Sustainability in the Lenzing Group

"Man is not the measure of all things, but life in the midst of life that also wants to live" (Albert Schweitzer)
Aerial view of the Lenzing site with Lake Attersee and the Salzkammergut Region in the background

ARA treatment basin at Lenzing AG

Fitness Day of the Lenzing Group

The Ager River on the Lenzing factory site

Outside view of high-rise storage rack system

View of interior of high-rise storage rack system

Detailed view of the smokestack at the Lenzing site

View of SPV

Members of staff at SPV/Purwakarta

Children from the children's orphanage at Altmünster/Lake Traunsee

View at angle of liquor tower in direction of smokestack

Main entrance to the Lenzing site

Thomas Fahnemann, Peter Untersperger, Christian Reisinger

The Managing Board of the Lenzing Group (from left to right):

Reflection of the smokestack in the Ager River which runs through the Lenzing premises

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Introduction

Sustainability – Quite Naturally
Yesterday – Today – Tomorrow

At an early point in time, long before everybody adopted this catchword, our company took account of the principles of sustainability. We were pre-destined to take an interest in sustainability, since we use wood – a renewable raw material – and manufacture our products with the greatest possible ecological compatibility, and since we are also concerned about our economic efficiency and want to create attractive jobs. With this publication the Lenzing Group presents – for the first time – a detailed overview regarding its sustainability aspects. We will continue to attach the necessary attention to this subject.

The Lenzing Group is the worldwide leader in cellulose fiber technology and also sets environmental standards in this field.

At the Lenzing site, we used the ecological and economic benefits of an integrated pulp production, together with a wide range of environmental measures in order to become the show-case company of the industry. Since wood is our natural raw material and we have a CO2 balance that is 70% neutral, sustainability is a principle put into practice at Lenzing.

Making careful use of resources, reducing emissions and thinking in holistic terms, in the sense of considering the life cycle of our product that is made of wood, the renewable raw material – these are part and parcel of our commitment to ecological sustainability.

The very gratifying economic results of the past years also show that we succeeded at the same time to secure the Lenzing Group’s economic sustainability through the application of appropriate strategies. In this context, growth, innovation and productivity are
three dimensions that play an important role for the Lenzing Group.

The achievements of the past years would not have been possible without the assistance of a motivated staff. Responsibility for staff members, but also attentiveness in our dealings with all interested groups, ranging from regional stakeholders to our customers and owners have always been and continue to be an important background to all decisions in the company.

It has been our experience that any effort to reach a balance between ecology, economics and social responsibility benefits all parties involved. For the Lenzing Group these principles are the basis for efficient business operations, growth and innovation, thus also ensuring our competitiveness and jobs on a long-term basis.

Lenzing, January 2004

[Signatures of Christian Reisinger, Thomas Fähnemann, Peter Untersperger]
Introduction

Companies are in a continuous process of development. They are exposed to the ongoing changes in society and thus never actually come to a standstill. Those who do stand still run the risk of soon being overtaken. A vital question to ask is therefore whether the development process of a company is conducted actively and with foresight. With the present publication the Lenzing Group has taken an important step in this direction. After all, for the first time it is not only economic issues that are addressed but also ecological developments and those with social implications.

Sustainability – A modern example for companies of tomorrow

At the beginning of a new millennium, many companies are increasingly becoming aware that economic success is only possible if the development also allows for a long-term perspective of the future. In addition to economic issues, sustainability also takes account of social and ecological issues. This combination is a major prerequisite for securing a business and industrial site, its jobs, and also the quality of life of the people involved. The Lenzing Group, too, is also guided by the example of sustainability in its activities. The present publication is therefore not only limited to enhancing communication about sustainability, in keeping with the slogan: “Speak about the good things that you do”. Since every initiative regarding sustainability reflects on the entire company, it also triggers additional, significant impulses:

- Creating awareness within the company
- Actively broadening the field of vision
- Improving the risk management
- Supporting strategic management
- Identifying and promoting opportunities for innovation
- Reinforcing the image and competitiveness

Sustainability – An innovative solution for the products of tomorrow

The achievements regarding innovation and the environment are certainly at the center of the Lenzing Group’s sustainability efforts. In this connection, many examples from Lenzing’s development sites would merit mentioning. However, a company that wants to be more conscientiously guided by the concept of sustainability will take the initiative on different levels: sustainable management, sustainable management systems, innovation management, staff development, development of organizational struc-
tures and communication about sustainability. The present publication is an important element to support a sustainable corporate development. It shows what achievements the Lenzing Group has obtained so far. The company’s further course will depend largely on its capacity to learn and to organize change in order to meet the cultural, social and natural challenges.

*Sustainability – The emotional wisdom of tomorrow’s customers*

In a world of saturated markets, emotional factors are increasingly becoming decisive. Credible facts about sustainability strengthen the image and thus also the competitiveness, not only on the product but also on the personnel and capital markets. In terms of time, the Lenzing Group is becoming more sensitive to medium and long-term trends. In terms of its geographical location, Lenzing is making it increasingly known what its relations are with the environment, with suppliers and the regions. With the present publication Lenzing is acting in an innovative spirit in order to actively face the growing demands on information transparency, value systems and product biographies. Sustainable development is a transitional process, which you begin by taking small steps. Lenzing has taken an important step in this direction with great commitment! Let me quote Robert Jungk to wish the Lenzing Group all the best for the course of sustainability on which it has embarked: “Only those who invent the future in advance can hope to effectively influence it.”

Alfred W. Strigl
The Lenzing Group is a worldwide leader in manufacturing and distributing all three generations of man-made cellulose fibers (Viscose, Modal and Lyocell), which primarily have a tradition for being used by the textile industry. However, special fibers made by Lenzing AG can also be found in many areas of the nonwovens industry (e.g. fibrous webs for hygiene, medical and cosmetic applications), as well as in the technical sector.

The success of the Lenzing Group is based on its consistent focus on customers, coupled with technology and quality leadership. The economic strength is secured both by focus on special products and a very good cost position.

The Group also operates in the field of engineering and systems construction, as well as the plastics and the paper sectors.

---

**The site at Lenzing, Austria**

The world’s largest integrated pulp and viscose fiber production

Capacity: 200,000 tons of fibers per year

Plastic products, engineering and systems construction, paper production

Staff: appr. 2,800

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**The site at Heiligenkreuz, Austria**

Production of Lyocell fibers

Capacity: 40,000\(^{1}\) tons per year

Staff: appr. 180

---

**The site at Purwakarta, Indonesia**

Production of viscose fibers

Capacity: 135,000 tons per year

Staff: appr. 1,500

---

\(^{1}\) Man-made cellulose fibers are industrially produced fibers made of natural raw materials (e.g. wood)  
\(^{2}\) 40,000 tons as of 2004  
\(^{3}\) incl. SPV
Sustainable development is a development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs and choose their own lifestyle. The requirement to make this development “sustainable” applies to all countries and people.

(Gro Harlem Brundtland: World Commission Report on Development, 1987)

Since it is a social process, sustainable development cannot only be achieved by standards and technical change alone. What is also needed is an in-depth change in values, objectives and – consequently – in society’s patterns of behavior when dealing with the challenges of the future.

(Designing a Sustainable Future for Austria – Austrian Strategies for a Sustainable Development)

In the long run, economic growth, social cohesion and environmental protection must go hand in hand. A sustainable development offers the European Union the positive long-term perspective of a more prosperous and equitable society; it promises a cleaner, safer and healthier environment – a society which offers us, our children and grandchildren a better quality of life. In order to reach this objective, economic growth must promote progress in the social field and respect the environment; social policies must support the performance of the economy, and environmental policies must be cost-effective.

(EU Commission)
The Three Dimensions of Sustainability

Sustainability is not a strategy designed to secure interests in the short run, but rather, a long-term process which comprises ecological, social and economic aspects.

Sustainability is a simple concept; the balance between the environment and society must not be upset through entrepreneurial actions – neither today, nor tomorrow. Adding long-term and competitive value in production, distributing resources fairly and providing social justice, as well as safe and sound working conditions; these are the issues that receive foremost attention.
Introduction

| Milestones |

Innovative technologies and major investments into environmental protection have made the Lenzing Group the quality and technology leader for man-made cellulose fibers. The central milestones along this road were, in particular, to set up new companies and to introduce new processes:

| 1938: | “Zellwolle Lenzing AG” was founded. Viscose fiber production began. |
| 1969: | The Lenzing pulp and paper factory was bought. The introduction of the magnesium bisulfite technology, developed at Lenzing for pulp production, allowed for the recovery of the chemicals required for the cooking process of the wood, as well as for the reduction of environmental pollution. |
| 1980: | Construction work for South Pacific Viscose (SPV) began. |
| 1983: | Acetic acid and furfural were obtained from wood components by developing and operating vapor condensate extraction, which resulted in a further reduction of the waste-water load. |
| 1986/91: | A multi-stage biological waste-water treatment plant was built. |
| 1987: | A fluidized-bed boiler was built to burn biological sludge, bark and other biogenic fuels. |
| 1992: | The world’s first large-scale technical ozone bleach plant for pulp was developed and taken into operation. |
| 1997: | The first European large-scale plant for the Lyocell technology went into operation at Heiligenkreuz. |

The Sustainability Priorities of the Past Years

**Economic priorities**

2001
- Proof of economic sustainability: Very positive development in spite of worldwide cyclical low in the textile industry (EBT slightly below record set in fiscal 2000)
- Share of special fibers in sales amounts to 60% for the first time

2002
- Best year in corporate history and highest dividend since going public in 1985
- Securing sites with sustainability at Lenzing and Heiligenkreuz by deciding on investments in the amount of EUR 135 mill.

**Environmental priorities**

2001
- Building a sulfate reduction plant for waste-water pre-treatment

2002/03
- Major investments to increase production with focus on resource recovery plants.

2003
- Introduction of an environmental management system according to ISO 14001 (certified in July 2003)
Human resources

2001
- Ideas Exchange: Good ideas bring potential for saving EUR 2.5 mill. – appr. EUR 280,000 paid in bonuses to suppliers of ideas
- Safety campaign “Easy to Reach 100%” won second place at “Präventa”, the international safety fair in Dornbirn.

2002
- Appr. 400 staff members attend multi-day health days to improve their information level and achieve greater awareness in the fields of health and nutrition.
- Non-smokers’ protection: A variety of changes in organization and room assignments, offering stop-smoking seminars

Sustainability in the Lenzing Group

For the Lenzing Group, the principle of sustainability implies that production is maintained on a high quality level in an ecologically sound environment. Only if a company scores economic success is it in a position to make investments and to ensure its performance capacity in the long term by its further economic, social and ecological development.

Award for Management’s Sustainability Strategy

The strategies of Lenzing’s Management towards sustainability were officially acknowledged in May 2002 when the company was awarded a prize; at the competition “Intelligent Applications for Renewable Raw Materials”, organized by the Austrian Federal Ministry for Innovation and Technology, two of the projects presented by the Lenzing Group received an award in recognition of its efforts to achieve sustainable management.

“The management of Lenzing AG thinks in terms of a strategy directed at renewable raw materials and sustainability. In consequence, this award is to acknowledge the efforts to promote a sustainable development both of the company and during wood processing.”

Taken from the jury’s comments.
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Responsibility for Economic Success

Strategic Factors for Success

Efficient Management and Growth

The Lenzing Group has a very sound economic basis which ensures a satisfactory result also at times of a cyclical low on markets. The success formula consists, among other things, of de-coupling from the fiber cycle by focusing on special fibers and non-woven products. These products also generate higher contributions to profits.

Further growth factors are the Group’s presence and performance on all world markets, as well as its capability to supply all three generations of man-made cellulose fibers: The product range covers classical Viscose fibers, as well as Modal and Lyocell fibers.

The ongoing optimization of the cost structure has been and continues to be a strategic corner stone. It was possible to clearly reduce unit costs by means of economies of scale. Business sectors that are not part of the core business, i.e. fibers, became independent entities, and numerous cost savings programs were implemented. All these measures have given the Lenzing Group cost leadership in man-made fiber production.

The Lenzing Group:

Sales/EBITDA*
Other decisive contributing factors were the promotion of entrepreneurial thinking and action in all staff members, as well the introduction of a success-oriented remuneration system. These sustainable competitive advantages secure our excellent world-market position, as well as a continuous increase in value.

In the chemical and textile industries, in particular, production processes with material and energy efficiency, as well as the substitution of substances with a harmful impact on the environment and the use of closed-loop systems are the basis for a sustainable economic and ecological development. For Lenzing AG, which operates the world’s largest integrated viscose fiber plant, these principles are the basis for efficient management, growth and innovation and therefore for securing long-term competitiveness.

The Lenzing Group:
Gross cash flow
Responsibility for Economic Success

Cost savings through integration
The world’s largest integrated cellulose and fiber production is located at the Lenzing site.

Integration
From wood, the raw material, to pulp production and all the way to fiber production – all fiber production stages are located in one and the same place.

In addition to the ecological advantages of an integrated pulp production, this manufacturing method offers a high economic advantage. In contrast to non-integrated sites, Lenzing saves costs, for example by short transport distances, as well as by not having to dry the pulp, which is an energy-intensive operation, nor having to wrap it. In addition, the waste heat from the process and the heat from the combustion of the residual materials from the integrated production process are utilized to save resources and re-introduced into the production circuit. Since spin-off products such as acetic acid, furfural and sodium sulfate, for example, are produced, they provide an additional contribution towards increasing the value added.
Innovation

The subject of innovation is a basic success factor. It comprises not only classical research and development, but also extends to marketing activities.

The Lenzing Group leads in innovation regarding all fiber categories: Viscose, Modal and Lyocell fibers. The company invests about 2% of its sales in research and development – an extremely high value for this industry. The research activities of the Lenzing Group are concentrated at the Lenzing site. More than 100 staff members work in this area. On account of the many years of research and development activities, excellent human resources and facilities are available. The focus is on developing new, innovative man-made cellulose fibers.

Innovative Fibers

**Lenzing Modal®**
A fiber specialty that excels on account of its special softness and that is preferably used for high-quality lingerie, etc. The fiber also has improved properties of use (regarding tenacity, dimensional stability, etc).

**Lenzing Lyocell®**
A cellulose fiber co-developed by Lenzing and manufactured by using a novel and highly environmentally friendly direct solvent process. Thanks to its properties it is possible to create new and innovative products.

**Lenzing Lyocell® LF**
It is a further development of the classical Lyocell fiber and has extremely low fibrillation (formation of fine fibrils).

**Lenzing Lyocell® Fill**
This is a special Lyocell fiber that is used as filling fiber for duvets and pillows, on account of its optimum moisture management.

**Viscostar®**
Lenzing manufactures especially absorptive fibers for sensitive hygiene applications. Their trilobal structure accounts for maximum absorption capacity, thanks to which the high requirements of hygiene products, such as tampons, can be guaranteed.

**Lenzing FR®**
The acronym “FR” stands for “flame resistant”. Lenzing FR is manufactured from wood, the natural raw material, and offers the textile industry new and diverse possibilities for applications where the combination of permanent flame resistance and high wearing comfort are an absolute must (personal protective clothing such as for fire brigades, the army and the police, as well as in many industrial areas, but also for home textiles, such as upholstery for the furniture sector).
Another focus for the world’s leading center of competence for wood, cellulose and fiber chemistry is process optimization and quality improvement in order to secure an environmentally friendly production. Activities in the field of research and development are undertaken in close cooperation with customers. Major results are also derived from a number of multi-year cooperation projects with industrial partners and university-based research institutes. The participation in a number of EU projects and other cooperating institutions deserves special mention. Improving the utilization of wood as a raw material is the focus of the partnership with K+ WOOD “Wood Chemistry and Wood Composite Materials”, a center of competence. The “Christian Doppler Laboratory for Pulp Reactivity” in Vienna is working on new analytical methods and a better understanding of the chemistry of process and product control. The “Christian Doppler Laboratory for the Chemistry of Cellulose-Based Fibers and Textiles” in Dornbirn deals with fiber properties from fiber production to the finished textiles.

Quality Leadership

The Lenzing Group warrants its customers a constant and high product quality and above-average services. A state-of-the-art technical department is available for assuring the quality of fibers and the development of textiles. It offers a cross-section of the textile industry, ranging from yarn production to fabric and knitwear production, dyeing and finishing, textile testing, as well as physical and analytical fiber tests. Presentations and workshops, as well as specialized literature are used to provide partners with competent information about optimum processing conditions from spinning to finishing operations.
The Lenzing Group – An Economic Factor

With a production of about 366,000 tons of fibers in 2002, the Lenzing Group is one of the largest companies in the industry worldwide. The three sites of the Lenzing Group are an important economic factor in the respective region. For fiscal 2002 the value added amounted to EUR 253.8 mill.
Responsibility for Economic Success

Lenzing: Lead Enterprise in the Region

About 2,800 persons are employed at the Lenzing site. This makes Lenzing the biggest employer in the region, providing important economic impulses and also helping to secure jobs in the sub-contracted enterprises.

In addition, the municipal authority of Lenzing holds a first place among all municipalities in Upper Austria regarding overall tax ratio and financial strength.

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<th>Tax Expenditure of Lenzing AG</th>
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<td>in EUR mill.</td>
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<tr>
<td>Municipal authorities</td>
<td>Municipal tax 3.2</td>
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<td></td>
<td>Real-property tax 0.1</td>
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<tr>
<td>Fiscal authorities</td>
<td>Corporate income tax 21.5</td>
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<td></td>
<td>Wage tax 18.8</td>
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<td>Total</td>
<td>43.6</td>
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Lenzing AG contributes to the better use of capacities at a number of small and medium-sized companies. As these orders by a big company, such as Lenzing, are a challenge for these enterprises, they increase their awareness of quality and dynamism, which is to the benefit of the economic region.
Heiligenkreuz: Providing Impulses to the Region

At the Business Park Heiligenkreuz/Szentgotthard at the border between Austria and Hungary, Lenzing Lyocell has a staff of about 180 and offers valuable jobs, particularly to specialists with good qualifications. Nearly 95 per cent of the staff members at Lenzing Lyocell come from the Burgenland region.

On account of its major importance to the region, the project was financially supported in its initial phase by the public authorities in the framework of EU directives. As a lead operation in the southern part of the Burgenland region, the company has given impulses to the industrial development of this border region. With an investment of EUR 35 mill., the capacity was doubled in 2003 to amount to currently 40,000 tons per year. Many regional companies were employed to implement the investment. Investments required for the ongoing operation are also placed in the region, whenever possible.

An Economic Factor in Indonesia

South Pacific Viscose (SPV) is the biggest manufacturer of viscose fibers in Indonesia. The production site is located in Purwakarta, West Java, at a distance of three hours by car from Jakarta, the Indonesian capital. It currently has three fiber production lines with a production capacity of more than about 135,000 tons per year. This makes SPV the market leader in Indonesia. In addition, it is also active on the most important markets in Asia, such as Taiwan, Pakistan, Iran, China and Turkey.

SPV offers work to about 1,500 staff members in a threshold country with a growing economy. In a development region with a high unemployment rate, every job counts several times – the existing jobs at SPV indirectly also feed a large number of persons in the different families. Many local sub-contractors also benefit from the economic clout of the company.
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Wood, the renewable raw material, is the basic material for all fibers of the Lenzing Group – from Viscose to Lyocell fibers. The pulp obtained from wood and the fibers produced from pulp are therefore materials derived from nature. The production of Lenzing products is compatible with nature – it is sustainable.

The pulp and fiber industry is part of a natural carbon cycle. Cellulose is generated during the photosynthesis of plants. During this bio-chemical process, the carbon dioxide in the air and water are transformed into an organic substance with the help of solar energy, with plants emitting oxygen. Cellulose is the most important building material in nature and available in abundance. Every year, some 4 billion tons grow worldwide. 0.3% of the total cellulose involved in this biological cycle are used by the pulp industry.
Lenzing – A Factor in an Environmentally Compatible Forest Management

Austria is a classical forest country; 47% of its surface is covered by forests. Every year, the forests grow by about 27 million solid cubic meters. Wood, the renewable raw material, is the basis for forest management and forestry, as well as for the downstream industrial and small-sized enterprises.

Forest management ensures the harvesting of wood and thus the cultivation and renewal of the forests. Only forests that are properly attended can fulfill their many different tasks – from their function to protect to that of purifying the air and water, as well as providing man with recreation facilities. Thinning and selective cutting enhances the resistance of forests and improves the quality of their timber. A target-oriented forest management strengthens forests and secures their survival.

Beech is the natural raw material for Lenzing fibers. More than half of the wood used comes from Austria, the rest from the surrounding countries such as Slovakia, the Czech Republic, Germany or Hungary. The supplied wood is derived exclusively from forests that are managed with sustainability and in keeping with the forestry regulations.

Lenzing AG processes about 95% of the domestic beech that is generated by thinning (initial use) and selective cutting. These “industrial timber qualities” cannot be used for more sophisticated purposes, such as the furniture industry, for reasons of quality. As a major customer, Lenzing supports beech production in forestry. The use of beeches by forest management contributes essentially toward maintaining the mixed forests which are a valuable ecological factor.
Our Technologies

Pulp – the Basis for Fibers

At the integrated fiber production plant at the Lenzing site, the majority of the produced pulp is processed into fibers. A small part of the produced quantities is delivered to Heiligenkreuz to produce Lyocell. In addition, pulp made from Brazilian eucalyptus wood is bought and used to produce Lyocell.

SPV in Indonesia also buys its pulp, which currently comes primarily from Russia, Brazil and South Africa. These suppliers manufacture the pulp from fir and eucalyptus trees. The pulp used to produce fibers (“dissolving pulp”) must meet different requirements than that used to produce paper. The specific requirements of the raw material for pulp production limit the supply available on the world market. The companies therefore decide on their pulp purchases according to their company-specific quality requirements.

From Wood to Pulp

The Lenzing site produces its own pulp, which it needs to produce fibers. This pulp production is exemplary, and Lenzing refers to it as “wood refinery”.

The beech logs are debarked, cut into chips and dissolved in magnesium bisulfite cooking liquor at about 150°C. In the course of this process, the cellulose components – almost 40% of the wood – are separated as raw pulp. The raw pulp is bleached, using oxygen, ozone and hydrogen peroxid and processed into pulp flakes. The other wood components remain in the so-called thin liquor, together with the other cooking chemicals. Marketable spin-off products such as acetic acid, furfural and xylose are obtained in the course of subsequent processing steps. In recent years it has been possible to increase the use of wood substances to such an extent that more than half of the wood is now transformed into products (“wood refinery”).

The cooking chemicals are recovered from the remaining residues. The components in the so-called thick liquor that cannot be put to further use (such as lignin) are used to produce energy. It is the most important source of energy at the site.
**Fiber Production**

**From Pulp to Viscose Fiber**

A chemical-technological process consisting of several process stages is used to produce fibers from pulp according to the viscose technology. The individual steps are controlled electronically and monitored continuously. They are decisive for the processing properties of the viscose and for fiber quality. Together with caustic soda, the pulp is transformed into alkali cellulose. Cellulose xanthate forms when carbon disulfide is added. The xanthate is dissolved in diluted caustic soda, filtered and pressed through the fine holes of the spinneret into the acidic spinning bath. In a last step, the fibers are stretched, cut, bleached, washed, dried, and ultimately pressed into bales. Sodium sulfate is the coupled product derived from the use of the chemicals sulfuric acid and caustic soda.

**Viscose Fiber Production**
From Pulp to Lyocell

The Lyocell process differs from viscose fiber production in that a direct solvent process is used for the cellulose. N-methylmorpholine-N-oxide (NMMO) is used as a solvent.

The pulp is finely dispersed in concentrated aqueous NMMO and dissolved, with water evaporating at the same time. The highly viscous solution is filtered and then pressed through spinnerets into an aqueous spinning bath, where cellulose precipitates in the form of fibers.

The production process for Lenzing Lyocell is characterized by an almost complete solvent cycle. The spinning bath is cleaned; the excess water is concentrated by evaporation and then used again to produce the solvent. The water generated during evaporation is used for the washing process.

On account of the closed-loop process, the solvent necessary for the production process is recovered almost completely. The remaining, very low emissions are decomposed in the biological treatment plant.
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Assuming Environmental Responsibility

| Responsibility for the Environment |

With its high environmental standards, the Lenzing Group plays a leading role in the pulp and viscose fiber industry. Already decades ago, the company initiated a development geared at reducing the emissions with impact on the environment.

In addition, Lenzing AG is continuously investing into adequate production technologies and optimizing measures that reduce emissions.

| Environmental Protection Begins with Purchasing and Production |

Feed Materials
All new raw and auxiliary materials are tested for their environmental compatibility before they are used. New chemicals are tested for their environmental compatibility and potential health risks by individual type registration procedures. Continuous monitoring of the in-house material flows guarantees the early detection and prevention of incidents.

Avoiding Emissions through Optimized Process Cycles
The company makes efficient use of its raw materials and chemicals. Closed-loop production processes are used that are provided with recovery facilities. A considerable part of the chemicals used can therefore be recycled. These are the pay-offs of our intensive research work:

- Recovery helps to recycle a considerable share of the materials used, which reduces new feed materials requirements.
- Producing spin-off products facilitates the manufacture of marketable materials of top quality. This generates further value added and secures jobs.
- The recovery and production of spin-off products clearly reduce the impact on the environment and result in a massive decrease in waste materials.
- Putting the residues of the remaining wood components to a thermal use reduces the use of fossil fuels dramatically.
Closed process cycles facilitate the recovery of heat and thus considerably reduce the waste-heat emissions into the water.

**Pulp Production at the Lenzing Site**

**A pioneer in chlorine-free bleaching**

Lenzing was the first company in the world to develop a process that allows the completely chlorine-free bleaching of dissolving pulp. Replacing chlorine and chlorine compounds by oxygen compounds helps to avoid the formation of complex organochlorine compounds and to decisively reduce waste-water pollution.

**Protecting the environment by recovering substances and producing spin-off products**

Emissions are avoided by optimizing the production process and the closed-loop processes and by producing spin-off products. This helps to protect the environment and also offers economic advantages: Instead of high-input waste-material treatment and removal processes, added value is created by the spin-off products.

The decomposition chemicals used during pulp cooking – magnesium oxide and sulfur dioxide – can almost completely be recovered when burning the thick liquor and subsequently producing the crude acid.

In a separate plant next to the Lenzing premises, Danisco Sweeteners GmbH produces xylose (wood sugar) from the components in the thick liquor, which is the parent substance for xylite – a caries-inhibiting sweetening agent.

Acetic acid (for the food industry) and furfural (for the chemical industry) are obtained from the vapor condensate extracted when evaporating the thin liquor.

The ashes obtained when burning biological sludge, bark and in-house biogenic residual materials are used to obtain materials, just as the soda is recovered when burning off the waste waters from the bleaching shop.
Protecting the Environment by Recovering Substances and Producing Spin-Off Products during Viscose Fiber Production

The sulfurous waste-air currents, generated during the fiber process, are responsible for the noxious odors. They are partly used to recover materials and partly transformed into sulfuric acid.

Since its inception, SPV in Indonesia has operated a CS$_2$ direct condensation facility to recover liquid CS$_2$, and a state-of-the-art TOPSOE sulfuric acid catalyst unit has been in use for years. As a result, more than 80% of the sulfur is recovered. In the course of expanding fiber production at the Lenzing site, these processes have also been introduced.

The chemicals caustic soda and sulfuric acid, used in the viscose fiber process, are transformed into sodium sulfate during spinning and then processed into a marketable coupled product when subsequently producing sodium sulfate (crystallization, calcination).
Closing the Lyocell Process Cycle

The Lyocell process is an environmentally friendly technology resulting in minimum air and water loads as far as emissions are concerned. More than 99.6% of NMMO, the solvent, are recovered. As most cycles are closed loops, there is only very little specific water consumption. In spite of closed-loop processes and material recoveries it is not possible to produce without waste-water and waste-air emissions. Downstream units serve to reduce these emissions to such a level that they can be transferred to nature without incurring any risks.

Major Ecological Achievements – Environmental Protection Put into Practice

Clean Water

Water is one of the most important agents when producing pulp and viscose fibers. At all production sites top priority is attached to production processes, closed-loop cycles and waste-water treatment in biological purification plants that protect the environment. Parallel to that, the focus is on a consistent reduction of the fresh-water requirements by putting the water to multiple uses, providing countercurrent flows, heat exchangers and cooling towers. Process-integrated environmental protection takes priority over end-of-pipe waste-water purification measures. In pulp production, for example, efficient material collection and washing results in a low specific water quantity. Waste-water emissions are clearly reduced by obtaining spin-off products, as well as by evaporating and by putting those wood components to thermal use from which no materials can be recovered.
**Biological Waste-Water Treatment**

In international comparisons Lenzing set standards in waste-water treatment.

As early as in the eighties, the company developed a biological waste-water treatment technology adapted to its specific conditions; this was the outcome of many years of research work.

In 1987 the first section of a waste-water treatment plant was taken into operation, in 1991 the complete system was finished. The entire waste water has been purified in a multi-stage biological plant since that date. In the pre-treated water, micro-organisms decompose the organic compounds into carbon dioxide and water. In this process, the organic pollutants are decomposed and reduced to as little as a few thousand population equivalents (PE) which can be transferred to the river without overtaxing its self-purification potential.

The biological sludge obtained from the biological waste-water treatment can be desiccated and burnt, thereby generating energy.
Clean Air

The sulfurous gas emissions generated during the pulp and the fiber process are collected and pass through different recovery processes. The sulfurous gas emissions from the pulp process are covered completely by the odorous gas collection system and burnt in the recovery plants. The sulfurous emissions released during the viscose process are subjected to material recovery to a large extent, as was described previously. The low-concentrate odorous gases from production and the wastewater treatment plant are used in the tanks as incineration air. All these measures reduce the sulfurous odor to an absolute minimum.
Assuming Environmental Responsibility

Model Role in Energy Generation

Protecting the Climate by a Neutral CO₂ Balance

Fiber production from wood is of particular importance with a view to protecting the climate. In the course of photosynthesis, plants bond carbon dioxide (CO₂) from the air and give off just as much CO₂ as they have absorbed, but only during incineration. This is called a neutral CO₂ balance.

Pulp production is of special significance in this connection. Since wood components from which no further materials can be recovered are incinerated, modern pulp plants are independent in their energy requirements and can actually supply excess energy to the fiber and paper production, as is the case, for example, at the Lenzing site with its integrated fiber production. For its entire energy generation the Lenzing site can boast a CO₂ balance that is biogenic by more than 62%. This is primarily due to the use of wood as raw material for the fibers, the production of different useful chemical products, and thermal use of the other wood components from which no further materials can be obtained, as well as the use of biogenic fuels. By operating the incineration plant for residual materials (RVL) at the Lenzing site, it was possible to reduce the share of fossil energy sources in the total energy demand to less than 23%, in relation to the calorific value.

Fuel Mix of Lenzing AG (incl. RVL)
Annual fuel consumption (2002): 10,880,700 GJ

<table>
<thead>
<tr>
<th>Fuel Mix</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Bark/Sawdust</td>
<td>10.0%</td>
</tr>
<tr>
<td>Liquors</td>
<td>40.5%</td>
</tr>
<tr>
<td>Coal</td>
<td>12.1%</td>
</tr>
<tr>
<td>Oil</td>
<td>2.1%</td>
</tr>
<tr>
<td>Natural gas</td>
<td>8.6%</td>
</tr>
<tr>
<td>Residual substances/biological sludge</td>
<td>26.7%</td>
</tr>
<tr>
<td>Biogenic fuels and residual materials – 77.2% CO₂-neutral</td>
<td></td>
</tr>
</tbody>
</table>
Electricity and Heat from Residual Substances

In the field of waste management Lenzing AG also took an innovative and courageous step and thus contributes considerably to a sustainable waste management in Austria.

Together with AVE GmbH, a subsidiary of Energie AG Oberösterreich, a state-of-the-art plant for the thermal use of sorted and prepared waste materials was set up at the Lenzing site. AVE Reststoffverwertung GmbH & Co KG, Lenzing, is responsible for the investments into the plant and the collection of the waste materials.

Today, approximately 200,000 tons of sorted plastic waste, rejects, biological sludge and overflows from waste processing plants are taken to a thermal processing plant and transformed into electricity and heat. All year round, the energy is used on a high level of energy efficiency.

The circulating fluidized-bed technology that is used in this connection creates optimum incineration conditions for the materials used. This, together with the complex dry and wet emission gas purification plant and the downstream catalyst, guarantees a high level of environmental compatibility.

The low-pollution emissions from the viscose fiber plant are used as combustion air for the plant so that by operating this plant another major improvement in the air quality at Lenzing was achieved.

With the incineration plant for residual materials at Lenzing, a decisive step was taken to implement the landfill ordinance which states that as of 2004 the dumping of waste materials that have a high thermal value and are capable of reactions is prohibited.

By operating the incineration plant for residual materials at Lenzing, Lenzing AG is in a position to substitute approximately 50 million m³ of natural gas per year. In addition to the advantages for the national economy, this is also of considerable ecological relevance.

After several years of a sophisticated and very successful trial operation, on 27 December 2002 RVL GmbH was issued the legally effective official permit for its permanent operation by the Federal Ministry of Agriculture and Forestry, Environment and Water Management.

The officially appointed expert commented on the result of the trial operation by saying that the RVL project could be regarded as an optimum solution from the viewpoint of waste management regarding the thermal processing. The goal of utilizing energy sources to a maximum is reached in the best possible manner at the Lenzing site.
Viscose Fiber: An Ecologically Meaningful Product

Interview with Haio Harms – Head of Research and Development

Every year, the world’s demand for fibers amounts to about 52 million tons. This translates into an average per-capita consumption of 8.6 kg. Of these, viscose fibers hold a share of about 4%. Haio Harms, Head of Research and Development at Lenzing gives us his opinion about the ecological aspects of fibers in general and in a comparison to one another.

What types of fibers are there?
We distinguish between fibers on a natural basis and synthetic fibers. The synthetic fibers comprise Polyester, Polyamide, Polypropylene and Acryl – fibers made from oil products. Among the natural fibers there are the animal fibers, such as wool or silk, and the fibers of plant origin. Like cotton they consist of natural cellulose, which is also a main component of wood. Viscose, Modal and Lyocell fibers are industrially manufactured fibers of plant origin made from natural cellulose.

Cotton meets about 40% of the world’s fiber demand. Can you tell us something about the ecological aspects of cotton, compared to viscose fibers?
Compared to cotton, wood-based cellulose fibers offer a number of ecological and economic advantages, both with regard to their raw materials and their processing. Let me go into detail about the raw material: Nearly 5% of the land suitable for cultivating foodstuffs are being used to grow cotton. As a rule, one hectare yields about 300 kg to 800 kg of cotton. (It is only in countries such as Israel and Australia that peak values of up to 1,700 kg/ha are reached.) For one ton of crude cotton an average area of 1.7 ha of first-class arable land is therefore needed. By comparison, the annual growth on about 0.8 ha of beech forest is sufficient – also in the temperate climate of Central Europe – for one ton of viscose fibers.

Since the amount of land available for growing cotton is already declining in the main cultivating regions, because the demand for food in the countries of the Third World with their vast populations is growing, the harvested quantities can only be maintained by intensive fertilizing, the use of pesticides, artificial irrigation and genetic modification. It has been estimated that up to 25% of the world’s pesticide production – which amounts to about 2.5 mill. tons – are used to grow cotton. This corresponds to up to 30 kg/t, 70% of which are insecticides and 20% are herbicides.
Viscose Fibers: An Ecologically Meaningful Product

Interview with Haio Harms – Head of Research and Development

What are the differences regarding water consumption?

With regard to water consumption, there are again major differences. In our latitudes, natural precipitation is sufficient for beech growth. At Lenzing, 350 m³/t of water are needed to produce one ton of viscose fibers. In the cotton-growing areas, enormous water quantities are needed, for example 7,000 m³ in Israel or 29,000 m³ in Sudan¹, to artificially irrigate the land needed to produce one ton of crude cotton. The use of such large water quantities can cause partly irreparable ecological damage to sensitive ecological systems, such as the drying-up of water bodies (Lake Aral is an extreme example in this connection) and salinization of the soil in entire regions.

The major part of the fibers consumed worldwide are the so-called synthetics. Their market share is 55% – with the trend going upwards.

What effects with an environmental impact are caused by the production of synthetic fibers?

In my reply I would like to limit myself to the case of Polyester, because it is this synthetic fiber that experienced the greatest growth in terms of quantity in recent years. While every ton of Polyester consists of about the same amount of natural oil, a further quantity of oil, in excess of one ton, is needed for the production process, transport and processing of every ton of fiber. The fact that the use of fossil fuels results in the generation of additional greenhouse gases is becoming a matter of increasing concern. However, disposal is another sensitive issue; Polyester fibers practically never rot and are thus a burden on landfills. Viscose fibers, on the other hand, are a biogenic product which can be composted and will slowly decompose and turn into carbon dioxide and water – substances of neutral effect on the ground water.

Which environmental problems result from the production of viscose fibers?

For a long time, the production of pulp and viscose entailed clearly noticeable effects on the environment. No adequate technical solutions were available to eliminate all emissions. However, on account of our intensive research activities and our willingness to incur very high costs and make major investments, this situation has changed. As a result, the pulp and viscose production at the Lenzing site has been extremely compatible with the environment for many years. Enormous improvements have been achieved regarding the reduction of immissions and emissions. On account of considerable raw-material recovery and almost completely closed material cycles, the resources needed for production are used most economically. The use of oxygen compounds in the production of pulp, instead of chlorine and chlorine compounds was another milestone in our research work. Today, we can truthfully say that our fibers, produced according to Lenzing technologies, are ecologically meaningful, sustainable products that facilitate bringing a high added value to the renewable resources of our domestic forests.

Assuming Environmental Responsibility

Awards and Certificates

- ÖKO-TEX Standard 100 Certificate “Confidence in Textiles – Textiles Tested for Pollutants” (Product Class I, Babies) for all Lenzing fibers.


- Certification of processes according to ISO 9001

- Certification of the environmental management system according to ISO 14001

- Eco-Label of the European Commission

  The “European Flower” from Brussels serves to prove the leadership in the ecological technology of Lenzing fibers. Since 1992, there has been a symbol for environmentally friendly products – the European Eco-Label. This allows consumers in the European Union, Norway, Liechtenstein and Iceland to identify environmentally friendly products such as Lenzing fibers, for example. The novel feature was that in December 2002 the European Eco-Label was awarded to a fiber manufacturer for the first time.

  In her letter of congratulations to Lenzing AG’s Members of the Managing Board, Ursula Haubner, Regional Counselor with Environmental Responsibilities in the Federal Province of Upper Austria, wrote: “Creating harmony between economic and social as well as environmental interests is an important prerequisite for the development opportunities in Upper Austria as a region with a future.”

- “Technology Award for Sustainable Development” of the European Union for Lenzing Lyocell

  In December 2000, Lenzing Lyocell GmbH, Heiligenkreuz, was the first Austrian company to be awarded the “European Environment Award 2000” in the category for “sustainable technologies”.

  A high-level 15-person jury selected Lenzing Lyocell from 85 European national winner projects. The criteria applied when awarding the prizes include consideration of ecological and social elements by the corporate management, in products, the technology and in international partnerships. In this connection, the focus is on the sustainable protection of the environment and its resources.
Responsibility for People
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Responsibility for People

The Lenzing Group offers its staff members overall conditions that empower them to face the market challenges in an optimum fashion regarding their professional and personal qualifications. In this connection, promoting individual responsibility and independent action, as well as providing support for personality development are in the priorities. The company supports these goals through many activities and measures in order to position itself as an attractive and reliable employer.

Interesting and Challenging Jobs

The diversity of the jobs offered, such as chemical process engineer, plastics processing engineer, testing and control engineer, system assembling technician, papermaker, 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. In keeping with a farsighted personnel policy, a majority of the skilled workers begin by being trained as apprentices in the company. With this policy Lenzing provides a valuable contribution to the stability of jobs in the region.

Great emphasis is put on cooperation with schools and universities. Every year, some 300 students and pupils find summer jobs and traineeships in business and technical departments, as well as in research and production.

Attractive Jobs

- Interesting and challenging work
- Development opportunities coupled with promotional measures
- Participation in process design
- Flexibility of working hours and in designing work places
- Remuneration schemes in conformity with the market and oriented to success
- A high level of safety at work
- Preventive measures for healthy living and eating
- Staff advancement beyond company sites
Students at technical colleges are also offered job opportunities for compulsory traineeships, with Austrian students also signing up for work in Indonesia.

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

**Development Opportunities Coupled with Promotional Measures**

One of the principles of our personnel policy is to assign in-house staff to the majority of vacancies in the form of job contests. Intra-group job applications and placements are possible and desired. Specifically tailored special seminars and training courses are offered to allow staff members to further their qualifications.

In the framework of specialized training options, the curriculum comprises courses on relevant IT topics and different modules in the fields of metal, electrical systems, plastics, chemistry and languages. The seminar program for developing one's personality comprises team training activities, communication, management training and courses to improve one's potential.

In Indonesia, too, a special training center offers employees adult training courses on an ongoing basis to allow them to become skilled workers.

Managers and staff members, as well as personnel management are responsible for further development activities. Since further training helps the company and staff members, the latter cover part of their training costs – depending on the type of further training course.

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**Staff Members of the Lenzing Group**

(Total: 4,458)

Status: 31 December 2002

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<tr>
<td>Purwakarta Site</td>
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<td>Others</td>
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</tr>
<tr>
<td>Heiligenkreuz</td>
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Participation in Process Design

Ideas Exchange

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

Team work – the recipe for success

Team-orientation is an important building block of our personnel policy. For a long time, the Lenzing Group has relied on the principle of team work. In this type of organizational structure, the staff members cooperate at a high level of personal responsibility in order to reach the goals that they have set themselves together. This helps to achieve visible success that can be measured in economic terms. However, team work 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 market challenges, but also internal differences can be solved more easily. This also promotes cooperation between staff members and managers.

Ideas Exchange

Suggestions for improvements / Cost savings
Flexibility in Working Hours and Designing Work Places

There are more than 70 different working-time systems in the Lenzing Group. These are due to the different processes but also take account of staff members’ spare-time needs. An overwhelming part of the staff members not working in shifts can opt for flexible working hours.

The flextime systems at the sites in Austria do not comprise any core time, which facilitates maximum flexibility, both to staff members and the company. These flextime systems are used both for blue and white-collar workers. A so-called “short-rhythm system” is used for continuous shift operations. This means that the shifts change at two-day intervals. In contrast to conventional shift models this system offers both social and medical advantages.

Many staff members make use of the part-time work program, especially women after maternity leave. Tele-working has also been around for some years. The spectrum ranges from desk-sharing to pure “working from home”. For older staff members, Austrian regulations provide for the so-called pre-retirement part-time work, which is readily accepted at the different sites.
Remuneration Schemes in Conformity with the Market and Oriented by Success

On the basis of the collective-bargaining agreements special remuneration systems were developed for the different groups of staff members. The different job descriptions are used as a basis. Expertise, know-how, responsibility, environmental factors and experience determine the value of the work provided, which is the yardstick applied to remuneration. Depending on the activity, there are different remuneration schemes.

Profit-sharing systems, which are essentially governed by the business results, round off the remuneration policy. This has helped to promote the general interest of staff members in the economic development, as well as to let them share financially in success.

As a matter of principle, there is equal treatment of men and women which, of course, also applies to remuneration.

A High Level of Safety at Work

The safety philosophy is the backbone of all joint thinking and acting in the Lenzing Group.

Safety at the work place is a managerial task; it is integrated into all business processes. This is ensured, in particular, by central safety committees which meet regularly to decide on targets, strategies and specific programs, to be implemented by the Lenzing Group.
Injuries, near-injuries and incidents are systematically examined as to their causes, so as to be able to derive a large number of remedial measures from the many influencing factors.

The safety stewards, whose appointments go beyond the statutory safety requirements, as well as regular short talks on safety, ensure that all staff members are integrated into the process. The talks serve the purpose of instruction, information and the exchange of experience.

In order to promote an attitude of awareness for safety issues, there are special campaigns, in addition to comprehensive training programs. The project “Easy to Reach 100%” is meant to achieve 100% compliance with all safety regulations.

Safety – a Lifestyle

Different measures are applied to communicate the idea of safety in all aspects of life. Organizing safety at in-house sports and other events is an important topic. Adequate attention is also paid to the accidents that staff member suffer at home and during their

Safety Philosophy

- All injuries can be avoided.
- Corporate and line managers are responsible for reaching this target.
- We are committed to providing safe work places.
- Every staff member is responsible for working safely and observing safety rules.
- Safety is part of a holistic approach that includes health and safety both at the work place and during spare time.
- Safety is tantamount to increasing the corporate value, productivity, profits, cost efficiency, quality and environmental protection.
- The example given by superiors and fellow staff members, as well as the will to assume responsibility for oneself are the key to success.
spare time. Reports on safety during spare-time activities in the company’s special broadcast on local TV “News from Lenzing” serve to raise staff members’ awareness for safety issues. Short talks and activities on safety, such as helmets for bikers, are intended to live up to the slogan “Living safely at Lenzing”.

Safe Facilities and Equipment
Already during the planning phase, our in-house experts draw up preventive safety plans for different equipment.

The result is that the equipment also has a high rate of availability, on account of its high safety standard. This is where business interests coincide with safety requirements.

In the past ten years, there were only two incidents at the Lenzing site that can be classified at all as industrial accidents according to the Industrial Accident Ordinance.

However, even comprehensive preventive measures cannot completely rule out dangerous situations. For such cases, the company has drawn up corporate accident defense plans that ensure a coordinated cooperation on the part of all corporate teams, the emergency staff and the crisis team.

Preventive Measures for Healthy Living and Eating
The health of staff members is a top priority. An excellently equipped center for occupational medicine at the Lenzing site is available to staff members, both for treatment and prevention purposes. In addition to a number of health-promoting programs such as special medical examinations, preventive check-ups, stop-smoking projects, eye tests for computer workers, health exercises, muscle function tests and vaccinations, “Health Days” were launched in 2001. In the course of a multi-day stay at special wellness hotels, experts will promote the awareness of health among staff members by actively involving them in such topics as nutrition, exercise and stress prevention. The focus is on implementing the knowledge acquired in everyday practice.

At the Heiligenkreuz site, health programs are drawn up together with the plant physician. This includes gratuitous vaccinations and health checks, but also very individual programs such as weight reduction and stop-smoking projects.

In Indonesia the promotional measures contribute to the health of staff members. In addition to an in-house cafeteria and special health and sports facilities, the company’s concerns also relate to providing support to the surrounding villages, where many staff members live, with regard to their drinking-water supplies.
The Lenzing Cafeteria

Lenzesa, the company’s restaurant, is responsible for the food and beverages of staff members at the Lenzing site. Every day, an average of 1,300 meals is served. Shift workers on their late or night shifts, as well as during weekends are also provided for. The focus is on a healthy and well-balanced diet, and staff members can choose from a variety of dishes – at socially acceptable prices. In addition, throughout the plant at Lenzing, tea and – in case of work under hot conditions – isotonic drinks are available free of charge.

The quality of the offered food was also attested by the “Fund for a Healthy Austria”. 45 cafeterias took part in a competition, submitting their meal suggestions which were evaluated according to the criteria “balanced, healthy, and oriented to the season and the region”. The Lenzing cafeteria earned an excellent third place.

Co-Sponsored Programs for Staff Members

Promoting interdepartmental relations

In addition to a number of sponsored leisure-time sports activities, the company’s swimming club “Lenzesabad” at Lake Attersee can be visited at favorable prices.

The kindergarten, owned by Lenzing, at the Lenzing site, is run by the community. Its opening hours are adapted to the needs of working mothers. The company also sponsors the program “Holidays for Lenzing Children”, offering two-week stays in an attractive holiday region.

Promoting shared transport

At the bigger sites, the company operates its own commuter system transporting staff members from and to their homes in the surrounding communities. Staff members pay the public transport rates, and the company covers the remaining costs.

Facilitating home-loans

No-interest loans are given to staff members wishing to build a home (detached houses, semi-detached houses and owner-occupied apartments).

Pension funds

Most of the companies in the Lenzing Group offer retirement schemes in the form of pension funds. Staff members contribute to these schemes and when they retire, they receive the accumulated value, plus interest, as a supplementary old-age pension.
Responsibility for People

Regional Support

The Lenzing Group’s social responsibility does not end at the respective plant gates. As a lead enterprise of the region, the company feels particularly committed to the people in the area. It therefore sponsors clubs and associations located in the region, giving priority to those with social commitment and those that promote sports activities for everybody and that cooperate with training institutions receiving primary attention.

The Lenzing Site

The regular sponsorship activities of Lenzing AG are clearly focused on the immediate vicinity around the site. It is particularly social and sports activities, but also some cultural events that receive support.

The company promotes a number of initiatives, especially in the social field, such as a “SOS Kinderdorf” (a family-based facility for orphans), local social organizations such as a hospice program at Vöcklabruck offering assistance to terminally ill persons or, for example, an association for the integration of foreign residents.
Helping the handicapped
As part of a partnership Lenzing AG supports “Lebenshilfe Oberösterreich” at Vöcklabruck, which is an organization offering homes and day-care centers to persons with mental and multiple physical handicaps, with emphasis on work and activities in guided groups, as well as individual further personality development. The biggest joint project to date was to refurbish and extend the residential center at Gallaberg near Lenzing in 2002.

Sports initiatives
Ever since its foundation 80 years ago, the ATSV-Lenzing Modal has been the local sports association for the staff members of Lenzing AG. For a long time, this club was the only possibility for many staff members to engage in “active” leisure-time activities and to find some healthy distraction after work. All groups within the club receive Lenzing’s support in order to give expression to the close links with Lenzing, the community of the site. Similar cooperation also exists with sports clubs in other communities in the vicinity.
The Heiligenkreuz Site
At Heiligenkreuz, there is also a broad range of different measures geared to fostering relations with the local community. There are ongoing activities with schools; several clubs and charitable institutions, such as the Red Cross or a center caring for severely handicapped children (Sterntalerhof), also receive support on a regular basis.

The Site in Indonesia
The viscose plant at Purwakarta, West Java, is characterized by a multi-national corporate culture. 98% of the staff are Indonesian, the middle management comprises many Indians, and the top management positions are held by Austrians.
A residential complex right on the plant premises offers a home to 160 families comprising a total of 600 individuals, largely Indonesian staff members and their families. 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. Free lunches are offered at the plant’s cafeteria.

A mosque within the plant gates is available to the mainly Muslim staff members. A small clinic for industrial medicine offers medical assistance.

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. Last year, for example, an important street was built leading through the village of Cicadas, which has clearly improved conditions, especially during the rainy season. For three years, work has been ongoing on refurbishing houses. Food products are given to 130 needy people. Furthermore, SPV finances scholarships so that the children of the villages can attend schools that require the payment of tuition fees.
### Economic Key Data

#### Sales and Result

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales in EUR mill.</td>
<td>626</td>
<td>623</td>
<td>599</td>
<td>550</td>
<td>547</td>
</tr>
<tr>
<td>Sales outside of Austria %</td>
<td>78.9</td>
<td>79.3</td>
<td>80.5</td>
<td>81.9</td>
<td>80.6</td>
</tr>
<tr>
<td>Income from operations / Operating result in EUR mill.</td>
<td>78</td>
<td>65</td>
<td>70</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Financial result in EUR mill.</td>
<td>-6</td>
<td>1</td>
<td>0</td>
<td>-9</td>
<td>-9</td>
</tr>
<tr>
<td>Result from ordinary business activities in EUR mill.</td>
<td>72</td>
<td>65</td>
<td>69</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Income before taxes and minority interest in EUR mill.</td>
<td>-23</td>
<td>-20</td>
<td>-23</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>Extraordinary result in EUR mill.</td>
<td>-1</td>
<td>9</td>
<td>-4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Income taxes in EUR mill.</td>
<td>-23</td>
<td>-20</td>
<td>-23</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>Result from discontinued operations in EUR mill.</td>
<td>-1</td>
<td>9</td>
<td>-4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Profit / loss for the year in EUR mill.</td>
<td>72</td>
<td>65</td>
<td>69</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

#### Cash flow

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Gross cash flow in EUR mill.</td>
<td>102</td>
<td>86</td>
<td>37</td>
<td>61</td>
<td>70</td>
</tr>
<tr>
<td>Gross cash flow as percentage of sales %</td>
<td>16.3</td>
<td>13.9</td>
<td>6.2</td>
<td>11.1</td>
<td>12.8</td>
</tr>
<tr>
<td>Net cash provided by operating activities in EUR mill.</td>
<td>127</td>
<td>82</td>
<td>28</td>
<td>61</td>
<td>50</td>
</tr>
<tr>
<td>Free cash flow in EUR mill.</td>
<td>85</td>
<td>59</td>
<td>-9</td>
<td>22</td>
<td>48</td>
</tr>
</tbody>
</table>

#### Capital expenditure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital expenditure in EUR mill.</td>
<td>42</td>
<td>67</td>
<td>41</td>
<td>39</td>
<td>39</td>
</tr>
</tbody>
</table>

#### Assets structure**

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-current assets %</td>
<td>63.6</td>
<td>65.0</td>
<td>59.4</td>
<td>62.0</td>
<td>63.2</td>
</tr>
<tr>
<td>Current assets %</td>
<td>36.4</td>
<td>35.0</td>
<td>40.6</td>
<td>38.0</td>
<td>36.8</td>
</tr>
<tr>
<td>Total assets in EUR mill.</td>
<td>689</td>
<td>686</td>
<td>691</td>
<td>688</td>
<td>689</td>
</tr>
</tbody>
</table>

#### Capital structure**

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity %</td>
<td>51.1</td>
<td>45.6</td>
<td>39.3</td>
<td>33.7</td>
<td>33.3</td>
</tr>
<tr>
<td>Social capital %</td>
<td>8.7</td>
<td>8.6</td>
<td>8.3</td>
<td>19.1</td>
<td>19.0</td>
</tr>
<tr>
<td>Liabilities (exclusive of social capital) %</td>
<td>40.2</td>
<td>45.8</td>
<td>52.4</td>
<td>47.2</td>
<td>47.7</td>
</tr>
</tbody>
</table>

#### Key data

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on sales (ROS) 1)</td>
<td>8.8</td>
<td>7.7</td>
<td>10.5</td>
<td>1.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Return on capital employed (ROCE) 2)</td>
<td>13.1</td>
<td>11.7</td>
<td>15.5</td>
<td>2.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Return on equity (ROE)</td>
<td>14.5</td>
<td>18.6</td>
<td>16.8</td>
<td>1.9</td>
<td>2.5</td>
</tr>
<tr>
<td>EBIT 3) in EUR mill.</td>
<td>78</td>
<td>65</td>
<td>70</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>EBITDA 4) in EUR mill.</td>
<td>121</td>
<td>102</td>
<td>108</td>
<td>61</td>
<td>66</td>
</tr>
<tr>
<td>EBITDA margin %</td>
<td>19.4</td>
<td>16.4</td>
<td>18.0</td>
<td>11.1</td>
<td>12.0</td>
</tr>
<tr>
<td>OEFA earnings / deficiency per share EUR</td>
<td>EUR</td>
<td>EUR</td>
<td>EUR</td>
<td>EUR</td>
<td>EUR</td>
</tr>
<tr>
<td>Earnings per share (basic) EUR</td>
<td>13.1</td>
<td>12.4</td>
<td>12.7</td>
<td>1.2</td>
<td>1.5</td>
</tr>
</tbody>
</table>

#### Number of employees at year-end

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees at year-end</td>
<td>3,365</td>
<td>3,282</td>
<td>3,216</td>
<td>3,166</td>
<td>3,226</td>
</tr>
</tbody>
</table>

---

1) = NOPAT = Income from operations (EBIT) less proportional income taxes
2) = NOPAT/Equity = Average of stockholders’ equity and minority interests
3)ugg
4) = EBIT plus depreciation and amortization of intangible fixed assets and property, plant, and equipment

** = LUSAC Group shown as a continuing operation

Ecological Key Data

Emissions into the Air

Not including LLG, since no air emissions of relevance
Data from SPV whenever collected

<table>
<thead>
<tr>
<th>CO₂ – fossil</th>
<th>SO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAG + SPV</td>
<td>LAG + SPV</td>
</tr>
<tr>
<td>kt/a</td>
<td>t/a</td>
</tr>
<tr>
<td>2001</td>
<td>2001</td>
</tr>
<tr>
<td>473 kt/a</td>
<td>3,576 t/a</td>
</tr>
<tr>
<td>2002</td>
<td>2002</td>
</tr>
<tr>
<td>498 kt/a</td>
<td>3,700 t/a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOₓ</th>
<th>H₂S</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAG</td>
<td>LAG + SPV</td>
</tr>
<tr>
<td>t/a</td>
<td>t/a</td>
</tr>
<tr>
<td>2001</td>
<td>2001</td>
</tr>
<tr>
<td>818 t/a</td>
<td>948 t/a</td>
</tr>
<tr>
<td>2002</td>
<td>2002</td>
</tr>
<tr>
<td>792 t/a</td>
<td>1,166 t/a</td>
</tr>
</tbody>
</table>
**Key Data**

### Ecological Key Data

#### Emissions into Water

Site data whenever relevant and as collected

**Cooling water**

LAG + SPV

<table>
<thead>
<tr>
<th>Year</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>50,242 t/m³/a</td>
</tr>
<tr>
<td>2002</td>
<td>49,257 t/m³/a</td>
</tr>
</tbody>
</table>

**Waster water**

LAG + LLG + SPV

<table>
<thead>
<tr>
<th>Year</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>37,635 t/m³/a</td>
</tr>
<tr>
<td>2002</td>
<td>37,939 t/m³/a</td>
</tr>
</tbody>
</table>

**CSB**

LAG + LLG + SPV

<table>
<thead>
<tr>
<th>Year</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>3,847 t/a</td>
</tr>
<tr>
<td>2002</td>
<td>3,458 t/a</td>
</tr>
</tbody>
</table>

**Zinc**

LAG + SPV

<table>
<thead>
<tr>
<th>Year</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>21.5 t/a</td>
</tr>
<tr>
<td>2002</td>
<td>14.5 t/a</td>
</tr>
</tbody>
</table>

LAG: Lenzing AG
LLG: Lenzing Lyocell
SPV: South Pacific Viscose
**Sulfate**
LAG + LLG + SPV

<table>
<thead>
<tr>
<th>Year</th>
<th>t/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>90,577 t/a</td>
</tr>
<tr>
<td>2002</td>
<td>93,697 t/a</td>
</tr>
</tbody>
</table>
Key Data

Social Key Data

Injuries between 1974 – 2002

from 1974 – 1992 only blue-collar workers
as of 1993 blue-collar, white-collar workers and sub-contracted employees
as of 1998: from first day of illness (previously as of 3rd day)

Staff Members of the Lenzing Group
(Total: 4,458) Status: 31 December 2002

LENZING SITE 2,795
PURWAKARTA SITE 1,502
OTHERS 9
HEILIGENKREUZ 152
### Legend to Photographs

- **Cover:** Reflections of stakeholders in the Ager River which runs through the Lenzing premises
- **Page 2:** Aerial view of the Lenzing site with Lake Attersee and the Salzkammergut Region in the background
- **Page 4:** The Managing Board of the Lenzing Group (from left to right): Thomas Göhmanns, Peter Schreyögg, Christian Bozoghe
- **Page 7:** The Ager River on the Lenzing factory site
- **Page 14:** Detailed view of the smokestacks at the Lenzing site
- **Page 21:** View of interior of high-rise storage rack system
- **Page 22:** Outside view of high-rise storage rack system
- **Page 24:** Partial view of nonwovens fiber line
- **Page 27:** Wood pulp at the Lenzing site
- **Page 32:** The Ager River on the Lenzing factory site
- **Page 41:** The Ager River on the Lenzing factory site
- **Page 56:** Top: Main entrance to the Lenzing site; Bottom: View at angle of liquor tower in direction of smokestack
- **Page 57:** Fibres Day of the Lenzing Group
- **Page 58:** Top: Children from the children’s orphanage at Altmüster/Lake Traunsee; Bottom: Members of staff at SPV/Purwakarta
- **Page 59:** Top: View of SPV; Bottom: Children of SPV staff residing on site
- **Page 63:** AHA treatment basin at Lenzing AG

### Glossary

#### BODS
The biochemical oxygen demand in flow to a treatment plant as a parameter for the amount of oxygen needed to break down organic matter, thus, according to a measure for wastewater pollution.

#### COD
Chemical oxygen demand – a measure to measure the organic pollution load. In addition to the oxygen required for biological degradation (BOD), the chemical oxidation (COD) is also used to measure waste-water pollution.

#### EBITDA
Income before fees, interest, taxes and financial result.

#### Population equivalents (PE)
Conversion factor when calculating commercial or industrial waste waters to household waste waters. Adjusted to every 1000 people. According to the rule of thumb, 1 PE is equal to 120 g of BOD per inhabitant and day to be used as a factor.

#### Fibers
The Lenzing Group manufactures Viscose, Modacrylic and Lyocell fibers. All three types of fibers are cellulose fibers made of wood, the natural raw material. Viscose and Modacrylic fibers (produced according to the viscose technology) and Lyocell fibers are produced by means of the lyocell technology. They are a sustainable type of fibers.

#### Dissolving pulp
A chemical generated when producing pulp. It is used as a plant-based raw material, for example.

#### Solid cubic meters
It is a measure to indicate the wood-cube volume corresponding to or as wood-cube weight, i.e. without voids.

#### Value added
A measure for the market value of a plant-based raw material, for example.

#### Integration
A measure for the market value of a plant-based raw material, for example.

#### Lycocell fibers
A cellulose fiber produced by means of a solvent and highly environmentally friendly method, conventionalized by Lenzing, which facilitates the production of new and innovative products.

#### Men-made cellulose fibers
Industrially manufactured fibers made of natural raw materials (e.g. wood).

### Nonwovens
In the same respect, these fibers are used, the term nonwovens, staple of fibers, are not used. They are used in various segments such as hygiene, technical and medical. The latter known products are absorbent cloths, technical textiles, and in the medical sector, the term “nonwovens” is used, among others, for medical bandages, tampons, and as components of surgical garments. Household applications, but also extremely absorptive fibers for tampons are further growth segments.

### Responsible Care
http://www.lenzing.com/responsible_care/default.htm
Responsible Care is a worldwide voluntary initiative of the chemical industry which has entered into its third and works on itself in order to improve the health, safety and environmental situation. Chemical enterprises that meet these requirements are awarded the Responsible Care certificate for a period limited to three years.

### Xerose
http://www.boku.ac.at/oin
A thick-liquor component, used as base material for xylite, which is a caries-inhibiting sweetener.

### Interesting links
- [http://lenzing.com](http://lenzing.com)
- [http://www.boku.ac.at/oin](http://www.boku.ac.at/oin)
- [http://forschung.lenzing.com](http://forschung.lenzing.com)
The Ager River on the Lenzing factory site:
- top: View of SPV
- bottom: Children of SPV staff residing on site
- top: Children from the children’s orphanage at Altmüster/Lake Traunsee
- top: Main entrance to the Lenzing site
- Fitness Day of the Lenzing Group
- The Ager River on the Lenzing factory site
- Wood yard at the Lenzing site
- Partial view of nonwovens fiber line
- top: View of SPV
- bottom: Children of SPV staff residing on site
- partial view of nonwovens fiber line
- top: View of SPV
- bottom: Children from the children’s orphanage at Altmüster/Lake Traunsee
- bottom: Members of staff at SPV/Purwakarta
- bottom: View at angle of liquor tower in direction of smokestack

Glossary

BODS The biological oxygen demand, or BOD, is a measure for the amount of organic substances present in water, which can cause the oxygen levels in water to drop and can cause a threat to aquatic life.
COD Chemical oxygen demand is a measure for the amount of chemical substances that can consume oxygen in water. The amount of oxygen which is consumed is measured in terms of biological oxygen demand (BOD).

EBITDA Earnings before interest, taxes, depreciation and amortization.

Nonwovens Nonwovens are a wide range of fibers that are produced without using any kind of weaving process. They are used in a variety of products, including medical, automotive, and electrical applications.

Responsible Care Responsible Care is a voluntary initiative of the chemical industry which has imposed strict auto-controls on itself in order to improve the health, safety and environmental situation. Responsible Care is the most widely known environmental label. It guarantees the non-objectionability and functional efficiency of the different products in the textile chain – from the fiber to the end product. Responsible Care is a worldwide voluntary initiative of the chemical industry which has imposed strict auto-controls on itself in order to improve the health, safety and environmental situation. Responsible Care is the most widely known environmental label. It guarantees the non-objectionability and functional efficiency of the different products in the textile chain – from the fiber to the end product.

Interesting links
- http://www.oeko-tex.com
- http://www.fcio.at/home/responsible_care/default.htm
- http://www.boku.ac.at/oin
- http://forschung.lenzing.com

Legend to Photographs
"Man is not the measure of all things, but life in the midst of life that also wants to live."

(Albert Schweitzer)

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