliers Trevira is careful to see that new vehicles that satisfy the euronorm are employed.
- To avoid CO2 emissions vehicles powered by electricity and gas are used internally.
- The quantity of VOC* released in production at Trevira lies below the EU directive on allocation of an eco-label for textile products:
At Trevira it is 1.2g VOC in relation to 1 kg PET polymer.

*Volatile organic compounds



Ecology

VOCs (Volatile Organic Compounds)

VOC (Volatile Organic Compounds) is the international designation of volatile organic compounds containing carbon. VOCs are destroyed by the effect of the sun's rays and by trace elements contained in the air.

If the air also contains nitrogen oxide – for instance, from the exhausts of vehicles – intermediate products occur (including ozone). These exercise an oxidising effect which is damaging to humans and the environment.

Ecology

3.2 What Trevira does to use resources sparingly

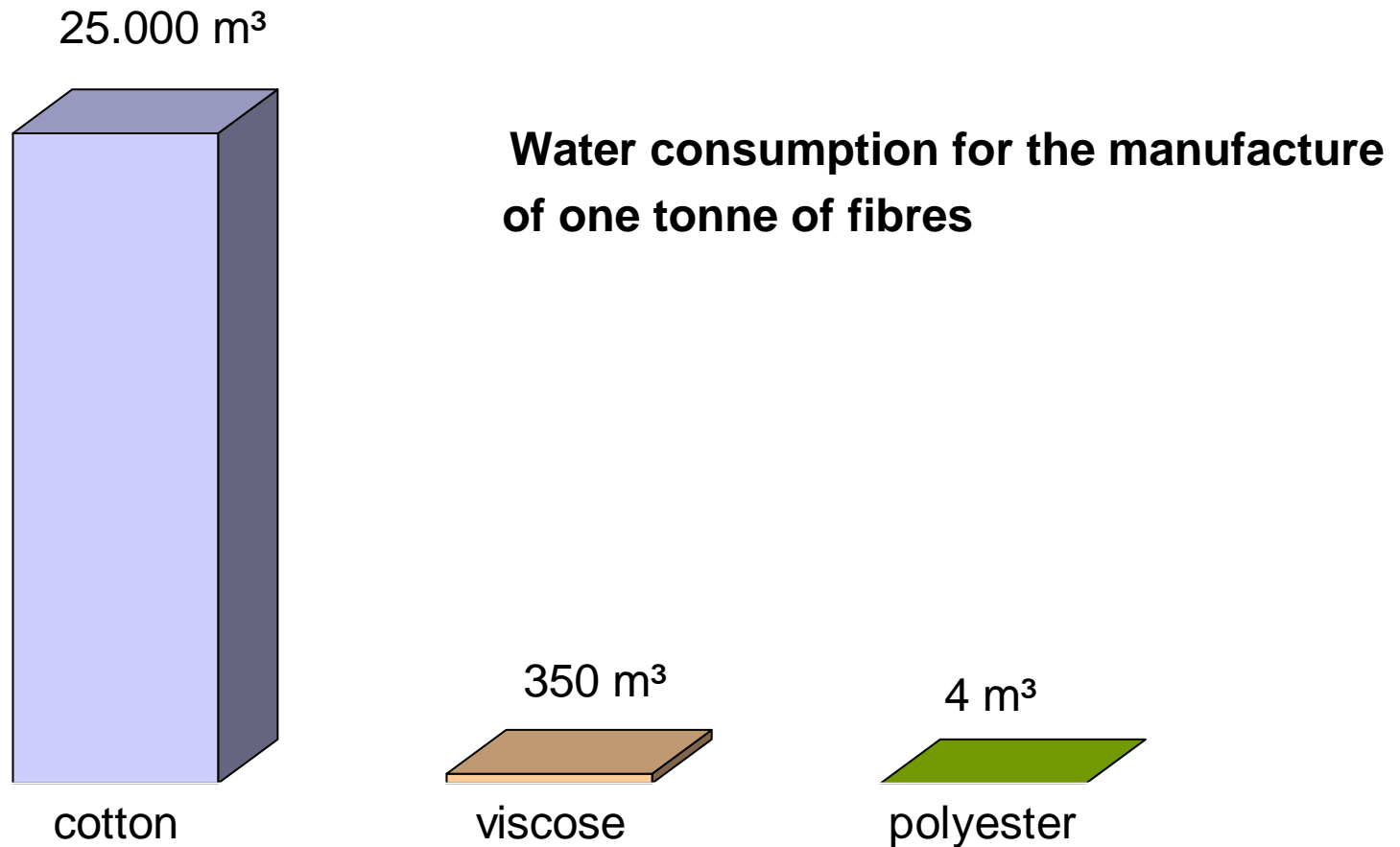
3.2.1 Water, land and crude oil in comparison

Man-made fibres constitute a relief to the use of farmland and thus contribute towards sustainability, without aggravating the food situation.

- Consumption of enormous amounts of water – 25,000 m³ per tonne of cotton fibres – primarily for the artificial irrigation of cotton fields, is dubious in ecological terms. In the manufacture of polyester only 4 m³ is required.
- For the manufacture of one tonne of wool fibres the average requirement was an area of 67 ha. It takes 1.3 ha agricultural land to obtain one tonne of cotton fibres. Man-made fibre production requires no agricultural land.
- Currently only 0.8 percent of the crude oil produced is employed in the global manufacture of man-made fibres.

 **Ecology**

3.2.1 Consumption of water in comparison



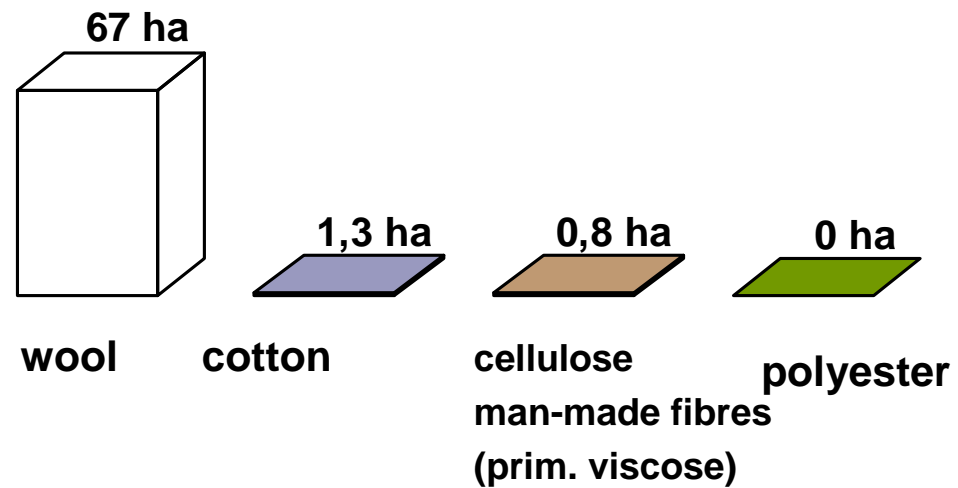
source: IVC



Ecology

3.2.1 Land requirement in comparison

Land required for the manufacture of 1 tonne of fibres in hectares



source: IVC

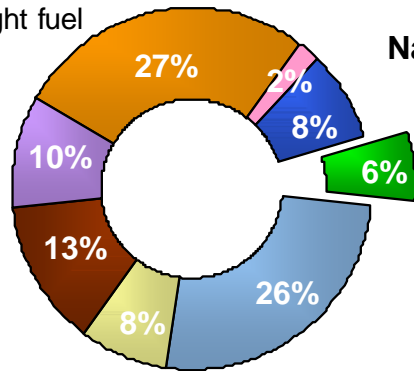


Ecology

3.2.1 Consumption of crude oil in comparison

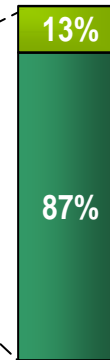
100% crude oil becomes...

- Diesel fuel/Light fuel oil
- Ethane
- Liquid gas
- Naphtha
- Gasoline
- Kerosene
- Heavy oil
- Others

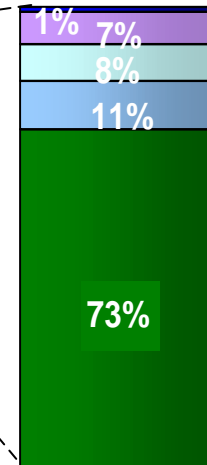


Naphtha

Man-made fibres



Other chem. products

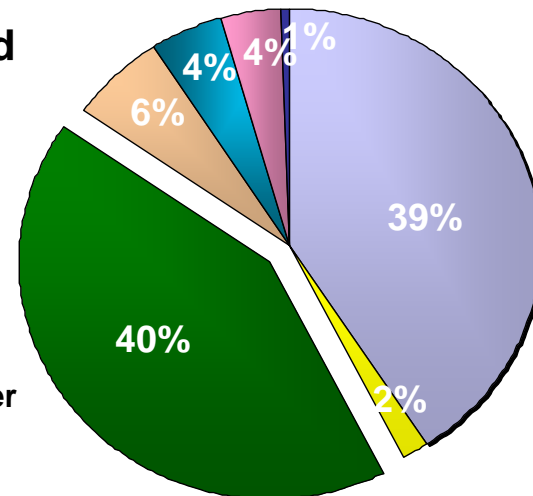


- Others
- Acrylics
- Polypropylene
- Polyamide
- Polyester

40% of global textile consumption is covered by 0.8% of total consumption of crude oil

Global textile consumption (68.7 million tonnes)

Polyester



- Cotton
- Wool
- Polyester
- Polyamide
- Polypropylene
- Acrylics
- Others

source: IVC, Oerlikon Fiber Year

Ecology

3.2 What Trevira does to use resources sparingly

3.2.2 Conserving water and energy (1)

- Trevira achieves massive savings of energy and CO2 emissions due to continuous production processes: the polymerisation process is directly followed by fibre spinning, thus avoiding the production of intermediate products (chips).
- After-burning of VOCs* produced in the exhaust fumes from polycondensation is recouping energy and keeps the exhaust fumes clean.
- Through total insulation of its production units Trevira reduces its energy use.
- Trevira has changed many cooling systems to air-cooled circulatory water systems to conserve cool spring water.

* volatile organic compounds

Ecology

3.2 What Trevira does to use resources sparingly

3.2.2 Conserving water and energy (2)

- Through improvements in production processes the COD* content in process effluents is controlled and constantly being cut: the energy created in the combustion of carbon hydrates reduces the use of fossil fuels when used as process energy.
- Production effluent is conducted to the Guben sewage plant with no pre-treatment in two flows of differing toxic concentration. Trevira saves costs for internal purification, the plant is used to capacity and can produce electricity.

* chemical oxygen demands



Ecology

3.2 What Trevira does to use resources sparingly

3.2.3 Ecobalance exemplified by the life cycle of Trevira CS (1)

At the manufacturing stage

- No solvents are used.
- No compounds containing halogen or nitrogen are employed.
- No dyestuff solutions require preparation at the dyeing stage as a result of spin-dyeing using dyed polymer.

At the processing stage

- No additional finish for easy care is necessary: neither synthetic resins nor formaldehyde are employed.
- No chemical finish is necessary for flame retardancy.



Ecology

3.2 What Trevira does to use resources sparingly

3.2.3 Ecobalance exemplified by the life cycle of Trevira CS (2)

In use

- Trevira CS textiles are noted for their excellent durability. Trevira CS shows excellent resistance, as for instance high color brilliance, fastness to light and high abrasion resistance.
- In the event of fire Trevira CS melts slowly and with no flaming.
- Also with very large fire seats only slight formation of fumes occur.

At the disposal and recycling stage

- There is - in contrast to chemically finished fibres - mainly just release of carbon dioxide and water during complete incineration of Trevira CS.
- Residual material occurring during production can be transferred into new products (downcycling).

Ecology

3.2 What Trevira does to use resources sparingly

3.2.4 Energy balance exemplified by Trevira CS

An **economy investigation** carried out by the London *Fabric Care Association* has shown that flame retardant Trevira CS textiles reveal a positive energy balance, unlike cotton:

- Water consumption during washing of Trevira CS textiles is very low due to slight receptivity of the Trevira CS fibre to water.
- Detergent requirement is also lower as a result of less tendency to soil and easy stain removal.
- Compared with natural fibres less energy is needed for washing and drying.

Over the total **lifetime of a Trevira CS textile** this results in

- 36% less water consumption than with cotton materials,
- 3.3% longer life,
- 39% reduction in total costs (taking into consideration procurement, finishing, maintenance and care).



Ecology

3.2 What Trevira does to conserve resources

3.2.5 Ecobalance with Trevira Bioactive as example

- Trevira Bioactive fibre products are not given a surface finish, but receive a silver additive with an antimicrobial effect, which is permanently embedded in the polymer.
- Where humidity is present only extremely small amounts of silver ions are released on the fibre surface, where their antimicrobial effect then comes into play.
- In some wash trials with textile fabrics in Trevira Bioactive there was no evidence of silver ions in the washing water (verifiability limit: 3 ppb).
- A report by the Hohenstein Institute confirms that Trevira Bioactive does not affect the skin flora, even after long periods of wear.
- As with all Trevira fibres, in washing, dry cleaning and drying Trevira Bioactive there is less use of water, detergents and energy than is the case with textiles made from natural fibres.



Ecology

3.3 What Trevira does to recycle residual substances

- Single materials left over from production are reprocessed by various recycling partners or they are downcycled into a variety of new products, such as energy saving insulation materials, mouldings for the automotive industry or even into ropes.
- If further processing is not sensible, then – as is not the case with products with a chlorine content - it is possible to use the energy content of polyester, a derivative of crude oil, to produce further energy.
- Trevira practises a system of reusable packaging: Intact packaging materials and yarn packages are reused.



Cops, Guben plant



Social aspects

4.1 Code of Conduct

The Code of Conduct of Trevira is the „basic law“ to which all employees are committed. The following principles are particularly stressed as enterprise values:

- Legal and ethical conduct
- Respect for the legal and cultural framework conditions
- Loyalty towards Trevira
- Fair, courteous and respectful conduct with employees and colleagues
- Appropriate consideration of the interests of customers and business partners, of authorities and the public, and those of the environment
- Cessation and desistance from all discrimination on the basis of sex or membership of a specific race or religion
- Conduct with regard to risks that is transparent and shows awareness of responsibility
- Professionalism, fairness and reliability in all external business relationships



Social aspects

4.2 Company suggestion scheme (1)

- Through its workforce Trevira has at its disposal mature knowledge and ideas. This valuable potential is exploited in the company suggestion scheme, thus providing a further important contribution towards sustainable operation.
- Trevira calls on all employees to avail themselves of the company suggestion scheme (CSS) by proposing improvements and thus enhancing the efficiency of the enterprise.
- Due to the different infrastructure and to accelerate the process, each site has its own suggestion scheme.
- The CSS is divided into the areas:
Health & safety at work, processes and production
and protection of the environment.
- A premium is awarded for every suggestion accepted



Spinnery Bobingen plant



Social aspects

4.2 Company suggestion scheme (2)

Trevira Bobingen and Trevira Guben	2006
Suggestions submitted	359
Suggestions accepted	241
Prizes paid out	56,287 EUR
Savings achieved	96,410 EUR



Social aspects

4.3 Health & safety at work (1)

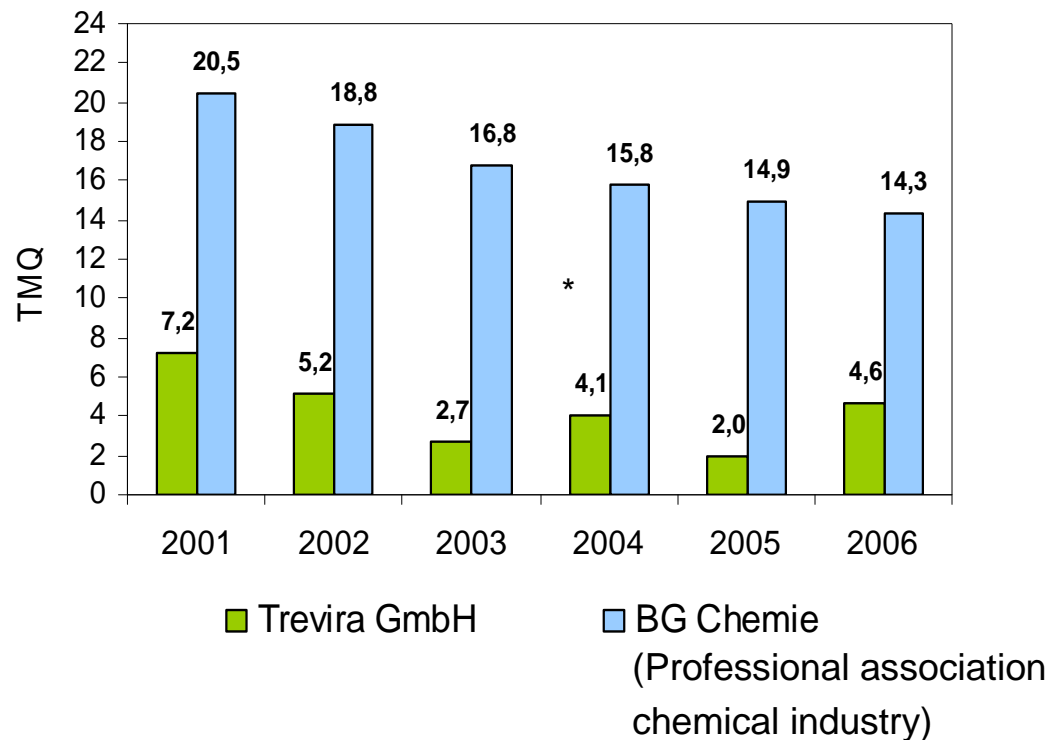
- The safety and physical integrity of the Trevira workforce takes priority over all production goals.
- Trevira believes firmly that all injuries, work-related sickness and safety-based accidents can be avoided.
 - Exceeding legal requirements there is ongoing improvement to technical and organisational rules and regulations and implementation of appropriate measures.
 - Within the framework of staff training special projects and programmes are used to raise awareness of safety issues among employees (e.g. „STOP“ programme).
- In all questions of safety Trevira seeks a factual and open dialogue with the relevant authorities and associations.
- External service providers at the Trevira sites are committed to uphold all obligatory safety standards.



Social aspects

4.3 Health & safety at work (2)

Thousand Man Quota 2001 - 2006
(TMQ = accidents per 1000 employees)



EHS Trevira Bobingen

In 2006 the chemical industry was once again the safest manufacturing sector in Germany. The accident quota at 14.3 industrial accidents per 1000 employees continues to fall. Trevira clearly undercuts this result with its TM quota of 4.6.



Social aspects

4.4 Social commitment

- Promoting employment of the disabled:
 - Production, reconditioning and repair of packaging materials, and document shredding, takes place at the Guben site through the „Lebenshilfe Werkstätten Hand in Hand GmbH“.
- Support of local associations at separate sites (e.g. youth and children's sport)
- Support of social organisations, such as nurseries and schools.
- Sponsoring student and cultural projects with a textile background
- Apprenticeship and promotion of training:
 - Collaboration with schools and higher education institutes in training projects (placements, final year theses)
 - Chamber of Commerce (IHK) award Guben site for „outstanding commitment to vocational education“:



Outlook



5. The way is the goal

What Trevira is doing to maintain sustainable management

We will continuously invest in environmental techniques to further optimise use of resources, to conserve energy and to cut emissions.

- We will undertake measures to continue avoiding and reducing accidents.
- We will continue to cut consumption of fresh water and contamination of effluent.
- We will continue to optimise maintenance of clean air.

The way is the goal.

