

SUSTAINABILITY AT SCHWENK

Information on the business, ecological
and social environment of our construction
materials

Reporting year: 2022
Publication: 2023





Foreword

Dear Reader,

The transformation towards more sustainability shapes our daily thoughts and actions. We are proud of what we have achieved and are highly motivated to push the change forward with all our might. For us, sustainability is not just a current trend, but the basis for future-oriented business and long-term success in our company and in society.

As a family company in its fifth generation, we have always made our decisions with a view to our responsibility to the next generation and to the future. We are continuously working on the development of climate-compatible processes, products and solutions with an eye to quality and innovation. This process not only covers our supply chain as a manufacturer of building materials, but it also integrates additional activities such as ecological transport, agriculture and forestry and also reforestation into our sustainability concept.

We take responsibility for people, nature and the environment and focus on central issues such as employee health, securing and protecting raw materials, and climate protection. For sustainability we endeavour to set standards in technology and to do far more than simply comply with legal regulations and requirements. We have proven in the past that we can meet this claim by our pioneer work with the introduction of SCR, DeCONOX and ExMercury plants. We are also continually pushing forward the use of alternative fuels within our building materials group in a leading role.

We view the global reduction of CO₂ emissions as the central challenge of our age. The process demands political, business and technical solutions. We are determined to be involved in these solutions and will continue to make a major contribution. This is why we intend to be CO₂-neutral by 2050. The construction of a CO₂-neutral cement plant is a significant milestone on the path to a technical solution. We plan to achieve this target by 2030.

However, this can only be achieved together with sufficient amounts of renewable energy, fair competition conditions and the appropriate infrastructure for the storage and/or use of CO₂.



Picture: Thomas Spannagl | SCHWENK

At the same time, we are already working intensively to reduce CO₂ emissions across the entire value chain. We are therefore committed to paving the way for future generations in the company and in society with great financial effort, innovation and full commitment.

You can read in the following pages about what we are doing and how we are doing it.

We are looking forward to hearing from you.

Yours sincerely,

Thomas Spannagl
CEO

Table of contents

Foreword	p. 03
About this sustainability information	p. 05
The SCHWENK Group	p. 06
Generalities	p. 06
SCHWENK Global	p. 07
Our understanding	p. 09
Strategy	p. 10
Company structure	p. 10
Sustainability targets	p. 11
Compliance management system	p. 13
Group statistics	p. 14
Production	p. 16
Supply and conservation of raw materials	p. 16
Alternative raw materials	p. 16
Aggregates	p. 16
Land use and biological diversity	p. 18
Concepts for limiting interference with nature and the environment	p. 19
Subsequent use - recultivation and restoration	p. 19
Conservation of nature and wildlife in our extraction sites	p. 20
"Nature for a time" migratory biotope	p. 21
Climate protection	p. 22
Raw materials	p. 23
Fuel	p. 26
Processes and innovations	p. 28
Emissions and ambient pollution	p. 30
Air pollution control	p. 30
Emission prevention technology	p. 30
Supply chain and logistics	p. 32
Sustainable purchasing	p. 32
Sustainable logistics	p. 32
Selection, monitoring and evaluation of logistics partners	p. 34
Recycling economy	p. 35
Use of raw materials and fuels	p. 35
In focus: Logistics 2.0	p. 36
Waste management	p. 38
Recycling economy in building materials	p. 38

Water management	p. 39
Recycled building materials	p. 40
Recycled concrete in use	p. 41
In focus: R-concrete	p. 42

Products and solutions	p. 44
Customer orientation	p. 44
Environmental relevance of our products	p. 44
Products and consulting	p. 46
Sustainability of our products	p. 47
Added value of our building materials	p. 47
Research and development	p. 49
Optimisation across all divisions	p. 49
Development of cement and concrete with improved CO ₂ balance	p. 50
In focus: CO ₂ reduction	p. 52
Cooperation with partners and universities	p. 56

People and environment	p. 58
Employees and employment	p. 58
People at the centre	p. 58
Employment and employee participation	p. 58
Payment policy and working time regulation	p. 60
Personnel development	p. 61
Training and continuing education	p. 62
Digital learning	p. 63
Management development	p. 63
Diversity management	p. 64
Work health and safety	p. 66
In focus: Safety in street traffic	p. 68
Health management	p. 70
Society and engagement	p. 72
Donations and sponsorship	p. 72
Associations and societies	p. 73
Stakeholder communication	p. 74

Appendix	p. 76
-----------------	--------------

About this sustainability information

Sustainability is a permanent component of our corporate strategy. It is a broad field and is reflected in a very wide range of areas and tasks at SCHWENK. With our first sustainability information at group level, we bundle and describe our diversity in the sustainability commitment for 2022. It is intended primarily for our employees, our customers and interested professionals.

References to persons in the following text always refer to all genders.

The following pages describe both well-known and completely new applications and solutions. We consider it important to describe sustainability holistically and to show both the background and interactions.

Our focus for 2022 is on the SCHWENK Building Materials Group in Germany and covers the divisions of cement, sand & gravel, concrete (ready-mixed concrete and mobile concrete), concrete pumps and recycling. We also select specific topics in different divisions for more detailed discussion. This offers a more in-depth view of the different areas of our supply chain.

On our focus pages, our colleagues provide answers to currently burning questions in interviews.

This sustainability information was created and designed largely by an internal project team - supported by the input of the individual departments. The update or new edition is issued on an annual basis.

The project team

- Laura Schleicher Corporate Communications
- Thomas Spannagl CEO SCHWENK Building Materials Group
- Dr. Hendrik Möller Member of Management
- Dr. Markus Schauer Technical Manager Raw Materials Supply/ Environmental Protection
- Michael Schmitt Technical Manager Integrated Management System (IMS)

THE SCHWENK GROUP



Picture: Ulm Head Office | SCHWENK

GENERALITIES

SCHWENK was founded in Ulm in 1847 making it one of the oldest family companies in the German building materials industry. Our core business is divided into the following divisions: Cement, sand & gravel, concrete (ready-mixed concrete and mobile concrete), concrete pumps and, since 2023, recycling as well

The constituents of our building materials are limestone, crushed rock, sand and gravel. We procure our raw materials mostly from our own deposits and extraction sites. Together they form the basic ingredients for manufacturing concrete. When combined with our concrete pumping services and our high-quality consulting services, we can supply a complete range of services for our customers.

SCHWENK is represented on the market internationally with a large number of investments and subsidiaries. They form a wide-ranging portfolio – from suppliers of building materials to research companies to the farming and agriculture business.

Our divisions



Cement



Sand & Gravel



Concrete
(ready-mixed concrete
and mobile concrete)



Pumps



Recycling

SCHWENK GLOBAL

Along with our partnerships we are present in many European countries and also Namibia.



■ Participations at and over 50% ■ Participations over 25%



OUR COMPASS

ONE TARGET– ONE DIRECTION

The compass symbolises our shared understanding of the vision, mission and values described below. Our vision sets the goal that we want to achieve by implementing our mission. Our values, built on the foundations of a family business, are firmly anchored in our daily actions.

Picture: SCHWENK employees | SCHWENK

OUR UNDERSTANDING

VISION

Sustainable building material solutions for future generations

MISSION

Development of CO₂-neutral products and processes with the help of outstanding employees and innovative technologies together with our partners.

VALUES



FOR FUTURE GENERATIONS



TWO STEPS AHEAD



MORE THAN THE SUM OF ITS PARTS

FOUNDATIONS

Family values:
Responsibility, honesty, trust and mutual support

STRATEGY

Corporate strategy and outlook

As a fifth-generation family business, we are aware of our responsibility towards people, nature, the environment and the climate. We think across generations and place particular focus on the sustainability of our building material solutions.

Our core market is Europe - where we combine our strengths in the regions to offer high-quality solutions for our customers. Our divisions of cement, sand & gravel, concrete (ready-mixed concrete and mobile concrete), concrete pumps and recycling form a vertically integrated value chain and create synergies.

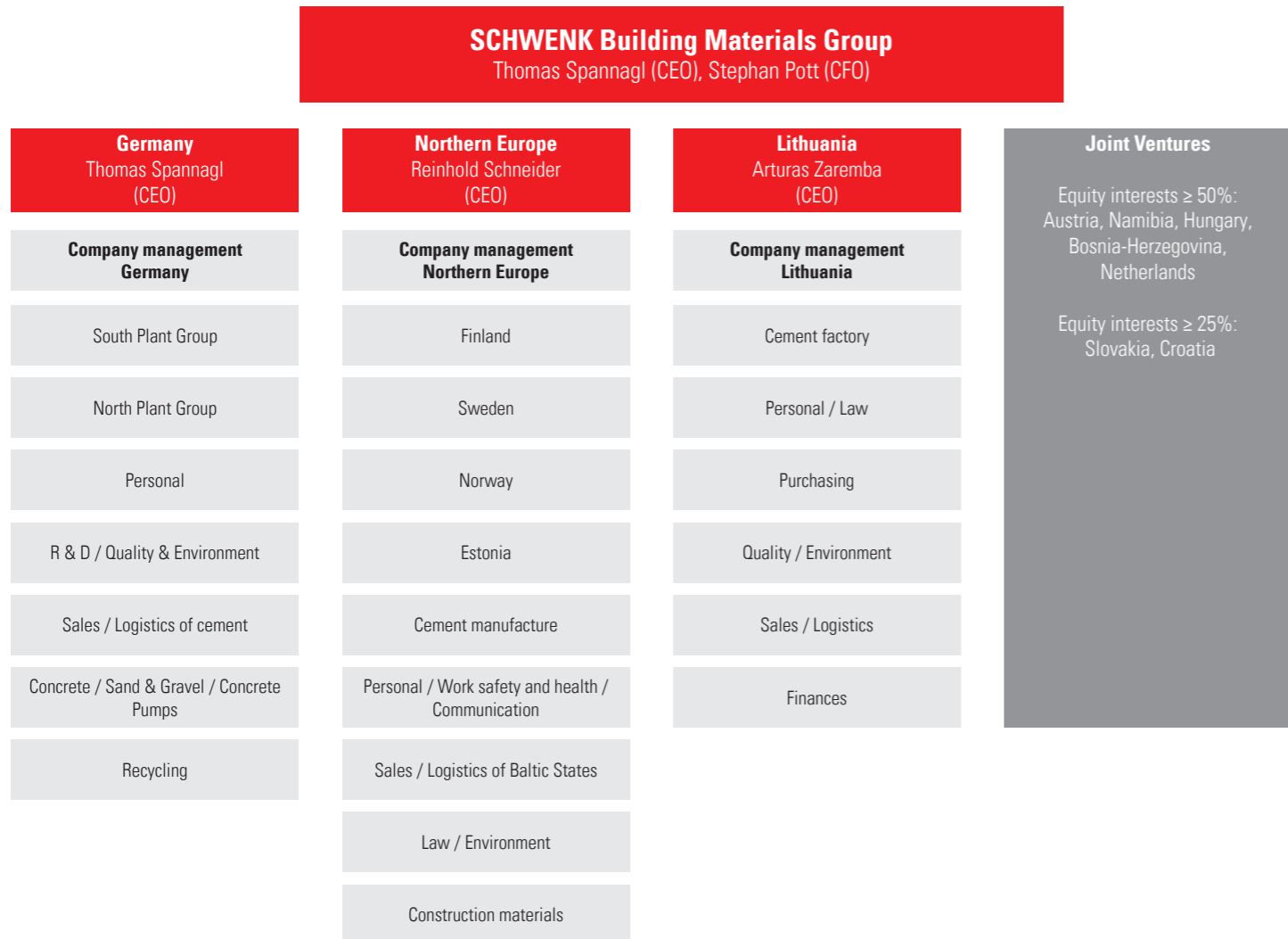
With selected investments in research and development, we pursue the goal of remaining an innovation leader in the industry. In collaboration with universities and science centers, we are therefore working on the development of future production processes and

emission reduction technologies. At the same time, we continually invest in our divisions in order to further increase efficiency based on the latest technologies and achieve our desired climate goals. We build trusting and open relationships with communities and interest groups and place great value on qualified and motivated employees as the core of our success.

Management structure

The SCHWENK Building Materials Group has grown continuously over many years. Today it includes a large number of investments and subsidiaries with a focus on Europe. It is structured decentrally, with local managers in the individual regions, each divided into divisions. Flat hierarchies and lean organisational structures support rapid decision-making processes and rapid implementation.

CORPORATE STRUCTURE



SUSTAINABILITY TARGETS

We also support all 17 UN Sustainable Development Goals (SDGs) with our vision, mission and values. In accordance with our sustainability goals, we focus on seven main topics that were defined and developed by an internal working group.



Picture: UN Sustainable Development Goals, SDGs | www.bmz.de



COMPLIANCE – HAND-IN-HAND WITH OUR PRINCIPLES

You can use the contact form on our website to let us know your questions or comments at any time.

Picture: Cement factories | SCHWENK

Observance of legal and internal corporate rules

General compliance with all legal and regulatory requirements and also internal company regulations is of central importance to us. We expect the same from our partners. The good reputation of our company is based on moral and ethical behaviour and fair competition.

Management requires both employees and suppliers not to engage in any form of corrupt practices such as extortion, fraud or bribery. Detailed instructions are provided in our compliance guidelines.

COMPLIANCE MANAGEMENT SYSTEM



MANAGEMENT SYSTEMS

The integrated management system as the hub

Our integrated management system (IMS) completely regulates all processes, instruments and sequences in the company. The basis for this is the "Safe with System" quality seal (occupational health and safety), DIN EN ISO 9001 (Quality), DIN EN 197-2 (Products), DIN EN ISO 14001 (Environment), DIN EN ISO 50001 (Energy) and the monitoring specifications for the monitoring and report of CO₂ emissions. The certifications of the systems set a standard at SCHWENK. This is regularly tested, ensured and continuously improved through internal and external audits.



MANAGEMENT OF RISKS AND OPPORTUNITIES

The internal early warning system

Our risk management is based on careful consideration of corporate chances and risks. It is an important instrument for the early detection of factors that could lead to discrepancies. Our risk management is therefore a basic requirement for deriving and implementing preventive actions. Basically, we consider various external influencing factors when weighing opportunities and risks.

- Economic developments: Willingness to invest in the construction industry as well as economic developments and cost drivers such as energy prices
- Procurement markets and supply chains: Availability of raw materials, operating resources, energy, fuel, personnel, spare parts, etc. as well as supplier structures and logistics partners
- Legal framework: Compliance with and observance of regulations and laws as well as changing legal requirements
- Technological developments: New processes, CO₂-reduction technologies and process optimisations



AUDIT AND CONSULTATION

The basis for the observance of specifications and continuous improvement

Our internal auditing departments see themselves as service providers for the SCHWENK Building Materials Group. Their objective is to support the management of the various entities to meet their specifications and targets, to increase efficiency, economy and returns and to secure the company assets. They therefore work with the organisation to achieve the targets. They apply a systematic and targeted approach to evaluate and optimise the efficiency of the auditing mechanisms and management and monitoring processes.



TRAINING AND E-LEARNING

Implementation of the defined actions and regulations in day-to-day work life

Through regular training in combination with e-learning, our employees are always informed about all currently applicable compliance requirements. We actively support further training, and our offerings of IT-based continuing education and training courses are being consistently expanded.

CORPORATE KEY FIGURES

Our key figures refer to the SCHWENK Building Materials Group in Germany.

OVERVIEW OF OUR DIVISIONS

We are continually investing in our plants and systems. In 2022, our investments amounted to around

29.1 million euros



CEMENT

4+1 plants

4 fully integrated cement plants and 1 milling plant



SAND & GRAVEL

7 plants

7 sand and gravel plants as well as numerous investments



CONCRETE

135 plants

135 ready-mixed concrete plants and numerous investments

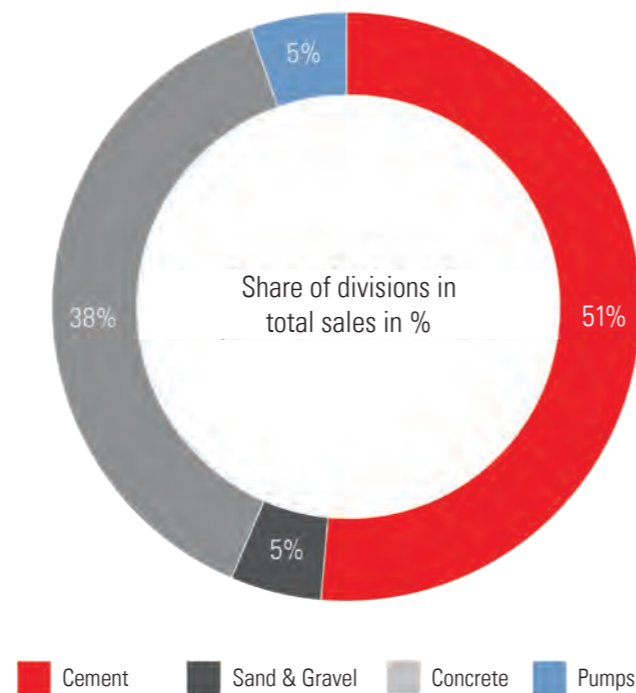


PUMPS

188 vehicles

188 concrete pump vehicles and numerous investments

Percentage share of the divisions in overall results for 2022

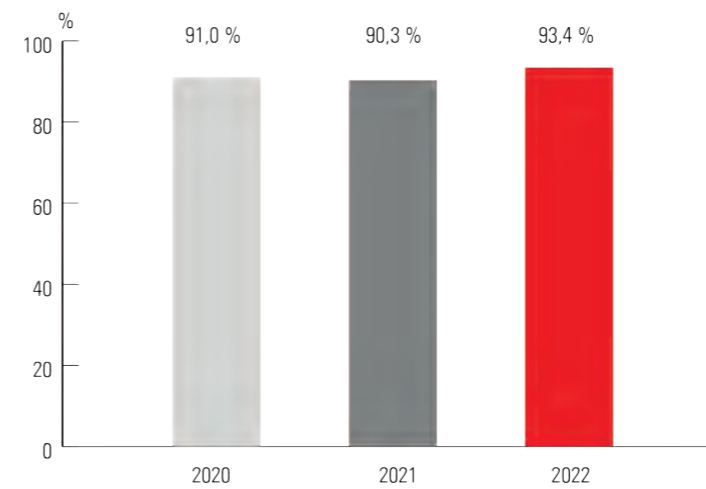


Sales	2020	2021	2022
Cement	4.1 million t	4.0 million t	4.0 million t
Sand & Gravel	3.0 million t	2.7 million t	2.6 million t
Concrete	3.9 million m ³	3.7 million m ³	3.4 million m ³
Pumps	3.6 million m ³	3.4 million m ³	3.3 million m ³

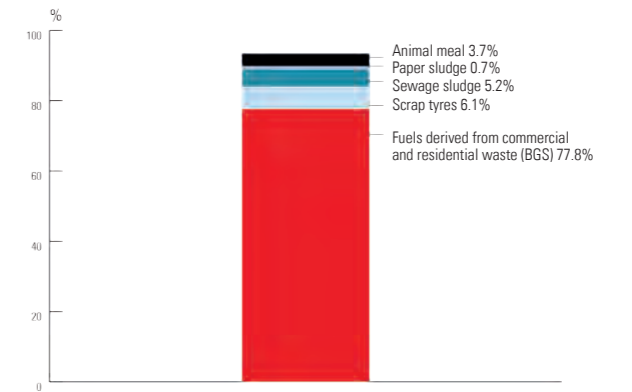
CLIMATE PROTECTION FIGURES

	2020	2021	2022
Specific net CO ₂ emissions (per tonne cement equivalent)	432	438	423
Specific net CO ₂ emissions (per tonne clinker)	534	537	528
Clinker/cement factor	78.7%	79.6%	77.5%
Proportion of alternative fuels	91.0%	90.3%	93.4%
Proportion of biomass	31.0%	32.1%	31.7%

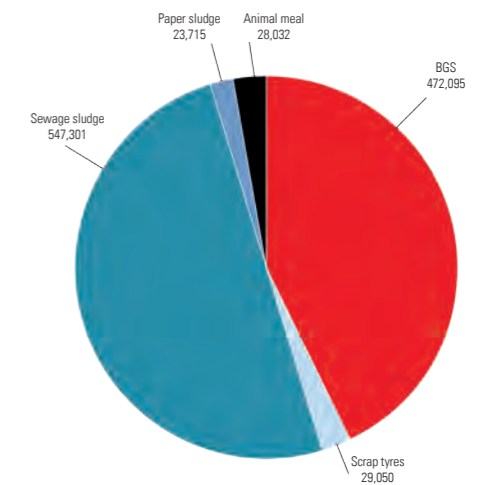
Development of alternative fuel consumption based on fuel energy consumption



Alternative fuel mix in clinker production based on the fuel energy consumption of 2022 in percent



Alternative fuel mix in clinker production based on volumes used in 2022 in tonnes



EMPLOYEE KEY FIGURES

At the SCHWENK Building Materials Group Germany, we employ around 2,180 people. They are distributed over the Cement, Sand & Gravel, Concrete and Pumps divisions.

2180 employees

We've been training our young talent in-house since as long ago as 1902. We are ensuring that we have the experts of tomorrow with a trainee ratio of 5.1% throughout all divisions.

5.1%

PRODUCTION



Picture: Collage of divisions | SCHWENK

SUPPLY AND CONSERVATION OF RAW MATERIALS

The manufacture of cement and concrete requires raw materials such as limestone, crushed rock, gravel and sand. The spatial distribution and quality of the raw materials is an essential component in our strategy for the supply and conservation of raw materials.

We find our raw materials with geological exploration using digital methods of mapping and analysis. Methods such as 3D mapping using drones and photogrammetry, exploratory drilling with geochemical analysis and the calculation and visualisation of models of deposits are only some of the technologies that we use. The knowledge derived from this about the spatial distribution of deposits enables us to contact property owners and approval authorities at an early stage and thus secure these deposits in the long term.

Competing claims for usage, even in areas with high-quality raw materials, are increasingly restricting and endangering the availability of raw materials. Sand and gravel deposits in particular, which are used as raw materials for the manufacture of concrete, are likely to become increasingly scarce in the short and medium term with a restriction of the number of deposits available for exploitation.

Our usage of natural resources is more and more based on the use of technology that enables us to use the available raw materials in our quarries to the fullest possible extent. This includes the use of online analysers for quality control and mixing beds for homogenisation of the raw material for our cement plants. We also use rock crushers in our gravel plants to make full use of oversized rocks.

ALTERNATIVE RAW MATERIALS

At SCHWENK we have been able to replace more than 14% of natural raw materials with alternative materials. These are combined with the natural raw materials to ensure that they meet our high standards of quality. This conserves natural raw materials and closes material cycles. Examples of alternative raw materials include used casting sand, sludge from processing potable water supplies and also calcined rough rock from soda production.

■ See also: Climate protection | raw materials p. 23

AGGREGATES

Aggregates for the production of cements with reduced clinker content include not only natural raw materials such as limestone or pozzolan but also alternative aggregates such as fly ash from power plants or granulated slag from steel production.

> 130 years

This is the number of years for which raw materials in our quarries will be available. This long-term foresight and action means security and ability to plan – also for the regions around our sites.

RAW MATERIAL SECURITY

The manufacture of one tonne of cement requires up to 1.5 tonnes of raw materials. There are only a small number of geological sites with the chemical and mineralogical quality and long-term availability that makes them suitable for cement production. For this reason securing these local deposits for the long term has top priority at SCHWENK.

Our five principles:

- Proactive geological exploration
- Securing ownership at an early stage by purchase or excavation contracts
- Planning security in regional raw material procurement plans
- Transparent approval processes with consultation of the local population at an early stage
- Prompt restoration of excavated areas

RAW MATERIAL CONSERVATION

Deposits of natural cement raw materials are local and thus are finite and cannot be increased. This is why we do all we can to conserve these resources as long as possible – so that they can also be used by following generations.

Our actions for conservation of natural raw materials:

- Development of products and production methods with reduced requirements for raw materials
- Use of alternative raw materials
- Use of excavating and processing technologies to minimise the proportion that cannot be used
- Exploitation of the deposit as completely as possible

IN HARMONY WITH NATURE

FROM EXCAVATION TO RESTORATION

SUSTAINABLE LAND USE AND BIOLOGICAL DIVERSITY

The extraction of raw materials in our quarries and pits represents a temporary use of land. However, this is always accompanied by a significant impact on nature and the landscape. Local people may also suffer disadvantage due to the work. When we submit an application to open a quarry, consultation with the local population – at the earliest possible stage – is very important to us.

We consider suggestions and objections from local people at information meetings and work with them to develop environmentally compatible quarrying processes. The required approvals and licences are then obtained in close consultation with the relevant approval authorities. The process is based on the applicable legal regulations for protection of the environment.

CONCEPTS FOR LIMITING INTERFERENCE WITH NATURE AND THE ENVIRONMENT

Quarry projects involve intervention in the natural world and the landscape that could last for several decades. For this reason we implement concepts that reduce intervention to the absolute minimum possible and that include measures for the promotion of protection of nature and species diversity during the operational phase.

We make an effort to keep the area required for our work as small as possible. We therefore make an effort to use the natural raw materials as completely as possible and we try to use alternative raw materials.

SUBSEQUENT USE – RECULTIVATION AND RESTORATION

The subsequent uses of our quarries are defined in the form of a landscape restoration plan at the initial planning stage for a new quarry. The plan includes the schedule and objectives of recultivation and restoration.

Landscape restoration plans are prepared for all of our quarries. Our many decades of experience in working with this type of planning has shown that the technical and natural conditions tend to develop dynamically and are continuously changing during the operational phase of a quarry project. Therefore, we have developed dynamic concepts at specific sites to define the targets for subsequent use and we have been able to implement them successfully.

Plans for subsequent use over a manageable period of a few years are defined in the course of regular inspections with government regulators and nature conservation organisations. We also include options for modifying plans based on the dynamics of natural developments. We are certain that such concepts will become increasingly significant – particularly when the speed of climate change is considered.



Subsequent use: Solar panel system in the Darast gravel pit



Subsequent use at the Riedheim gravel pit



Result of a dynamic subsequent use plan with the example of the Mergelstetten quarry

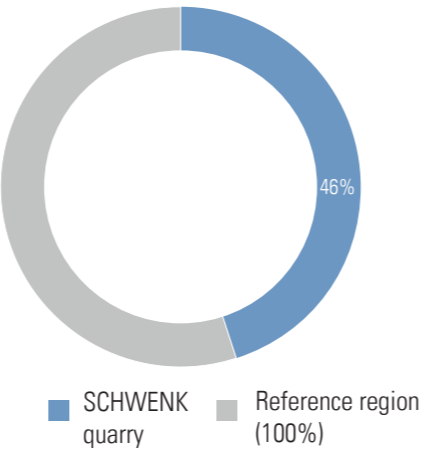


Restoration of the Aufhausen quarry

LIVING SPACE FOR RARE ANIMALS AND PLANTS

CONSERVATION OF NATURE AND WILDLIFE IN OUR EXTRACTION SITES

Quarries and sand and gravel pits provide space for rare animals and plants even during their operating phase. We regularly record biodiversity data for use in preparation of biodiversity management plans in order to determine the biodiversity values of our extraction sites and to develop measures for the promotion of species protection. We also initiate and promote a range of projects for species protection.



We currently have an average of 385 species of plants recorded in our quarries. This makes up around 46% of all plant species that could be found in the relevant reference region (ordnance map TK25), although the area of all our quarries makes up less than 1% of the total area of this region. Our quarries therefore represent a hot spot of biodiversity.



Dr Markus Schauer, Technical Manager Raw Materials Supply/Environmental Protection | SCHWENK

“NATURE FOR A TIME” MIGRATORY BIOTOPE

Over the total lifetime of our extraction sites spatially separated areas tend to develop where there are often no quarrying operations for several years. Local species and natural communities that can no longer find living space in the general cultural landscape, get a chance to settle here.

We promote such sites with the “Nature for a Time” concept. This involves removing areas within quarries from operational use for several years and identifying them as stepping-stone or migratory biotopes. This allows nature time for restoration and the development of biological diversity. These biotopes and environments migrate in the most literal sense of the word through the quarry over time. This has enabled us to establish environments for the yellow-bellied toad, the sand martin, rare plants such as the sarsaparilla and other species.



REINTRODUCTION OF THE PARTRIDGE

Implementation of a research project with cage breeding and provision of the preferred habitat (open fields).



FALLOW DEER PROJECT

We are introducing new methods for the maintenance and development of open-land biotopes in our quarries, such as planting low-nutrient grassland. Here we are supporting fallow deer in an area of more than 100 ha.



ECOLOGICAL ACCOUNTING PROJECTS

We are supporting species diversity and the networking of biotopes with various projects such as the maintenance and development of meadow orchards and the development of flowering strips, wild meadows and hedges in neglected fields.



MONITORING THE YELLOW-BELLIED TOAD

Our quarries are preferred habitats for the yellow-bellied toad. We continuously record developing migratory biotopes to enable biotope development and quarrying operations to exist together.



Our main levers

concerning climate protection and energy efficiency



Raw materials



Fuel

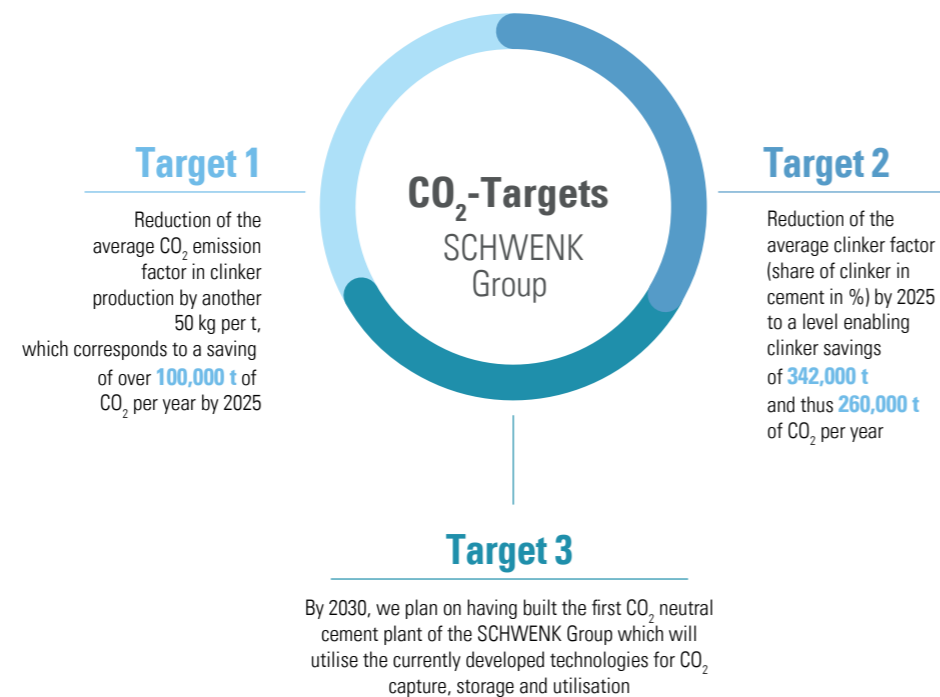


Processes and Innovations

CLIMATE PROTECTION

As producers of building materials such as cements, specialised building materials and concrete we are part of the resource and energy-intensive primary industry. Our manufacturing processes, particularly with cement clinker, necessarily involve CO₂ emissions. The cement industry throughout Germany annually releases approximately 20 million tonnes of CO₂. Efforts have long been in train to reduce CO₂ emissions for the sake of climate protection. The Kyoto protocol defines three mechanisms for reaching global climate protection targets. The best-known mechanism is emissions trading, which is regulated by an EU Directive for companies in Europe. The number of emissions permits is allocated to specific types of industry and is reduced from period to period. Companies that have already made great efforts for climate protection can sell excess permits.

If the allocated number of permits is not sufficient to meet the obligations, emissions permits must be purchased. We calculate the annual CO₂ emissions and prepare emission reports for our cement plants based on the EU monitoring regulation and monitoring plans. We issue the corresponding number of emissions permits via our emissions trading accounts in accordance with the verified emissions reports. Our target is to reduce the average CO₂ emission factor of clinker production by another 50 kg per tonne of clinker between 2019 and 2025. By reducing the proportion of clinker in the cements over the same period we aim to reduce specific CO₂ emissions per tonne of cement equivalent by 38%. At the end of 2022, the reduction was already 24%.



RAW MATERIALS

What is SCHWENK doing to conserve natural raw materials and to close the material cycle in a reasonable manner?

The manufacture of cement and concrete requires high volumes of natural raw materials. They are obtained by excavation of the required primary material in quarries or sand and gravel pits. They form the most important basis for the production of cement and concrete. Because natural deposits are finite and also for ecological reasons, alternative raw materials and ash from alternative fuels are becoming increasingly important. At SCHWENK we have been able to replace more than 14% of natural raw materials with alternative materials. These are combined with the natural raw materials to ensure that they meet our high standards of quality in products. The addition of alternative raw materials saves not only natural raw materials and closes material cycles but it also reduces CO₂ emissions.

MORE THAN 14%

of natural raw materials for cement manufacture have already been replaced at SCHWENK by alternative substitute materials.



Picture: Excavation in the quarry Karlstadt | SCHWENK



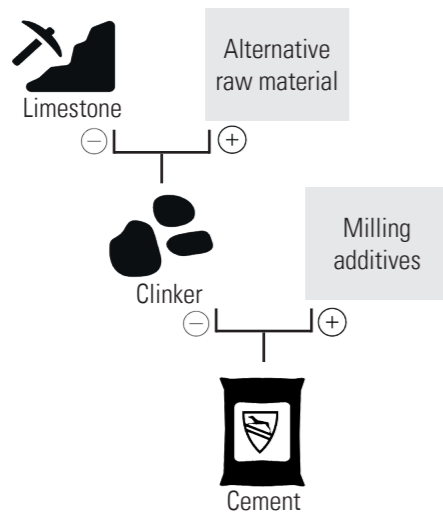
Picture: Allmendingen quarry | SCHWENK

How does the use of alternative raw materials reduce CO₂ emissions?

Approximately two thirds of CO₂ emissions in the cement manufacturing process are due to the raw materials. The emissions are already integrated into the starting product, the limestone. The first stage of cement manufacture is to calcine the limestone to form clinker and then grind the clinker to cement. The following two options are available to save on CO₂ emissions: see graphic.

1. Less limestone in the clinker

2. Less clinker in the cement



Use of alternative raw materials in clinker production

Cement manufacture is a high-temperature process with the rotary kiln. A wide range of very different raw materials is completely decomposed, melted and converted to new mineral phases at extremely high temperatures (approx. 2,000 °C gas temperature and approx. 1,450 °C material temperature). Limestone (CaCO₃) is the most important raw material for clinker production. The integrated CO₂ is released during the calcination process. This is referred to as “deacidification”: CaCO₃ becomes CaO and CO₂. Alternative raw materials, which are already “deacidified” and thus have less or absolutely no CO₂ integrated in the starting material do not release CO₂ in the clinker calcination process.

Clinker producers should prefer this process for reasons of environmental protection. So long as the chemical composition of the starting materials and the end materials – with reference to the chemistry of the fuel ashes – meets the requirements of the “recipe” for the chemical composition of the final Portland cement clinker, the choice of the type and origin of the raw materials placed in the rotary kiln is very flexible. Whether the silicate or silicon components required for the production of clinker come from natural sand from a sand pit or whether used sand from casting is used is virtually irrelevant for the chemical composition of the clinker. The natural and alternative raw materials are equivalent in their capacity for use in the extremely high processing temperatures in the rotary kiln, so long as the chemical composition is comparable. Unfortunately, the availability of limestone-containing alternative raw materials that also contain no or little CO₂ is very limited.

For this reason, SCHWENK selects sites that have access to sources of appropriate alternative raw materials such as used casting sand, broken concrete from roof tile production, filter dust from steel manufacture or residual materials that contain aluminium. Materials of this type have

already been in use for clinker production for many years. The technical and legal approval prerequisites for the use of alternative raw materials must of course be in place.

Our Bernburg site has a special factor in this connection. We share a quarry with SOLVAY AG, a manufacturer of soda. The manufacture of soda requires CO₂, which is produced from limestone in the SOLVAY process. The remaining CaO, referred to as lime lenses, is used in the Bernburg cement plant with limestone to produce clinker. The exploitation of the synergy of two completely different industrial processes has enabled the Bernburg plant to reduce its CO₂ footprint in clinker production to the lowest specific level of all SCHWENK cement plants.

Use of milling additives in cement manufacture

A high-temperature process is not required for grinding cement clinker with a wide range of granulates. In addition to clinker, powdered limestone, gypsum, fly ash, granulated slag, natural pozzolan or volcanic ash are the most important materials for grinding cement. Almost nothing is changed other than the fineness. This takes materials that can no longer be used in their own material cycles and adds them to the material cycle in the production of building materials.

This additional use saves valuable resources. The substitute materials for cement manufacture must therefore be subject to rigidly defined quality standards before they can be used. Therefore, the options for the use of alternative raw materials in cement grinding are significantly more restricted compared to clinker production. The regional availability of the approved milling additives is the deciding factor in the manufacture of cement with the lowest possible proportion of clinker. SCHWENK is also experimenting with different processes in this area. We are conducting research projects to test the suitability of very

fine material from concrete recycling (RCF = recycled concrete fines or crushed concrete) as an alternative milling additive.

Other projects have already demonstrated that innovative recycling processes for used concrete (referred to as electrohydraulic pulsing) make it possible to separate the additives (gravel and sand) in used concrete completely from the cement matrix (bonded hardened cement). The sand and gravel recycled in this way can be used for manufacturing concrete. The remaining cement stone can be used in the rotary kiln calcination process and also in cement grinding.

IN THE LEAD

The use of alternative fuels at SCHWENK is the rule, not the exception. We have been leaders in the German cement industry in this field for many years.

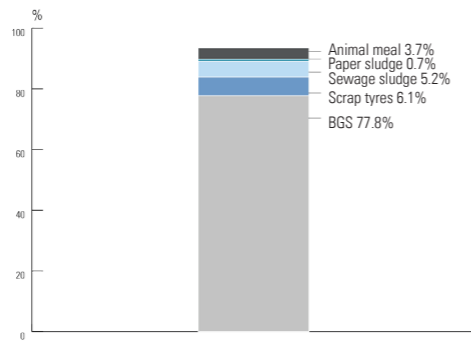
We have replaced more than 94% of our coal consumption with alternative fuels in all of our German plants. This has saved millions of tonnes of CO₂ over the years. It has also helped us to remain competitive.

FUEL

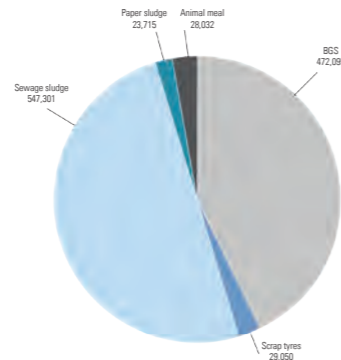
CO₂ emissions are generated in the rotary kiln during the clinker calcination process by the use of energy from the fuel to generate the processing heat. This forms approximately two thirds of CO₂ emissions in the cement manufacturing process. The use of alternative fuels replaces fossil energy sources such as oil, natural gas or coal. With high biogenic proportions they contribute to the reduction of CO₂ emissions and thus to protection of the climate.

Alternative fuels include dried sewage sludge or fuels derived from commercial and residential waste (BGS). Organic pollutants are burnt completely at temperatures over 2000 degrees Celsius. The mineral components from the ash are completely integrated into the cement clinker and also help to save natural raw materials. This means that the fuels used in cement manufacture are fully used not only for their energy content but also for their material content.

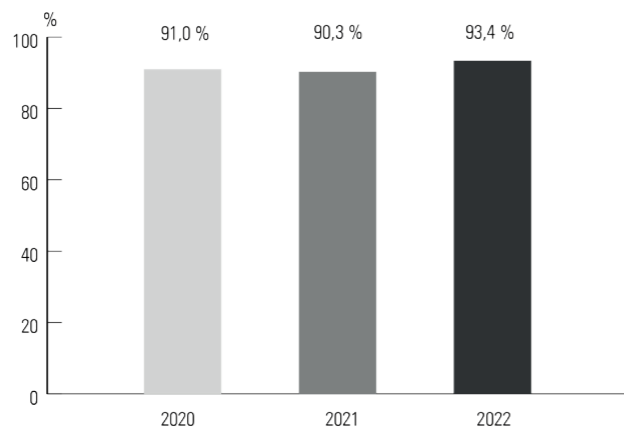
Alternative fuel mix in clinker production based on the fuel energy consumption of 2022 in percent



Alternative fuel mix in clinker production based on fuel volume used in 2022 in tonnes



Development of alternative fuel consumption based on fuel energy consumption



What is the difference between an "alternative fuel" and "waste/rubbish"?

Alternative fuels are precisely computed mixtures of specially sorted and prepared waste streams (for an optimal combustion process and thus a consistently high-quality product). They enable utilisation of energy and materials. The biogenic proportion also improves the environmental assessment.

The latter aspect has become more important in emissions trading, particularly in recent years, a commonly little-known factor. The deciding factor is whether the fuel components consist of biogenic (renewable) materials (wood, paper, rubber, grease, etc.) or residues derived from crude oil (such as plastics). Replacing fossil fuels with alternative fuels improves the ecological balance. This improvement is greater, the more biogenic content the fuels used in the rotary kiln have. In addition to the absolute quantity of fuels that we use in the rotary kiln, the biogenic proportion of the fuel has become very important for the economical operation of our plants and to keep them as climate-neutral as possible.



Used tyres

Biogenic component: 27%



BGS

Biogenic component: 26-35%



Sewage sludge

Biogenic component: 75-85%



Paper fibre residues

Biogenic component: 70-90%



Animal meal

Biogenic component: 100%



Waste wood

Biogenic component: 100%

Why does SCHWENK burn sewage sludge?

Sewage sludge from municipal sewage treatment plants was formerly spread primarily on farm fields as fertiliser. However, due to the ever-increasing proportion of questionable content in the sludge, such as drug residues or microplastics, the legislation now prefers thermal processing as the best solution. Sewage sludge contains 75-85% biogenic carbon content from paper, soap and digestive products. When dried, sewage sludge has a heating or fuel value equivalent to the brown coal dust that we used to use as fuel. The composition of sewage sludge is therefore an excellent addition to the "recipe" for clinker production. SCHWENK recognised the economical and ecological benefits of burning sewage sludge in the rotary kiln at an early stage. We have invested in storage capacity, transport, drying and process technology, and we are now one of the largest industrial processors of sewage sludges in all of Germany.

Where are the limits to alternative fuel use?

Organic pollutants are burnt completely at temperatures over 2000 degrees Celsius. However, not everything that could theoretically be used as fuel in our kilns would be considered practical.

As a result, SCHWENK group management has undertaken not to use fuels containing contaminated waste as defined in the CSI Guidelines for Co-Processing Fuels and Raw Materials in Cement Manufacturing.

20.9 million

tonnes of CO₂
from 9.5 million tonnes of coal – this is how much CO₂ and fossil fuels we have already saved since 1990 by the use of our substitute fuels.

547,000

tonnes of sewage sludge is what we burn annually and thereby avoid fossil CO₂ emissions of approx.

67,400

tonnes.
We are also helping to ensure that organic pollutants do not enter the food chain by being spread on fields.

472,000

tonnes of BGS are burned annually.

In accordance with CSI Guidelines contaminated waste includes:

- Electrical and electronic waste (e-waste)
- Whole batteries
- Radioactive waste from the nuclear industry
- Explosives and ammunition
- Corrosive waste, including mineral acids

PROCESSES AND INNOVATIONS

The cement manufacturing process is one of the most energy-efficient industrial processes overall. The average efficiency is around 80%. Compared with the most modern coal-fired power plants with an efficiency of <50% that is extremely efficient. We traditionally use as much as possible of the heat emitted by the combustion process in our plants.



FOR RAW MATERIALS

We use the waste heat of our kiln to dehydrate moist raw materials such as clay, marl or limestone.



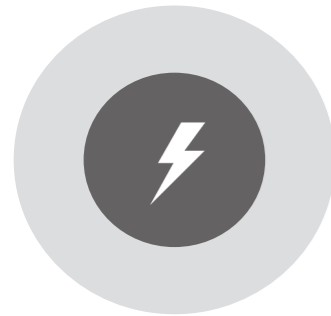
FOR FUELS

We also use the waste heat of the kiln in large BGS or sewage sludge dryers to prepare our fuels for use. The dryer they are, the more efficiently and consistently they can be used.



FOR THE NEIGHBOURS

We also do a good deed for the neighbours and the whole community at our plant in Karlstadt near Würzburg with the unused waste heat: we use it to heat the local swimming pool.



FOR ENERGY EFFICIENCY

At SCHWENK we have an energy team that continuously monitors energy use as part of certification in accordance with DIN EN ISO 50001 and develops and coordinates measures to continuously optimise energy use and reduce the fuel used. All major energy consumers in our plants are equipped with separate consumption meters for this purpose. This allows us to track, analyse, plan and optimise energy consumption in detail.

In addition to reducing the specific electricity requirement, the main focus is on improving thermal energy efficiency and reducing CO₂ emissions in clinker production. The specific CO₂ emissions per tonne of cement have been continuously reduced in recent years.

Another goal is to gradually increase the proportion of green electricity through our own photovoltaic projects and systems to convert waste heat from the production process into electricity. In addition, we would like to increase the proportion of electricity from green energy sources by participating in new construction projects to generate green electricity or by purchasing it from renewable generation plants.



Picture: Bernburg quarry | SCHWENK

Celitement

Celitements are high quality hydraulic binding agents which are manufactured using a patented, energy-efficient process. They are characterised by a reduced use of limestone and low CO₂ emissions in production. We optimise these new hydraulic binding agents and carry out the first industrial production tests with users. We use the most modern analytical facilities and draw on many years of experience in the field of building materials.

■ See also: In focus: CO₂ reduction p. 52

THE TARGET BY 2045

The long-term target for Germany is to be as carbon-neutral as possible by 2045. SCHWENK accepts this challenge and is taking an active part in various research projects – including projects for the development of innovative binding agents and manufacturing processes.

Cement Innovation for Climate

“CI4C” – Cement Innovation for Climate is a joint venture of the four European cement manufacturers Buzzi Unicem – Dyckerhoff, Heidelberg Materials AG, SCHWENK Zement GmbH & Co. KG und Vicat. The objective of this group is the implementation of a research project under the title “catch4climate” to investigate the practical application of oxyfuel technology in the cement manufacturing process.

■ See also: In focus: CO₂ reduction p. 52



Picture: DeCONOx plant Allmendingen | SCHWENK

EMISSIONS AND AMBIENT POLLUTION

AIR POLLUTION CONTROL

While the excavation and processing of raw materials and also the production of building materials primarily produces noise and dust, a number of different air pollutants must be dealt with in the kilns of our cement plants. We comply with the legal requirements for protection of the environment and are subject to close monitoring by regulators.

We are also consistently investing an above-average amount in the best available environmental technology at all our sites. This ensures that our plants' emissions are regularly below the applicable limits and benchmarks. It also means that we are achieving our targets of reducing emissions of air pollutants to below the legally required amount. Our actions are making significant contributions to the protection of health and the climate.

EMISSION REDUCTION TECHNOLOGY

The use of modern fabric filters for removal of dust and the entrapment of dust aggregates is standard practice in our plants. We use road watering systems in our quarries to minimise the diffusion of dust. We are also leaders in the development and application of innovative emission reduction technology. This means that we exceed the currently applicable regulations for the use of the best available technology (BVT).

We use SCR systems to minimise NO_x and NH₃ emissions at our Karlstadt and Mergelstetten cement plants and we also have a DeCONOx system in our Allmendingen cement plant.



Picture: Control room at Mergelstetten | SCHWENK

We not only comply with the valid limit values for all pollutants but we are also below many times below the limits.

Ammonia (NH ₃) emissions in mg/m ³	2020	2021	2022
---	------	------	------

Limit value in Germany	30	30	30
SCHWENK Germany	7.8	7.1	10.5

NO _x emissions in mg/m ³	2020	2021	2022
--	------	------	------

Limit value in Germany	200	200	200
SCHWENK Germany	176.1	183.8	181.5

Dust emissions in mg/m ³	2020	2021	2022
-------------------------------------	------	------	------

Limit value in Germany	10	10	10
SCHWENK Germany	4.0	4.0	3.0

Mercury emissions in µg/m ³	2020	2021	2022
--	------	------	------

Limit value in Germany	30	30	30
SCHWENK Germany	11.4	8.2	9.1



Picture: SCR plant Mergelstetten | SCHWENK



Picture: SCHWENK motor pool | SCHWENK

SUPPLY CHAIN AND LOGISTICS

MORE SUSTAINABLE PURCHASING

In all procurement processes, the implementation of optimum material economy as well as customer, team and process orientation is the guiding principle of our actions. The basic requirement is the observance of our company's compliance principles and other binding obligations, taking into account environmental protection and occupational safety, social aspects and energy efficiency. Responsible resource extraction is also a criterion when purchasing raw materials. We require our suppliers to implement appropriate measures to continuously improve the aforementioned principles. In addition, we reserve the right to terminate the business relationship with a supplier if specifications and regulations are not adhered to.

SUSTAINABLE LOGISTICS

SCHWENK focuses on the reliable, on-time and cost-efficient delivery to our customers. Even with wide fluctuations in customer demand we remain a reliable partner with deliveries almost always at the precise time promised. In addition to our strong customer orientation, sustainable logistics has always been a central component of our principals. This becomes particularly clear in the long-term and diverse relationships that we maintain with our logistics partners.

Our building materials are naturally very heavy. For the sake of sustainability we try to use barges and rail transport as much as possible for transporting raw materials and to deliver building materials. We prefer to work closely with local, generally small to medium-sized transport companies for transport by road. The emphasis on local means that in most cases drivers are able to come home at night to their families. Our way of working also strengthens regional economies.

Our transport fleet



Transport by rail

Our subsidiary BELog gives us in-house expertise in rail transport. Through continuous expansion, we want to increasingly transport goods such as sand, gravel, clinker and cement by rail in the future. Our terminal in Rostock harbour allows us to supply our terminals in Norway and Sweden. We are continuously establishing additional supply lines, including to customers with direct rail connections or connections via transshipment rail terminals.

Transport by barge

Our cement plant in Karlstadt has a direct connection to the Main river. We receive important raw materials and ship cement and cement clinker by barge from this harbour. We have maintained a continuing relationship with a number of locally based, in some cases family-owned shipping companies for many years. They assist us with the supply of our customers with access to canals, even in difficult cases.

Transport by road

Our partly outsourced fleet of silo trailers, tippers, mixer trucks and concrete pumps uses almost exclusively engines that conform to the most current EURO 6 environmental standard. We are already using alternative fuels such as CNG (compressed natural gas) und LNG (liquefied natural gas) in regions with the appropriate network of fuelling stations. We are also considering vehicles using hydrogen and electric drive for short distances and very small loads. Regardless of what type of engines will be used in the future, we are planning a significant expansion of the decarbonisation of our truck fleet.

We use a modern and fully integrated fleet management system that digitally assigns tasks to drivers in order to optimise our routes and processes. This has significantly improved the speed and flexibility of our logistics. Our order and dispatch receiving system is noted for its closeness to customers. By close cooperation we can avoid unnecessary travel and respond quickly to changes. Modern loading systems also assist us in reducing the transport of "air". They ensure that the freight capacity is fully exploited without exceeding the permissible total weight. This enables us to avoid many unnecessary loads, particularly on the road.



BELog train in front of the Bernburg cement plant | SCHWENK



Harbour at the Karlstadt cement plant | SCHWENK



Cement silo semitrailer at the Mergelstetten plant | SCHWENK

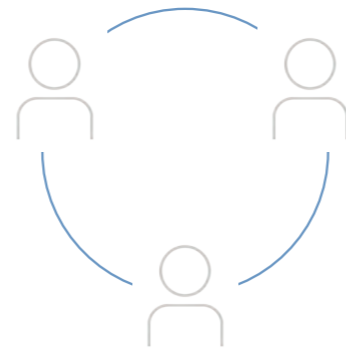


Concrete mixer truck in front of the SCHWENK headquarters | SCHWENK

SELECTION, MONITORING AND EVALUATION OF LOGISTICS PARTNERS

We base the selection of our small to medium-sized logistics partners on their sustainability. We pay attention to items such as compliance with environmental standards, safety regulations and identification with our company.

We assess our selections once a year and our partners are subjected to a transparent, fair and traceable evaluation. Achievement of the best environmental standard is an important target. So that our partners can maintain a long-term sustainable business, we decided in 2018 to reimburse the costs for the road toll extension and adjustment to the polluter pays principle (to the last kilometre) directly to our transport contractors. In order to create a further strong incentive for the most modern environmental standards, only freight forwarders who meet the Euro 6 standard benefit from these cost advantages.



Over
700
suppliers in
2022



Picture: Silo truck | SCHWENK

SAVING, USING, UPGRADING

Picture: Alternative fuel BGS | SCHWENK

TWO CYCLES – ONE TARGET

Material cycle: Recycling of building materials that we have produced and processed

Residual material flows: Recycling residual material flows from other industries that we integrate into our manufacturing process

RECYCLING ECONOMY

USE OF RAW MATERIALS AND FUELS

When defining the term “recycling economy”, SCHWENK distinguishes between the material cycle of recycling the building materials that we have manufactured and processed and the recycling of residual material flows from other industries that we integrate into our manufacturing process. By using alternative raw materials and fuels we can integrate materials that cannot be recycled in their original material cycles into the cycle of the manufacture of building materials.

Examples of fuels

We recycle short fibres from paper recycling that can no longer be used in the paper and cardboard production cycle. They supply valuable energy. The conversion of materials to cement clinker moves them into the manufacture of building materials cycle and the subsequent recycling process. The same applies for alternative fuels such as

biological sludges, animal and bone meal, old tyres, old plastic and paper and textile residues.

Examples of raw materials

Alternative raw materials include dust from metal manufacturing and processing industries, granulated slag from steel production, fly ash or synthetic gypsum (REA gypsum) from coal-fired power stations and used casting sand. Similarly to alternative fuels, these residual materials can also no longer be used in their original material cycles. Their use in the manufacture of cement and clinker transforms them into a product that gives them a “new life” in a new material cycle.

SHIPPING AUTOMATION IN THE PLANT MERGELSTETTEN

An interview with Stefan Hofmiller, Assistant Department Head of Logistics at SCHWENK Zement GmbH & Co. KG

At SCHWENK we are constantly working to improve our processes. In order to optimise the process in the Mergelstetten pilot plant, the Logistics 2.0 project was launched.

When and how did the idea for the project come about?

The first digitalisation project was implemented in 2017 with the introduction of our telematics system. This enabled us to significantly improve the communication of our scheduling with the drivers and also implement a digital delivery slip. The ordering app was later added, which enables our customers to order cement and track delivery status. Last year we started the Logistics 2.0 project to also optimise the logistical processes in the plant.

What is behind the Logistics 2.0 project?

Logistics 2.0 is a project on our digitalisation roadmap. We are replacing old hardware in our plants for handling or loading and unloading vehicles with new terminals. In addition, the entire logistical process is optimised. By integrating customers and suppliers into the process, we want to achieve consistent acceleration of processes on all sides.

What improvements should be achieved through Logistics 2.0?

With Logistics 2.0 we primarily want to be faster, more digital and more transparent. The throughput time for trucks should be accelerated and manual rework and document handling should be reduced to a minimum.

Thanks to the integrated vehicle recognition, registered vehicles can drive in and out of the plant without stepping out. Vehicles that have not previously been registered use our self-service terminals for check-in – and in one of currently 17 languages.

What challenges did you encounter when implementing the project, and how were you able to overcome them?

We put together a powerful project team and involved some drivers in the project early on. Because it is also clear that such a large project cannot work without the support of those who will later use the terminals.

A system that has been used successfully for over 20 years cannot be replaced overnight. We were, of course, nervous before the go-live, because a renovation of the loading terminals also means that no cement can be loaded during this time. Open heart surgery, so to speak, since nothing can go wrong.

Thanks to our great team in Mergelstetten, we mastered the weekend brilliantly and were able to go productive as planned on the morning of the go-live Monday.

How did customers and suppliers react to the change at the Mergelstetten plant?

The key users of the new hardware are, of course, our drivers. The new terminals and dialogs were very well received, not least because they can be used in several languages. The system permanently remembers the selected language and greets drivers at all terminals in their native language.

Our self-collecting customers appreciate the independent collection by their drivers. Most people already use our order app, so orders are created before the vehicle arrives.

For our purchasing and suppliers, the change primarily offers transparency, because delivering drivers scan, for example, the accompanying documents at check-in. This means that receipts can be automatically attached to all goods bookings and distributed digitally.

Are you planning to implement the project at other plants as well?

Mergelstetten was only the beginning. We prepared and supported the first rollout particularly intensively. A template approach was chosen in this case. This means that the processes were analyzed using Mergelstetten as an example, and our new system was adapted taking local conditions (fit gap) into account. This means we can roll out additional locations more quickly and harmonise processes across all plants. Next, Allmendingen will be rolled out in the first quarter of 2024 and Broceni in Latvia in August.

That sounds very exciting. Thank you, Mr. Hofmiller, for these insights, and good luck with further implementation.

Very pleased to talk to you and thank you for the best wishes.

Interview: October 2023



Picture: Stefan Hofmiller | SCHWENK



Picture: Shipping at Mergelstetten | SCHWENK

5581 successful processes in the first 2 months



Improvement in **throughput time** during loading by **23%**

Already **24%** of deliveries are **digitally registered** and are completed independently



Picture: Sand and Gravel Schwarz | SCHWENK

WASTE MANAGEMENT

At SCHWENK we act according to the principles of the circular economy and take responsible care of any production waste generated in our divisions. We sort the materials generated during the manufacturing process and then deliver them to certified disposal companies. The majority of the materials generated in the production process are recycled - they return to other production cycles as raw materials and are therefore used to manufacture new products.

RECYCLING ECONOMY IN BUILDING MATERIALS

There is a significant shortage of natural raw materials in the face of the increasing demand for raw materials. A recycling economy dedicated to efficient use of resources is becoming more important for securing supplies of raw materials. The building industry in particular is forced to think and act in material cycles with the requirements for greater energy and resource efficiency. The residues of building materials left after an initial stage of use should be recycled as completely as possible. The lifecycle of a building should be considered at the stages of planning, design, erection and usage. The composition of the building materials must therefore be considered for recycling during the manufacturing process. We at SCHWENK make sure that we not only comply with material limit values at the usage stage but we also guarantee recycling as completely as possible at the end of the lifecycle. Even now the greater part of old concrete manufactured with cement is recycled for road and footpath building or for manufacturing recycled additives.

Recycling and reuse of mineral building wastes or building residues as completely as possible, including in the cement manufacturing process, is in our view becoming ever more important. When recycling old concrete, very fine particles that cannot be used directly fall out of the concrete matrix. We are working to develop options for use of this material in clinker production and also in cement grinding (RCF=recycled concrete fines and crushed stone fines). In our ready-mix plants we are working on the technical options for adding or even completely replacing natural additives with recycled additives on request. Concrete and reinforced concrete are ideally suited for recycling into building materials at the end of their useful life. We are continuously experimenting with the material and technical possibilities and applying them to practical use.

■ See also: Climate protection p. 22

WATER MANAGEMENT

Water is a limited and therefore essential resource, particularly in this time of climate change. It is essential for us for combining with cement, sand and gravel to manufacture concrete. Water is also used in many other ways during the production process.

In cement manufacture

All SCHWENK cement plants have access to large quarries from which we obtain our raw materials: limestone, marl, clay and sand. We place great emphasis on protection of the water table. We regularly measure and analyse the development of the ground water situation during the excavation process. In some cases our cement plants are in water conservation areas. In these plants all stored raw materials, auxiliary materials and operating materials must be stored so as to eliminate the possibility of water pollution, even in the event of an accident. In quarries where dewatering and therefore pumping out of water is necessary to protect against flooding, we use this wherever possible to supply our cement plants. We are increasingly using the option of decentralised seepage areas to return water from precipitation to the water table immediately after rainfall.

We not only use water in the production process but we also simultaneously release large volumes of water. This occurs while drying raw materials and fuels and also during calcination in the rotary kiln. In addition to the release of CO₂, every combustion process releases a comparable volume of water (H₂O). When you drive past a cement plant in cool weather you can see the condensed water vapour rising from the chimney. Depending on the location 20–25 tonnes of water can be released from our chimneys every hour.

Water management for cement	2020	2021	2022
Used drinking water	126 million l	139 million l	164 million l
Average specific water use per tonne of cement	186 l/t	193 l/t	190 l/t

Sand and gravel excavation

Water management is just as important when excavating sand and gravel as in the operation of quarries for cement plants. We operate sandpits in the dry layers above the water table and also gravel pits below the water table. Special excavators dig the gravel directly out of the water. We take great care in the process to ensure that the machines and technology cannot pollute the water. After the excavation natural lakes are left – and also lakes that can be used for swimming. The water available on site is used for washing gravel and it is returned to the water table after use.

Manufacture of concrete

Concrete consists primarily of sand and gravel, cement and water. To manufacture a cubic meter of ready-mixed concrete, about 180 liters of water are necessary. More water is required for cleaning mixers or silo trucks after delivery of ready-mix concrete. This results in mud from washing and residual water that should be returned to the concrete manufacturing cycle as much as possible. All of our ready-mix plants are fitted with water recycling systems.



Water vapour at the Allmendingen plant | SCHWENK



Dredger at the Borgsdorf plant | SCHWENK



Cleaning the mixer in the ready-mix plant | SCHWENK

RECYCLED BUILDING MATERIALS

Concrete and mortar not only offer advantageous technical properties, they are also building materials that can, in principle, be almost completely recycled. In principle, all constituents of concrete can be considered a component of a recycling economy and can be used completely in the manufacture of concrete and cement, depending on the available options and the technical effort required.

In order to show what possibilities the use of recycled aggregates opens up in the production of concrete, we have taken part in various projects. If customers request it we therefore supply ready-mix concrete with recycled additives – interesting examples of successfully implemented construction projects can be seen. The properties of recyclable additive are in some cases different from those of natural raw materials. This must be considered and taken into account accordingly to prevent new problems arising from a seemingly reasonable solution to the original problem.



Processed recycled aggregates at Fees | Heinrich Feeß GmbH & Co. KG

RECYCLED CONCRETE IN USE

Regulations allow the use of recycled concrete for a defined area of the concrete structure for internal and external building parts up to strength class C30/37. The special characteristics of the recycled aggregate must be taken into account in the manufacture of the concrete in the ready-mix plant. Processing at the construction site with installation and post-installation treatment is no different from standard concrete.

This means that recycled concrete can also be used to construct permanent and visually striking structures.

FROM RED TO GREY

Although the colour of the recycled aggregate differs significantly from normal aggregate, you can no longer tell from the finished component which one was used.



Picture: Recycled concrete aggregate 2/16 type 2 | Heinrich Feeß GmbH & Co. KG



Picture: Concrete exterior facade | SCHWENK

RENOVATION OF THE MERCEDES-BENZ ARENA

An interview with Werner Rothenbacher, Head of Application Technology at SCHWENK Zement GmbH & Co. KG.

What is recycled concrete?

This is a concrete in which the coarse natural aggregate > 2 mm is partially replaced by recycled aggregate. This means that the recycled aggregate comes from a building that is being dismantled. The material is broken, washed and divided into appropriate grain groups. That is classical recycling. Concrete becomes concrete again. This makes an important contribution to the circular economy.

How can this concrete be used again?

The concrete can be used in all common applications in building construction up to strength class C30/37.

In what form was the material used in the renovation of the Mercedes Benz Arena?

In the Mercedes-Benz Arena, the majority of the concrete we used was up to strength class C35/45, with a proportion of recycled aggregate with a grain size of 2-16 mm of approx. 25% by weight of the total grain size.

What other options are there for building in a more environmentally friendly way?

The use of recycled aggregate is an important contribution to sustainable construction and the conservation of raw materials that come from natural deposits such as gravel pits. In addition, by using clinker-reduced cements, the CO₂ emissions of the concrete can be significantly reduced, depending on the type of cement.

Were other methods used in the renovation of the Mercedes-Benz Arena?

By using a blast furnace cement CEM III/A 52.5 N-SR from our Karlstadt supplier, the CO₂ emissions of the concrete were reduced by over 40% compared to a reference concrete of the same strength class.

What challenges did you encounter during the renovation, and how were they overcome?

Of course, the problem with the project was that the recycled material was obtained from the old grandstand. And of course the first use of the concrete will only take place after the entire grandstand has been demolished. Therefore, appropriate storage capacity was needed to temporarily store the processed material before use. Furthermore, "approval in individual cases" from the highest building authority was necessary for RC concrete in strength class C35/45, as this strength class is not addressed in the standard or guideline. A lot of lead time is required here to obtain the relevant reports and approvals. This must be taken into account when planning. Close coordination and cooperative work between everyone involved in the construction is essential.

The topic of sustainability has been in focus for several years. How does a construction site that was built ten years ago differ from one that is being built today?

Today there is much more demand for building materials and materials that are sustainable, and what possibilities cement and concrete can offer here. Earlier, that wasn't true.

Which "sustainable building" projects are planned for the future?

The use of clinker-reduced cements, also in conjunction with recycled aggregates, will become more and more established. Builders, architects and planners are increasingly asking more specifically about "sustainable solutions". We in the cement and concrete industry face these requirements and are able to offer appropriate solutions for all possible applications.

Thank you, Mr. Rothenbacher, for presenting this exciting construction site.

It has been a pleasure.

Interview: October 2023



Picture: Werner Rothenbacher | SCHWENK



Picture: Concrete wall | construction site Mercedes-Benz Arena



Picture: Construction site Mercedes-Benz Arena

PRODUCTS AND SOLUTIONS



Picture: Dresden Bridge | SCHWENK

CUSTOMER ORIENTATION

ENVIRONMENTAL RELEVANCE OF OUR PRODUCTS

We are surrounded every day by a wide range of products and structures that were erected with concrete and cement. We often take little notice of this building material. It has become an integral part of our environment. Its continuing success is becoming part of a global challenge: climate change. The more building material is manufactured, the greater the volume of CO₂ emissions. The CO₂ naturally contained in the limestone is released in the manufacture of cement. It forms around two thirds of the CO₂ emissions of the entire manufacturing process. The high demand results cumulatively in a significant "CO₂ footprint" and thus is highly relevant to the environment. From a global point of view it is the sheer mass of cement and concrete used every year that represents a significant factor for the climate. And the demand is increasing! The reasons for the growth are the increase in population, urbanisation and the desire for modern infrastructure with roads, bridges and residential buildings.

We are meeting the challenge at SCHWENK!

Increased efficiency and longevity of our building materials

In order to improve the CO₂ balance and increase the efficiency of resource usage, we need to do "more with less". We have already improved the performance of our building materials and are doing our best to continue our development to face the challenges of the future. Cement and concrete are ideally suited for the construction of lasting and very robust structures. The challenge is to close the associated material cycles as much as possible.

Together as an industry

Our building materials serve an extremely specific market. The market demands properties of our products that we have optimised and adjusted with our customers for many decades. CO₂ balance and optimal resource efficiency as well as environmentally relevant properties and economically important characteristics must be taken into account today. The required changes, in some cases huge changes, will demand close cooperation from all involved. This will be the only way to reduce the climate relevance of our building materials in the long term.

At SCHWENK we are convinced that environmental factors are becoming increasingly important to the extent that we are expecting a future paradigm change in the entire cement and concrete industry. This is why we are continuously researching, developing and investing in keeping our manufacturing processes, products and services as sustainable as possible. Our target is to demonstrate to Europe the technical options required so we can continue to build sustainably with concrete and cement. Our ambition requires us to continually reinvent ourselves without losing our competitiveness and profitability.

CSC certification

In Germany, SCHWENK has had gold certification for all of its cement plant locations in accordance with the CSC system standard 2.1 (CSC = Concrete Sustainability Council) since March 2020. This certification system, established worldwide, is a high-quality certification covering sustainable procurement of raw materials and the production of building materials. We are also striving for further certifications for all of our divisions and cement locations in Northern Europe and Lithuania.

It assesses and evaluates the environmental, social and economical company facets for companies in the field of cement, concrete and aggregates. The certification process has confirmed that our construction materials meet the highest claims for national and international systems for the assessment of the sustainability of buildings and structures (DNGD, LEED, BREEAM). In Germany 30% of all buildings are already certified in accordance with such systems and the number is continuously increasing. The reason is that certified buildings have higher value and are more attractive for investors. In addition to the cement division, the first companies of our concrete division have successfully completed their certification.



Picture: SCHWENK CSC certification | SCHWENK

PRODUCTS AND CONSULTING

With our construction consulting, we support our customers in the optimal use of our products. In addition to cement, concrete or additives, we also offer services and digital consulting in the fields of quality control, logistics and consultation. The SCHWENK technology centre (Technologiezentrum; TZ) inspects and advises plant laboratories for SCHWENK companies and also for external customers. The pending changes in the area of the reduction of the CO₂ intensity of our processes must remain in harmony with the advanced technical requirements of our customers for our products and services. This requires competent consulting and coordination. We ensure this through construction consulting, the concrete technology centre and our plant laboratories.

The increasing desire for sustainable construction can only be fulfilled as a social performance via many interfaces. From planners to architects to manufacturers of building material, from companies commissioning buildings to government regulators – all entities involved are required to complete a building project successfully both technically and sustainably. The increasing complexity is the major challenge here. Good communications and coordination, above all at an early stage, are essential to avoid an increasing number of faults, damage or an overwhelming of planners, owners and building contractors. The properties of new building materials must harmonise with the practical work on the construction. Newly defined building materials derived from the application of new technology must be securely controlled. We are trying to engage ourselves through all interfaces. Our target is a solution combining the best aspects of environmental, economic and technological factors.

ACHIEVING THE TARGET TOGETHER

Individual entities in construction often work together like a well-rehearsed orchestra. A new “piece” or a new challenge must be communicated properly and rehearsed in order to achieve success for all.



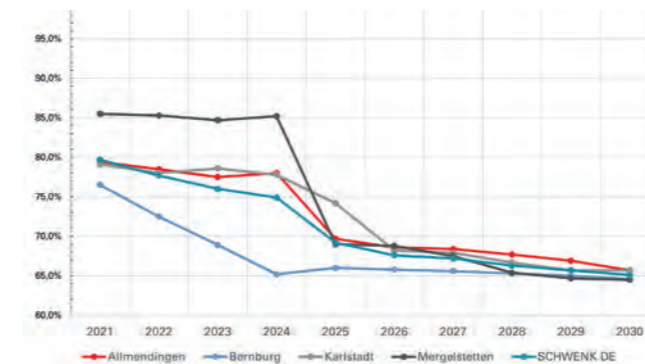
Picture: Werner Rothenbacher
Application technology | SCHWENK

SUSTAINABILITY OF OUR PRODUCTS

Cement

Our cement is used for the production of various concrete structures, bridges, slabs, reinforced concrete and concrete paving stones, ready-made mixes and the construction of heavy-duty objects such as bridges and building foundations. We produce a variety of cement types and are working to increase the number of lower clinker factor cements to support climate goals. Raw materials, production processes and products are subject to thorough tests and controls.

At all of our German cement plant locations, we produce clinker-reduced cements with a clinker content of < 60%. At the Allmendingen site, this is the CEM II/C-M (V-LL) 42.5 N. At the Mergelstetten, Karlstadt and Bernburg sites, the CEM II/C-M (S-LL) 42.5 N is produced. In practice, these cements are already largely used in the ready-mixed concrete area and classical high-rise construction. Customers value the good processing properties and, above all, the very low ecological footprint of these cements. An important contribution to sustainability and the reduction of the clinker factor.



Development of the respective clinker factor [%] at the SCHWENK plant sites

Concrete

We offer our customers technical and advisory support in the more efficient use of concrete for sustainable construction. Various tests on raw materials and products are carried out regularly and upon request in our concrete laboratories. The concrete quality experts are also in close contact with committees in the cement, concrete and construction industries that deal with the development of industry standards and sustainable construction practices.

Aggregates

We produce certified aggregates for road construction, agriculture and construction. Production takes place in our quarries in compliance with the recognised rules of environmentally friendly rock extraction, whereby the principles of responsible recultivation and the preservation of the diversity of flora and fauna are implemented. The additives are manufactured and monitored in accordance with the applicable standards and regulations.

ADDED VALUE OF OUR BUILDING MATERIALS

Successful projects are characterised by the fact that on completion all involved are satisfied and the personal benefits and added value and also the common goals have been reached. An increasingly important common goal is sustainable building. Our aim therefore is to supply building materials that meet the growing demands for climate protection, environmental protection, sustainability and resource efficiency. At the same time we must achieve added technical value – whether it is by very consistent product qualities, simple and robust handling on the construction site or physical properties that go beyond the fulfilment of minimum standards.

We as a family company are convinced that the investment and effort that we place in increased climate and environmental protection will bring significant added value to the company with its employees and their families, our customers and, viewed in the long term, also society as a whole. The building materials concrete and cement have attractive future potential due to their flexible application options and excellent properties.

Under good technical management concrete building components and concrete structures can be used for a very long time, even under the most extreme conditions. This is a very positive factor in the ultimate overall ecological assessment that includes the complete lifecycle of building structures. Concrete is not a disposable product! Well and innovatively planned and built and maintained with high quality, concrete is a building material for all who value long-term added value above short-term success.

ADDING VALUE

BUILT FOR GENERATIONS

Building with concrete means thinking long-term. The earliest uses of this material have proven this. Buildings such as the Pantheon in Rome or the aqueducts have already lasted for millennia.

Picture: Reference IN Tower | SCHWENK

RESEARCH AND DEVELOPMENT

OPTIMISATION ACROSS ALL DIVISIONS

As a building materials group with the cement, sand & gravel, concrete and concrete pumps divisions, SCHWENK has a lot of experience and know-how across the entire construction value chain.

We cover virtually all requirements for our building materials by our own activities in practice – from knowledge of geology and the environmentally compatible operation of our quarries, sand and gravel pits for the additives in the concrete to the manufacture and quality control of cement, the main binding agent, through to optimisation and monitoring of high-performance concrete mixes. SCHWENK is the market leader in many parts of Germany when it comes to the most demanding applications such as pumping concrete over long distances under very high pressure.

The development of new cements with even less clinker content and new properties has immediate effects on the subsequent options for application in concrete. For example, the increased use of recycled aggregates changes the requirements for classical additive materials such as sand and gravel or the usable building chemistry in the concrete. Even the processing procedures for manufacturing recycled building materials may change some important durability properties.

As a building materials group our strength lies in research into the complex interactions with all divisions working together. We work with universities, research centres, our industry associations and of course our customers to maintain a holistic view over sustainable building.

ONE DIVISION FOR ALL AND ALL FOR ONE:

Because the overall solution is not in individual solutions along the supply chain. Therefore, at SCHWENK all divisions work closely together to improve the sustainability of building.



Picture: Concrete laboratory | SCHWENK

“Developments in the building materials field are a marathon – not a sprint!”

Our starting points

Product



Application



Process



DEVELOPMENT OF CEMENT AND CONCRETE WITH IMPROVED CO₂ BALANCE

One of our strengths is our proximity to our customers and markets. Ensuring the uniformity of our building materials, a high level of reliability and security of supply as well as consistent compliance with the guaranteed properties are and remain the top goals of our building material developments. Climate change brings another factor into the focus of our research and development. The associated demands have made it necessary for us, in addition to improving existing products and processes, to work on some completely new technologies, which are also referred to as “breakthrough” technologies. This will require a high degree of effort in development and financing.

We will have to develop multiple selected and potentially promising technical approaches in parallel to comply with legal requirements and to meet the general interest in climate-neutral building materials. And of course we naturally cannot neglect the daily cooperation and continuous product development.

We are currently working on projects in this area such as Celitement, additive manufacturing (3D-printing) and the oxyfuel process.

Product technology: Celitement – a completely new type of hydraulic binding agent

With the use of Celitement, SCHWENK now has a completely new binding system with excellent technical and environmental properties. It is covered by patents throughout the world. We have now developed the product and the production process to industrial maturity. At the beginning of 2020, SCHWENK completely took over Celitement GmbH, including the pilot plant, and invested in a substantial expansion of the plant technology for mechanochemical activation.

The production output of the pilot plant was increased to 5-7 tonnes per week. With these amounts of binder, innovators from a wide variety of application areas have already successfully tested new product lines on an industrial scale. The test plan designed by the German Institute for Building Technology for general building approval for Celitement is currently being processed. Once approval has been received, Celitement can then be used in all classic concrete and mortar applications in the future.

Celitement is one of the very few developments in the field of innovative binding agents that has managed the transition from research to industrial practice.

Projects of this type need the long-term outlook of a family company like SCHWENK for successful implementation.

Application technology: Additive manufacturing (3D printing) with short carbon fibres

Using a special extrusion process we are working with a partner in the building industry to develop a process for manufacturing innovative finished parts without using reinforcing steel by additive manufacturing. We see the industrial prefabrication of concrete components as a possible way of introducing innovative building practices that also save resources to the industry. We are interested in applying productivity increases that have long been implemented in other industries to the manufacture of concrete. This will require the development of not only machinery and processing technology but also the right building materials. A particular challenge in the field of additive concrete building is the achievement of product characteristics that are normally achieved by the use of reinforcing steel. In contrast to many other “3D concrete printing” concepts, our initial focus was on the development of building materials with oriented short fibres derived from specially treated carbon fibres. When correctly combined and applied, these materials can achieve not only the well-known high compressive strength of cement mortar

but also extremely high flexural strength. We are following and promoting the development of innovative 3D printing processes in concrete construction so we can align our products to the new requirements of the technologies at an early stage. Technology such as this requires close cooperation with materials scientists, mechanical engineers and toolmakers, specialists in computers and IT along with planners, and structural engineers and civil engineers.

Processing technology in cement manufacture: The oxyfuel process

The manufacture of building materials such as cement at a consistent quality demands great familiarity and experience with the industrial processing technology for cement manufacture. The process of developing a cement plant as free from CO₂ as possible is very ambitious. The aim is to capture CO₂, which cannot be avoided in the process, using carbon capture technology. Once liquefied it can be stored underground (CCS = Carbon Capture & Storage) or combined with hydrogen in a wide range of processes to form additional products such synthetic fuels (CCU = Carbon Capture & Use).

Two basic approaches for separating CO₂ in cement plants are available:

1. The CO₂ can be separated from the exhaust gas flow from the chimney. The disadvantage of what is referred to as post-combustion technology is the very high volume of exhaust gas. Air consists of 78% nitrogen by mass (N₂). The carbon capture process requires nitrogen and CO₂ to be separated from each other. This requires a high investment in plant technology and high power and heat requirements during operation.
2. An alternative is oxyfuel technology. This process uses pure oxygen for combustion in clinker manufacture. This significantly reduces the volume of gas that must be cleaned. SCHWENK, along with three other partners in the cement industry, has decided to set up an initial pilot plant using this technology at Mergelstetten. The company set up for this purpose, Cement Innovation for Climate (CI4C), will manage the project over the following years.

PIONEER PLANT AT MERGELSTETTEN

Our Mergelstetten cement plant will be the site of the first oxyfuel research and development plant



Picture: Mergelstetten cement plant | SCHWENK

NEW BINDING AGENTS, PRODUCTS AND TECHNOLOGY

Step by step to CO₂ reduction

An interview with Dr. Hendrik Möller, member of the management team and managing director of Celitement GmbH, Bastian Elterlein, member of the management team and responsible for sales and logistics, and Dr. Georg Locher, technology / project.



Picture: Dr Hendrik Möller | SCHWENK

Dear Dr Möller, you are Managing Director of Celitement GmbH & Co. KG and we interviewed you on the binding agent developed there for the last sustainability information in Autumn 2020. What has happened since then?

We've invested heavily and increased the production capacity of the pilot plant to about 5 tonnes per week since the beginning of 2022. That's a tiny amount compared with one of our cement plants, which can be produced by a cement mill in a few minutes. That's a ten-fold increase compared to earlier though, when we were only able to produce approx. 500 kilograms per week. It also allows our innovators, the partners with whom we test the practical application of this new binding agent, to conduct industrial application trials.

Since my last interview, we have successfully conducted numerous large-scale practical trials with several tonnes of Celitement in a wide variety of applications. Recently we've produced the world's first industrial aerated concrete and were able to replace all of the cement portion by Celitement. We're now beginning experiments in the context of the tests for building approval of Celitement by the DIBt (German Institute for Construction Technology) in Berlin. This is

the first approval procedure in Germany for a new binding agent that can be used to replace Portland cement in all applications. A lot has happened as a result, especially in the area of market preparation.

How much better is the CO₂ balance of Celitement compared to Portland cement?

That is difficult to answer. Let's start with the basis of the comparison. What sort of cement are you thinking of? The European cement standard includes 27 types of cement, soon to be 30. Even if no reliable figures based on measurements at an industrial Celitement plant are available as yet, in our opinion pure Celitement is now at least 30 percent better than an average European ground clinker. Higher savings of up to about 50 percent are also possible, depending on the recipe for the starting raw materials and how far we can optimise the process.

However, ultimately the volume of CO₂ per tonne that a single binding agent emits is not really relevant. What is relevant is the total CO₂ burden of the structures or building products manufactured with it. This is where efficiency and technological performance become a factor, where the "green" cements or special binding agents such as Celitement can still have some advantages.

So what happens to the pilot plant in Karlsruhe when Celitement is produced on an industrial scale?

It will of course continue to be operated because we have built a globally unique technical centre here for the SCHWENK Building Materials Group, which, in addition to the production and further development of Celitement, also offers valuable opportunities for many other development areas in the area of binder production and especially mechanochemistry.

Our various milling plants, for example, provide us with the means to dry and mill a wide range of different milling additives. For the development of new composite elements such as CEM II/C-M which have to contain up to three other milling additives besides clinker, it is very important to be able to conduct concrete trials at an early stage. To do so, you need up to one tonne of material fast. To date, we haven't been able to put this into practice easily at SCHWENK. The mills in the plants are too big for this and the laboratory mills in the cement laboratories are somewhat too small. So the size of the plant in Karlsruhe is just right. We have already milled many interesting materials there for the future, ranging from various kinds of slag through material for recycled concrete to natural pozzolans. Our autoclaves can also be used for experiments in numerous other building material groups. Autoclaving is used in aerated concrete, sand-lime brick or fibre cement for example.

Moreover, the plant is also used for design and dimensioning tests for plant engineering. Depending on the raw material base, the process and guarantees for industrial plants can be optimised. I used to work in cement plant construction. You have pilot plants there too, so you can run design tests for new cement plants. We don't want to build just one Celitement industrial plant.

Which brings us to the last question. When do you think the first industrial reference plant will go into operation?

That's the question I'm asked most frequently at present. We've made an application for building authority approval at this stage so that Celitement customers from an industrial plant can use it to construct structural components in the near future. If everything goes well, we'll be holding the DIBt approval in our hands in just over two years.

Many thanks for the update Dr Möller.

It has been a pleasure.



Picture: Bastian Elterlein | SCHWENK

celitement
ADVANCED PROCESSING

Besides Celitement, SCHWENK is also working on new CO₂-reduced cements. What exactly do you mean by that Mr Elterlein?

We achieve CO₂ reduction with these cements by using an efficient mixture of clinker and various milling additives as the main constituents. These could be ground limestone, fly ash, granulated slag or pozzolans.

At SCHWENK, we talk in terms of CO₂-reduced cement types with a clinker content (reinforced) of less than 70% and hence with a milling additive content of more than 30%.

Incidentally, we have marked these cements clearly in our price lists. With the types available as bag goods, we have also supplied each bag with our focus point for sustainability to increase awareness directly with the user.

How many CO₂-reduced products does SCHWENK already have in the programme and where are you heading?

15 out of 34 cement types available in our price list for 2024 meet the criterion described above. Five different CO₂-reduced cement types are available to our clients as bag goods. Increasing trend!

What are the challenges involved in CO₂-reduced cements?

I'd like to mention an internal and a client-side aspect here. Firstly, the availability, logistics and storage of these additional massive material flows are a challenge, which is connected with high materials costs and investments in the plant.

For the client's part, using the correct type of cement for the exposure class in question makes the whole matter more complex. So interior components with significantly CO₂-reduced cements are easily produced although other cements may have to be used for directly adjacent external components. This means that convenient "one-size-fits-all cements" have to be replaced by 2 cements in some instances and increased attention is required on the building sites when installing the concrete. We are happy to address these challenges with our clients for the potential CO₂ reductions that are made possible.

That sounds like an exciting future.

Thank you, Mr Elterlein.

Yes, exactly. An exciting future task true to our vision: "Sustainable building material solutions for future generations".

IN FOCUS: CO₂ REDUCTION

CO₂ can not only be saved using new binding materials or new products, however. Technical measures offer solutions as well. Dr. Locher, what technical options are there on the market at present?

Amine washing is the only market mature option at present which is established in the chemical industry and is already used in other industries such as waste incineration for example. In addition, there is a high number of other processes which are being studied and further developed in the technical and scientific sphere and in industry. The development effort which is required from the original concept to the industrial plant is frequently supported in terms of both time and finance. We are talking here about development costs over ten years and costs that far exceed 100 million Euros until a technology has been developed which means that approx. 2,000 tonnes of CO₂ daily can be removed in the average German cement plants. This is why many technologies are still in their infancy and will probably not reach the point of technical readiness for large-scale use in this decade.

I also assume that not just one individual technology will be used in the future. Rather the choice of the best solution depends on the conditions that prevail on site, particularly the availability of thermal and electrical energy. Currently, about ten processes are increasingly the subject of expert discussion, including the oxyfuel technologies which we find particularly interesting. But obviously we are also following developments in other technologies very closely.

And what path has SCHWENK chosen?

With our partners in Konsortium CI4C (Cement Innovation for Climate), we are currently constructing, on the premises of the SCHWENK cement plant in Mergelstetten, our own research and development facility on a semi-industrial cycle for almost complete CO₂ removal from the exhaust gas from cement factories. The pure-oxyfuel process (from oxy for oxygen and fuel) used in Mergelstetten is a clinker combustion process in which, instead of air, pure oxygen is put into the oven to guarantee heat generation excluding atmospheric nitrogen by burning primary and alternative fuels. In this way, the CO₂ portion in the waste gas is increased to approx. 90 percent and hence the potential for CO₂ removal is greatly increased. The aim is to remove 100 percent of CO₂ emissions cost effectively.

In addition, we have been able to save a high amount of CO₂ in recent years by massive investment in our plants. Through improved technical plants, we are able to replace fossil fuels in production almost completely by alternative fuels.



Picture: Dr Georg Locher | SCHWENK

What do you see as the biggest challenge for technical solutions?

Society and industry, above all in Europe and other industrialised countries, are currently striving to achieve an optimally climate-friendly world by 2050 (or even by 2045). That leaves us at least 20 years to make the necessary changes.

From the technical perspective, the construction of CO₂ infrastructure is of decisive importance. It must be available when, at the end of this decade, large amounts of CO₂ must be removed and transported not just from the cement industry. A further challenge consists of providing large quantities of renewable electrical energy and of green hydrogen as well, to transform the CO₂ removed into chemical products, e.g. into aviation fuel. However, I see these technical challenges as less serious than the political and social challenges. Many agreements and undertakings have been made on the highest political level (national and international) but the local and regional actors have been only partly involved in the decision – so industry is faced with question marks in relation to implementing the measures. It is to be feared that, although we can remove CO₂ at our plants, it will prove impossible to convert it into chemical products or to transport it. But I can see the positive in this – we make a constructive contribution and solve our problems.

Very nice closing words.

Thank you very much, Dr. Locher.

It has been a pleasure.

Interviews updated: October 2023

A STRONG NETWORK

FOR RESEARCH AND DEVELOPMENT

COOPERATION WITH PARTNERS AND UNIVERSITIES

We have maintained and expanded a network with a wide range of partners for many years. We use the network to find out about and continue the development of the latest methods and processes – particularly in the field of CO₂ reduction. Because the construction industry is dominated by small and medium enterprises, the average expenditure on research and development is not comparable with other industries such as the automotive industry. This makes it even more important for us to work closely with reliable partners.

COOPERATION PARTNERS IN THE R&D NETWORK

R&D	MIP Polymerforschung Mainz	MPA Berlin Brandenburg	University of Stuttgart and MPA Stuttgart
EMPA Zurich	University of Augsburg	University of Weimar	University of Ulm
KIT Karlsruhe	TU Clausthal	TU Munich	Fraunhofer Institute for Silicate Research
Bergakademie Freiberg	MFPA Leipzig	TU Aachen	HBC Hochschule Biberach
BASF Construction Chemicals	FH Nuremberg	University of Erlangen	

In 1879

we started working with the Test Institute for Building Materials directed by Dr Wilhelm Michaëlis.

In 1894

we started working with the Royal Technical University in Stuttgart (today the Otto Graf Institute).



SIX DECENTRALISED SCHWENK LABORATORIES

Our laboratories at the cement plants are competent contacts for our network.

Picture: Cement laboratory | SCHWENK

PEOPLE AND ENVIRONMENT



Picture: SCHWENK employees | SCHWENK

EMPLOYEES AND EMPLOYMENT

PEOPLE AT THE CENTRE

Highly qualified and motivated employees guarantee the success of our company. We have established a working environment that includes attractive working conditions and targeted development activities that help our employees achieve success. This forms the foundation for sustainable company development. Work safety and employee health have top priority for us as a manufacturing company.

We are proud to be a traditional family company. It is important for us to ensure a modern and safe working environment for our employees. SCHWENK as a company takes full responsibility for the protection of employees, their health and a sustainable business environment. A good employee policy for us means that we establish general conditions for our employees within which they can develop their potential and achieve top results. Appropriate remuneration and attractive benefits are as important as targeted individualised development opportunities and an atmosphere characterised by fairness and esteem.

Our management principles describe fundamental and binding principles with respect to employee management. It offers our managers valuable support for their daily management tasks, such as with reference to responsible actions, the development of employees and transparent communication at an equal level.

EMPLOYMENT AND EMPLOYEE PARTICIPATION

Company co-determination has been firmly established and proven in several of our companies over many decades. Group management, human resources and employee representatives maintain continual constructive communication. Dialogue with the union is also open and fair in the applicable contexts. As a family company we have always been socially engaged with great enthusiasm, more out of conviction than as a social requirement.

Number of employees

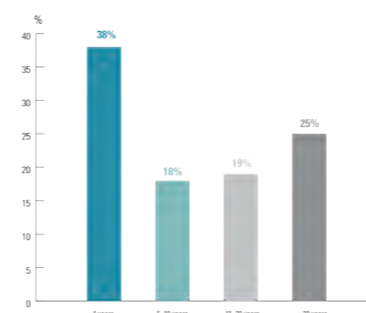
At the SCHWENK Building Materials Group Germany, we employ around 2,180 people. They are distributed through our four divisions: cement, sand and gravel, concrete and concrete pumps in Germany, Northern Europe and Lithuania.

2180 employees

Period of employment

We are particularly proud of how long our employees remain with us. Around 45% of our employees have worked with us for more than 10 years and are therefore an integral part of the SCHWENK family.

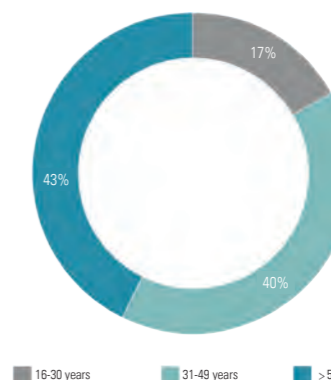
Membership in our company



Employee distribution



Age



Men



Women

Senior executives



Non-senior executives





Picture: Nico Häber trainee | SCHWENK

SECURE AND FLEXIBLE

FLEXIBLE WORKING HOURS

In order to enable flexible working hours we offer employees models such as trust-based working hours, flextime, work hour accounts, part-time and leaves of absence as well as hybrid work models. We offer some of our older employees individualised part-time contracts. The number of employees working part-time is, on average, five percent.

PAYMENT POLICY AND WORKING TIME REGULATION

Our pay policy is based on the general market standards for companies in this industry. Nearly all of our companies are subject to collective agreements and we reward the efforts of our employees with competitive wages and salaries. The amount of the company pension scheme at SCHWENK matches general market standards.

We comply strictly to the legal requirements for regulating working hours. Our compliance guidelines, under which employees are able to report violations, support our compliance with all applicable regulations.

PERSONNEL DEVELOPMENT

Targeted and accurate personnel development measures make a major contribution to the success of our company. They promote specific competencies and the capacity for action of our employees. Personnel development is therefore a central task of our managers and at SCHWENK it is based on the following three foundation stones.

Tasks and responsibility

By assigning tasks and responsibilities, for instance through project assignments, employees are developed professionally and personally in their daily work environment. With regular employee appraisals, to which every employee is entitled, we create the conditions to specifically identify our top performers and high potential and to support and further develop them using individual development plans. The systematic succession planning for all management and key positions is linked to personal development. It is a central and personal-based risk management process and is implemented in close consultation between management and the human resources department.

Coaching

Coaching forms another foundation stone. Our managers use continuous feedback, exchange and meetings to support the development of all employees.

Training

Our employees have access to internal and external training, continuing and further education courses as required. The internal promotion of young talent is an integral part of our personnel development measures. For example, in Germany there is a development program that supports young high potential workers in their personal and professional development.



Picture: Employees and training officers | SCHWENK



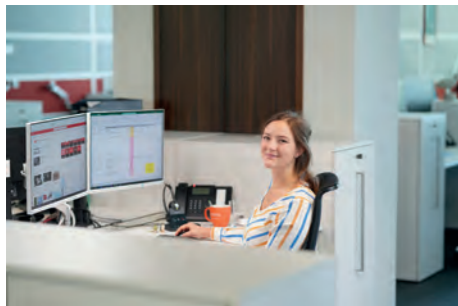
Hannes Rattunde, industrial mechanic | SCHWENK



Alina Urbanski, building materials tester | SCHWENK



Toni Angermann, electrician | SCHWENK



Nina Krenzer, Bachelor of Science in commercial IT | SCHWENK

TRAINING AND CONTINUING EDUCATION

Training

In addition to the activities described, vocational training at SCHWENK has always been very important in ensuring qualified young talent. In 2022, we offered a total of 16 different commercial and industrial-technical training occupations as well as two dual study programs. Overall, in 2022, we achieved a training rate of 5.1 percent in the SCHWENK Building Materials Group in Germany. We are particularly proud of the fact that, in the same year, 92 percent of our trainees were able to start their careers at SCHWENK due to passing exams and very good performance. We offer our trainers and training representatives internal and external qualification measures to further professionalise their work with young people.

In addition to the actual apprenticeship, we also offer school and university students the opportunity to gain practical experience on the job in the form of internships, dissertations and working student activities and to become acquainted with SCHWENK as a potential employer.

5.1%

Trainee ratio

18

different commercial and industrial-technical training occupations/dual study programs

92%

employment of trainees

Continuing education

We find it very important to offer employees development opportunities precisely tailored in line with their requirements. When it comes to methods, we pay attention to the appropriate mix of practical and theoretical activities. We also support employees with obtaining additional qualifications associated with the duties of the position such as more comprehensive continuing education courses over an extended period. In the 2022 financial year, we extended our continuing education activities to place a central emphasis on the topic of work health and safety.

The most important factor in all of our employee development measures is that we encourage employees to reflect on what they have learnt and how to transfer it to their daily work. Appropriately designed tools and processes systematically promote this transfer and increase the sustainable effectiveness of these activities. The responsibility for all of the above is shared by the learners and their managers, whose primary duty is to oversee the personal development of their subordinates.

DIGITAL LEARNING

We have already had very good experience with online courses in the field of work safety. We have expanded this to the IT area and offer online training on various software solutions. We intend to expand our range of digital learning formats and content to further areas and topics in the future. Modernisation of the IT infrastructure and the introduction of cloud-based collaboration tools will also promote new virtual forms of working together.

MANAGEMENT DEVELOPMENT

We offer our managers leadership courses tailored for specific groups. We also encourage reflection on their own management role along with exchange of experience by individualised coaching and group discussions of specific cases. It all assists our managers to develop ideas and solutions for their everyday management problems.

WORKING
TOGETHER
TOWARDS
ONE GOAL

For the development of our employees
and our company



Picture: Tobias Schullar, TZ Central Laboratory North | SCHWENK

DIVERSITY

MAKES ALL THE DIFFERENCE

DIVERSITY-MANAGEMENT

We require all managers and employees of our group to act legally and ethically at all times. SCHWENK acknowledges the core working standards of the International Labour Organisation (ILO) and the Universal Declaration of Human Rights of the United Nations. We expect consistent compliance with these basic standards and recommendations from our employees and business partners. We promote international cooperation and exchange within our building materials group for greater variety and diversity, particularly through cross-border projects.

Diversity as a success factor

We recruit and promote employees solely on the basis of their professional qualifications and experience in carrying out the respective job. We are firmly convinced that people are best motivated to work if they feel that they and their performance at work are assessed without any form of prejudice. The diversity of our people contributes to the success of our company. The different backgrounds and differences in thinking and point of view also promote additional potential creativity and innovation. This makes a valuable contribution to the design of processes and the development of solutions for our customers. What appears important to us is that we also form a common understanding of the company and a unified system of values to reconcile the difference between diversity and unity. We are proud to have people from 27 different countries employed in our company.

Generation management

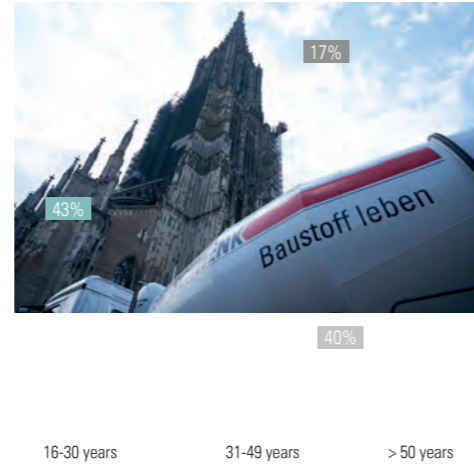
Through forward-looking and systematically updated personnel planning, we ensure that retirement-related departures and young talent developed during training and external recruitment are brought into balance and that staffing risks are avoided in a forward-looking manner. We particularly enjoy seeing how, on a day-to-day basis, our employees support and promote one another regardless of their age groups. This happens on the one hand by the sharing of years of extensive technical and process experience, and on the other hand by efficiently using modern technology and software and communications solutions.

Compatibility of job and family

We as a family company have always placed great importance on family values. Depending on their domestic situation the needs of our employees can vary greatly: from building a house to family planning to the care of relatives. We support our employees by being aware of the individual situation, assessing applicable actions and developing individual solutions. Examples of how we assist can be flexible working hours and home-office regulations.

44.6 years
is the average age of our employees.

Our people fall into the following age groups:



Communication

Targeted and dialogue-oriented communication is the core of our collaboration and specifically promotes the exchange of knowledge. A variety of online and offline communication platforms are available to tailor the sharing of information to specific target groups, to bring transparency to company processes, and to make information available at all times.

The SCHWENK One Intranet has been used as the main communication channel at SCHWENK since 2020. SCHWENK One is used for announcements of all kinds, but also as a dialog-oriented platform and for sharing documents in real time. This is complemented by the digital collaboration platform Microsoft Teams, which offers an optimal solution for fast, formal and informal exchange, even across countries. Announcements are also published at all of our locations via digital or analogue information boards, which ensure comprehensive access to the information.

Despite the increasing importance of digital channels, we see regular personal communication as an essential part of internal communication. For this reason, our digital channels are rounded off with personal formats tailored to specific target groups and topics. In our plants, for example, early morning meetings underlie daily collaboration. Regular marketplace discussions at headquarters and annual company meetings round off the communication offering and enable an open dialogue.



Picture: SCHWENK employees | SCHWENK

WORK HEALTH AND SAFETY

Safe and healthy working conditions are an important foundation for the success of our company. This applies to our employees and to all persons who enter our facilities or could be endangered by our activities and products. Every accident means human suffering for the victims and their families. Therefore, the prevention of work-related injuries, health problems and diseases is top priority for us. In cases of doubt work health and safety always take priority. All employees are required to take active responsibility for work health and safety in their areas of work and to take an active part in improving health and safety at work. We promote competence and awareness of risk and the responsibility of all employees through personal training courses and e-learning activities.

With the MISSION ZERO campaign, in Germany we are pursuing the goal of working accident-free and even preventing near misses. We have a common slogan for all processes: "We will work safely or not at all". All supervisors are responsible at all times for making sure that everyone knows that we take this very seriously.



Concrete pump with secure support, BPD Vogtland | SCHWENK

Accident rate (LTIFR) *	Cement	Sand & Gravel	Concrete	Concrete pump
2020	6.3	53.0	26.1	53.9
2021	4.2	45.2	31.3	74.9
2022	3.5	50.5	33.6	51.8

*Number of accidents of all employees with at least one day off work per 1,000,000 working hours.



Picture: Personal protective equipment | SCHWENK



Picture: Personal protective equipment | SCHWENK

SAFE AND HEALTHY

More than 90 percent of work health and safety management systems in our German plants are certified with the "Sicher mit System" [Systematically safe] certification of the professional associations.

We have established management systems for safety and health at work. This provides a structured procedure for the planning and implementation of measures for the prevention of work-related accidents, occupational diseases and other health hazards related to work and for effective first aid. The provision of safe and healthy workplaces, the detection of risks and opportunities and the continuous improvement of our work and health performance are in the forefront.

The health and safety of third parties is also important to us. The rules for the protection of visitors to our facilities are described in binding guidelines. Our pump and ready-mix trucks have turning sensors and camera systems, particularly for the protection of pedestrians and cyclists on the road. We provide checklists to construction managers and our pump operators for setting up concrete pumps. They cover all

aspects relevant to safety for our machines and building sites. Trained safety coaches support our pump operators on site with site inspections and inspections of the vehicle and driver's protective equipment to ensure health and safety.

IN FOCUS: SAFETY IN STREET TRAFFIC

GET OUT OF THE BLIND SPOT

Everyone who drives has heard all about blind spots in driving school. This is underestimated by many, however. For the bigger the vehicle, the bigger the blind spot as well. On a truck there are four areas of dangerous zones: to the left and right of the vehicle and behind and in front of it. In the "Safety in street traffic" project, students come to understand this topic better.

An interview with Markus Katzer, CEO of SCHWENK Beton Alb-Donau GmbH & Co. KG.

How did the "Safety in street traffic" project come to be?

The blind spot is especially dangerous for a truck. Our vehicles have the best possible all-round technology, including sensors. For the driver, however, it isn't possible to see everything from his position. After an accident in 2019 that was caused by the blind spot, we asked ourselves what else we could do to reduce accidents of this type.

My wife, who works in a lunchtime childcare center, told me one day that the children were dealing with the topic of traffic education in class. So we came up with the idea of combining one with the other – and the project was born.

How is the topic of blind spots made tangible for children?

The children go through several learning stations within about 45 minutes. Depending on class size, they are divided into 2 groups. In the classroom, we first cover the theoretical part of the blind spot using a film and a presentation. Afterwards we go to the playground with the class. The highlight is waiting there – our truck mixer.

First, the children are allowed to draw the area where they think the blind spot is. We then resolve the whole thing with a red triangular tarpaulin, which represents the blind spot. The children are usually amazed because the blind spot is always larger than they estimated. Each of the students is allowed to sit in the driver's seat once and see that their classmates have disappeared on the red tarpaulin.

In road traffic, it's not just important to pay attention to the blind spot. Keeping enough distance from the vehicle is also relevant. To show the children this, pylons are set up in a curve. The rear wheels shorten the curve and so they drive over the pylons.

Children learn something about the topic of "behaviour in traffic" at school. Why is it still important for SCHWENK to get involved in this topic?

In class, most of the time only the theory of blind spots is discussed. The focus is more on general behaviour in traffic. Most people underestimate the blind spot, which significantly increases the risk of an accident.

It is also important to us to support drivers by doing our best to avoid accidents. We want drivers to feel safer and children to be aware of the danger.

What is the best way to avoid blind spots?

You should always keep enough distance from a vehicle. It is also important to make eye contact with the driver. Because only if you see the driver can the driver also see you. Making yourself noticed and waving, for example, is also helpful. If you ride a bike, you should definitely have a working light on the front and back. Wearing light-coloured clothing makes you easier to recognise, even in the dark.

What particularly surprised or pleased you during the implementation of the project?

I was particularly pleased by the high demand. At every school we are always told "Please come back next year". My colleague Mr. Rothenbacher is now in constant contact with the Neu-Ulm police. He organises the training and teaches the children the content with a lot of fun. We are very grateful to him for his commitment!



Picture: Markus Katzer | SCHWENK

What surprised me was that the teachers in particular were amazed at how dangerous the blind spot is because the driver can't really see everything. The feedback was often that they are definitely more attentive in traffic now. I was very happy about that because that is exactly our goal.

Thank you, Mr. Katzer, for this great project and your impressions.

You're welcome. It was a pleasure.

Interview: October 2023



Picture: Group photo



Picture: Exploring the zones around the vehicle

HEALTHY LIVING

Picture: Irene Walter and Christoph Schultze (Heads of training unit of Ulm-Augsburg-Kempten) | SCHWENK

THE DUTY OF US ALL

The promotion of employee health always needs to strike a balance between working conditions, individual behaviour and personal responsibility.

risks and stress. We offer a wide range of measures, activities and programmes designed to meet the needs of our employees. We conduct regular surveys of employees to ensure continuous improvement and adjustment of our services.

HEALTH MANAGEMENT

Healthy and top-performing employees are a significant factor in the success of our company. Since 2013 we have bundled our actions in the field of health into a company health management system.

The target of our holistic approach is to implement and promote a comprehensive and preventive health strategy. This includes areas such as improving awareness of health issues among employees and management, well-being in the workplace and reducing health



TIPS

Quick and easy – tips for everyday use on the intranet

We regularly post targeted exercises and information in the field of health on the intranet. In small learning units, employees can take part in teaching tips on how to improve their health and integrate them into everyday life. The continuous expansion of the content creates a wide range of information for everyone who is interested.



PREVENTION

The basis for early action

Medical prevention is an important part of maintaining health. We support participation in preventive medical examinations with local offers and as part of our bonus programme.



COMMUNICATION

From training to workshop

Training and workshops for our managers ensure that they can conduct communications processes, such as employee interviews, successfully. We maintain a communications culture that provides open and regular information on health topics to promote and reinforce awareness of health among employees.



COURSES

Preventive action for physical and mental health

Some of our sites have various exercise courses for maintaining health and fitness. Employees can participate in an internal SCHWENK course during breaks or after work. The options range from endurance training to back exercises through to yoga. We also work with Jobrad, a company bike leasing plan, designed to promote healthier and environmentally friendly movement.



BONUS PROGRAMME

Collect points

The bonus programme is an important part of prevention. Employees can collect points by healthy behaviour, even at home, and convert them to prizes.



RISK ASSESSMENT

Guide to our offers

The risk assessment of psychological stress is an important field of action for work health and safety and for health in particular. Specific offers in this area are derived from our regular surveys of employees.

SOCIETY AND ENGAGEMENT

We are represented throughout Germany with our numerous locations and companies. This supports the local economy by increasing employment, paying taxes and bringing our supply chain close to our locations. In addition to our business responsibilities we consider it our duty to participate in public life. We therefore also get involved in what is happening in the region around our locations. We all profit from open discussion, social projects and community involvement.

DONATIONS AND SPONSORSHIPS

We support selected associations and activities around our locations with our donations and sponsorships. This enables us to support regional environmental, social and cultural projects in our regions. This means that we contribute to the quality of life in the cities and communities where we work. We pass on the social responsibility that we practise in the company to our successors in the company in the earliest years of their employment. For example, some of our trainees organise a donation-supported Christmas market every year, with the income going to community projects. We have also maintained close contacts and cooperation with schools, universities and other educational establishments for many years. We take the topic of traffic safety very seriously. Our "Safety with SCHWENK" programme teaches the youngest children everything they need to know about blind spots, the dangers of road traffic and how to behave correctly on the road.

BEING LOCAL

LOCALS AS PART OF THE COMMUNITY



Picture: Concrete mixer truck in front of Ulm Minster | SCHWENK

REGIONS, BUILDING AND CULTURE

One example of all that holds us together is our strong involvement in the cathedral support association of Ulm, the city where we started.



HUMANITARIAN AND SOCIAL PROJECTS

We make our decisions based on our responsibility to society. It is up to us to help those who most need help. We support them with a wide range of different projects.



ENVIRONMENTAL AND CLIMATE PROJECTS

Our production process means that we are intervening in nature and the landscape – this is unfortunately unavoidable. We are fully aware of this and therefore we support special environmental and climate projects.



SPORTING AND CULTURAL ASSOCIATIONS

We can all experience social cohesion, community and family values in sporting and cultural associations. We want to be involved to contribute to making sure that our society has continuing access to a wide range of recreation options and opportunities to play various sports.



RESEARCH AND EDUCATION PROJECTS

Success for us is based on continuing development. We therefore also support scientific projects in the field of building materials and a wide range of education projects.

ASSOCIATIONS AND SOCIETIES

The principle of working together is also applicable to the associations and societies with which we are involved. In addition to memberships in industrial associations such as the Verein Deutscher Zementwerke e.V. (VDZ), the Cembureau and the Global Cement and Concrete Association (GCCA), which are actively involved in promoting sustainability in the construction industry, SCHWENK is also a member of a number of local associations involved in nature, education and culture.



European Cement Association (CEMBUREAU)



Global Cement and Concrete Association (gccca)



Verein Deutscher Zementwerke e.V. (vdz)



Bundesverband Baustoffe-Steine und Erden e.V.(bbs)



Bundesverband der Deutschen Transportbetonindustrie e.V.(BTB)

STAKEHOLDER RELATIONSHIPS

FOR DIALOG AND EXCHANGE

STAKEHOLDER COMMUNICATION

As a company we are subject to the demands and expectations of various stakeholders. Open communications and making opportunities for open exchange of views is essential for us for the detection of requirements and trends. We address questions, suggestions and concerns of various interest groups and develop solutions. When we apply for approvals required for obtaining raw materials we involve the local population at the earliest possible stage with information events. We work together to develop concepts for extracting rock in an environmentally responsible manner. Customers have the opportunity to discuss current concerns and work actively with us to face challenges and actions at our customer events such as concrete seminars. We maintain a continuous dialogue with our employees via our organisational structure, our company meetings and the intranet. We are currently working on improving internal communications with the introduction of new technical solutions and increasing digitalisation. We want to make information available faster and more easily and reinforce cooperation.

Relationships and open dialogue with internal and external stakeholders are an important part of our culture and our daily work. Therefore, we do everything necessary to develop sustainable and open cooperation between employees, with our neighbors, the local community, industry, suppliers, municipalities and government institutions.



Picture: SCHWENK conference room

STAKEHOLDERS & HOW WE COMMUNICATE



APPENDIX

General

Investments	2022
-------------	------

Investments	29 million
-------------	------------

Plants	2022
--------	------

Cement factories	5
------------------	---

Sand & gravel plants	7
----------------------	---

Concrete plants	135
-----------------	-----

Share of total sales	2022
----------------------	------

Cement	51%
--------	-----

Sand & Gravel	5%
---------------	----

Concrete	38%
----------	-----

Pumps	5%
-------	----

Sales	2020	2021	2022
-------	------	------	------

Cement	4.1 million t	4.0 million t	4.0 million t
--------	---------------	---------------	---------------

Sand & Gravel	3.0 million t	2.7 million t	2.6 million t
---------------	---------------	---------------	---------------

Concrete	3.9 million m ³	3.7 million m ³	3.4 million m ³
----------	----------------------------	----------------------------	----------------------------

Pumps	3.6 million m ³	3.4 million m ³	3.3 million m ³
-------	----------------------------	----------------------------	----------------------------

Climate protection

	2020	2021	2022
--	------	------	------

Specific net CO ₂ emissions (per tonne cement equivalent)	432	438	423
--	-----	-----	-----

Specific net CO ₂ emissions (per tonne clinker)	534	537	528
--	-----	-----	-----

Clinker/cement factor	78.7%	79.6%	77.5%
-----------------------	-------	-------	-------

Proportion of alternative fuels	91.0%	90.3%	93.4%
---------------------------------	-------	-------	-------

Proportion of biomass	31.0%	32.1%	31.7%
-----------------------	-------	-------	-------

Raw materials	2020	2021	2022
---------------	------	------	------

Proportion of natural raw materials in cement production that are replaced by alternative raw materials	13.15%	13.28%	14.58%
---	--------	--------	--------

	2020	2021	2022
--	------	------	------

Limit value of ammonia (NH ₃) emissions in mg/m ³	30	30	30
--	----	----	----

Ammonia (NH ₃) emissions in mg/m ³	7.8	7.0	10.5
---	-----	-----	------

Limit value for NOx emissions in mg/m ³	200	200	200
--	-----	-----	-----

NOx emissions in mg/m ³	176.1	183.8	181.5
------------------------------------	-------	-------	-------

Limit value for dust emissions in mg/m ³	10	10	10
---	----	----	----

Dust emissions in mg/m ³	4.0	4.0	3.0
-------------------------------------	-----	-----	-----

Limit value for mercury emissions in µg/m ³	30	30	30
--	----	----	----

Mercury emissions in µg/m ³	11.4	8.2	9.1
--	------	-----	-----

Development of fuel use	2020	2021	2022
-------------------------	------	------	------

Development of alternative fuel consumption based on fuel energy consumption	91.0	90.3%	93.4%
--	------	-------	-------

Alternative fuel mix in clinker production based on fuel energy consumption	2020	2021	2022
---	------	------	------

BGS	75.9%	75.0%	77.8%
-----	-------	-------	-------

Used tyres	5.7%	5.7%	6.1%
------------	------	------	------

Sewage sludge	5.2%	4.9%	5.2%
---------------	------	------	------

Paper fibre residues	0.8%	0.6%	0.7%
----------------------	------	------	------

Animal meal	3.5%	4.0%	3.7%
-------------	------	------	------

Other	0.0%	0.0%	0.0%
-------	------	------	------

Alternative fuel mix in clinker production based on amount use	2020	2021	2022
--	------	------	------

BGS	449,123	465,345	472,095
-----	---------	---------	---------

Used tyres	27,223	27,553	29,050
------------	--------	--------	--------

Sewage sludge	555,170	536,002	547,301
---------------	---------	---------	---------

Paper fibre residues	25,081	23,646	23,715
----------------------	--------	--------	--------

Animal meal	26,892	30,924	28,032
-------------	--------	--------	--------

Other	0	0	0
-------	---	---	---

APPENDIX

Logistics

Vehicles	2022
Cement	240
Sand & Gravel	14
Concrete	208
Pumps	188
Suppliers	>700

Water

Cement manufacture	2020	2021	2022
Drinking water consumed in litres	126 million l	139 million l	164 million l
Average specific water consumption l/t cement	186 l/t	193 l/t	190 l/t

Employees

Employment	2020	2021	2022
Number of employees	2,184	2,176	2,176
Full-time employees	88.7%	90.6%	89.7%
Part-time employees	11.3%	9.4%	10.3%

Period of employment	2020	2021	2022
≤ 4 years	37%	38%	38%
5–10 years	18%	18%	18%
11–19 years	18%	18%	19%
≥20 years	27%	26%	25%

Age	2020	2021	2022
Average age	44.8	44.5	44.6
≥ 29 years	18%	17%	17%
30–49 years	39%	40%	40%
≥ 50 years	43%	43%	43%

Training	2020	2021	2022
Trainee ratio	5.1%	5.2%	5.1%
Number of qualified jobs	18	18	18
Employment of trainees	91.5%	91.4%	91.8%

Work safety

Accident rate (LTIFR)	2020	2021	2022
Cement	6.3	4.2	3.5
Sand & Gravel	53.0	45.2	50.5
Concrete	26.1	31.3	33.6
Pumps	53.9	74.9	51.8

SCHWENK Building Materials Group

Hindenburgring 15 | 89077 Ulm | info@schwenk.de

Publisher and Responsible for Content

SCHWENK Zement GmbH & Co. KG

Hindenburgring 15

D-89077 Ulm

Tel. +49 731 9341 - 0

Fax +49 731 9341 - 416

www.schwenk.de

Project team:

Laura Schleicher, Thomas Spannagl,

Dr. Hendrik Möller, Dr. Markus Schauer,

Michael Schmitt

Picture credits

Photos SCHWENK:

Conné van der Grachten,

Andrius Vasilūnas

Other photos:

Celitement GmbH & Co. KG,

www.stock.adobe.com,

WavebreakmediaMicro

www.thenounproject.de,

Heinrich Feeß GmbH & Co. KG



SCHWENK