Focus Sustainability

SUSTAINABILITY IN THE LENZING GROUP 2008

Wood – the natural raw material
Sustainable management

Life Cycle Analysis
Evaluating the sustainability of fibers
Economic success
as the basis of sustainable action

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Christian Reisinger
Thomas Fahnemann
Chairman of the management board
Peter Untersperger
Editorial by the management board

Environmental protection, global warming and energy consumption – these issues have been making media headlines for more than just the past few months. And they do leave an impact on a global industrial enterprise such as the Lenzing Group.

The challenges to management by sustainability are growing – purchasing issues, energy supply challenges, product quality demands by the market and by end consumers.

The Lenzing Group is in a process of dynamic and successful expansion and has to answer many new questions. Ecological issues have become the order of the day for the textile industry and for our customers in the nonwovens business who use our cellulose fibers in hygiene and cosmetics products. There is a growing interest in the origin and the sustainability of raw materials. The demands of eco-conscious customers and the future sustainability of products are being discussed.

With fibers made from the renewable resource wood, Lenzing is in a special position. Several interesting properties of Lenzing’s botanic fibers are closely related to the plant origin of the raw material. The conservation of land and water, and the fact that wood absorbs carbon dioxide and produces oxygen in the long years before its harvest are essential elements of both sustainability and our business management.

Concepts such as sustainability, corporate social responsibility, new developments in eco-funds and the seemingly limitless number of eco-certificates and certifications of varying credibility make it increasingly difficult to obtain a clear picture of what is required. Even the most aware customers and raw material purchasers are occasionally confused and find it hard to get through to the factual basis of statements and promises.

Lenzing discusses these issues in a clear and credible manner. And that includes the realization that we cannot come out at the top of the class everywhere, all the time; we need to define our room for improvement – and its limitations. It takes more than green raw materials to make a green enterprise, and that applies to the cellulose fiber industry. But it is our ambition as a global company, with a wide variety of conditions at our different production sites, to make the best of any given situation and to act as sustainably as possible.

We are convinced that our products, our processes and our achievements as employers make us a company that rightly deserves the title “sustainable.” Our success of the past years has been very much the result of management by sustainability.

Lenzing has become a very successful international market and technology leader. And the innovative power that it takes to achieve this goal has grown along with our success. So here we are, confident that we will master the challenges of the future – with sustainability.
Arriving at sustainability

Where is our world, where is humanity headed? How can we shape economy, prosperity and population in a way that will truly create and sustain our future? More and more people are beginning to think about these questions. The concepts of sustainability and social and ecological responsibility receive more and more attention in the media, in politics, in business and in wide circles of the general public. One thing is certain: carrying on as before could maneuver us into a dead end and leave future generations with far fewer opportunities and options than we have now.

Global warming, poverty and injustice trigger dynamics – such as rising migration from Africa to Europe – which may become hard to manage. We have suddenly become aware of our carbon footprint. Scientists tell us that we live way beyond our means. If each of our 6.3 billion citizens lived the Austrian way of life, we would need three planets Earth for survival, the American way of life would require six. Something doesn’t quite add up. For the first time in human history, we are beginning to realize that the future of the whole planet is at stake.

We are in the process of questioning our attitudes and values, of decisively changing our conduct and our actions. "Lifestyle of Health and Sustainability – Lohas" is the term social and consumer researchers use for a lifestyle defined by health and sustainability. The Lohas mega trend caused the demand for organic food to grow by 30 percent in 2007. Sustainable investment is booming as never before. The word “ethical” describes money. New houses are actually beginning to generate energy. Fair trade has doubled sales since 2004. Fashion discounters offer organic cotton products. Soft travel is becoming a trend. To sum up: We have arrived at sustainability.

Incorporating sustainability

Modern management theories describe the phenomenon of success begetting success, meaning that those who created in the past are successful today and will shape the future tomorrow. Let us look at Lenzing with that perspective.
Yesterday: A complex legacy

Take wood and turn it into fine fabrics. The magic of chemistry. So far, so good. But that kind of chemistry was hard on the environment. Untreated wastewater went straight into lakes and rivers. Largely unfiltered fumes went straight up into the sky. Environmental activism then brought second thoughts to business management. The eighties and nineties of the past century saw substantial improvements in technology. And ‘Chemical Fiber’ Lenzing then took the lead. The company created new fibers, such as lyocell (TENCEL®) and introduced them to the market. Fact: Lenzing has been a fast learner and its investment into the environment actually turned out to be an investment into the future.

Good managers don’t rest on their laurels. While Lenzing production cooks pulp for today, Lenzing management creates tomorrow’s menu: innovation in production, products and services.

Tomorrow: A bird’s eye view

Right in front of our eyes, health and sustainability permeate the markets. And trend researchers tell us that this is just the beginning. Networking and interconnectivity boost this development. Individual strands of value creation will be woven into a global fabric: the cycle of forests – textile chains – consumers and recycling is being completed by Lenzing. And this is where systemic thinking sets in: It takes minds and hearts to make the right decisions.

Enterprising sustainability

How can Lenzing incorporate sustainability into its future? One answer: continue to be active and courageous, as you have been in the past years. Another answer: Enterprise health, lifestyle and equal opportunity. The thread of initiatives, such as “Botanic Principles,” must not be allowed to snap. Create future by creating facts – that should be the order of the day. Consumers are beginning to discover sustainability – and companies with sustainability will be winners. Consumers want peace of mind and peace for the world.

How to achieve that goal while keeping a balanced perspective along the road? The ancient Greeks tell us of three elements to create perfect holism – beauty, truth and goodness. These three aspects can be compared with the three dimensions of sustainability: environment, economy, and society. All three aspects have their own quality and dignity; have strength and their own logic. This entirety is unharmed if none of the dimensions dominate the others. Life is not complete without its many different unique dimensions. Just as we have learned to behold beauty through our eyes, to assess truth by our intellect and to feel goodness with our heart, we need to measure nature, economy and social life with different qualities and quantities. In doing so there will emerge multiple values, which will give back our souls hope and a sense of belonging.

Right in front of our eyes, health and sustainability permeate the markets. And trend researchers tell us that this is just the beginning.
About us

The Lenzing Group is an international group of companies with its headquarters in Austria, production sites in all major markets and a global network of sales and marketing offices. Lenzing provides the global textile and nonwovens industry with high-quality cellulose fibers. The company is the leading supplier in many business-to-business markets – from special cellulose fibers to high-tech plastics polymers.

Lenzing quality and Lenzing innovative power set standards for man-made cellulose fibers worldwide. Seventy years of fiber production expertise make us the only producer worldwide of all three man-made cellulose fiber generations, from classic viscose to modal and lyocell. Lenzing’s unique combination of consistent customer orientation with leadership in quality, innovation and technology is the foundation of our success.

Our focus on specialty products from cost-efficient production is the source of our economic power. Lenzing is committed to the principles of sustainable management and very high environmental standards. Lenzing’s core business, fibers, is complemented by our activities in the business fields plastics, as well as engineering.

Products of the Lenzing Group

Business Unit Textile Fibers

Fibers for textile applications
- Shirts/blouses
- Outerwear
- Lingerie
- Home textiles

Business Unit Nonwoven Fibers

Fibers for the nonwovens industry
- Wet wipes
- Surgical covers and wound pads
- Tampons
- Fiber-reinforced products

Business Unit Pulp

Pulp
The primary material for fiber production in the Lenzing Group

Chemicals
Acetic acid: for the food industry and industrial applications
Furfural: for the production of furfural alcohol and as a selective solvent for the oil industry
Magnesium lignin sulfonate: for the animal feed industry, for the ceramics and construction materials industry
Sodium sulfate: for the detergent and cleaning agents industry, for the glass, textile and chemical industry
Xylose: basis of sugar substitutes (caries-inhibiting chewing gum)
Business Unit Engineering

Engineering and Contracting
- Fiber and environmental technology
- Pulp technology
- Filtration and separation

Mechanical Construction and Industrial Services
- Mechanical construction and industrial services
- Sheet Metal Technology

Automation and Mechatronics
- Automation
- Electronics

Business Unit Paper *
- Recycled paper
- Poster paper
- Envelope paper

Business Unit Energy
- Electricity
- Heat
- Utilities
- Disposal management

* sold with effect from 4 March 2008
Production sites | Fiber

1. **Lenzing**  
   Austria  
   World’s largest integrated pulp and viscose fiber production site  
   - **Staff:** 2,800  
   - **Annual capacity:** 235,000 t of pulp and fibers

2. **Heiligenkreuz**  
   Austria  
   Lyocell fibers (TENCEL®)  
   - **Staff:** 180  
   - **Annual capacity:** 40,000 t of fibers

3. **Purwakarta**  
   Indonesia  
   Viscose fibers  
   - **Staff:** 1,500  
   - **Annual capacity:** 155,000 t of fibers

4. **Grimsby**  
   Great Britain  
   Lyocell fibers (TENCEL®)  
   - **Staff:** 180  
   - **Annual capacity:** 40,000 t of fibers

5. **Nanjing**  
   China  
   Viscose fibers  
   - **Staff:** 550  
   - **Annual capacity:** 60,000 t of fibers
Production Sites:
- Fibers
- Plastics
- Engineering

Offices:
- Fibers
- Plastics
- Engineering

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<th>Staff</th>
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<td>Fibers</td>
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<td>Purwakarta</td>
<td>Indonesia</td>
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Milestones

Sustainability focus in the Lenzing Group

Innovative technologies and high investment in environmental protection make the Lenzing Group the quality and technology leader in man-made cellulose fibers. The major milestones along the road were the foundation of new companies and the implementation of new processes.

1892
Industrialist Emil Hamburger operates a paper mill in Lenzing.

1938
Zellwolle Lenzing AG founded. Construction of a viscose fiber plant.

1964
Market introduction of modal.

1969
Acquisition of the Lenzinger Zellstoff- und Papierfabrik.

1975
Environmental division established.

1976
Production start-up for flame resistant viscose protective wear and home textiles (today: Lenzing FR®).

1977
Start of ecologically sound bleaching of cellulose.

1979
Replacement of elementary chlorine with oxygen and hydrogen peroxide – start of ECF cellulose production.

1982
Changeover of cellulose production to the magnesium bisulfite process developed by Lenzing. The process enables the recovery of chemicals used in the cellulose cooking and reduces environmental load.

1983
Production start-up at PT. South Pacific Viscose (SPV) in Indonesia. Recovery of acetic acid and furfural from wood ingredients through the development and implementation of exhaust vapor extraction. The process further reduces environmental load.

1984
Name changed to “Lenzing AG”

1985
Lenzing quoted at the stock exchange.

1986–91
Construction of the multi-stage biological wastewater purification plant.

1986
Start-up of a waste gas purification plant for removing high concentration CS₂ and H₂S from spin bath degassing.

1987
Construction of a fluidized bed boiler for the combustion of sludge, bark and other biogenic fuels.

1988
Start-up of a SULFO plant enabling first-time recovery of CS₂ and sulfur from low concentration H₂S and CS₂ waste gas.
1992
Lenzing becomes the first producer worldwide of TCF viscose fibers for sensitive applications in hygiene. This fiber specialty developed by Lenzing is to become the industry standard for the hygiene segment of the nonwovens industry.

1993
SPV: Start-up of a TOPSOE plant (recovery of H2SO4 from low and high concentration waste gas)

1995
Cellulose: Development and start-up of a thermal monosulfite cracking plant enabling quantitative capture and recovery of all SO2 waste gas flows without affecting base liquor or cellulose quality.

1997
Construction and start-up of xylose production from pulp wastewater by partner company Danisco (formerly Xyrofin)

Heiligenkreuz: Start-up of Europe’s first industrial-scale plant with lyocell technology

1998
Start-up of a fluidized bed boiler (RVL) for the thermal utilization of fractionated waste materials enabling the substitution of 50 mill. cubic meters of natural gas – equivalent to a 39% reduction of fossil fuels.

1999
Construction and start-up of a cooling water/cooling tower plant
Above average production increase has become the challenge of the decade to environmental protection performance. The past eight years alone saw a rise in production output by about 50 percent. The only way to keep up is to continuously raise the efficiency of existing environmental protection installations.

2001–2007

Extension of CS₂ recovery by condensation to many spinning machines.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>2001</td>
<td>Construction of a sulfate reduction plant for wastewater pretreatment</td>
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<tr>
<td>2001</td>
<td>Construction of a special nonwoven fiber production line. The globally most productive line for nonwoven fibers of exceptional purity</td>
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<tr>
<td>2004</td>
<td>Acquisition of the Tencel group</td>
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<tr>
<td>2004</td>
<td>Start-up of a TOPSOE plant (recovery of H₂SO₄ from low and high concentration waste gas)</td>
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<tr>
<td>2004</td>
<td>Start-up of anaerobic biological sulfate reduction (anaerobics – a unique process in global viscose production)</td>
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<tr>
<td>2004</td>
<td>Start-up of cooling towers for the wastewater purification flow. The process reduces water heat load</td>
</tr>
<tr>
<td>2005</td>
<td>Modernization of water power generation plants almost doubled electricity produced</td>
</tr>
</tbody>
</table>
2006
Start-up of a nano-filtration system in viscose production for separating hemi-celluloses from the liquor cycle (pilot plant trial runs since 2002).

2007
Start-up of a new liquor combustion boiler. Increased efficiency reduces CO₂ emission by 8,000 tons per year.

Start-up of a recovery plant for zinc from sludge. In addition to resource conservation, environmental load is further reduced by a significantly lower zinc content of the combustion ashes.

Nanjing, China:
Start-up of production at the viscose fiber plant

Lenzing Nanjing is one of the most technologically advanced viscose fiber production plants in Asia. Closed chemical cycles, a waste gas purification plant (TOPSOE) unique in the Chinese viscose industry and efficient energy management make the facility a best-practice plant in China.

Acquisitions in segment Plastics (Hahl, Pedex, Glassmaster, Dolan)

Purwakarta, Indonesia:
comprehensive environmental activities

Construction of stage two of the wastewater purification plant

Start-up of a Supersorbon plant for the recovery of CS₂ from fiber production waste gas. The plant is the first of its kind in Asia.

Optimization of energy supply: heavy fuel oil was fully replaced by natural gas.

Heiligenkreuz, Austria:
Lenzing Fibers GmbH obtains sustainable energy from bio-mass and saves 30% on fossil energy.

The information provided refers to the Lenzing site, unless specified otherwise.
Leading Fiber Innovation

The Lenzing Group is the global leader in cellulose fibers for the textile and nonwovens industry and a leading company in special plastic polymers.

The pillars of the Group’s excellent position are:

- Pacemaker of technological development for the cellulose fiber industry
- The only producer of cellulose fibers with production sites in all major global regions
- Leader in innovation and technology
- The only company worldwide with cellulose fibers as its core business
- Long-term raw material supply secured
The pillars of the Group’s excellent position are:

- Successful niche provider of special polymer products
- The only global provider with local customer service
- Producer of all three cellulose fiber generations: viscose, modal and lyocell
- The Lenzing site: largest integrated cellulose fiber production worldwide – the number one expert in pulp production
Leading Fiber Innovation

Fiber markets

- **China**
  - No. 1 exporter of textiles
  - Annual viscose staple fiber consumption 1.1 mill. tons
  - Rising standard of living leads to rising consumption of nonwovens convenience products

- **Western Europe**
  - Growth market for nonwoven fibers
  - Focus on high-end products in textile fibers

- **India**
  - Greatest market potential, next to China
  - Rising demand for sophisticated high quality products

- **Indonesia**
  - Major domestic market for textile fibers

- **Turkey**
  - A stable and expanding market for many years
  - Continuous expansion of nonwovens capacity

- **USA**
  - Strong nonwovens growth market
  - Important consumer market for textiles

- **Taiwan**
  - Innovative specialty market

- **South America**
  - Market with potential for textile fibers and nonwovens

Lenzing’s mainstay product – cellulose fibers: a global growth market

Lenzing expects the global demand for cellulose fibers to grow in the medium and long term. The demand is driven by these factors:

- Cellulose fibers have been firmly established in the upper quality segment of the world of textile fibers. Great comfort of wear in textiles, absorbency, excellent technical properties in nonwovens and uniform quality make cellulose fiber an indispensable element of the textile and nonwovens industry.

- Population growth and rising prosperity in the emerging markets and a continuous stream of new applications provide further growth impetus. The per-capita consumption of cellulose fibers is rising steadily.
Japan
- Highly developed market for textile and nonwovens specialties

Korea
- Innovative specialty market

Pakistan
- Important export market for fibers

Eastern Europe
- Focus Russia: market with potential for nonwovens
- Growing consumer market for textile fibers

Israel
- Continuous expansion of nonwovens capacity

Vietnam

Syria

Egypt

Bangladesh
- Potential future markets

Worldwide consumption of viscose staple fibers *

Nonwovens + 9%
Textile fibers + 7%

Growth market Asia – viscose staple fibers *

Growth rate of nonwovens + 13%
Growth rate of textile fibers + 9%

Per-capita fiber consumption

International average: 10.5 kg/year
USA: 41.8 kg/year
Western Europe: 22.5 kg/year
China: 13.2 kg/year

Source: Lenzing Market Intelligence

Cellulose fibers are made from pulp, which is made from wood, a renewable and climate-friendly resource. Wood incorporates carbon dioxide throughout its lifecycle. This climate-friendly and resource-conserving raw material is the foundation for the long-term market gains of cellulose fibers.

* 2002 – 2007 (est.)
Focus on business-to-business niche products

- Lenzing is a supplier of high-quality, innovative products made from cellulose fibers and specialty polymers including carbon fibers precursor. Lenzing is a business-to-business company.

- Lenzing actively maintains an international network of partner companies in the supply chain, from development to processing and retail.

- The focus is on markets for applications and product groups where Lenzing holds leading positions and is instrumental in shaping these markets.

- Lenzing products do not compromise on quality or customer benefit.

Innovation

- Lenzing is the innovation leader and pacemaker of the cellulose fiber industry and a leading developer of high-quality polymer products for niche markets.

- Lenzing’s research and development activities are far above the industry average.

- Decades of expertise provide the foundation for the further development of production processes and attributes specific to Lenzing fibers.

- Innovative marketing strategies and a flexible organization with teams geared to project work and inter-site cooperation create a high level of market awareness and fast response.

Global presence

- Lenzing is the only global cellulose fiber producer with production facilities in all key markets and an international network of sales and marketing offices.

- Lenzing’s global customer and technical service is unique and recognized as setting industry standards.

- Lenzing is where its customers are: Business Unit Textile Fibers has a clear focus on Asia, the place of future textile growth. Fast delivery, low cost, local production – Lenzing offers all of these to Asia’s growing markets. Nonwovens serves its customers globally. Locations in Europe, the USA and Asia secure long-term customer cooperations.

- The focus of Plastics is currently still on Europe and North America. Future growth will take place with high-tech products, but on a global basis.

Sustainable growth

- Lenzing focuses on long-term quality growth.

- Lenzing uses renewable resources with low impact on climate change, such as pulp, and applies ecologically sound and energy-efficient production processes to the greatest possible extent.

- Lenzing takes care to maintain a long-term raw material supply base.

- Lenzing’s products actively contribute to protecting the environment.

- Lenzing has evolved from a European fiber producer into a global provider of fibers and specialty polymer products within fifteen years.
Lenzing’s growth platform: plastics

Lenzing has been a successful provider of specialty polymer products for decades. The company responds to the growing market for niche plastics products with a strategy of dynamic acquisition. The product portfolio expands continuously and today covers monofilaments for special applications, PTFE fiber products, carbon precursor and products for the construction industry. The versatile expertise in fibers and materials, as well as research and development geared to the fast pace of innovation, equally applies to Lenzing’s plastics products.

Competitive advantages: size and stability

The cellulose fiber industry is characterized by major investment in capital and expertise. Entry barriers are high. Lenzing’s customers appreciate the Group as a reliable supplier all over the world. Lenzing operates on the basis of long-term stable customer relationships, many of them stretching back over decades.

Size, technological leadership, customer orientation and secure raw material supplies make Lenzing the market leader and guarantee product and service quality, as well as supply security. Lenzing’s expansion is continuous, and the company spreads risk by broadening its global presence, gaining ever more stability in the process.

Lenzing has also proven itself as the reliable partner in specialty polymers. The financial strength of the Group and synergy effects between the fibers and plastics segments drive the further rapid expansion of Lenzing’s position in the market for high-quality specialty polymer products.

Innovative power based on technological leadership

Lenzing is the global pacemaker of cellulose fiber innovation. Lenzing matches decades of expertise in the production and application of all cellulose staple fibers with the competence of an experienced producer of pulp. Lenzing continuously enhances its lead by above-average investment in cellulose and fiber research and by the further development of cellulose fibers.

Lenzing is the only manufacturer worldwide producing all three generations of man-made cellulose fibers: viscose, modal and lyocell.

The goal of Lenzing is to enhance and secure its expertise in wood and cellulose chemistry, as well as in the production and application aspects of the fiber and plastics industry, and to provide world-class innovation.
Population growth and rising prosperity drive the growth of the cellulose fiber industry in the emerging markets.
Who’s who in fibers

Lenzing fibers are man-made cellulose fibers: they are made from the natural raw material wood which contains about forty percent cellulose. The natural origin contributes to the fibers’ excellent properties such as absorbency and moisture management, the industrial production process provides purity and clearly defined, uniform quality.
Lenzing fibers – sustainable products

Ease of wear, superior moisture management and physiological parameters: these properties of Lenzing fibers make them particularly suited to very special applications. They can be traced back to their raw material – wood. Lenzing fibers always had the advantage of their natural origin, and the market has become very responsive to these properties and topics.

Lenzing produces botanic fibers and takes the lead

Ever more critical consumers take adequate product quality for granted. Environmental soundness and impact on global warming, however, are becoming more and more important in making purchasing decisions. Environmental awareness and ethical considerations are becoming the new criteria of distinction for eco-conscious customers. International retail chains, such as British TESCO or IKEA of Sweden, are beginning to disclose the size of their products’ carbon footprints on labels. In the fiber market, the trend towards ecologically superior products is gaining more and more importance: fibers, just like food, after all are products of great physical intimacy.

Product ranges and collections whose materials are labeled “organic” or “bio” have become a common feature of the textile industry. The natural origin of cellulose fibers by Lenzing makes them botanic fibers.

The new botanic concept highlights their natural origin and presents parallels to mechanisms of the plant world.

CO₂-neutral raw material: wood

Wood, the renewable raw material of Lenzing fibers, is a product of photosynthesis, the single most important biochemical process on our planet. Photosynthesis is the creation (synthesis) of organic matter with the help of solar energy. In this process the plant gives off oxygen. The absorbed carbon dioxide is released only at decomposition or combustion. The CO₂ balance is therefore neutral.
Lenzing fibers – sustainable products

Emulating nature

Moisture management

Lenzing fibers embody botanic principles. The optimal moisture management of Lenzing fibers is based on the botanic principle of capillary activity. Plants transport water from the soil to their leaves through fine channels: Lenzing fibers use the same principle when removing body moisture, at the same time creating optimal temperature equalization and great ease of wear.

Conserving land and water resources

Lenzing fibers are ahead of natural fibers, such as cotton, in other ways as well. Comparing TENCEL® and cotton, the fiber yield per area is up to four times higher and total water consumption up to twenty times lower. The primary raw materials for Lenzing fibers are beech and eucalyptus. Neither of these need artificial irrigation and both can be cultivated on land unsuitable for food production.

Closing production cycles

The production process for TENCEL® (lyocell process) is characterized by a recovery rate of almost 100%. This process, an example of ecological soundness, received the environmental award of the European Union. It makes TENCEL® – apart from its excellent fiber characteristics – a future-oriented alternative and secures Lenzing’s competitive advantage.

Success with new applications

In the past, viscose fibers were almost exclusively used in ladies’ wear. Lenzing broke that dependence on fashion cycles by a dedicated strategy of focusing on specialties. The strategy is founded on clear innovative advantages in fiber technology and, increasingly, on innovative and dynamic marketing. Lenzing, together with its customers, focuses on the joint development of products, marketing concepts and sales through global merchandising organizations. The strategic milestones of this strategy were the extension of Lenzing’s product portfolio by innovative high-value specialty fibers (Lenzing Modal®, TENCEL® and Lenzing FR®) and

Fiber production creates jobs

The share of wood in the price of a shirt made from viscose fibers (pure cellulose made from wood) is less than one percent. This difference is essentially a result of value added by an above average number of jobs in downstream processes (forestry; pulp; fiber production – spinning, weaving, dyeing; clothing; and trade).
the expansion of markets by conquering new segments (menswear, active sportswear, home textiles and technical textiles), and by going international. From being the technological innovation leader, Lenzing progressed to being the marketing innovation leader.

Lenzing fibers – botanic principles at a glance

Photosynthesis

Lenzing fibers are extracted from plants which convert carbon dioxide and water into wood and oxygen by means of photosynthesis.

Water management

The water management of the plants is important for the ecosystem as a whole. Due to nanofibrils, TENCEL® can store a great deal of moisture and then release the moisture quickly into the environment.

Sustainability

Lenzing uses wood only from sustainable forest plantations for the production of TENCEL® and Lenzing Modal®. Sustainability is also given priority in the production processes using persistent recovery technologies.

The Cycle of nature

TENCEL® and Lenzing Modal® are produced from wood and therefore are fully natural and biodegradable. Nature returns to Nature.
Success through innovation: Expanding the product range with new applications

Performance

Agriculture
Battery separators
Carpeting
Construction materials
Filtration
High activewear
High temperature insulation
Hotel and hospital equipment
Lightweight components
Packing materials
Sensitive skin applications
Sleeping bags
Spacers for electronics
Sports shoes
Surgical wear
Thermal insulation for protective jackets
Workwear
Wound care

Home and technical textiles

Bath mats
Bed linens
Business shirts
Cosmetics applications
Defensive protective wear
Dish towels
Fire-resistant fabrics for public transport (aviation, rail)
Golf wear, Polo shirts
Industrial protective wear
Mattresses
Medical applications
Metal splash fabric
Sewing thread
Sidelines
Tires
Towels
Quilts

Fashion

Cleaning and hygiene
Fire-fighting protective wear
Flame-resistant furniture fabrics
Jeans
Knitwear-cotton blends
Underwear
Women’s knitwear
Women’s woven wear

Cleaning and hygiene
Fire-fighting protective wear
Flame-resistant furniture fabrics
Jeans
Knitwear-cotton blends
Underwear
Women’s knitwear
Women’s woven wear

Cleaning and hygiene
Fire-fighting protective wear
Flame-resistant furniture fabrics
Jeans
Knitwear-cotton blends
Underwear
Women’s knitwear
Women’s woven wear

Source: Lenzing AG
Lenzing empowers its customers to distinguish themselves in their markets by generating ever new products and applications.

1. The smoothness and coolness of TENCEL® offer extra comfort. Its moisture management provides coolness wherever it is hot. But TENCEL® is not just about ease of wear, it is particularly gentle and soothing to the skin as well.

2. Safety is first priority wherever there is fire. Lenzing FR® is the heat protection fiber.

3. High-quality applications require high-quality fibers. The special properties of Lenzing nonwovens fiber secure the quality of the end product to the advantage of manufacturers and consumers alike.
Lenzing fibers – sustainable products

Global production of nonwovens

![Graph showing global production of nonwovens from 2002 to 2012 with CAGR for 2002-2007 and 2007-2012]

Source: Pira International – The Future of the Global Nonwoven Market

Lenzing Nonwovens – fibers for discerning applications

The natural origin of Lenzing fibers from the renewable resource wood contributes to a sustainable future. The fibers’ natural purity and absorbency convince in every-day use as medical applications, filters and specialty papers.

Textile fiber products are made from fibers spun into yarns to be woven or knitted into fabrics. Nonwoven fiber products, on the other hand, are made by a variety of techniques, such as hydroentanglement and airlaid technology, to form fleece-like materials. Typical nonwovens products are wet wipes for infant care, cosmetics and facial tissues and medical applications such as wound pads, surgical

*CAGR (Compound Annual Growth Rate)*
swabs and components of surgical gowns and a variety of domestic and hygiene applications. Increased awareness of environmental and sustainability issues makes customers want to know more about the raw material used for nonwovens, too.

The nonwovens sector currently consumes more than five million tons of fibers with a steady stream of new production processes and applications. As the majority of these products are disposable, use of sustainable resources will gain more and more importance for future growth. Three-quarters of nonwoven fibers are still petrol based, mainly on polypropylene and polyester. The remaining quarter is made from renewable resources such as cellulose fiber and pulp.

Natural degradability

Lenzing fibers are fully biodegradable and become part of the natural cycle. Nonwovens made from Viscose® and TENCEL® are certified and registered as biodegradable by DIN CERTCO, which issues certificates only for products fully made from compostable raw materials.

The nonwovens industry increasingly favors the advantages of sustainability and biodegradability as end consumers are increasingly appreciative of the environmental compatibility of the raw materials used.

Natural hygiene

Lenzing fibers combine the advantages of the renewable resource wood: a high degree of purity, softness and absorbency.

The natural hygiene and other properties of Lenzing Viscose® and TENCEL® meet the high quality standards of the nonwoven industry. Moreover, Lenzing fibers meet stringent requirements, such as the European Pharmacopoeia.
Lenzing fibers – sustainable products

Highest purity requirements for medical applications

Lenzing’s clients produce a broad range of medical products from our fibers ranging from the treatment of small cuts or lesions to operating theater applications. Lenzing fibers help treat small wounds, the type that children all over the world bring home almost every day. They also contribute to complex treatment solutions, such as chronic wound treatment, alleviating the pain of patients suffering from severe, long-term illnesses. And Lenzing fibers are the absorbent component of surgical swabs, as well as modern operating theater covers, supporting surgeons in their job. All these sensitive applications require the highest purity of materials to meet the exacting requirements of hygiene. Lenzing’s purest raw materials and exceptional production processes provide just that.

High performance products

Industrial filtration uses Lenzing fibers in a broad range of applications. They increase the service life of lubricants, thereby extending the life cycle of production equipment, and they are used in the filters of industrial environmental protection systems.

TENCEL® short cut fibers are used in high-tech products. Fiber-reinforced construction materials save material, weight and energy. Carbonized TENCEL® is used for high-temperature insulations – the multitude of technical applications is almost unlimited.

The rapidly growing sector of hybrid and fuel cell vehicles use Lenzing fibers as important components of large double-layer capacitors. These capacitors are key components of hybrid power vehicles. Lenzing maintains long-term partnerships with major producers of advanced separator technology for hybrid and fuel cell vehicles. The unique properties of Lenzing TENCEL® fibers contribute to ensuring optimum performance of the end product.

Technological lead

High-performance technology such as hydroentanglement or airlaid technology require high-performance fibers. Their excellent fiber physiology (absorbency, tensile strength, water transport, etc.) make Lenzing nonwovens fibers the product of choice for realizing the full production potential of the latest nonwoven production equipment.
From technology leader to market and innovation leader

Active market innovations on many levels, innovative communication strategies with our partners and production process innovations are the key topics that have become the focus of Lenzing’s Business Unit Textile Fibers in recent years.

Brand strategy

Tending and promoting fiber brands such as Lenzing Modal®, ProModal®, MicroModal®, TENCEL® and Lenzing FR® plays an important role in this strategy. The individual brands are presented by a clear positioning strategy according to their property profiles.

Labels and tags for discerning customers

Labels and tags by Lenzing enable manufacturers to show that prime raw materials, and above all, natural origin are particularly important to them.

Proof of quality and brand protection

Lenzing fibers stand for quality. Labels and tags show customers that the product in their hands is superior in terms of the raw materials used.

Garment makers from a variety of business lines ordered more than 180 million tags in 2007.

Individual and personal customer relationships come first

The Textile Fibers Business Unit generates and maintains about 10,000 customer relationships on all levels of textile value creation. These relationships are maintained by our customer relationship management system. It extends far beyond the circle of primary clients. The system facilitates serving a prominent feature of the fiber business: the individual and personal contact of sales, marketing, service and logistics with our customers, who always come first.
Push/Pull marketing by textile chain expertise

Lenzing as a fiber producer is at the beginning of the value creation chain that extends from spinning (primary) across knitting, weaving, and finishing (secondary) to garment making (tertiary) and retail sales (see chart).

A global marketing network covers the full textile chain right up to the purchasing decision makers of brand producers and retail companies. Direct contacts as well as direct contracts with leading companies in garments, lingerie, active sportswear and home textiles generate demand for TENCEL® and Lenzing Modal® in the textile value creation chain, where decisions are made.

Communication in the textile chain

Source: Lenzing AG
Lenzing is in continuous exchange with a variety of partners in the textile chain, among these large retail chains, such as Marks & Spencer, IKEA and WalMart, as well as brand producers, such as ADIDAS, Puma and Nike.

Global technical service by experts

Competent care for our customers downstream, through our global network of fiber and textile experts is an important element of our strategy. Lenzing provides added value by offering highly qualified application expertise.

A team of highly specialized technicians and scientists supports our customers in many ways. The Lenzing site has a highly modern textile machine park which emulates textile processing on a pilot scale and quickly solves any technical problems that customers may encounter. Lenzing’s global and local technical support provides fast help, and its laboratories for analysis and testing are state-of-the-art. This support makes the company an important and direct contact point and help desk for problem resolution, as well as a resource for exceptional questions of analysis and testing.

Economic success

These activities enabled the Lenzing Group to quickly adapt to the changing structure of its markets, such as the drastic shrinking of the West European textile industry and the migration of textile production to Asia. The emphasis on a broad product portfolio enables steady expansion and reduces the impact of fashion cycles.

The share of special fibers in total business rose from 20% to 50% over the past ten years.

The export share in the company’s fiber business in 2007 was 86%. As opposed to the emerging trend of rising imports from Southeast Asia, the Lenzing Group exports almost half of its fiber production to this region.

Organization innovation

Lenzing reorganized its corporate structure in order to successfully implement new strategies.

Creating business units with global responsibilities, integrating research into these business units close to the market and developing a project management system that transcends organizational divisions were essential elements of this innovation.
What do you think about Lenzing’s achievements in sustainable management and which aspects do you consider to be most essential according to your experience?

Sustainable innovation is the key economic driver of the 21st century. Supply chain transparency is one of the basic tenets or “rules of engagement” for any sustainable business. Lenzing offers the fiber market what few, if any, producers of fibers do, and that is both sustainable innovation and full transparency of the supply chain. One of the most important global issues is “what is the source of our raw materials? Where were the materials harvested, processed, produced?” This is a total mindset shift at the textile design level.

Do you think that the communication of the Lenzing Botanic Principles has been well received by the important players in the market?

Lenzing’s Botanic Principles lead us back to the source of life on the planet, back to nature. They enhance the education of the market by applying these simple, yet easy-to-understand principles. Botanic Principles connect the lifecycle of nature and sustainability to fiber innovation. Nature and sustainability are not separable.

I strongly believe Lenzing’s products are a key component to any sustainable fiber
strategy, when considering all the environmental impacts associated with fiber growing and production. Lenzing Modal® and TENCEL® come out on top – practical, applicable and economically viable to integrate into fiber strategies of most global organizations.

In which segments of the industry do you feel Lenzing innovations have been most visible?

Lenzing places a high priority not only on supply chain transparency and disclosure, but also continual improvement and ongoing research and improvements of their products. Their innovations are especially vital to the activewear market as options to replace high-performance petrol based products, while maintaining quality fiber performance and economical viability. Many activewear brands are also struggling with finding sustainable options for organic cotton as their customers require garments that have excellent moisture management. Lenzing’s fibers offer the market sustainable fiber performance solutions.

Apart from the more product related aspects, how would you rate the importance of the more general social and environmental issues in the supply chain? Are customers prepared to pay premiums for outstanding performance in these fields?

Fundamentally, social and environmental issues are business issues, and this concept is part of the core foundational principles at Lenzing. “People, Planet, Profit” is often used to describe the triple bottom line and the goal of sustainability. The fact is that they are all connected and should be thought of in one globally accepted conversation. Lenzing does just that. Human rights and environmental stewardship are inextricably linked. Everybody has the right to a secure, healthy and ecologically sound environment. We have also seen a huge market shift to fair trade products, from coffee to cotton, in the last few years. This is a positive sign that the brands and consumers are willing to pay extra to ensure that farmers and producers are able to live sustainably.

Lenzing sets very high benchmarks, where other fiber producers should aspire to. It is a key valued fiber partner and regards partnerships with the market to be very important. I recently toured the Modal facility in Lenzing, Austria, and was impressed with the closed loop system in place and accountability for all inputs and outputs.

Sustainable innovation is the key economic driver of the 21st century. Supply chain transparency is one of the basic tenets for any sustainable business.
Responsibility for the environment

Economic success as the basis of sustainable action

- Editorial by the management board
- Guest column: Sustainability, or the future of corporations
- About us
- The Lenzing Group 2007
- Milestones
- Leading Fiber Innovation
- Who’s who in fibers
- Lenzing fibers – sustainable products
- From technology leader to market and innovation leader
- Talking with our partner

Responsibility for the environment

- Environmental philosophy
- Wood – the renewable resource
- Life cycle assessment
- Energy – a key factor for Lenzing
- Environmental protection systems in the Lenzing Group
- Lenzing – active environmental care

Responsibility for people

- Our employees are the basis of our success
- Social responsibility at the sites
- Talking with our staff members

Facts and figures

Glossary
Environmental philosophy

We live sustainability

The Lenzing Group is committed to the fundamental principles on which sustainable development is based. We work towards securing the ecological foundations of life while maintaining social balance.

Our environmental policy is foresighted and includes the responsible, preventive and conserving management of resources as a central tenet of sustainability.

Our processes are geared to protecting the environment

We create our products from renewable raw materials and use these to a very high extent. We work towards exemplary ecological production and energy generation.

The environmental impact of our production is continually monitored and evaluated by internal and external measurements. Environmental concerns are factored into our decision making and investment processes. New materials are assessed for environmental compatibility, and new products are tested for environmental soundness while still in their design phase.

We anticipate new ecological findings and future legal and technological developments, and we are committed to continually improving our environmental performance.

We assume responsibility

We are serious about our social and ecological responsibility. Beyond our commitment to comply with current environmental legislation, our staff operates on a high level of responsibility.

Work safety, the protection of health and the environment are as important to us as economic concerns. We continually improve our standards by a system of voluntary self-monitoring.

We engage in dialogue

We maintain a steady environmental dialogue with politicians, administrators and the public. We are open, direct and accessible neighbors.

We inform our staff and the public about our environmental guidelines.

We focus on our customers

We strive to produce ecologically sustainable and commercially successful products that are safe to use and safe to dispose. We want to fulfill our customers’ expectations in our ecological products.
Wood – the renewable resource

The renewable resource of wood is the basis for all Lenzing fibers – from viscose to lyocell. Wood is converted into pulp, and pulp into fibers – Lenzing products are created in unison with nature and are therefore sustainable products.

The pulp and fiber industry is part of the natural carbon cycle. Cellulose is created during plant photosynthesis; carbon dioxide and water are converted into organic matter. The process is powered by sunlight, and the exhaust product is oxygen. Cellulose is nature’s most important construction material – natural global production is about 40 billion tons per year. Three-tenth of a percent is used by the pulp industry.
Cellulose is the world’s most important biopolymer by far. About half of the global biomass consists of this material. It provides the structure of all plant matter. From a technical point of view, cellulose is the reinforcement material of one of the highest performing versatile composite materials – wood. Cellulose provides soft protection for the airborne distribution of poplar seeds, but also hard spikes for cacti which can be driven into wooden boards like nails. And we keep discovering more amazing properties of this unique biopolymer.
Sustainability – an old principle

The concept of sustainability is rooted in forestry. It entails forests being managed in a way that enables perpetual functionality, not only in terms of raw material supply, but as the habitat of flora and fauna, a protection against erosion and landslides, and as a recreational retreat and as an aquifer.

Wood and pulp from sustainably managed resources

The pulp production facilities at Lenzing are fully integrated into viscose fiber production. Beech wood is the raw material and more than half of it originates from Austria, with the remainder coming from neighboring countries. We process only wood from forests managed in compliance with sustainable forestry legislation.

Origin of wood

Source: Lenzing AG
Wood – the renewable resource

Lenzing processes about 95% of the Austrian beech wood generated by thinning and selective cutting. The quality of industrial wood makes it unsuitable for furniture production. Lenzing as the major consumer therefore supports forestry beech production in general and the conservation of mixed forest of ecological value.

Pulp from plantations

All other fiber producers of the Group receive their raw material from the full subsidiary Pulp Trading GmbH which in turn buys pulp made from eucalyptus, pine and other trees from several suppliers. Globally, there are only very few producers of dissolving pulp, the pulp required for fiber production. The Lenzing Group obtains this raw material from Europe, America and South Africa. It is transported, wherever feasible, by ship. The material originating from the northern hemisphere is mainly beech and pine wood, primarily produced by sustainable forestry. Due to the favorable climatic conditions of the southern hemisphere, producers there grow plantation wood: fast-growing eucalyptus, as well as pine. Appropriate breeding efforts make plants more resistant and faster growing, thus yield per area is increased without having to resort to chemical means or irrigation. All these efforts secure a sustainable ecological and economic basis, and, for Lenzing, the material basis for producing its cellulose fibers.

Lenzing uses pulp from sustainably managed forests and plantations. A variety of certification systems, such as PEFC, FSC, SFI or CSA provide proof of this process. Europe and North America, in addition, have strict and enforceable forestry legislation.
Pulp production at Lenzing: global best practice in the viscose fiber industry

The Lenzing site uses pulp made from beech wood. The facility is a global example of high-level environmental conservation and use of the valuable raw material, wood. Lenzing calls the process the biorefinery of wood. Pulp is obtained by the acidic magnesium bisulfite process and oxygen, ozone and hydrogen peroxide are used for absolutely chlorine-free bleaching. Subsequent process steps yield marketable by-products, such as acetic acid, furfural and xylose. Our efforts of recent years have increased the utilization rate of the raw substance to high-value products to over 50%. The remainder is used as the most important biogenic source of energy at the Lenzing site.

Integration – an important environmental factor

The integration of pulp and fiber production at the Lenzing site enables process optimization in many areas and significant conservation of resources, for example by avoiding the energy-intensive drying of pulp. Consistent realization of the integration potential at the Lenzing site, combined with innovative processes of environmental protection, result in a significant energy surplus and additional cash flow generated from fine chemical wood by-products. The pulp factory therefore does not consume energy, but actually produces it for other sections of the site. Moreover, residual material is used as the main energy source to ensure maximum utilization of the valuable raw material, wood.

Sustainability based on innovation

Lenzing is the leader in the field of wood biorefinery. The intensity of innovation is enormous: as a rule, processes and procedures are not commercially available and therefore have to be newly developed in-house. Among these are the extraction of acetic acid and furfural from the condensate of liquor evaporation, the crystallization of xylose from thick liquor, the membrane-based recovery of xylan from several alkaline process flows and the anaerobic production of biogas and regeneration of sulfur by wastewater fractionation.

What does Lenzing make of a ton of wood?

- Pulp (dry weight): 381 kg
- Acetic acid: 36 kg
- Furfural: 7.5 kg
- Caustic soda: 91 kg
- Xylose
- Thick liquor

Thermal utilization of wood ingredients is CO₂-neutral, and the obtained products are fully biodegradable and contribute to reducing CO₂ emission. Forest-based pulp production fulfills all sustainability criteria and its life cycle assessment is particularly positive. The cellulose yield per area is high – even for European latitudes and the marginal production areas used – without requiring the standard agricultural inputs of irrigation, fertilization and pesticides.

\[1] Bark, sludge and others  \quad \[2] One ton of dry, stripped, chopped and graded beech wood
Pulp production at the Lenzing site is not only self-sufficient, it even generates surplus energy. One ton of wood (dry weight) yields a net surplus of heat (in the form of steam) of 4.53 GJ on an annual average. This amount corresponds to 113 kilograms of fuel oil. The electricity generated by the steam turbines further adds to the surplus, resulting in 205 KWh per ton of beech wood, after internal consumption for pulp production has been deducted.

Both surplus heat and surplus electricity are used for fiber production.

More than 50% of the raw material wood utilized

Wood as the raw material and energy source of pulp production

Source: Lenzing AG
Lenzing’s sustainability is put to the test. Lenzing commissioned Utrecht University in the Netherlands to conduct a first-time comparative life cycle analysis of fibers. The sustainability of Lenzing fibers was assessed and compared with that of cotton, polyester and polypropylene.

Evaluating the sustainability of fibers

A comprehensive evaluation of fibers in terms of consumption of nonrenewable resources, emission of greenhouse gases, impact on human health and impairment of ecosystems requires a systemic approach, the compilation of a life cycle analysis. Martin Patel and Li Shen of the Copernicus Institute of Utrecht University, Netherlands, in 2006 and 2007 compiled a life cycle analysis for Lenzing Viscose®, Lenzing Modal® and TENCEL® in direct comparison to cotton, polyester fibers and polypropylene fibers according to a uniformly applied method. Lenzing provided comprehensive process and energy data for pulp and the various technologies employed at Lenzing and Heiligenkreuz in Austria and Purwakarta in Indonesia for the production of cellulose fibers. These three sites in 2006 produced 87% of the Lenzing Group’s fiber volume. The viscose fiber production plant in Nanjing, China, was still under construction at that time.

Records for cotton from the USA and China, representing 43% of the global cotton market, as well as polyester, polypropylene, process chemicals and energy consumption were obtained from current and reliable sources.

The scope of this life cycle analysis covers all material flows, processes and shipping movements in a cradle-to-factory gate approach. It is virtually impossible to include the production, use and care of textile products, due to the multitude of technologies and products of the textile value creation chain. The evaluation of consumption of nonrenewable energy and of carbon footprint size, however, does consider aspects of disposal.

The evaluation of environmental impact was conducted according to the CML method*, developed by Leiden University, Netherlands, considering these factors:

- Global warming potential
- Abiotic depletion
- Human toxicity
- Freshwater ecotoxicity
- Terrestrial ecotoxicity
- Photochemical oxidation
- Ozone layer depletion
- Acidification
- Eutrophication

The results represent equivalent values. They permit relative comparisons of fibers. They do not consider whether a particular factor is relevant to fiber consumption at all. Therefore the equivalent value was related to total global load to obtain the contribution per ton of fiber to global environmental load on the basis of data from 1995.

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* an internationally recognized method for evaluating life cycle impact developed by the Centrum voor Milieukunde of Leiden University (Netherlands)
Life cycle analysis

Relative environmental load per ton of fiber*

Results show that the relative contribution of all fibers in terms of photochemical oxidation and human toxicity is negligible. The contribution of cotton to terrestrial and freshwater ecotoxicity, however, is significant. The share in acidification and eutrophication is higher than that of other fibers, too. It is not surprising that the synthetic fibers, polyester and polypropylene, have the highest

* All figures are relative values, calibrated to the average value for cotton. The value for Lenzing is the weighted average of viscose, modal and TENCEL® fibers.
values for abiotic depletion and global warming potential. Lenzing fibers have the smallest carbon footprint and contribute least to global warming.

The overall picture clearly shows the advantage of Lenzing cellulose fibers. Detailed analysis shows viscose and modal fibers produced at the Lenzing site to be particularly sustainable. This is the result of synergy between the integrated production of pulp, energy and fibers, which proves and represents the best available technology of the fiber industry. Production conditions of viscose production in Asia are less favorable in terms of abiotic depletion and potential global warming but still significantly better than those of cotton. The good results for the TENCEL® fiber are due to its ecologically sound lyocell production process, which has received several awards.

Two other factors that are not part of CML criteria were investigated in detail because they are relevant to cellulose fibers: land use and water consumption.

Land use

Despite the intensive cultivation of cotton plantations by irrigation and agrochemicals, yields per area and year are modest compared to industrially produced cellulose. Compared to cotton cultivation, the cellulose fiber yield from Central European beech forest is 50% higher and that from fast-growing eucalyptus is four times higher. Moreover, cotton consumes acreage suitable for food production, whereas wood grows in natural forests and plantations with soils of marginal productivity.

Try to imagine a world without Lenzing fibers: demand would be the same, but the remaining fibers, such as cotton and polyester, would have to cover it. How would that affect the environment?

Did you know that . . .

. . . Lenzing’s total annual fiber production produces 1.3 million tons less carbon dioxide than the equivalent volume of polyester fibers?

. . . that this amount is equivalent to more than five percent of Austria’s total industrial carbon dioxide emission?

. . . that the substitution of Lenzing fiber production with cotton would cause the additional emission of 300,000 tons of carbon dioxide?

. . . and that in this case an extra 340,000 hectares of arable land and an extra 2.2 billion cubic meters of water would be consumed?
Life cycle analysis

Required acreage
for the production of one ton of fiber

<table>
<thead>
<tr>
<th>Material</th>
<th>Area per ton and year</th>
</tr>
</thead>
<tbody>
<tr>
<td>TENCEL® Austria</td>
<td>0.24</td>
</tr>
<tr>
<td>Lenzing Viscose® Asia</td>
<td>0.33</td>
</tr>
<tr>
<td>Lenzing Viscose® Austria</td>
<td>0.69</td>
</tr>
<tr>
<td>Lenzing Modal® Austria</td>
<td>0.70</td>
</tr>
<tr>
<td>Cotton USA and China</td>
<td>0.82</td>
</tr>
<tr>
<td>Cotton global average</td>
<td>1.07</td>
</tr>
</tbody>
</table>

Source: Li Shen, Martin Patel

Water consumption

Pulp and viscose fiber production are known to be water intensive. The water consumption of cotton production, however, is frequently underrated. US and Chinese cotton production per ton of fiber produced requires ten to twenty times more water than Lenzing viscose production, and the specific water consumption of some cotton production areas is far higher. In addition, most of the water consumed in industrial cellulose
To sum up: The Utrecht University study in its consideration of 11 environmentally relevant factors provides a clear and unanimous overall picture: The environmental load caused by Lenzing fiber production is many times lower than that of cotton. The widely held belief that the natural fiber of cotton is ecologically superior to industrially produced cellulose is not supported by scientific evidence.
Energy – a key factor for Lenzing

The production of cellulose fibers from the natural raw material of wood consumes significant amounts of energy, just like any industrial-scale production process. The Lenzing Group produces half a million tons of fibers annually. The process consumes five million megawatt hours of thermal energy and one million megawatt hours of electrical energy.

Careful energy management

Careful energy management is a Lenzing tradition. The biggest production site at Lenzing itself is proof of that: long before current energy and raw material trends made headlines, decisions and investments were made that created what is now the best practice example for the cellulose fiber industry.

Moreover, decades of accumulated and applied expertise of in the construction and operation of power plants at Lenzing is used to optimize the energy economics of Lenzing’s international sites as part of the Group’s globalization.

Intensive yet efficient

Lenzing is an energy-intensive, yet highly energy-efficient company. Cellulose fiber production, just like steel production, is very capital intensive. The given framework of costs (raw materials, energy, capital, staff, logistics) at the different sites is therefore an essential factor to be considered for successful management.

The sustainability concept of Lenzing is defined by the balance between economic success, environmental responsibility and responsibility for people. These three pillars are a clear commitment to energy efficiency and climate protection.

Optimizing and utilizing

As a company of sustainable products and long-term perspectives, Lenzing is also aware of the given constraints, in particular for energy conservation. For Lenzing that means customizing meaningful strategies of optimization to the actual and widely varying conditions at its diverse production sites. This procedure corresponds to the responsibility for the people working for the company in the various regions.

Climate-friendly raw material: wood

An essential factor of Lenzing’s sustainable production is the use of the renewable resource, wood. The customers of core business cellulose fibers get sustainable products that conserve the environment and have an excellent climate assessment. Live wood incorporates CO₂ from the atmosphere and breaks it up into carbon for building substance and oxygen. That is why forests are called the green lungs of the planet. Please refer to page 41 for more information.
Energy – a key factor for Lenzing

Energy production in the Lenzing Group (2007)

All production sites of the Lenzing Group can rely on secure energy supplied at a high technological level. The major fiber production sites especially operate highly efficient energy generation systems or are in close cooperation with local energy suppliers. These plants are equipped with cogeneration systems, which ensure a high level of fuel utilization.

Lenzing, Austria

<table>
<thead>
<tr>
<th>Steam and hot water</th>
<th>100% self-generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>93% self-generated</td>
</tr>
<tr>
<td></td>
<td>7% purchased and water power</td>
</tr>
<tr>
<td></td>
<td>very large degree of cogeneration</td>
</tr>
<tr>
<td>Facilities</td>
<td>4 liquor boilers</td>
</tr>
<tr>
<td></td>
<td>2 gas boilers</td>
</tr>
<tr>
<td></td>
<td>2 fluidized bed boilers (including RVL plant)</td>
</tr>
<tr>
<td></td>
<td>3 sulfuric acid boilers</td>
</tr>
<tr>
<td></td>
<td>6 steam turbines</td>
</tr>
<tr>
<td>Fuels</td>
<td>thick liquor, thickened bleaching liquor, bark, sludge, in-house residual matter, external residual matter (RVL plant), oil, gas, coal, sulfur</td>
</tr>
<tr>
<td>Installed capacity (thermal/electrical)</td>
<td>602 MW / 101 MW</td>
</tr>
<tr>
<td>Electricity consumption</td>
<td>70 MW (average)</td>
</tr>
</tbody>
</table>

Heiligenkreuz, Austria (Energy and Media Center Heiligenkreuz)

<table>
<thead>
<tr>
<th>Steam and hot water</th>
<th>90% self-generated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10% steam from a biomass power plant (since end of 2007)</td>
</tr>
<tr>
<td>Electricity</td>
<td>100% self-generated</td>
</tr>
<tr>
<td></td>
<td>cogeneration</td>
</tr>
<tr>
<td>Facilities</td>
<td>3 steam boilers</td>
</tr>
<tr>
<td></td>
<td>2 gas turbines with waste heat boilers</td>
</tr>
<tr>
<td>Fuels</td>
<td>natural gas</td>
</tr>
<tr>
<td>Installed capacity (thermal/electrical)</td>
<td>94 MW/9.5 MW</td>
</tr>
<tr>
<td>Electricity consumption</td>
<td>6.7 MW (average)</td>
</tr>
</tbody>
</table>
### Purwakarta, Indonesia

**Steam**  self-generated  
**Electricity**  self-generated and purchased  
**Facilities**  
- 4 fluidized bed boilers  
- 4 oil boilers  
- 2 waste heat boilers  
- 3 steam boilers  
**Fuels**  coal, natural gas, oil  
**Installed capacity (thermal/electrical)**  175 MW/19.2 MW  
**Electricity consumption**  20 MW (average)

### Grimsby, Great Britain

**Steam and hot water**  100% purchased from neighboring cogeneration plant  
**Fuels**  mainly natural gas, occasionally coal  
**Electricity consumption**  7.1 MW (average)

### Mobile, Alabama (USA)

**Steam and hot water**  100% self-generated  
**Electricity**  100% purchased  
**Facilities**  2 steam boilers  
**Fuels**  natural gas  
**Installed capacity (thermal)**  56 MW  
**Electricity consumption**  7.2 MW (average)

### Nanjing, China

**Steam**  40% self-generated, 60% purchased  
**Electricity**  100% purchased  
**Facilities**  1 waste heat boiler  
**Fuels**  light fuel oil, sulfur  
**Installed capacity (thermal)**  18 MW  
**Electricity consumption**  7 MW (average)

---

### Save Energy Year 2007

Save Energy Year 2007 was a broadly planned project with its initial focus on technical evaluation and staff attitude at the Lenzing site. The ambitious goal of another three percent energy saved in an already highly optimized production system will be achieved after all projects have been completed. Motivation, information, and training related to specific issues, accompanied by a communication program, turned staff into energy savers. Numerous workshops generated energy-saving ideas and concepts, which were collected at an idea exchange. Many of these ideas and projects have been implemented already. The remainder will be realized as soon as a team of experts has evaluated the input and made detailed plans.
### Lenzing AG fuel mix*

**Annual fuel input (2007): 12,600,893 GJ**

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Biogenic fuels and residual substances</th>
<th>Residual substances/Sedimentation sludge</th>
<th>Natural gas</th>
<th>Oil</th>
<th>Coal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>86.3% (CO₂ neutral)</td>
<td>29.6%</td>
<td>5.7%</td>
<td>1.3%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Liquors</td>
<td>44.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bark/Sawdust</td>
<td>12.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Comparison of energy sources

**Global, Lenzing Group, Lenzing site** (2007)

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>World</th>
<th>Lenzing Group</th>
<th>Lenzing site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-fossil fuels</td>
<td>8.0%</td>
<td>45.4%</td>
<td>86.3%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>6.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Oil</td>
<td>39.0%</td>
<td>1.1%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Gas</td>
<td>23.0%</td>
<td>24.8%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Coal</td>
<td>24.0%</td>
<td>28.7%</td>
<td>6.7%</td>
</tr>
</tbody>
</table>

**Source:** Lenzing AG

* incl. RVL
Focus CO₂

Continuous optimization increases power plant efficiency and decreases CO₂ output.

- In 2005 Lenzing modernized the water power plants at the Lenzing site: electricity generation by water power almost doubled.

- In 2007 Lenzing started the new liquor combustion boiler 2K10 at the Lenzing site: increased efficiency reduced CO₂ emission by 8,000 tons annually.

- 2007 at Lenzing became Save Energy Year: our dedicated staff will have saved three percent of the Lenzing site’s energy consumption with the completion of all projects.

- PT. South Pacific Viscose in Indonesia is a fully self-sufficient producer of process steam, which is generated at a coal-fired power plant and at the boiler facilities: cleaner natural gas now replaces oil as the energy source for the boiler house (generating heat for fiber drying).

- The in-house energy and utilities saving team at Purwakarta in Indonesia focuses on measures for reducing energy input. Many projects were implemented. A particularly effective success: significantly more efficient cooling systems with ammonia-based refrigerants made the old systems with their CFC (greenhouse effect) refrigerants obsolete – and less electricity consumed here means less coal used.

Company energy sources range from fossil fuels to the high-tech thermal post-utilization of wood. Wherever feasible, biogenic fuels are preferred, as is the case in particular at the Lenzing site due to the integration of pulp production and the use of internal and external residual waste.

The Group’s biggest site at Lenzing itself managed to continually improve its energy mix over the years. The energy consumption for the amount of 235,000 tons of produced fibers is correspondingly high: only a little over 1% had to be bought externally in the form of electricity.
Environmental protection systems in the Lenzing Group

**Lenzing, Austria**

- Multi-stage biological wastewater treatment plant (owned by Wasserreinhaltungsverband Lenzing – Lenzing AG)
- Sulfate removal: gypsum precipitation and anaerobic biological sulfate reduction
- Mechanical pre-treatment
- Neutralization pits
- Pre-treatment, zinc precipitation
- Dual-stage biological wastewater treatment plant
- Flocculation filter
- Sludge treatment
- External use of ashes
- Dual-purpose cooling towers (cooling water and wastewater)
- Waste gas treatment with sulfur recovery

**Heiligenkreuz, Austria**

- Equalization pit
- Neutralization pit
- Mechanical pre-treatment
- Online effluent monitoring
- Cooling towers
- Dual-stage gas washer
- Single-stage biological wastewater treatment plant (in-house)
- Incorporation of treated wastewater into local community wastewater treatment facilities

**Purwakarta, Indonesia**

- Neutralization pit
- Mechanical pre-treatment
- Pre-treatment, zinc precipitation
- Single-stage biological wastewater treatment plant
- Wastewater cooling tower
- Sludge treatment
- Waste gas treatment with sulfur recovery
Grimsby, Great Britain
- Equalization pit
- Neutralization pit
- Online effluent monitoring
- Cooling towers
- Water recycling

Mobile, Alabama (USA)
- Equalization pit
- Neutralization pit
- Cooling towers
- Single stage biological wastewater treatment plant (owned by Mobile County and operated by Lenzing Fibers Inc.)
- Sludge treatment
- Water recycling
- Wet electrostatic precipitator

Nanjing, China
- Dual-stage biological wastewater treatment plant (external, operated by joint venture partner)
- Waste gas treatment with sulfur recovery
REACH has been in force since 1 June 2007 with the declared objective of increasing protection for people and environment while at the same time improving the competitiveness of the European chemical industry. The regulation is the most compendious legislation created by the European Union so far. It provides uniform legal standards for the union.

The regulation is a challenge for the industry and the Lenzing Group. We will have to address new tasks and commitments and we will have to implement a new quality and intensity in communicating with our suppliers and customers.

Lenzing will implement the regulation as part of a group-wide project with the following objectives:

- to define and clarify areas of corporate responsibility
- to define a clear process of how REACH requirements can be communicated to our partners
- to secure long-term supply with production chemicals

The regulation affects the four business units of core business fibers, Textile Fibers, Nonwoven Fibers, Pulp and Energy and the three production sites, Lenzing, Heiligenkreuz and Grimsby. Cooperation and documentation takes place via a dedicated internet portal.*

We facilitate the business of our customers.

* The Plastics and Engineering Business Units are affected by REACH to a lesser extent. They have set up their own projects.
Lenzing is equally responsible for the chemical products it produces and the intermediate products it transports. Process chemicals are the second important factor: as a first step, current product lists have been carefully revised and updated considering hundreds of chemicals and preparations. Several substances and preparations were identified for special consideration. The criteria, among others, were strategic interest, supplier compliance with REACH requirements, and imports by Lenzing from non-EU countries.

Lenzing set up work groups for each selected chemical, made up of a group leader, a representative of the unit that processes the chemical, a representative of purchasing and a member of the REACH core group.

Checklists will support work groups and decision makers in finding the best procedures.

Staff attended seminars and workshops on the details and finer points of REACH. Lenzing is in close communication and continuous cooperation with the various associations of our industry, such as CIRFS, EDANA, FCIIO, IVC, ÖZEPA, WKO and others.

EDANA, the leading association of the nonwovens and related industries, assumes the important role of communication with our downstream industries. The Supply Chain Forum, already held in 2005, was an important early milestone of Lenzing’s REACH activities, providing us with firsthand information on the needs of this important market segment. Lenzing is a member of the EDANA REACH core group; therefore information on the needs of this important market segment is firsthand.

Lenzing spent a considerable amount of time on the implementation of REACH, and more time will have to be invested. With the end of pre-registration in 2009, even more time and money will be invested in external monitoring and assessment.

Lenzing is therefore well prepared for REACH. We are confident that our chemicals supply is secure and that we will be able to provide our customers with all the information they need. We see REACH as another challenge, to be taken on in the spirit of our motto: “We facilitate the business of our customers.”
Responsibility
for people

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Our employees
are the basis of our success

The commitment, creativity and skills of our staff are the basis for our success.

Our first priority is a safe work environment. We integrate it into all our corporate workflows.

We offer our staff a work environment that enables them to meet the personal and professional challenges of the market.

The pursuit of economic goals by the Lenzing Group does not prevent our support for sustainable organizational policies that recognize our social and business responsibilities.

As a global organization, we are committed to universal standards that go beyond statutory obligations, and our policies and actions express the values we hold. They are known as the Lenzing Principles. It is through the people that work for the company that we demonstrate our desire to constantly improve our performance and our business practices. Our success is therefore also the result of the dedication, creativity and skills of our staff, and above all, their motivation and willingness to learn.

Wherever we operate we observe local laws and regulations. We show respect for the local culture and the local way of life, with the real intention of understanding the special character of our host country. We want to understand and appreciate our host communities.

Interesting and challenging jobs

We offer our staff members a work environment that empowers them to take on the challenges of both their personal and professional lives in the best way possible. Therefore it is most important to us to promote individual responsibility and independent action, as well as to provide support for personal education and development. The company supports these goals through many activities and measures in order to position itself as an attractive, long-term employer.

The diversity of the jobs offered, such as chemical process engineer, plastics processing engineer, testing and control engineer, system assembling technician, textile technician, textile finisher, accountant, payroll accountant, project engineer, marketing manager, programmer, chemical engineer, research worker, laboratory worker, etc., is an incentive for many people to work for Lenzing at our sites around the world. In keeping with a farsighted human resources policy, the majority of skilled workers at the Lenzing site begin by being trained as apprentices in the company. With this policy, Lenzing provides a valuable contribution to the stability of jobs in Upper Austria.

Lenzing places great emphasis on cooperation with schools and universities. Every year, some 400 students find summer jobs and traineeships in business and technical departments, as well as in innovation and production.
Students at technical colleges are also offered job opportunities for their mandatory internship, with Austrian students also signing up for work in Indonesia.

In addition, the Lenzing Group commissions a number of doctoral theses and diploma papers on technical-chemical and marketing-related subjects. In the field of basic research, the company provides valuable, practice-oriented contributions to science.

Some of the attractive employment features in the Lenzing Group

- Interesting and challenging work
- Development and career opportunities
- Teams working together
- A global and success-oriented remuneration scheme in conformity with local markets
- A high level of safety at work
- Occupational health services provided at all sites
- National and international career opportunities
Our employees
are the basis of our success

The Lenzing Group staff

As of 31 December 2007, the Lenzing Group employed 6,043 people worldwide.

Distribution by country

Staff as of 31 December 2007: 6,043 people

Source: Lenzing AG
Our principles

The Lenzing Principles were presented and discussed with staff members at all sites.

**Economic Value Generation**
- We add value in all of our activities.
- We use our resources effectively.

**Entrepreneurial Spirit**
- We encourage creativity and thinking outside the box.
- We are positive and determined.
- We are flexible and responsive to change.

**Accountability**
- We are accountable for the well-being and development of our staff.
- We build and maintain strong customer and supplier partnerships.
- We comply with our social, legal and environmental responsibilities.
- We are accountable for our actions and results.
- We take responsibility and delegate authority to the level best able to make decisions.

**Openness and Integrity**
- We promote tolerance and respect for others and their cultural background.
- We create a trusting environment.
- We fulfill our commitments.
- We are open to new ideas and challenges.
- We give and receive constructive feedback and learn from experience.
Our employees are the basis of our success

Development opportunities

One of the principles of our human resources policy is to make every effort to identify labor market trends, such as new forms of employment, alternative schedule arrangements and modern forms of staff development. We want to promote the economic growth of our business and the long-term employment and personal development of our staff members through a variety of measures. These include job assignments in various parts of the world as well as wide ranging education and training programs. The relevant management and the human resources department are responsible for determining staffing requirements. Staff members are encouraged to take responsibility for their own development. We assign in-house staff to the majority of vacancies resulting from internal advertisements and selection processes. Intra-group job applications and placements are possible and encouraged, both within specific countries and internationally.

Specifically tailored special seminars and training courses are offered to allow staff members to further their qualifications. Specialized training options include courses on current IT topics and different modules in the fields of metal, electrical systems, plastics, chemistry and languages. The seminar program for personal development comprises team training activities, communication, management training and courses to improve potential.

Teamwork – the recipe for success

Team orientation is an important building block of our human resources policy. The Lenzing Group has relied on the principle of teamwork for a long time. In this type of organizational structure, the staff members cooperate with a high level of personal responsibility in order to reach the goals that they have set together. Teamwork helps to achieve visible success that can be measured in economic terms. However, teamwork also leads to changes in the attitude and conduct of staff members. Working in a group leads to a better team spirit and better communication, while at the same time reinforcing the competency and qualification of the individual team member. The challenges of the market, as well as internal differences, can be solved more easily. This approach also promotes cooperation between staff members and managers.

A global remuneration scheme

As a global enterprise, we require a competitive reward system to ensure that our staff members are remunerated in an equitable way in line with local market rates in each country in which we operate and that they are motivated to be successful.

On the basis of collective bargaining agreements, special remuneration systems have been developed for the different groups of staff members. The different job descriptions are used as a basis along with expertise, know-how, responsibility, environmental factors and experience to determine the value of the work provided. Depending on the location and the business activity, different remuneration schemes are applied.

Profit sharing schemes, which are linked directly to the business results, round off the remuneration policy. This has helped to promote the general interest of staff members in the economic development of the company.

Idea exchange

Good ideas from our own ranks contribute towards increasing the company’s success. The idea exchange is the point of contact for creative staff members who actively think beyond their own immediate scope of work. Numerous suggestions for improvements have been beneficial to both the company and staff members in the form of improved results and bonuses for staff members.
Safety Philosophy

- Healthy staff members in a sound company secure sustainable success.
- All workplace injuries and illnesses are preventable.
- We oblige our staff to work safely, to assume personal responsibility and to comply with safety regulations.
- Managers are expected to live safety leadership.
- We promote a safe and healthy lifestyle for all staff members.
- We invest in safe systems and processes, ergonomic workplaces and training.
- We benchmark ourselves against the best of our industry.

Safety and health

The Lenzing Group has its own health and safety management system. It is IT-based just like other quality management systems, and it is applied across the whole group. The head of health and safety management is a member of the management board.
Our employees are the basis of our success

A high level of safety at work

Our safety philosophy determines thought and action of the Lenzing Group.

Safety in the workplace is the responsibility of all staff members; it is integrated into all business processes. This philosophy is reinforced, in particular, by safety committees that meet regularly to decide on targets, strategies and specific programs, to be implemented at each location across the Lenzing Group.

The new companies integrated into the Lenzing Group received special support for implementing OHSAS 18001 safety management. Efficient knowledge management provided these companies with Lenzing safety expertise. This resulted in a decline of injuries as early as the second half of 2007. Plant safety is being further improved by consistently and continuously reducing residual operative risk. In 2007 technical improvements were made to systems for the protection from fire, explosions and emissions.

Development of injury rates in the Lenzing Group

The health of staff members has top priority. All sites have taken measures to ensure professional work health care.

The Lenzing site health program has been running for several years and will be continued. Special care is taken to address the issue of employees psychosocial crises. A practical handbook was
compiled, and recommended practice was taught in several workshops. A social worker provides support when needed. Prevention offers customized stress tests and enhancement seminars. Existing offers, such as health days, spinal exercise programs, fitness classes, health checks, smoking cessation seminars and counseling on ergonomics were expanded. To promote the health awareness of adolescents, Lenzing started a special young health promotion program in 2007 together with its trainees and in collaboration with the health insurance of Upper Austria.

When we send our staff members abroad, we provide them and their partners and children with medical care tailored to their needs and the requirements of the country in question, including detailed medical checkups before and during assignments.

A center for occupational medicine with excellent equipment is available to staff members at the Lenzing site, both for treatment and prevention.

The Institut für humanökologische Unternehmensführung GmbH has been in charge of the health center’s management since the beginning of 2007.
Our employees are the basis of our success

Health program 2007 at the Lenzing site

Corporate psychology
- Help for staff members in times of psycho-social crisis
- Compilation of a handbook (‘Psycho-social Crises’)
- Several workshops for managers

Trainees
- Incorporation of health care and prevention issues into the training program
- Three workshops

Human work index
- Analysis of findings in health circles and workshops

Spinal exercise program
- The successful program of several years is being continued

Health check 40+
- Staff members over 40 are offered free health checks

Healthy despite stress
- Special tests and seminars for coping with stress
- Relaxation for shift workers

Smoking cessation seminars
- For groups of up to 25 on demand

Shared transport
At the bigger sites, the company operates its own commuter system that takes staff members to and from their homes in the surrounding communities. Staff members pay the public transport rate, and the company covers the remaining cost.

Retirement
Most of the companies in the Lenzing Group offer pension plans to help employees plan for their retirement. Staff members contribute to these plans and receive a supplementary pension made up of the accrued capital plus interest when they retire.
Social responsibility
at the sites

The Lenzing site

Lenzing is the region’s lead company. It has a clear focus on the locality and provides regular sponsoring activities within the framework of social responsibility as a part of the company’s sustainability philosophy. Lenzing’s sponsoring concept has a long-term perspective and is based on sustainability. It is not primarily a PR tool; instead the company offers itself as a sustainable and reliable partner.

Sponsoring activities focus on numerous social projects and clubs with an interest in communal values, such as sports and cultural issues. Cultural sponsoring emphasizes culture as a visible part of everyday life.

The company supports a number of social and charitable initiatives, such as an SOS Children’s Village, local social organizations like the Vöcklabruck Hospice Movement, Upper Austrian Life Aid and Clini Clowns, an organization providing emotional support to children during their hospital stay.

In 2005 Lenzing started a cooperation with a self-help group for children suffering from epidermolysis bullosa.

Sponsoring of cultural events focuses on events initiated by the numerous local and regional clubs.

The sports initiative

The local sports club, “Arbeiter Turn- und Sportverein ATSV Lenzing Modal,” has been Lenzing’s club ever since its foundation 80 years ago. For a long time, this club was one of the few opportunities for many employees to find active recreation. To express Lenzing’s close ties to the site community, all sections of the club are supported. Similar forms of cooperation exist with sports clubs of neighboring communities.
Social responsibility at the sites

The Heiligenkreuz site

The Heiligenkreuz plant, too, fosters relations with the local community with a broad range of activities. In addition to projects with schools, clubs and the Red Cross, institutions such as the “Sterntalerhof” (a center for severely disabled children), “Sportpool Burgenland” (supports athletes of Burgenland on their way to top national and international status) and “Jopera” (summer festival in Jennersdorf) are supported. The health-group plans and supports various activities to promote staff health (health checks, health bus, free fruit on-site, cost sharing scheme for glasses).

The Nanjing site

Our newest site at Nanjing in China, which was built on a new business park outside the city, has contributed in excess of 550 jobs to the local community, which previously was mainly an agricultural area. Following the commissioning of the plant and the commencement of commercial production, the company has worked with the employees to establish a labor union to help with employee welfare and communication issues.
The Purwakarta site

The viscose plant at Purwakarta, Indonesia is characterized by a multinational corporate culture. A residential complex right on the plant premises offers a home to 160 families, comprising a total of 600 individuals. The houses are provided and maintained by the company. There is a special playground for the children of the workers’ families, as well as a soccer field and a swimming pool. Transport is also provided for taking employees’ children to school.

Training and development plays a significant role at the site where a mechanical and process training center is used to upgrade the skills of both production and maintenance staff. Also employees have participated in a global training program entitled Economic Thinking, aimed at getting staff members to evaluate everything they do in terms of adding value in line with the Lenzing Principles. A mosque within the plant gates is available to the mainly Muslim staff members. A small clinic for industrial medicine offers medical assistance.

SPV’s environmental and social standards make the company a pioneer of the Asian fiber industry. Lenzing’s technology of closed chemical cycles is applied at SPV in a way similar to that at the Lenzing site. In combination with state-of-the-art waste gas and wastewater purification facilities, this technology enables very high environmental standards in production. Moreover, SPV has long been committed to improving education and social conditions in the area around the Purwakarta plant. The company sponsors schools and educational projects, and finances numerous communal projects.

There are also many different social activities outside the plant gates. In addition to sponsoring projects in the immediate vicinity of the region, support is given to the closest neighbors. In recent years, SPV has taken a fair number of initiatives in order to improve the prevailing living conditions. A foundation, in which the village community is represented as well as the responsible people from SPV, carries out a wide range of projects. Work has been ongoing on refurbishing houses, renovating the school building and resurfacing the road in the village adjacent to the site. Food is also given to needy people, and clean water supplies are maintained. Furthermore, SPV finances scholarships so that the children in the surrounding villages can attend schools that require the payment of tuition fees.

Employees and their families also participate in an annual recreation event sponsored by the company involving approximately 5,000 people.
The Grimsby site

The TENCEL® plant at Grimsby in the United Kingdom continues to develop its engineering apprenticeships to ensure the growth of the skills that are needed not only now, but for the long-term future of the business. In line with this commitment to development and training all employees at the Grimsby site participate in annual development reviews to establish their training needs for the coming year in order to ensure their development continues from recruitment to retirement.

The company’s systemic management approach is based on the Lenzing Principles. A consultation forum in which business information is shared and matters affecting employees are discussed is actively used.

The Grimsby site has been accredited as an Investor in People. This is a national award that recognizes the company’s commitment to the training and development of employees in line with the business strategy.

The Kelheim site

Qualified staff are appreciated as the most important resource at the Kelheim site. A wide range of training opportunities for young people in eight different fields provide the basis for excellent teams. The career of each and every staff member is promoted with customized further training. The company actively cares for economic security after retirement by providing pension plans.

Our health team offers regular medical checkups and a variety of programs, ranging from skin cancer prevention to smoking cessation support in collaboration with health insurers. Initiatives such as “Cycle to Work” and the nordic walking group invite employees to spend leisure time actively.

The dividend this commitment pays is highly qualified and motivated staff, and an exceptionally low job turnover rate.
The Mobile site

The TENCEL® plant at Mobile in southern Alabama in the United States is proud to be involved with the United Way, a community-based organization that provides resources for a variety of programs to help individuals and families in times of need. The company matches employee contributions to the United Way and provides volunteers to help in fund-raising and worthwhile community projects. In the local community, Lenzing Fibers is an active member of the LeMoyne Industrial Park. All activities associated with the industrial park are designed to foster a cooperative relationship between industry and the community for the betterment of all. The company supports an employee charitable contributions committee, which reviews requests by employees to sponsor local youth sports teams and other community-related activities and events. Special consideration is given to activities in which employees personally volunteer their time. The Lenzing Principles were introduced to site employees during 2007. They support the site’s commitment to safety, teamwork and continuous improvement.

The Lexington site

The Lexington plant in South Carolina in the United States, which joined the Lenzing Group in 2007, is now working closely with ReadySC, a workforce development program that coordinates activities among the South Carolina technical colleges. A Training Program has been developed for staff members dealing with issues of operation, safety and quality.

In conjunction with the company’s health care providers, the Lexington site conducts an annual wellness program as a proactive approach to monitoring and managing the health of our employees.
Focus at the companies recently acquired by the Lenzing Group: Expanding training to further improve staff qualifications and skills.
Du Guoxiang (36)
Nanjing, China

Du Guoxiang was born in Hebei province in northern China and holds a degree in mechanical engineering. He is married and the father of a ten year old son. His interests include science and technology, and he likes to read books like “A Brief History of Time” by the famous British physician Stephen W. Hawking. Before he joined Lenzing, Du Guoxiang had worked at the Tangshan fiber factory, a company operating with equipment made by Lenzing Technik. His excellent contacts to Lenzing go back to those days. He has been on the Lenzing team in Nanjing since April 2006 and his contribution to the start-up of fiber production in Nanjing has been considerable.

“I love to work for Lenzing because my technical experience is appreciated and – very important to me – I keep learning. The Lenzing spinning equipment runs smoothly and produces excellent fiber quality. I am proud to work for the world leader in cellulose fibers. Lenzing is a responsible employer, and the work atmosphere is excellent.”

The international Lenzing Group employs people from a wide range of cultural backgrounds, languages and skills. This blend of views, expertise and qualifications generates new concepts and ideas and is the basis of creativity, innovation and therefore Lenzing’s long-term success.
Talking
with our staff members

Gerhard Danninger (51)
Jakarta, Indonesia

“As part of my work as marketing and sales director for the Textile Fibers and Nonwoven Fibers Business Units, some 200,000 tons of fibers pass over my desk every year, so to speak. Asia is a huge market on the one hand, but everybody knows everybody, on the other. I love the insight my work provides; and the opportunity to participate in shaping events makes this job special for me. I like to work for Lenzing, it’s an exciting company.”

Austrian-born Gerhard Danninger started working for Lenzing in 1984 as part of the fiber sales team. After several years on different assignments within the Group and a period of professional activity outside, he followed Lenzing’s call to rejoin in 2003. He is now a member of SPV’s management board and in charge of fiber sales in Asia, Australia and parts of Africa. He is away from home a lot as the job makes him a frequent traveler. But whenever he is home, he is in – Jakarta.

Anja Zenz (24)
Heiligenkreuz, Austria

Anja Zenz started her career eight years ago as a lab technician trainee at the Heiligenkreuz site. The choice for her then was either more years at school or an apprenticeship with Lenzing. She opted for the apprenticeship at Heiligenkreuz.

“The opportunity to start an interesting apprenticeship in chemistry right where I lived was the decisive factor. Lenzing is known as a good employer in our region, and I was looking forward to an interesting and versatile job. My area of responsibility today covers routine and special chemical analyses for environmental and process assessments. Documentation is part of my job, too. Chemistry is an exciting field, and I enjoy my work. Its spectrum is broad, and the challenges are always new. I never regretted my decision to work for Lenzing.”
Liu Ping (31)
Shanghai, China

Liu Ping is married and lives with her family in Shanghai. The dynamic mother of a little daughter is logistics manager at Lenzing Fibers Shanghai. Liu Ping is open to everything new, and it is important for her to be able to tackle problems up-front, without skirting the issues. She is an optimist and believes that tomorrow will be even better than today, along with the Chinese saying “There will always be a beautiful rainbow after a thunderstorm”. The challenges and problems that her job brings along are a source for professional as well as personal development. Liu Ping about what she likes best about her work environment:

“I am interested in European culture, like to work in a good team and my colleagues and I get along really well. It is important to me to find out who I am and where I am heading – my work for Lenzing provides me with the opportunity to discover that.”

Tricia Carey (35)
New York, USA

Tricia Carey is a third-generation American with German roots. She is married and has two children, aged four and eight. For Tricia Carey, her work in the fashion business as a Lenzing US merchandiser is more than just a job. Her passion for textile design extends well into her private life, too: the fantastic Halloween costumes she designs and makes for her ten nieces and nephews are just one example of her textile creativity.

The fashion expert with a degree in fashion merchandising first got a feel for TENCEL® back in 1998 through her job in cloth purchasing for a US apparel company. As a Lenzing merchandiser, she now provides the US textile world with prime information on TENCEL®, Lenzing Modal® and MicroModal®. What does she like about her job in particular? “Every day in the fast-paced world of fashion is unique! We are able to meet the needs of customers sourcing ecologically minded fibers. Our global network makes us a ‘winning team’ – it is simply great fun!”
Talking
with our staff members

Christine Setianegara (32)
Jakarta, Indonesia

Jakarta-born Christine Setianegara, lives “just five minutes by motorbike” away from the Jakarta office of PT. South Pacific Viscose. An unusually short ride, considering Jakarta traffic—and as unusual as Christine herself: full of bounce, with perfect German (acquired at Wilhelmshaven University, Germany), and English, and quite a bit of French and Mandarin, apart from her native Indonesian.

Christine has been the right hand of sales and marketing director for Asia, Gerhard Danninger, as part of a multitasking job: “It requires flexibility, dedication, responsibility, and above all: speed” she says about her challenging job. “I am outgoing, love to travel and to meet people with different cultural backgrounds. It is delightful. I like working for Lenzing, with its international companies, its different fields of business and the variety of nationalities and cultures.”

Günther Maier (45)
Lenzing, Austria

The trained technician describes himself as a “happy single with a seventeen-year old daughter.” He joined Lenzing right after having passed his general university entrance exam and has gained the experience to do his present work in a number of jobs in pulp production. He is section staff coordinator in pulp production and responsible for any staff and safety concerns, as well as for production coordination with other sections.

“I grew up in the Lenzing area – already my parents were “Lenzingers” – and that makes for a special relationship with this company. Lenzing AG offers safe employment in wonderful surroundings, and I have many fantastic colleagues. I like to work with people and the challenge to reconcile the interests of so many individuals with those of the company is simply exciting.”
# Facts and figures

<table>
<thead>
<tr>
<th></th>
<th>under IFRS</th>
<th>under US GAAP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sales and result</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales ** EUR mill.</td>
<td>1,260.5</td>
<td>1,042.6</td>
</tr>
<tr>
<td>Sales outside of Austria ** %</td>
<td>85.9</td>
<td>85.6</td>
</tr>
<tr>
<td>Income from operations (EBIT)/ Operating result ** EUR mill.</td>
<td>162.3</td>
<td>(32.8)</td>
</tr>
<tr>
<td>Financial result ** EUR mill.</td>
<td>(11.3)</td>
<td>(11.3)</td>
</tr>
<tr>
<td>Income before taxes and minority interest (EBIT) ** EUR mill.</td>
<td>151.0</td>
<td>(32.8)</td>
</tr>
<tr>
<td>Income taxes ** EUR mill.</td>
<td>(11.3)</td>
<td>(11.3)</td>
</tr>
<tr>
<td>Net income ** EUR mill.</td>
<td>151.0</td>
<td>(32.8)</td>
</tr>
<tr>
<td>Net income attributable to shareholders of Lenzing AG EUR mill.</td>
<td>109.6</td>
<td>(32.8)</td>
</tr>
<tr>
<td><strong>Cash flow</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross cash flow ** EUR mill.</td>
<td>203.6</td>
<td>223.8</td>
</tr>
<tr>
<td>Gross cash flow as percentage of sales ** %</td>
<td>16.2</td>
<td>16.2</td>
</tr>
<tr>
<td>Operating cash flow EUR mill.</td>
<td>223.8</td>
<td>223.8</td>
</tr>
<tr>
<td>Free cash flow EUR mill.</td>
<td>223.8</td>
<td>223.8</td>
</tr>
<tr>
<td>**Capital expenditure ** (Intangible assets, property, plant and equipment) EUR mill.</td>
<td>136.7</td>
<td>136.7</td>
</tr>
<tr>
<td>**Assets structure ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-current assets %</td>
<td>62.1</td>
<td>62.1</td>
</tr>
<tr>
<td>Current assets %</td>
<td>37.9</td>
<td>37.9</td>
</tr>
<tr>
<td>Total assets EUR mill.</td>
<td>1,308.6</td>
<td>1,308.6</td>
</tr>
<tr>
<td>**Capital structure ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted Equity/Equity %</td>
<td>44.8</td>
<td>44.8</td>
</tr>
<tr>
<td>Post employment benefits %</td>
<td>6.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Liabilities (excl. post employment benefits) %</td>
<td>48.9</td>
<td>48.9</td>
</tr>
<tr>
<td>Number of employees at year-end</td>
<td>6,043</td>
<td>29,88</td>
</tr>
</tbody>
</table>

** under IFRS

1) = Equity incl. grants less proportionate deferred taxes
2) = NOPAT (= Income from operations (EBIT) less proportionate income taxes) 
3) = NOPAT (The average of stockholders’ equity and minority interests + Interest bearing debt + Cash + Investments + Current and non-current securities and loans) / (1+31/12)^2
4) = NOPAT + amortization of intangible fixed assets and depreciation of property, plant and equipment

** under US GAAP

1) = NOPAT (= Income from operations (EBIT) less proportionate income taxes) 
2) = NOPAT (The average of stockholders’ equity and minority interests + Interest bearing debt + Cash + Investments + Current and non-current securities and loans) / (1+31/12)^2
3) = NOPAT + amortization of intangible fixed assets and depreciation of property, plant and equipment

Facts and figures

Emissions into water

**Cooling water**
Lenzing, Purwakarta, Grimsby and Heiligenkreuz

- Million cubic meters per year

**Wastewater**
all sites*

- Million cubic meters per year

**COD**
all sites*

- Metric tons per year

* Including all sites where parameters are relevant, excluding Nanjing (under construction at the record date)
Zinc
Lenzing and Purwakarta

SO₄
Lenzing, Purwakarta and Heiligenkreuz
Facts and figures

Emissions into the air

**CO₂ fossil**
all sites*

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
</table>
| **SO₂**
| all sites* |
| Year | 2004 | 2005 | 2006 | 2007 |
| **NOₓ**
| all sites* |
| Year | 2004 | 2005 | 2006 | 2007 |
| **H₂S**
| Lenzing and Purwakarta |
| Year | 2004 | 2005 | 2006 | 2007 |

* including all sites where parameters are relevant, excluding Nanjing (under construction at the record date)
Awards

**DIN CERTCO**

Lenzing fibers are fully biodegradable. As opposed to fibers based on fossil raw materials, Lenzing Viscose® and TENCEL® decompose in the soil or in water treatment plants. Nonwovens made from these fibers are certified and registered as compostable materials by DIN CERTCO.

**Eco-Label of the European Commission**

The “European Flower” demonstrates the ecological leadership of Lenzing fibers. This symbol for environmentally sound products has been awarded since 1992 – the European Eco-Label. It tells consumers in the European Union, Norway, Liechtenstein and Iceland that the product in their hands is ecologically sound – such as Lenzing fibers. Lenzing is the first fiber manufacturer to have received the Eco-Label of the European Union.

**European Award for the Environment**

„European Award for the Environment” of the European Union for Lenzing Fibers GmbH (formerly Lenzing Lyocell). Among the criteria for this award is the consideration for the ecological and social aspects of corporate management, products, technology and international partnerships. The emphasis is on sustainable management of environment and resources.

**ÖKO-TEX Standard 100 Certificate**

“Confidence in textiles – tested for harmful substances”

**Panda-Award (WWF Austria)**

Awarded by Claude Martin, director general of WWF International, and Helmut Pechlaner, president of WWF Austria, in recognition of the support for the goals of the WWF, in particular the WWF water program and special achievements in and commitment to the protection of natural environments.

**Responsible Care**


**VÖNIX Sustainability Index**

The Lenzing share is listed on the VÖNIX Sustainability Index. VÖNIX (VBV Sustainability Index) lists Austrian companies quoted on the stock exchange who are leaders in social and ecological performance.
Facts and figures

Awards

R.I.O. Award 2006
Recognition for TENCEL®, the lyocell fiber by Lenzing

R.I.O. stands for
Reduce resource consumption
Implement innovation
Optimize

The R.I.O. Award recognizes ideas that will shape the future and companies whose products set new standards in material and energy efficiency.

www.rio-award.info

CSR ranking Austria 2008
ThinkTank Center for Corporate Citizenship

Rank 9 (of 100) in the Austrian CSR Ranking – ranking companies with commitment to environment, staff and social issues beyond legal requirements.

www.ccc-austria.at

Certification progress in the Lenzing Group

<table>
<thead>
<tr>
<th></th>
<th>ISO 9001</th>
<th>ISO 14001</th>
<th>OHSAS 18001</th>
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<tbody>
<tr>
<td>Lenzing</td>
<td>✓</td>
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<td>✓</td>
</tr>
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<td>Heiligenkreuz</td>
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<td>✓</td>
</tr>
<tr>
<td>Grimsby</td>
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<td>✓</td>
</tr>
<tr>
<td>Mobile</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>Purwakarta</td>
<td>✓</td>
<td>✓</td>
<td></td>
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<tr>
<td>Nanjing</td>
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</tbody>
</table>

2007
Cellulose production – chemical cycles, by-products, utilization (simplified)
Facts and figures

Lenzing production processes

Viscose fiber production

From wood to lyocell

* N-Methylmorpholinoxide
Glossary

Anaerobic wastewater cleaning system for biological sulfate removal: A novel system for the biological removal of sulfates from wastewater. This wastewater treatment process is new to the viscose fiber industry. Anaerobic bacteria decompose the relevant substances primarily into sulfide and methane. The waste gas contains methane and is used for the generation of electricity and process heat.

Carbon footprint: Describes the quantity of generated CO₂ attributable to the production process of a particular product.

Cellulose: The raw material of viscose fiber production. Cellulose is a component of all plants. The cellulose content of wood is about 40%.

CIRFS: Comité International de la Rayonne et des Fibres Synthétiques (International Rayon and Synthetic Fibres Committee). Represents the European man-made fiber industry

COD: Chemical oxygen demand. A method for assessing the organic load of wastewater (next to BOD biological oxygen demand) using the chemical oxidation potential of wastewater load.

Discoloring pulp: A special kind of pulp used to manufacture viscose, modal and lyocell fibers and other cellulose-based products.

Emissions/Immissions: Substances, noise, vibration, light, heat, radiation, odors or similar phenomena emitted during production (emissions). Their impact on the environment decreases with increasing distance from the source and abates with time (immissions).

FCIO: Association of the Austrian Chemical Industry

Furfural: A chemical product generated at pulp production. It is used, among other applications, as a plant protection agent.

Integration: All stages of fiber production are located at one site – from wood, the raw material, to pulp and fiber production.

Lyocell fiber: A novel fiber developed by Lenzing, produced by a highly environmentally sound solvent process. Its properties enable the design and production of new and innovative products.

Modal: Viscose fiber refined by modified spinning conditions and characterized by its special softness: The preferred fiber for high-quality lingerie.

Nonwovens: Nonwoven materials. fleece. Nonwovens made from fibers by Lenzing are used for sanitary, medical and cosmetics applications.

OHSAS 18001: Occupational Health and Safety Assessment Series. A series of health and safety standards jointly developed by the British Standards Institution and international certification agencies.

ÖZEPA: Österreichische Vereinigung der Zellstoff- und Papierchemiker und -techniker (association of Austrian pulp and paper chemists and technicians)

Responsible Care: A global and voluntary initiative of the chemical industry setting up a stringent control and monitoring system to improve health, safety and environmental protection standards. Companies in the chemical industry complying with these standards are awarded the certificate “Responsible Care” with a validity of three years.

Vapors condensate extraction: A process for recovering volatile ingredients (acetic acid and furfural) from the condensed vapors of evaporation units by means of extraction.

Viscose fiber: Cellulose fiber produced by the viscose process from the natural raw material wood.

WKÖ: Wirtschaftskammer Österreich (Austrian chamber of industry)
Glossary

Anaerobic wastewater cleaning system for biological sulfate removal:
A novel system for the biological removal of sulfates from wastewater. This wastewater treatment process is new to the viscose fiber industry. Anaerobic bacteria decompose the relevant substances primarily into sulfide and methane. The waste gas contains methane and is used for the generation of electricity and process heat.

Carbon footprint:
Describes the quantity of generated CO₂ attributable to the production process of a particular product.

Cellulose:
The raw material of viscose fiber production. Cellulose is a component of all plants. The cellulose content of wood is about 40%.

CIRFS:
Comité International de la Rayonne et des Fibres Synthétiques (International Rayon and Synthetic Fibres Committee). Represents the European man-made fiber industry. www.cirfs.org

COD:
Chemical oxygen demand. A method for assessing the organic load of wastewater (next to BOD biological oxygen demand) using the chemical oxidation potential of wastewater load.

Dissolving pulp:
A special kind of pulp used to manufacture viscose, modal and lyocell fibers and other cellulose-based products.

EDANA:
European Disposables And Nonwovens Association. www.edana.org

Emissions/Immissions:
Substances, noise, vibration, light, heat, radiation, odors or similar phenomena emitted during production (emissions). Their impact on the environment decreases with increasing distance from the source and abates with time (immissions).

FCIO:
Association of the Austrian Chemical Industry. www.fcio.at

Furfural:
A chemical product generated at pulp production. It is used, among other applications, as a plant protection agent.

Integration:
All stages of fiber production are located at one site – from wood, the raw material, to pulp and fiber production.

IVC:
Industrievereinigung Chemiefaser e. V. (association of German and Austrian man-made fiber producers). www.ivc-ev.de

Lyocell fiber:
A novel fiber developed by Lenzing, produced by a highly environmentally sound solvent process. Its properties enable the design and production of new and innovative products.

Modal:
Viscose fiber refined by modified spinning conditions and characterized by its special softness: The preferred fiber for high-quality lingerie.

Nonwovens:
Nonwoven materials. Flecso. Nonwovens made from fibers by Lenzing are used for sanitary, medical and cosmetics applications.

OHSAS 18001:
Occupational Health and Safety Assessment Series. A series of health and safety standards jointly developed by the British Standards Institution and international certification agencies. www.quality.de

ÖZEPA:
Österreichische Vereinigung der Zellstoff- und Papierchemiker und -techniker (association of Austrian pulp and paper chemists and technicians). www.austropapier.at

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Xylose:
Wood sugar, component of thick liquor and base material for xylitol (caries-inhibiting sweetener).