

Environmental Statement 2020

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Abbreviation	Meaning
BHR	Vertical bio-reactor
BImSchG	Federal Immission Control Act
BImSchV	Federal Immission Control Ordinance
BREF	best available reference document
CHP	combined heat and power
CLP	Regulation (EC) No.1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures (CLP: Chemical Labelling and Packaging)
CO ₂	Carbon dioxide
COS	Carbon oxysulphide
CS ₂	Carbon disulphide
CSB	Chemical oxygen demand (COD)
H ₂ SO ₄	Sulphuric acid
ISO 17025	General requirements regarding the competence of testing and calibration laboratories
LCA	Life Cycle Analysis
NaOH	Sodium hydroxide solution
N _{tot}	Nitrogen total
NH ₄ -N	Ammonium nitrate
NO _x	Nitric oxide
REACH	Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
S	Sulphur
SO ₂	Sulphur dioxide
TA Lärm	Technical Instruction on Noise Pollution Abatement
TA Luft	German Directive on Air Pollution Control
TRGS	Technical Rule for Hazardous Substances
ZDHC	Zero Discharge of Hazardous Chemicals
Zn	Zinc
ZnSO ₄	Zinc sulphate

Environmental Statement

1 EMAS - Challenge and Opportunity

Great challenges lie ahead. At present, it is the Corona crisis that is making us hold our breath! However, it would be a mistake to neglect other challenges which involve a high degree of environmental relevance and enormous social significance: global warming, energy system transformation, water shortage, plastic waste and microplastics are just a few of the catchphrases that will probably occupy us for a long time "after Corona". Kelheim Fibres considers itself to be a company which contributes towards the solutions for the challenges of our time with innovative products and approaches.

At the same time, Kelheim Fibres GmbH looks back on a company history of more than 80 years.

Founded in the 1930s as Süddeutsche Zellwolle AG, the end of the 1960s marked the beginning of a trend-setting era that still shapes our company today: the takeover by the former Hoechst AG, in whose group of companies we remained until the 1990s.

During this period, the foundations were laid for process-integrated plant operation and thus also for environmental protection. This included projects such as expansion of the carbon disulphide recovery plant, conversion of the power plant from oil to gas firing and construction of the vertical bio-reactors, to name but a few examples.

The onset of the new millennium witnessed the initiation of another transition: Kelheim Fibres, which is now an independent and medium-sized enterprise, concentrated more and more on viscose speciality fibres. In addition to innovative and sustainable products, investments were also made in the future viability of the site via the construction and modernisation of supply and processing plants.

Projects such as construction of the sulphuric acid plant and a new evaporation plant, as well as construction of a further biological wastewater treatment plant were implemented. Among other things, this has led to a significant improvement in environmental performance.

The next step is obvious: we are proud of our excellent environmental performance, which, however, has not yet been certified by an environmental management system. As a leading manufacturer of speciality fibres, we also want to meet the highest environmental standards. For this reason, we are the first viscose fibre manufacturer in the world to strive for validation in accordance with the demanding requirements of EMAS. By doing so, we are also underpinning our leading role in the environmental sector.



Craig Barker, CEO Kelheim Fibres GmbH

2 The Kelheim Fibres Company

Kelheim Fibres GmbH counts among the world's leading manufacturers of speciality viscose fibres. With a production capacity of around 90,000 tons, the Lower Bavarian company may count amongst the smaller players in the fibre industry, but it is one of the innovation drivers in many future-oriented topics. Our fibres are used in the most diverse areas: they can be found in clothing, hygiene or medical products, but also in speciality papers, insulation or filtration applications.

Production site	Kelheim
Headcount	approx. 500
Owners	Kelheim Fibres GmbH
Production capacity	90,000 tons/year
Turnover	approx. EUR 180 m



3 The life cycle

3.1 The raw material

The wood used for viscose production in Kelheim comes exclusively from certified, sustainably managed forests. Two types of wood are used: Plantation wood, in which the trees are reforested after harvesting, and wood from natural forests, which is no longer suitable for other uses, e.g. in the furniture industry. Through the exclusive use of wood with FSC® and PEFC™ certification, we ensure that the wood has not been obtained illegally or in violation of protection regulations for humans and nature. By joining the Canopy Initiative, Kelheim Fibres has committed itself to the protection of primeval forests and threatened forest areas. This commitment is also reflected in our policy on pulp purchasing.

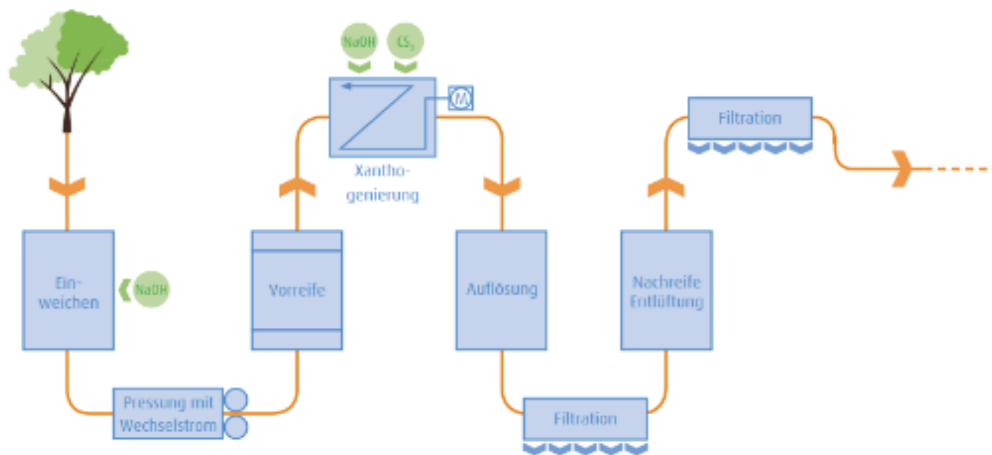
To achieve even greater sustainability in the use of raw materials, we are examining the use of recycled cellulose (“circular economy”) as well as other source materials (e.g. orange peel or straw).

Viscose fibres consist of cellulose, the most abundant biopolymer in nature. Cellulose is the main component of many plants and is contained in wood with a proportion of about 40 %. More than 100 years ago, a process was developed to extract the cellulose stored in wood and form it into a fine viscose fibre:

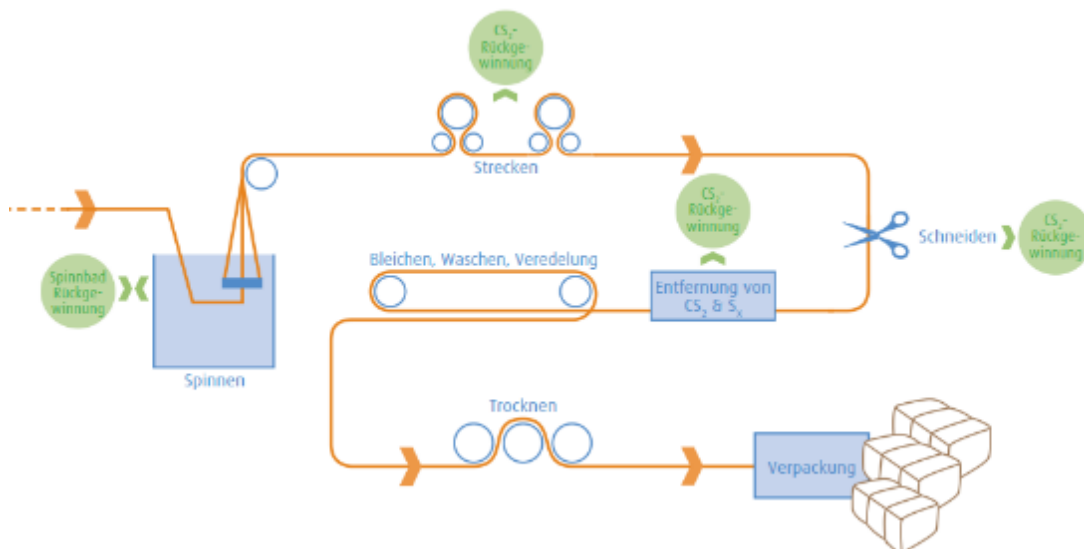


3.2 The production process

In this process, the cellulose used in the form of pulp is dissolved to form a honey-like, highly viscous liquid, which gives the viscose process its name. This liquid is introduced into a spinning fluid by means of a jet, whereby the dissolved cellulose regenerates into a fibre. During this process, the shape, thickness and length of the fibre can be changed or additives (such as colour pigments) can also be embedded. Our fibres are available in cut form (staple fibre) or as endless cable (uncut).



Production of viscose (textile pulp) from pulp



Production of viscose fibres from the textile pulp

3.3 Our products

Whether environmentally friendly hygiene products, speciality papers or high-quality textiles - many end products obtain their special properties from our viscose fibres. The products range from tea bags, bandaging material, textiles, banknotes right through to wipes and tampons.



© Kelheim Fibres GmbH / Stefan Kiefer

Close-up of viscose fibres

In hygiene products that are mostly intended for convenient use (such as wet wipes, tampons, sanitary towels, etc.), our viscose fibres contribute towards replacing more and more crude oil-based materials in the future. Today, these products are manufactured to a not inconsiderable extent from synthetic raw materials, representing an enormous burden on the environment. Our speciality viscose fibres allow consumers to choose an environmentally friendly product without sacrificing performance.

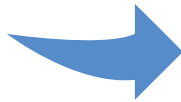


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Textiles made of viscose fibres are characterised by excellent moisture management and are therefore comfortable to wear.



In speciality papers, such as are frequently used in food packaging, our fibres offer environmentally friendly and high-performance options - for example, for tea bags that do not tear and yet are free of microplastics.



Being biodegradable as well, our technical fibre specialities are therefore an environmentally friendly alternative to synthetic materials. Under this portfolio we market, for example, a flame retardant fibre or carbon fibre precursors.

The co-product sodium sulphate is obtained during the production of our fibres. This valuable chemical is used in the detergent, glass and food industries.

We also obtain our sulphuric acid from our waste gases which contain sulphur, together with purchased liquid sulphur.

Sodium sulphate

520 kg sodium sulphate per tonne of fibre produced

Sulphuric acid

750 kg sulphuric acid per tonne of fibre produced

3.4 Biodegradability

Our viscose fibres are biodegradable in accordance with OECD 301 B¹, i.e. they are completely decomposed by microorganisms under appropriate conditions in the sea and in the soil.

In contrast, synthetic fibres (= plastics) are not or not completely biodegradable. They are broken down over the years into the finest microparticles which, invisibly for the naked eye, pollute the air, land, water and living creatures.

3.5 Certificates

A large number of certificates confirm the environmental friendliness of our viscose fibres.



¹Test procedure for the degradability of fibres

4 Our actions make a difference

4.1 Why are we introducing EMAS?

By introducing EMAS, we want to prove and further improve our environmental performance. EMAS is directed at the owners, the customers, our employees and last but not least, at our region. All stakeholders benefit from EMAS at different levels. Combining sustainable and ecological action with an economic perspective is the goal we all share. To this end, we intend to continue along the path of continuous improvement at all levels.

4.2 Owners

Our shareholders are investing in a company with a promising future. To achieve this, we must address the questions of our time and offer solutions for current and future challenges.

Products which are manufactured in an environmentally friendly manner and, in addition to their actual function, also make an active contribution to the protection of the planet, promise long-term success.

4.3 Customers

This also applies to our customers. Our fibres enable our customers to create environmentally friendly end products, no matter whether they are customers from the hygiene sector, the textile sector, the (food) packaging or the technical sector.

We create added value with innovative solutions, customized fibres that offer our customers real added value: A fully biodegradable product whose technical performance is competitive by far versus petroleum-based alternatives.

Here, our customers can rely on us as well. We store production parameters and raw material batches for each delivered fibre unit. This complete transparency meets our quality standards and provides the greatest possible security for consumers, our customers and for us.

4.4 Employees - from generation to generation

We have been producing viscose fibres in Kelheim for over 80 years. The parents and even the grandparents of many of our employees have already worked in our company.

This brings with it an enormous wealth of experience, a deep connection and a friendly, almost family atmosphere in the company. More than a third of our employees have been with the company for over 20 years. We are proud of this, as well as of our low fluctuation rate, because we know that the know-how and commitment of our employees are our capital.

We promote co-determination at the workplace and develop common goals with employee representatives. We offer our employees competitive wages and social benefits as well as the ideal conditions for their personal and professional development. At the same time, we promote the future and educational opportunities of young people from the region. With currently 70 trainees, the training rate is 12 %, which is far above the federal state and national average.

Our employees are actively involved in the continuous improvement process through our Employee Proposal Scheme.

4.5 Neighbours, region, society

In line with our guiding values, we take our responsibility seriously - for society, the environment and the region in which we produce. Compliance with all regulations and the documentation of processes provide security for all parties involved. We safely comply with specified limit values, meet both environmental standards and the highest demands on the state of the art and use our know-how to become even better. Good cooperation with the authorities is of central importance for us.

While at the time of the company's founding, proximity to the employees' place of residence was a clear advantage, today an industrial company is not always viewed as a popular neighbour by an adjacent residential area.

We nevertheless have a very good relationship with our neighbours and are actively committed to ensuring that it stays that way. Open communication is the basis for this. For example, following the big fire in October 2018, we informed our neighbours in several civic dialogues about the status of reconstruction, thus further strengthening the existing basis of trust.

5 Our management system

The EMAS environmental management system is being introduced for the entire Kelheim Fibres GmbH. The purpose of our company is the development, production and sale of viscose fibre specialities as well as the production and sale of sodium sulphate and sulphuric acid. The sole location is Regensburger Straße 109 in Kelheim. Kelheim Fibres is the service provider at the Kelheim fibre centre for the other two companies on the site, Dolan GmbH and European Carbon Fiber GmbH. The scope of EMAS is restricted to Kelheim Fibres GmbH exclusively.

EMAS is part of our integrated management system, which covers the areas of quality (ISO 9001), energy (ISO 50001), hygiene (company standard) and compliance (on a holistic and cross-aspect basis). The management representatives of the individual management systems as well as legally required representatives (such as the water protection officer) report directly to the Management.

The anchoring of environmentally conscious action in the company is ensured by the transfer of obligations to our Managers with binding effect. Moreover, all employees were trained with regard to EMAS and our environmental policy.

Processes govern the interfaces between the individual departments. The appropriate details are regulated in the corresponding internal departmental work instructions. The regulations cover both normal operation and emergency situations.

We regularly set targets for the improvement of the respective environmental performance and pursue and review these as part of our continuous improvement process. In annual internal audits, the so-called environmental audits, we check compliance with regulations, the application of the management system and improvements we aim towards achieving. Once a year, the Management conducts a management evaluation in the scope of a so-called management review.

The basis for our actions in the environmental sector is our environmental policy:

Umweltpolitik

Das Unternehmen

Seit über 80 Jahren entstehen in unserem Werk in Kelheim Zellulosefasern. Als einer der weltweit führenden Hersteller trägt Kelheim Fibres so zum Erfolg vieler Marken und Produkte bei. Damit dies auch in Zukunft so bleibt, baut unsere Umweltpolitik auf Effizienz, Glaubwürdigkeit und Nachhaltigkeit.

Die Ziele

Wir streben nicht nach kurzfristigen Erfolgen, denn es ist unser Anspruch, dass sich Menschen auf der ganzen Welt auf die einzigartige Qualität unserer Produkte nachhaltig verlassen können. Damit tragen wir von Kelheim Fibres eine große Verantwortung. Für unsere Kunden, Endverbraucher, Mitarbeiter, Eigentümer, die Gesellschaft, die Region und die Umwelt. Aus Verantwortung für künftige Generationen stellen wir die Umwelt in einen besonderen Fokus.

Der Erfolg unserer Umweltpolitik beruht auf den drei Säulen **effizienz, Glaubwürdigkeit und Nachhaltigkeit**. Das Streben danach prägt unsere gesamte Firmenphilosophie.

Effizienz

Die der Menschheit zur Verfügung stehenden Ressourcen sind endlich. Deswegen sind die Anwendung der bestverfügbaren Technologien, eine ständige Steigerung der Energieeffizienz und eine optimierte Kreislaufführung unserer Einsatzstoffe in unserem Handeln fest verankert. Unsere Mitarbeiter arbeiten stetig daran, die Stoff- und Energieströme in unseren Prozessen weiter zu optimieren und somit unsere Umwelt durch eine effiziente Rohstoffnutzung zu schonen. Mit diesem Handeln schlagen wir eine Brücke zur Nachhaltigkeit.

Glaubwürdigkeit

Als historisch gewachsener Standort inmitten eines Wohngebietes der Stadt Kelheim, ist und war Kelheim Fibres immer ein glaubwürdiger Partner seines Umfeldes. Wir legen deshalb Wert auf einen aktiven Dialog mit den Menschen, die rings um unseren Standort leben. Gemeinsam mit den lokalen Behörden waren und bleiben wir bestrebt, durch eine Vielzahl von Projekten - weit über die gesetzlichen Anforderungen hinaus - die Auswirkungen auf unsere Umwelt und damit auf unser Umfeld zu minimieren und so das in uns gesetzte Vertrauen zu rechtfertigen. Mit dieser Philosophie sind und bleiben wir ein verlässlicher Partner auch für unsere Kunden.

Nachhaltigkeit

Nachhaltiges Handeln umfasst den Lebenszyklus unserer Produkte. Über Ressourceneffizienz hinaus werden ökologische Merkmale wie eine umweltgerechte Forstwirtschaft, die Minimierung von regionalen und globalen Umweltauswirkungen entlang der Wertschöpfungskette sowie die Kreislaufschließung bei der Entsorgung unserer natürlichen Produkte zur Kernbotschaft nachhaltigen Handelns. Unsere Viskosefasern mit ihren natürlichen Eigenschaften werden unter Anwendung der höchsten und effizientesten Umweltstandards hergestellt und sind damit als Schlüssel zur Lösung vieler global wirkender Umweltprobleme zu sehen.

Kontinuierliche Verbesserung

Unser Anspruch ist es, sich stetig zu verbessern und den Beweis anzutreten, dass Ökologie und Ökonomie durchaus im Einklang stehen können. Gesetzeskonformes Handeln ist immer die Grundlage unserer Herstellungsprozesse. Darüber hinaus wenden wir die modernsten Umwelt- und Prozesstechniken an.

Wir setzen uns regelmäßig Ziele zur Verbesserung der Umweltleistung, verfolgen und überprüfen diese. Im Einklang mit der Natur zu stehen, zum Wohle unserer Kunden, unserer Mitarbeiter und für unser nachbarschaftliches Umfeld, ist und bleibt unser stetiger Anspruch und Auftrag.

6 Legal framework

EMAS stands for a continuous improvement of environmental performance. This improvement process is based on a functioning environmental management system, which has its origins in a legal action system. Comprehensive legal action stands for the consolidation of all applicable areas of law in a schedule of legal provisions which is constantly maintained and updated. Internally, we monitor compliance with regulations through the activities of the appointed officers for waste, water protection and immission control, for example, and through internal audits. External monitoring by authorities is also performed in various annual inspections such as

- IE monitoring (Industrial Emissions Directive),
- monitoring of the residue incinerator,
- annual waste water discussion on the operation of the biological waste water treatment plant,
- fire safety inspection.

The production facilities and the upstream and downstream equipment determine the applicable legal framework. The following list contains the most important regulations:

Production of viscose fibres

- Approval of the plant in accordance with § 4 BImSchG in conjunction with Annex I of the 4th BImSchV No. 4.1.8
- Limitation of emissions from this plant according to “TA Luft”
- Specification for the biological limit value for carbon disulphide in TRGS 903 in conjunction with TRGS 402

Production of sulphuric acid

- Approval of the plant in accordance with § 4 BImSchG in conjunction with Annex I of the 4th BImSchV No. 4.1.13
- Limitation of emissions from this plant according to “TA Luft”

Operation of the power plant

- Approval of the plant in accordance with § 4 BImSchG in conjunction with Annex I of the 4th BImSchV No. 1.1
- Limitation of emissions from this installation in accordance with the 13th BImSchV
- Greenhouse Gas Emissions Trading Act
- Combined Heat and Power Act

Operation of the residue incinerator

- Approval of the plant in accordance with § 4 BImSchG in conjunction with Annex I of the
- 4th BImSchV No. 8.1.1
- Limitation of emissions from this installation in accordance with the 17th BImSchV

Operation of the biological waste water treatment plant in connection with the sewers

- Approval of the plant in accordance with the Water Resources Act in conjunction with Annex 22 of the Waste Water Ordinance
- Limitation of emissions from this plant in accordance with the Water Resources Act in conjunction with the Water Framework Directive and the Self-Monitoring Ordinance

Operation of cooling plants

- according to 42nd BImSchV

We are currently preparing for the upcoming amendments of TA Luft, the 13th and the 17th BImSchV.

Other applicable areas of law are:

- Industrial safety regulations, especially with regard to explosion protection,
- AwSV (inter-company): the ordinance on plants for handling substances hazardous to water,
- Hazardous substances law with CLP regulation (classification, labelling and packaging of substances) and Ordinance on Hazardous Substances,
- Hazardous goods law,
- REACH regulation to ensure chemical safety.

7 Sustainable production processes - closed cycles

A sustainable production process means conserving resources, minimizing emissions and waste, and operating plants in an energy-efficient manner. This is ensured above all by the operation of modern, technologically advanced recovery and processing plants. The recovery plants close our cycles and guarantee a process-integrated approach.

Examples of process-integrated plant operation:

- waste gas with a high concentration of carbon disulphide is either fed into an activated carbon adsorption unit or directly condensed for recovery purposes.
- Partial streams containing high concentrations of hydrogen sulphide and carbon disulphide are fed to the sulphuric acid plant for combustion. This is used to produce sulphuric acid and high-pressure steam for subsequent power generation. This process also serves to reduce CO₂ emissions.
- On-site waste is professionally disposed of in our incineration plant and used to generate steam. This is associated with savings in natural gas and the reduction of CO₂ emissions from fossil fuels.
- Hot media flows are energetically recovered via the use of heat exchangers.

The BREF definitions, ZDHC specifications and well-known labels such as the Nordic Swan and the EU Ecolabel are used as a benchmark for sustainability:

- ZDHC: non-profit foundation "Zero Discharge of Hazardous Chemicals" with the aim of eliminating harmful chemicals from production
- BREF: Best Available Techniques Reference Document of the European Commission
- Nordic Swan: Eco-label of the Nordic Council of Ministers, official eco-label of the Nordic countries
- EU Ecolabel: Environmental requirements of the European Commission

Our process-integrated plant operation enables us to achieve the following performance values and comply with the specifications of the current standards of ZDHC and BREF, whereby Nordic Swan and EU Ecolabel are based on BREF. All values refer to 2019 average values:

Parameters	Unit	ZDHC	BREF	Kelheim Fibres
CS ₂	[kg/t fibre]	80 - 100	No value defined	91
NaOH	[t/d fibre]	0.45 - 0.6	0.4 - 0.6	0.519
H ₂ SO ₄	[t/d fibre]	0.65 - 1.03	0.6 - 1	0.753
Zinc	[kg/t fibre]	2 - 10	2 - 5	6.1
Pulp	[t/d fibre]	1.0 - 1.065	1.035 - 1.065	1.038

8 Other facilities on site

EMAS looks at the environmental sector and its effects. Here, some production facilities are particularly prominent. In addition to these plants which are essential to produce our viscose fibres, there are many other sub-areas which are indispensable to ensure that operations run smoothly.

Having our own railway siding guarantees delivery of our raw materials. In the packing hall, all fibres produced on site are packed and subjected to a final visual inspection.

Our chemical laboratories, which have been certified according to the specifications of "Analytical Quality Assurance" (AQS) for more than 20 years now, support the production and environmental plants with several thousand analyses per year. This ensures that the quality of our fibres meets the highest standards and at the same time, that environmental aspects are fully reviewed. At this point it is important to mention that the chemical laboratories will be accredited according to the strict standards of ISO 17025 in the next few years.

Only thanks to Research & Development and the creative ideas from New Business Development can Kelheim continue to expand its position as an innovative and sustainable speciality fibre manufacturer. Listening to the market and taking up the ideas of the customers is the mission of our marketing department. These departments understand their task as developing joint ideas into sustainable products.

Production plants need to be developed and maintained. The technical department has undertaken to promote the development process. The maintenance and repair of plants and site infrastructure and the erection of partly complex new buildings are the tasks of both the workshops and the construction department.

A plant fire brigade is on site as to be immediately ready for action in the event of any incident. We know how important this facility is - not least since the big fire in 2018. Thus, we are all proud that the plant fire brigade will be able to move into its new shed by mid-2021.

Within the administrative sector of our organization, special mention should be made of the Finance and Human Resources departments and the Works Council, because no company can be managed without employees and without sufficient financial resources.

Health, safety and environmental protection go hand in hand. This is ensured by the safety and environmental department together with the company's medical department. The plant security staff are also trained paramedics and are available to our employees around the clock.

Eating keeps body and soul together, which is something the canteen takes care of. The canteen also sees itself as a place for personal encounters.

Last but not least I&K (information and communication) should be mentioned. The responsibility of I&K encompasses the production processes and tailor-made application programs, right down to supporting computers at the workplace.

Even if not all departments were mentioned to a sufficient extent here, it is part of our shared self-image that we are a team and therefore everyone should feel addressed.

9 Environmental effects

Environmental effects include energy, water, air, odours, waste, soil and noise. They are considered on the emissions and immissions side. The emissions side mainly comprises the pollutant loads emitted. On the immissions side, the effects on the neighbourhood are considered.

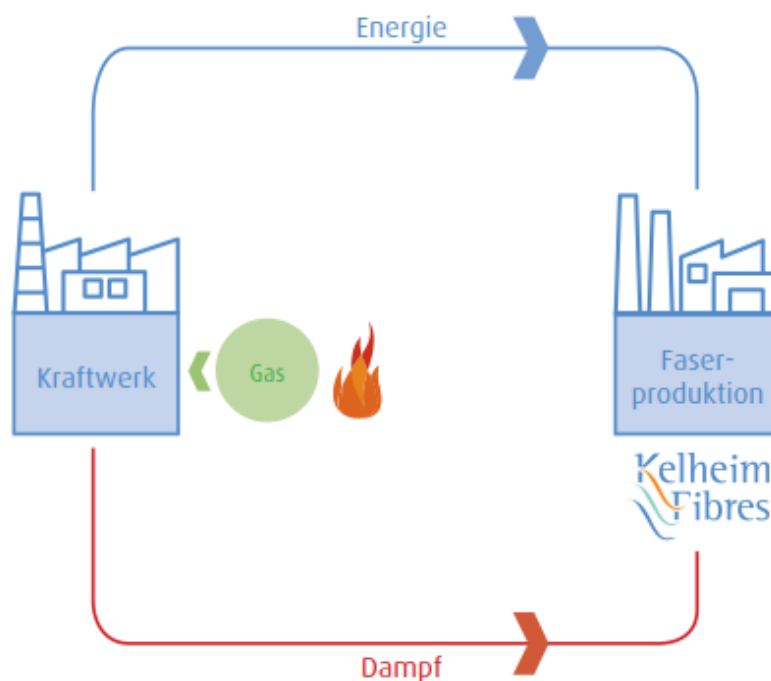
9.1 Energy

In order to meet our responsibility for successful, efficient and sustainable business operations, a major focus is on optimizing the generation and use of energy.

Our responsible use of energy resources is reflected by

- the effective generation and provision of energy,
- the economical use of energy and the best possible use of residual energy from the processes,
- the efficient use of energy through recycling and reuse of processing aids and
- the continuous improvement process.

We operate a modern power plant at low emission levels using natural gas and according to the environmentally friendly and efficient principle of combined heat and power generation (cogeneration). This enables us to achieve efficiencies of over 88 %.

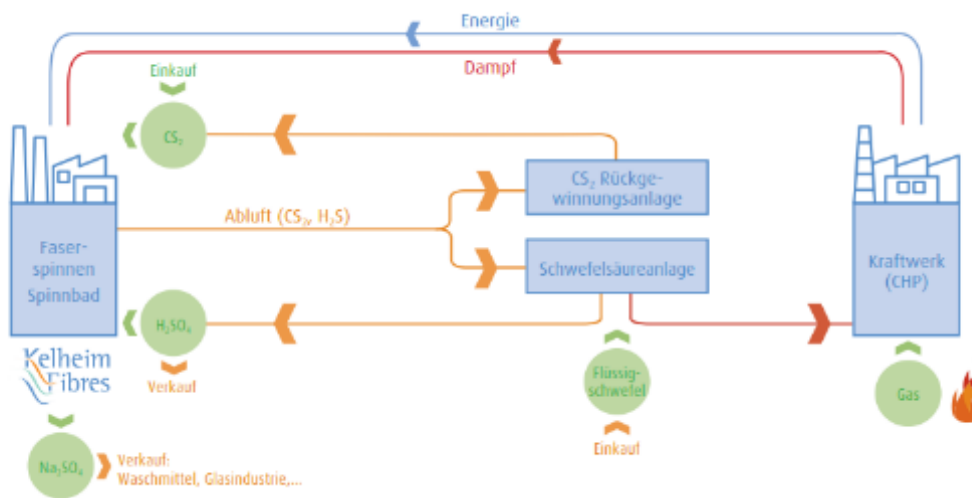


Energy supply based on the principle of cogeneration

By operating recovery plants, we fulfil the requirement of material and thermal utilisation of waste gas streams. Waste produced at the site is recycled thermally within the plant. Thanks to our sulphuric acid plant we generate a significant proportion of our energy without releasing climate-damaging CO₂. This enables us to save considerable amounts of primary energy of fossil origin, thus making an active contribution to reducing greenhouse gases.

We aim to generate energy from renewable sources. This is one of our objectives for the years to come.

Other energy sources include the residue incinerator with its low-pressure steam generated therein and condensate streams being returned to the power plant.



Material flows and closing of cycles on site

As far as energy production and consumption are concerned, we are committed to a site-wide structured energy management system. Taking economic circumstances into account, we want to further increase our energy efficiency in a continuous improvement process and minimize our specific energy consumption. To this end, we also enter into partnerships with energy specialists and energy organizations.

Data on power plant operation:

Parameters	Unit	BREF/13. BImSchV	Kelheim Fibres
Spec. CO ₂ emissions	[kg t CO ₂ /t fibre]	No value defined	1.78
Nitrogen oxides (NO _x)	[mg/Nm ³]	100	90 - 95
Efficiency	[%]	≤ 60	> 88
High efficiency	[%]	10	15 - 20

Primary energy consumption in a highly efficient combined heat and power plant such as the one we operate is at least 10 % lower than if heat and electrical energy were produced separately.



Our power plant

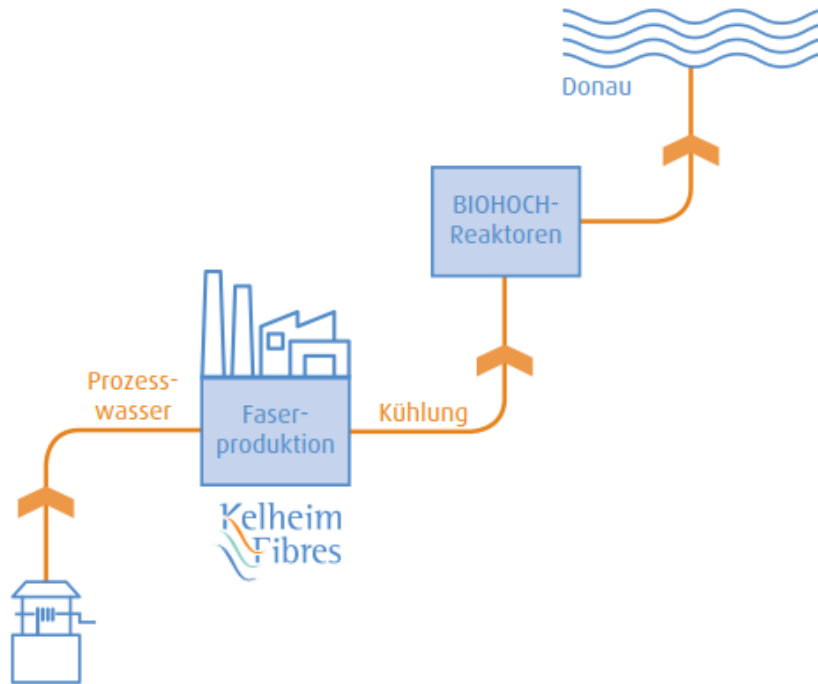
Objectives:

- Implementation of an energetic potential analysis on site
- Use of renewable energies for power generation
- Increase of combustion quantities of high-calorific substances in the residue incineration plant
- Review of the possibility of replacing natural gas by biogenic substances

9.2 Water

Water is mainly used for cooling and is then returned in virtually uncontaminated form to the Danube, as the receiving body of water. Where water is required as a reaction medium in the process flow, we try as far as possible to use the water several times, thus saving resources. Process water is then purified in vertical bio-reactors, which meet the highest standards of purification performance,

Kelheim Fibres was the first company to invest in state-of-the-art and unique vertical bioreactor technology. With a decomposition rate of 96 %, our vertical bioreactors significantly outdo that featured by conventional waste water treatment plants, which is usually around 90 %. Their purification capacity corresponds to that of a sewage treatment plant for a city with 160,000 inhabitants. A tight monitoring network, both internal and external, guarantees constant compliance with the legal limits.



Rough schematic representation of the water regime

What is commonly known as pollutants provides the basic nutrients for microorganisms. These transform organic residues into harmless substances. In this process, mainly carbon dioxide, water and nitrogen are produced. This natural process takes place under optimized conditions in the vertical bioreactors.

Intelligent measurement technology helps to control the process in a very specific way: by using an Alphasizer, for example, the purification systems can be supplied with air in the future in a load-optimized manner. This ensures a constant supply for biological organisms and that the introduction of air is energetically optimized.

The waste water produced in the process is returned to the Danube. Protection of the Danube is a top priority. Compliance with the limit values is monitored by the water management office. We also fall under the Self-Monitoring Ordinance. Samples are continuously taken and analysed to enable us to react immediately to changes in the values.

Consumption data:

Parameters	Unit	ZDHC	BREF	Kelheim Fibres
Process water	[m ³ /t fibre]	No defined value	35 - 70	60
Cooling water	[m ³ /t fibre]	No defined value	189 - 260	220

Emission data:

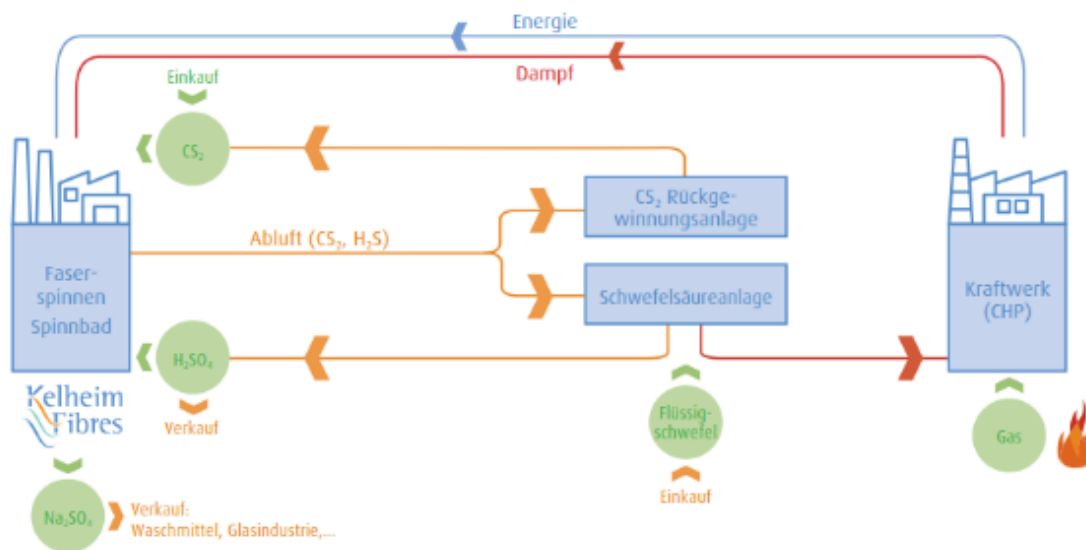
Aspect	Unit	ZDHC			Kelheim Fibres
		Basic requirement	Advanced	Maximum requirement	
CSB	[kg/t fibre]	7.2	6.0	3.6	4.80
	[mg/l]	120	100	60	20 - 50
Zn	[kg/t fibre]	0.15	0.06	0.018	0.165
	[mg/l]	2.5	1	0.5	0.5
N _{tot}	[mg/l]	30	25	20	15
NH ₄ -N	[mg/l]	5	3	1	3



Biological waste water treatment plant: Our three vertical bioreactors in the Danube area

9.3 Air

The use and handling of sulphur-containing substances plays a decisive role in the production of viscose fibres.



Operational material cycles for material recycling and emission minimisation

The cellulose used in the form of pulp is dissolved in caustic soda and carbon disulphide during the production process (xanthogenation) and forms a honey-like, highly viscous liquid, which gives the viscose process its name. This liquid is introduced into a spinning fluid by means of jets, whereby the dissolved cellulose regenerates itself into a fibre. The process then passes through several steps, whereby carbon disulphide and hydrogen sulphide are released in these sub-steps. While the highly concentrated streams are fed to a material recycling process, the low concentrated streams mainly enter the atmosphere via the 86-metre high viscose stack. Beyond that, only a few partial streams are emitted close to the ground via the roof of the spinning room.



CS₂ recovery with viscose stack



Sulphuric acid plant

The highly concentrated waste gas streams are treated either in the sulphuric acid plant, in which sulphuric acid is produced in a combustion process, or in the carbon disulphide recovery plant, in which the carbon disulphide is bound to activated carbon by means of adsorption. The substances recovered in this way are then returned into the process. Another form of carbon disulphide recovery is via direct condensation. However, the preferred and more established method is adsorption to activated carbon.

These technologies have helped to reduce sulphur emissions by 45 % in the last ten years.

This enables Kelheim Fibres to comply with the WHO's stricter limits for environmentally relevant sulphur emissions, which go far beyond the state of the art.

Parameters	Unit	BREF	Kelheim Fibres
Spec. Sulphur emissions	[Kg S/t fibre]	12 - 20	6.9
Carbon disulphide immissions	[µg/Nm ³]	100	95 ²

9.4 Odours

The same hydrogen sulphide that is known from curative springs is released in the course of the production processes in our facilities and is sometimes perceived by the neighbouring population. Of course, the concentrations and loads in which the hydrogen sulphide is released make a difference.

Thus, Kelheim Fibres has always strived to significantly reduce sulphur emissions. In the last ten years, a targeted modernisation program has reduced the loads of hydrogen sulphide by more than 50 %.

Objectives:

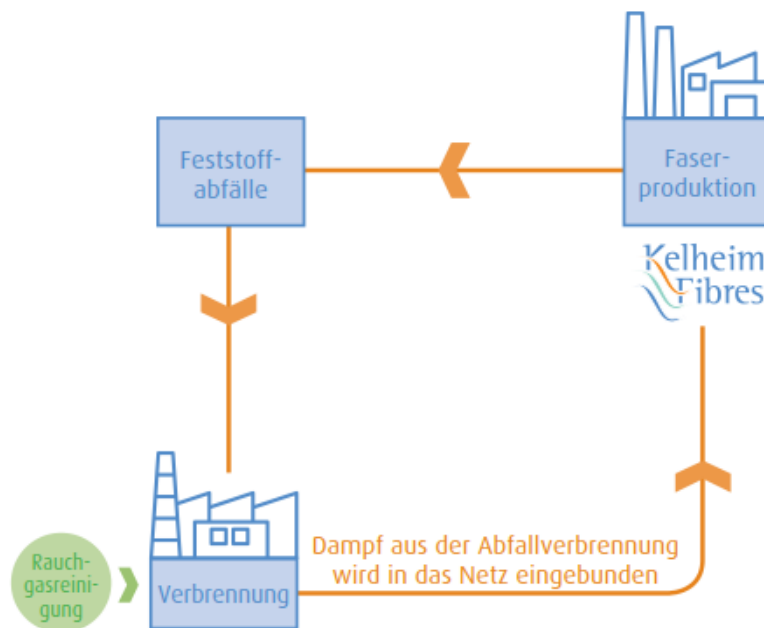
We are continuing to work on reducing our emissions and immissions. This is achieved at the emission source by further encapsulation of defined waste gas streams, which are then fed into a waste gas purification or recovery system. Relocating further diffuse emission sources close to the ground to the 86-metre high stack enables us to achieve an additional reduction in immissions.

²Immission forecast by Müller BBM dated 02/2019

9.5 Waste management

Waste produced at the site is disposed of professionally. Internally, the site has its own residue incineration plant for this purpose. The plant, which was built in 1974 and modernised in 2001 and 2002 respectively, meets the highest standards of safety and emissions technology. The residue incineration plant falls under the 17th BImSchV. Natural gas is required for the combustion processes as well as the thermal energy of the waste, some of which has a high calorific value.

In the residue incineration plant, most of the waste produced is used thermally. The combustion processes generate approx. 4 tons of 16-bar steam per hour, which is then fed into the plant's low-pressure steam network for thermal use. The residue incineration plant also features a waste heat boiler for steam generation and wet electrostatic precipitators for flue gas cleaning.



In-process combustion process

Emissions monitoring:

As with many of our plants subject to immissions control legislation, important emission parameters are recorded online by an emissions calculator. In addition, the licensing authorities have unlimited access to the data of the emissions calculator. This means that our plant emissions can be checked by the authorities at any time. Moreover, the plant is also subjected to a separate check in the scope of annual inspections by the Bavarian State Office for the Environment.

Objectives:

- Reduction of the operational waste volume
- Improved utilization of the residue incinerator with simultaneous reduction of the operational use of natural gas
- Optimisation of the energy contribution resulting from operation of the residue incinerator



Area of the residue incineration plant

9.6 Soil

The monitoring of soil and groundwater has been performed by hydrological institutes for more than 30 years on the basis of the Federal Soil Protection Act as well as the contaminated site guidelines.

A monitoring network of at least 15 measurement levels ensures area-wide monitoring. An extract status report also describes the overall site conditions with regard to soil and groundwater status.

9.7 Noise

The population density in Kelheim is growing and the residential areas are moving closer to industrial locations. This trend is increasing in line with the current shortage of housing.

Over the past ten years, we have invested several million euros in noise protection within an ambitious noise remediation program. Visible signs of noise protection are our noise protection halls located to the west, the sound-reduced stack of the carbon disulphide recovery plant and the renovated 86-metre high viscose stack. Within the reconstruction measures following the fire in 2018, further necessary measures involving the spinning hall roof are to follow. This package of measures means that in future, noise immissions at the relevant immission points will be reduced by at least a further 6 dB(A) in future. It is important to note that a reduction of 3 dB(A) in noise emissions corresponds to these being halved.

Objectives:

Noise and healthy living conditions are directly related. Our aim is therefore to continuously improve noise immissions in the future as well. We continue to pursue this goal, even though the legal requirements at the individual immission locations are already being undercut. Further programmes of measures are derived from the obligation to comply with the state of the art of noise abatement technology at the relevant emission sources. Accordingly, old blowers, fans and compressors are being replaced by quieter units as part of the ongoing maintenance programmes.

10 Quo vadis viscose fibres, quo vadis Kelheim Fibres?

As a manufacturer of speciality fibres, we develop unique solutions together with our customers. Sustainability plays just as important a role as the properties and application possibilities of our products:

our fibres are an environmentally friendly alternative to synthetic materials. This includes certified sustainable raw material procurement, resource-saving and low-emission production processes and the ongoing search for improvements and forward-looking solutions in line with the challenges and trends of our time.

Based on our many years of experience in the hygiene sector, we deal with both femcare products and toilet-compatible wet wipes, but also with completely harmless food packaging. In addition, we are venturing into new areas of application and are working both globally and regionally - here, for example, on alternatives to the common hop or tomato tying wires or on moisture-retaining asparagus foils.

In each of these cases, our fibres not only offer the required functionality, but also an enormous advantage for the environment - an aspect that is becoming increasingly important and which allows us to look to the future with confidence.

We see ourselves as leading the innovation in the industry and we thus continue to follow this path with enormous dedication. To this end, we rely on dialogue both within and outside of the sector, with industry and science, with end customers and innovative start-ups.

11 Validity statement of the environmental verifier



Validity Declaration

The undersigned EMAS environmental verifiers Dr. Ulrich Wilcke with verifier registration number DE-V-0297, accredited and approved for the scope NACE 20 "Production of chemical products", as well as Jochen Buser with verifier registration number DE-V-0324, confirm to have verified that the site Regensburger Str. 109 as indicated in the environmental statement of Kelheim Fibres GmbH meets all requirements of Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 as amended on August 28, 2017 and December 19, 2018 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS).

By signing this declaration, I declare that:

- the verification and validation has been carried out in full compliance with the requirements of Regulation (EC) No 1221/2009 as amended by Commission Regulation (EU) 2017/1505 and (EU) 2018/2026,
- the outcome of the verification and validation confirms that there is no evidence of non-compliance with applicable legal requirements relating to the environment,
- the data and information of the environmental statement/ of the organisation reflect a reliable, credible, and correct image of all the organisations activities.

This document is not equivalent to EMAS registration. EMAS registration can only be granted by a Competent Body under Regulation (EC) No 1221/2009. This document shall not be used as a stand-alone piece of public communication.

Berlin, 24.11.2020

Dr. Ulrich Wilcke
Umweltgutachter DE-V-0297

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12 Annex

12.1 Direct and indirect environmental aspects and evaluation thereof

To determine the direct environmental aspects, the approval notifications of the sub-area, if available, were used initially. An approval under immission control law is prepared on the basis of expert opinions with the participation of official agencies from all environmental sectors. Thus, expert opinions on the relevance of the individual aspects are already available in these areas. We have added practical experience to this basic classification grid, for example by asking ourselves questions such as "Where do we have particularly high fuel consumption?" or "Where do the highest emissions occur?"

We have also asked ourselves these questions for areas without our own approval notification and, supported by safety analyses and expert reports, have structured these areas.

This results in the following pattern:

Operating area	Subareas	Air	Noise	Water	Waste management	Energy	Safety	Dangerous goods	Radiation protection	Fire protection	Resources	Soil
Supply systems	Heat and electricity	H		o	o	H	x	o		x	x	
	Refrigeration					x	x					
	Compressed air					x	x					
	Inert gas					x	x					
	Water treatment			H	o						x	
Disposal	Residue incineration	H	o	o	H	H	x	x	x	x	x	
	Biological waste-water treatment	o	o	H	o	o	o			o		
Production - core areas	Viscose production	x	o	H	H	o	H	x		x	x	
	Spinning room	H	x	H	x	H	x	x		H	x	
Production - support areas	CS ₂ recovery	H	x	o	o	x	H	x		x	x	
	CS ₂ storage/CS ₂ discharge			o			H			x		
	Acid protection ering	o	o	x	o	H	x	x	x	o	o	
	Zinc plant	x		x	H	o	x	x		o	o	
	Sulphuric acid plant	H	x	x		H	x	x		x	x	
	Calcination			H		o	o					
Production - downstream areas	Packaging		o	x						x		
Location				x	x							x

H	Most important aspect	Very high relevance	Very high legal requirements and/or very high consumption/emissions/immissions.
x	Main aspect	High relevance	High legal requirements and/or high consumption/emissions/immissions.
o	Secondary aspect	Medium relevance	Legal requirements in place and/or moderate consumption/emissions/immissions.
	No aspect	Very low/no relevance	No specific legal requirements and/or no or very low consumption/emissions/immissions.

The assessment refers to normal operation. If operation takes place other than as intended, further emissions of pollutants or releases of substances may occur additionally. We have defined how we have to react to this within our company alarm and hazard prevention plan. This is also checked by the authorities.

Examples of operational conditions other than as intended are:

- Biological waste water treatment plant:
Unadapted biocenosis and associated poorer degradation capacity during the start-up phase due to increased loads
- Failure of the sulphuric acid plant:
 - Increased sulphur emissions
 - Increased natural gas consumption in the power plant to compensate for the lack of energy production from operation of the sulphuric acid plant
- Start-up process of the sulphuric acid plant after plant malfunction:
 - Increased emissions of sulphur oxides during the start-up process after a plant malfunction

In addition to these environmental aspects which can influence directly the environmental impact of viscose fibre production is also determined by external conditions which are beyond our control.

Aspect	Explanation	Impact	Assessment	Reasons
Composition of product range	The composition of our product mix is developing more and more towards speciality fibres.	Water: The higher the proportion of specialities, the higher the specific water consumption. Energy: In addition, the mix between dry and wet fibres has an influence on energy consumption. Customer requirements are decisive here	high	The trend towards speciality fibres is already clearly visible. The water consumption of speciality fibres is significantly higher; energy consumption tends to decrease, but also fluctuates.
Life cycle	Primarily in focus: End-of-life, what happens to the final product after use?	Fibres are not classified as plastics or microplastics. -> Proof of complete biodegradability or compostability according to DIN and OECD methods; low recyclability of hygiene products	high	Legal labelling requirement if products would be classified as plastics, Circular Economy
Life cycle	Environmental aspects of pulp production	Scope 3 of the life cycle assessment and the LCA is affected	medium	Pulp cannot be substituted easily, degrees of freedom are only the pulp supplier and the medium-term development of new pulp sources
Selection of services	Transport of our products	CO ₂ emissions, NO _x emissions	low	Transport is not a major factor in the CO ₂ footprint; the savings potential is low
Environmental performance and behaviour of contractors, subcontractors and suppliers	Suppliers of our raw materials	Manufacturing processes also have an impact on the carbon footprint and LCA results	low	Due to the quantity of special raw materials, the range of suppliers is limited and KF's influence is therefore severely limited.

12.2 Core indicators

Core indicators have been established so as to better present the environmental performance of our company. After the big fire in 2018, we are currently still in the phase of rebuilding our spinning room. Production capacity is therefore limited. Until the completion of the construction measures and the resumption of full production in 2022, the figures are mainly affected by these low production capacities. This has led to an increase in specific indicators as of 2018, as site facilities must continue to operate even if production is lower.

Production quantities

	2017	2018	2019	
Production quantity				
Fibres produced	78,684	63,765	40,852	t
Energy				
Current	95,366,000	84,473,000	72,133,000	kWh
Steam	525,852,000	478,903,000	370,326,000	kWh
Renewable energy consumption	0	0	0	kWh
Fuel for vehicles	269,553	249,882	202,478	kWh
Material				
Pulp	81,057	65,890	42,411	t
NaOH	41,499	33,895	21,195	t
H ₂ SO ₄	60,827	49,758	30,761	t
CS ₂	6,787	5,645	3,735	t
Water				
Well water	13,719,732	13,232,890	13,252,014	m ³
Danube water	9,487,799	9,738,877	6,784,123	m ³
City water	30,899	23,538	22,062	m ³
Waste management				
Total waste	6,521	5,644	5,613	t
Process waste for recycling	191	212	195	t
Process waste for disposal	2,182	2,184	2,114	t
Other waste	4,148	3,248	3,304	t
Total hazardous waste	1,170	867	1,099	t
Hazardous process waste for recycling	85	102	73	t
Hazardous process waste for disposal	127	153	141	t
Other hazardous waste	958	612	885	t
Land consumption				
Total land consumption	211,934	211,934	211,934	m ²
Total sealed area	177,544	177,544	177,544	m ²
Total near-natural area at the site	34,390	34,390	34,390	m ²
Total near-natural area off the site	-	-	-	
Emissions				
Total greenhouse gas	119,187	98,195	81,422	t

Total dust	118	123	92	kg
SO ₂	122,322	102,168	93,153	kg
NO _x	32,298	48,262	40,836	kg

Values for input/output in relation to production quantities

	2017	2018	2019	
Energy				
Current	1,212	1,325	1,766	kWh/t fibre
Steam	6,683	7,510	9,065	kWh/t fibre
Renewable energy consumption	0	0	0	kWh/t fibre
Fuel for vehicles	3.43	3.92	4.96	kWh/t fibre
Material				
Pulp	1.030	1.033	1.038	t/t fibre
NaOH	0.527	0.532	0.519	t/t fibre
H ₂ SO ₄	0.773	0.780	0.753	t/t fibre
CS ₂	0.086	0.089	0.091	t/t fibre
Water				
Well water	174	208	324	m ³ /t fibre
Danube water	121	153	166	m ³ /t fibre
Waste management				
Total waste	82.9	88.5	137.4	kg/t fibre
Process waste for recycling	2.4	3.3	4.8	kg/t fibre
Process waste for disposal	27.7	34.3	51.8	kg/t fibre
Other waste	52.7	50.9	80.9	kg/t fibre
Total hazardous waste	14.9	13.6	26.9	kg/t fibre
Hazardous process waste for recycling	1.1	1.6	1.8	kg/t fibre
Hazardous process waste for disposal	1.6	2.4	3.5	kg/t fibre
Other hazardous waste	12.2	9.6	21.7	kg/t fibre
Land consumption				
Total land consumption	211,934	211,934	211,934	m ²
Total sealed area	177,544	177,544	177,544	m ²
Total near-natural area at the site	34,390	34,390	34,390	m ²
Total near-natural area off the site	Kelheim Fibres does not have any near-natural areas off the site			
Emissions				
Total greenhouse gas	1.51	1.54	1.99	t/t fibre
Total dust	1.5	1.92	2.25	g/t fibre
SO ₂	1.55	1.60	2.28	kg/t fibre
NO _x	0.41	0.76	1.00	kg/t fibre

12.3 Environmental goals

With EMAS, we commit ourselves to doing what is already anchored in our business strategy: to further optimize our environmental performance.

Our environmental program covers the greatest environmental aspects and includes measures in all areas of our plant.

Water

Target		Activities	20	21	22	Unit	Responsibility
Qualitative	Quantitative						
Guarantee for safe plant operation	Savings of compressed air (energy relevant)	Conversion of the flotation plant	x	x	x		Environmental plants
	Saving of compressor air and thus energy savings (energy relevant)	Automatic return of sludge from post-clarification to activation		x			Environmental plants
Homogenizing the inflow loads		Integration of the BHR 1 as an upstream expansion tank			x		Environmental plants

Air

Target		Activities	20	21	22	Unit	Responsibility
Qualitative	Quantitative						
	Reduction of specific sulphur emissions	Cable tow exhaustion at the spinning lines and then transfer to the CS ₂ recovery plant	-0.5	-0.8	-1	[kg S/t fibre]	Spinning room
	Reduction of immissions values CS ₂	Discharge of defined individual sources (washing sectors) into the viscose stack and thus improvement of discharge conditions			-55	Annual average: [µg/Nm ³]	
					-233	Daily average: [µg/Nm ³]	
	Reduction of odour hour frequency				-5	[%/a]	
Improved measurement acquisition		Installation of an emissions evaluator as well as with extended monitoring spectrum for the parameters CS ₂ and COS			x		

Noise

Target	Activities	20	21	22	Unit	Responsibility
Reduction of immissions	Performance of immissions measurements at the relevant receptor points to verify the measures taken so far under the noise remediation programme (reference: specifications from subsequent injunction)		x		dB(A)	HSE
Reduction of immission guide value	Installation of silencers in the viscose stack to reduce the sound power level in connection with further measures on the spinning room roof	(- 6) - (-13)			dB(A)	Technology

Waste management

Target	Activities	20	21	22	Responsibility
Improvement of operational safety	Feasibility study for the addition of fractions with high calorific value such as wood	x	x		HSE/environmental facilities

Energy

Target	Activities	20	21	22	Unit	Responsibility
Increasing the proportion of CO ₂ -free energy production	Feasibility study for erection of a 300 kWp PV plant as a basis for operational implementation		x			HSE/Energy department
Reduction of primary energy consumption	Potential analysis for optimized energy generation and utilization		x			HSE/Energy department
	Continuous improvement process from energy management as the sum of all energy projects	-1	-1	-1	[%]	Technology/facilities
	Installation of an Alphasizer for better air utilization and thus for more energy-efficient operation of the compressor units.		-9.6	-9.6	[t CO ₂ /a]	Environmental plants

Sustainability

Target	Activities	20	21	22	Responsibilities
Biodegradability tests according to OECD 301 B	Proof of biodegradability of viscose fibres under maritime conditions according to OECD 301 B	x			HSE/quality assurance
Annual capture of 10 t of CO ₂ per hectare with a humus build-up of 0.2 %	Project sponsorship for humus build-up programmes in agriculture to capture CO ₂	x	x	x	Management
Sustainable cultivation with sustainable materials	Project cooperations with regional farmers through the use of biodegradable viscose products in hop and tomato cultivation	x	x	x	New business development
Creating the basis for further energy projects	Creation of a multi-stage carbon footprint / corporate footprint as a basis for further energy projects	x	x		HSE
Enforcement of Circular Economy	Feasibility study on the use of alternative pulps	x	x	x	Research and Development
Plastic reduction, materials from renewable resources	Project Femcare - development of sustainable feminine hygiene products		x	x	New business development

With the various measures to be implemented within the framework of the environmental programme, our aim is to improve our environmental performance.

Consumption

Target	Activities	19	20	21	22	Unit
Progress of the process	Pulp	1.038	1.031	1.025	1.025	[t pulp/t fibre]
Progress of the process	Sodium hydroxide solution	0.519	0.514	0.52	0.52	[t NaOH/t fibre]
Progress of the process	Sulphuric acid	0.752	0.747	0.75	0.74	[t H ₂ SO ₄ /t fibre]
Progress of the process	Zinc sulphate	15	14.5	13.5	13.5	[kg ZnSO ₄ /t fibre]
Progress of the process	Carbon disulphide	91.4	87	87	87	[kg CS ₂ /t fibre]
Progress of the process	Process water consumption (hygiene fibres)	42	42	45	43	[m ³ water/t fibre]

Generation

Substance	Activities	19	20	21	22	Unit
Sodium sulphate	Increased evaporation from drawing bath	0.55	0.57	0.57	0.58	[t Na ₂ SO ₄ /t fibre]

Emissions

Substance	19	20	21	22	Unit
Sulphur emissions	6.9	6.4	6.1	6	[kg S/t fibre]
CSB	4.8	5.57	5	5	[kg CSB/t fibre]
Zinc	0.16	0.17	0.15	0.15	[kg Zn/t fibre]

Immissions

Substance	19	20	21	22	Unit
CS ₂	80	75	75	25	Annual mean value: [µg/Nm ³]
Frequency of odour immissions	19	18	18	14	[%/a]

12.4 Contact persons and deadlines

Contact person for the environmental statement of Kelheim Fibres GmbH:

Theresa Schreiner
Environmental Engineer
Phone: 09441 99-404
Email: Theresa.Schreiner@Kelheim-Fibres.com

The deadline for the next environmental statement is 12/2021.