Sustainability Report 2023

Steuler Group

Dear reader,

As our society confronts geopolitical crises, a resurgence of populist parties, and upheavals in major industrial sectors, climate change and sustainable development attract considerably less attention than they did three or four years ago. But news of ever higher record temperatures, droughts and flooding testifies to the grim reality that the problem of global warming has yet to be resolved – quite the contrary. That's why we persist in the pursuit of our ambitious goals, implementing emission reduction projects with the same intensity that we address our social sustainability topics.

Major progress on this front in 2023 included the start-up of a high-temperature tunnel kiln, which operates much more energy efficiently than our shuttle kilns. Another milestone was the completion of a large photovoltaic system in Höhr-Grenzhausen, which now produces about 45 percent of the site's electricity demand. Part of that carbon emission reduction has been offset, however, by increased production volumes and changes in the product assortment. At the same time, we are working on innovations to minimize our customers' environmental impacts. The decarbonization of the economy requires some industries to convert to hydrogen – and so it is in the steel industry as well. In that context we provide the engineering and production of refractory linings for the manufacture of green steel, i.e. steel production using hydrogen instead of carbon, in direct reduction plants. In 2024, we won the contract for the complete refractory lining of Salzgitter AG's first direct reduction plant.

To satisfy our customers and overcome the many challenges, we need each and every member of our team. And that's yet another reason why we're glad to receive consistently positive feedback about our work climate. In the course of further developing our employer branding, we have identified what many of our colleagues particularly appreciate about working here: people who join Steuler become part of our community on day one. And people who work at Steuler have good career development opportunities within the company. In other words, work at Steuler is characterized by "Arrive" and "Thrive" – and now we actively communicate this, both within our own ranks and to the outside world.

The present Sustainability Report 2023 of the Steuler Group is based on the Sustainability Report 2021 of the Steuler Linings Division. The Equipment Engineering Division has been added to it. With this new report, we have started preparing ourselves for the extremely comprehensive requirements of European Sustainability Reporting Standards (ESRS). We welcome the fact that there are standards to help companies compare performance. By complying with these reporting requirements, our internal operations are also learning what we can do better. But the scope of the ESRS requirements goes well beyond reasonable proportions. Along with ESRS, we must also comply with other new regulations – such as, in particular, the German Act on Corporate Due Diligence Obligations in Supply Chains (Lieferkettensorgfaltspflichtengesetz) and the EU Regulations on deforestation-free products and establishing a carbon border adjustment mechanism – which likewise tie up considerable resources. Resources that we then lack elsewhere.

Climate protection and sustainable development are not our only concerns, obviously. Our core business comprises the manufacturing and construction of refractory and corrosion-resistant equipment and surfaces. That means winning contracts, meeting deadlines and delivering quality – in other words, satisfying our customers. At the same time, in the race to develop new technologies we always have to stay one step ahead. Sustainability must be integrated within these processes and enhance our competitive position. This is where we apply our ideas and our energy. But the government also has a role to play here, because sustainable investments and innovations must be worthwhile, and that requires suitable boundary conditions.

Michael Steuler, Dr. René Aust

Michael Steuler (right) and Dr. René Aust (left)
General Managers Steuler Holding GmbH

Our vision

Since its foundation in 1908, the Steuler Group has been an innovator that develops new technologies, optimizes material combinations and applies improved processes – and this will remain our primary focus in the future as well.

We will be carbon neutral by 2045 at the latest.

To achieve this, we are reinforcing our material development activities, optimizing material treatment technologies (including heat treatment), and increasingly turning to new applications. This also includes further expanding our own electricity generation capacity and steadily increasing our recycling rates. For the benefit of our employees and to maintain consistently high quality, further digitalization measures will help optimize resource management. Everything we do to avoid CO_2 emissions, improve occupational safety and reduce energy consumption brings us another step closer to meeting our goals.

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Company

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The Steuler Group

Founded in 1908, this longstanding medium-sized company based in Germany's Westerwald region specializes in industrial linings and builds plants and equipment for environmental and pickling technology the world over. After separating from its Tile Division in 2023, the Group now focuses on the industrial segment, which is covered by the Linings Division and the Equipment Engineering Division.

Steuler Linings

The Linings Division of the Steuler Group develops, manufactures and installs corrosion-resistant and refractory materials. Special lining technologies from industry partners are also used for customer-specific requirements. The Linings Division comprises STEULER-KCH GmbH as the core company together with other manufacturing and sales subsidiaries based in Germany, other European Union countries and overseas. With the help of these subsidiaries, Steuler Linings manages projects and constructs large-scale plants in a variety of industry sectors throughout the world. Steuler Linings is a global leader for complex industrial corrosion protection solutions.

Linings Division business segments

The activity fields and services covered by Steuler Linings derive from four specialized business segments:

- Surface Protection Linings
- Refractory Linings
- Plastic Linings
- Pool Linings

Steuler Equipment Engineering

Steuler Equipment Engineering designs and delivers plants and equipment for exhaust air purification and surface treatment. Together with subsidiaries across several continents, the company is a valued partner for engineering services the world over.

Activity fields in the Equipment Engineering Division

Steuler Equipment Engineering's portfolio is divided into three main areas:

- Exhaust and flue gas treatment
- Surface engineering
- Catalytic waste gas treatment in combination with CO_2 fertilization

Products and Services

02

Steuler Surface Protection Linings

Steuler Surface Protection Linings

Steuler Surface Protection Linings manufactures and processes

- bricks, tiles and shaped parts for the construction of brick and tile linings
- rubber linings for on-site and workshop application
- coatings for mineral-based substrates and steel
- mortar systems for installing brick and tile linings
- lining systems certified in accordance with the German Water Resources Act
- lining systems made from stainless steel, and
- lining systems made from special plastic anchor plates.

An extensive portfolio of materials allows for project-specific optimization. The focus here is on chemical, mechanical and thermal durability, with the goal of achieving the longest possible service life through the ideal combination of materials to form comprehensive protective systems. This helps extend the useful life of plants considerably. An extremely wide range of material systems can be deployed wherever aggressive media are used to manufacture or handle products. That is often – but not only – the case in the chemical industry.

Brick linings

Steuler Linings is an experienced industry partner and specialist in brick linings. This holds equally true for pickling and regeneration plants, process vessels, flue gas ducts, reactors, venturi scrubbers, autoclaves and absorption towers. Brick linings are often subjected to extreme stresses as a result of exposure to specific media or to a combination of different media – whether in a liquid, gaseous or solid state, at high temperatures, or across varying temperature distributions. The same applies to mechanical influences, such as differing pressure ratios, vibrations, abrasion, shock loading or vehicular traffic.

Tile linings

Tile linings are used wherever coating systems alone cannot withstand the imparted stresses but substantially thicker brick lining is unnecessary. This is typically the case in areas with heavy vehicular traffic or in containment basins underneath plant areas that handle hot process media.

Rubber linings

Rubber linings are the ideal choice for providing optimal protection in environments requiring resistance to permeation processes under constant exposure to aggressive media. This is particularly relevant for chemicals with small molecular sizes and operating temperatures above ambient temperatures. Rubber linings from Steuler Linings are used to protect steel structures and concrete elements. Vessels, pipework, reaction towers and gas scrubbers are typical steel structures protected in this way. Examples of concrete structures include tanks and wastewater pits. Rubber linings are also used in drinking water treatment plants and the tanks of tank trucks. The rubber lining can be applied either at Steuler's facilities or on the customer's premises. The material, i.e. the rubber membrane, can be made from either natural or synthetic rubber. The special chemical and mechanical properties are obtained during processing in internal mixers through the combination of rubber, fillers, cross-linking agents, accelerators and other additives.

Coatings

Our coating systems are used as an impervious layer to seal structures or protect concrete and steel process equipment against corrosion. Examples include chemical reactors and storage tanks. Coating systems are also used for industrial flooring and containment basins. They reliably withstand the stresses caused by temperature fluctuations, moisture, exposure to chemicals, vehicular traffic with heavy loads, and abrasion in production environments and during maintenance work. Additional properties include safe electrostatic dissipation, impermeability to liquids, slip resistance, color variety, high crack-bridging capability, and water vapor permeability or impermeability. An extremely wide range of binders can be used, including polyurethane made from castor oil, epoxy resin, polyester resin, vinyl ester resin, furan resin, and phenolic resin, as well as custom formulations.

Mortar systems

Our lining systems are complemented by special mortars for brick linings, tile linings, and trench connections and construction, as well as sealing features on foundation plinths and production buildings. Acid-resistant mortars, which are the very first products Steuler marketed, are still an important part of the product portfolio.

Contribution to environmental protection and occupational safety

The services provided by the Surface Protection Linings division protect against exposure to aggressive environments. In some cases, effective protection is what makes it possible to operate a plant in the first place. The thermal treatment of waste or flue gas desulfurization, for example, would not be possible without functional protective systems. Protective systems have a positive impact on a plant's useful life, too. By obviating the need to perform repairs and make replacement investments, a long service life also helps conserve resources. Another consideration is reliably sealing construction materials against penetration and permeation by substances hazardous to water.

Steuler Refractory Linings

Steuler Refractory Linings

Steuler is a global innovation leader in the field of refractory lining systems. We produce, design and install refractory linings for special thermal processes for our customers and manufacture the required refractory materials at our factories in Höhr-Grenzhausen and Breitscheid, Germany. Our manufacturing program includes shaped, non-basic refractories based on raw materials ranging from refractory clay to corundum, including chromium corundum, zirconium and SiC materials, as well as unshaped products.

The services we offer in this area include:

- Engineering
- Production
- Installation
- Research and development

Engineering
For our customers, we develop detailed refractory design concepts, the scope of which can extend to complete refractory layouts with assembly drawings and thermal conductivity calculations.

Production
In our production facilities, we manufacture refractory components in tried-and-tested standard shapes and equipment-specific geometries. Depending on the requirements, we can produce refractory materials ranging from complex custom-shaped bricks to complete lining systems.

Installation
The Refractory Linings Division offers full installation service or installation supervision by Steuler construction supervisors, to ensure the meticulous installation of the specialized systems.

Research and development
Complex refractory lining solutions require in-house research and development departments. In our laboratories we develop reliable materials and test them according to the internationally applicable standards. To ensure that the refractory material development process is successful, we conduct all the required studies beforehand, including exhaustive raw material selection processes and wear and slagging analyses. We develop detailed lining concepts and refractory designs based on the respective process conditions.

Steuler Plastic Linings

Steuler Plastic Linings

Steuler Plastic Linings custom manufactures linings made of glass-fiber reinforced plastics and thermoplastics:

- Piping systems
- Vessels and process equipment
- Components for wet electrostatic precipitators

Piping systems

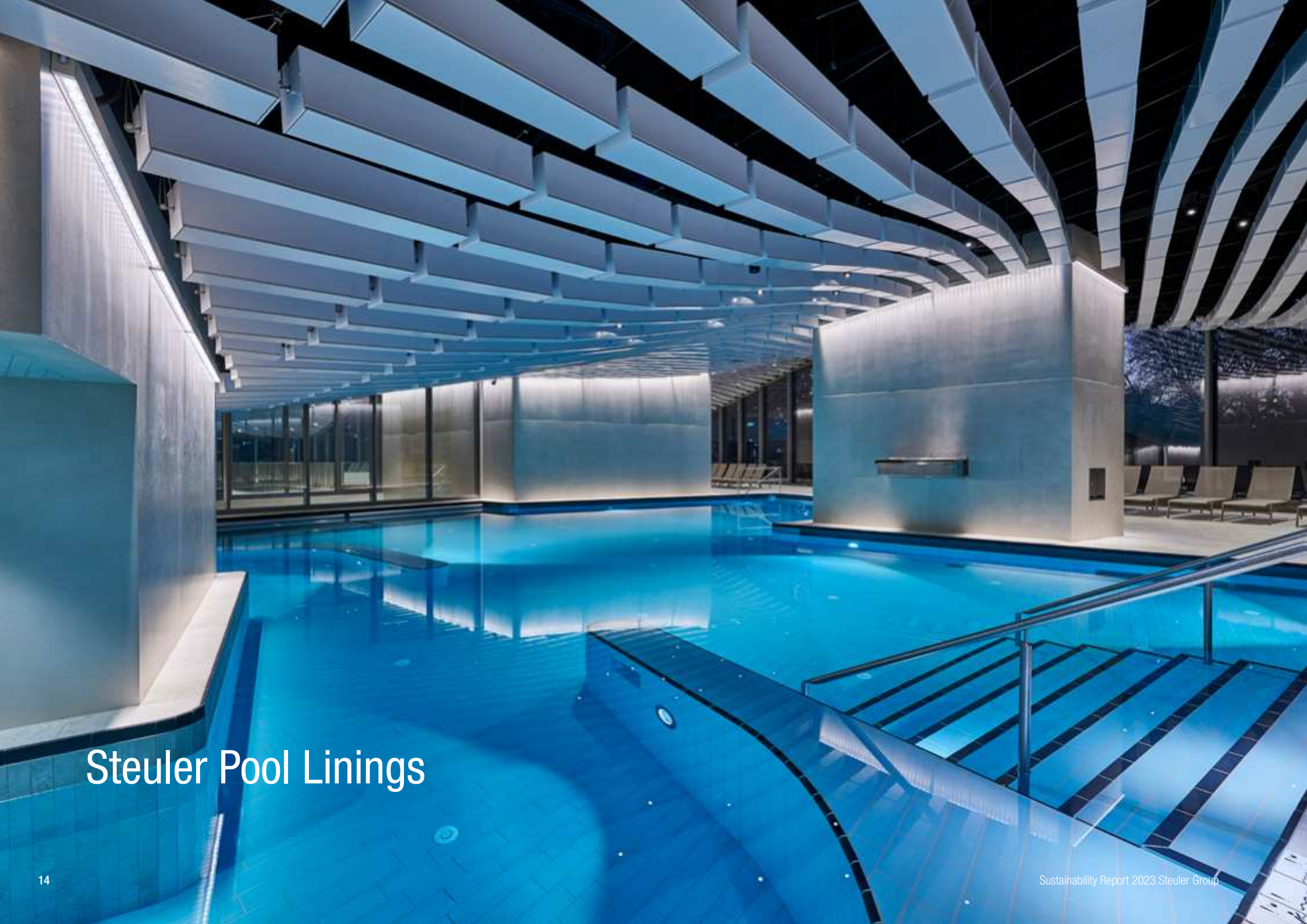
Plastics excel over traditional materials wherever applications must meet high safety standards and withstand extreme mechanical or chemical stresses. The materials used by Steuler Plastic Linings can withstand temperatures of up to 160°C. The glass-fiber reinforced composite materials are highly resistant to chemicals and need no additional corrosion protection measures. Steuler's portfolio includes pipes, elbows, tees, reducers, flanges and special components. Vacuum-resistant and electrostatically dissipative versions are also available.

Vessels and process equipment

One of Steuler's core competencies is the manufacture of vessels, process equipment and special designs made of glass-fiber reinforced plastic, whether as a composite structure with a thermoplastic lining or made from reinforced phenolic resin. The composite material polytetrafluorethylene M (PTFE-M) has proven itself in the process engineering sector, most notably in columns and reaction vessels of all sizes and specifications. We manufacture vessels and plant equipment not only out of thermoplastics for the metal finishing industry, but also out of our own "Kera" brand thermoset. Components made with Kera exhibit exceptionally high strength as well as chemical resistance to non-oxidizing acids and solvents. With this special material, we can also produce very specific geometries for our customers.

Components for wet electrostatic precipitators

Wet electrostatic precipitators are used to scrub gaseous mixtures, separating out aerosols such as sulfuric acid, titanium dioxide or tars, as well as fine particulates. Such precipitators are used in the flue gas desulfurization units of coal-fired power stations, for example. In order to separate out these hazardous particles, they are first electrostatically charged in the tubes of the electrostatic precipitators and deposited on the oppositely charged tube surface. The tube bundles that form the heart of these wet electrostatic precipitators are custom-made by Steuler Plastic Linings. The advantages of the tube bundles include their modular, building-block design, the use of tubes with specific properties, and a special grounding system that meets the strictest safety standards.



Steuler Pool Linings

Steuler Pool Linings

Steuler Pool Linings specializes in the planning, 3D visualization, water circulation system design, project management, waterproof lining and tiling of swimming pools. The lining systems and structures are always custom-designed and find use in public pools, hotel complexes and private spas.

- Seven-layer system
- Composite system
- Flexible lining

Seven-layer system

A seven-layer system that has proven itself in the field for 40 years is used to line all imaginable pool configurations. Surfaces range from traditional ceramics and glass mosaics to natural stone linings. The system opens up a myriad of design possibilities and enables planners to fulfill virtually every special request of the client. Even pools located on upper floors or above sensitive rooms can be reliably waterproofed using the system. Thanks to its versatility and reliable processing characteristics, the proven layered system is suitable for renovations, especially when modifying pool shapes or optimizing overflows for energy efficiency.

Composite system

Steuler offers another construction concept for pools in the form of a composite system comprising precast concrete elements with an integrated lining. A highly durable plastic lining material is permanently mechanically attached directly to the proven structural building material concrete. Individual ready-to-install segments are fully prefabricated for each project, transported to the worksite, and installed in just a short space of time. The prefabricated segments already make allowance for pool equipment and fixtures, such as inlets and overflows, detailing elements, and integrated components, which just need to be connected up on site. Short construction times, a testable lining, and re-usable components are the key advantages of this building method.

Flexible lining

Steuler offers a third system that features high-end coatings for waterslides, channels and pools. Irrespective of the geometric shape and color desired, Steuler's special lining transforms bare concrete into an exciting bathing experience. We coat channels and pools in exacting detail, creating a permanently waterproof, long-lived, UV and wear-resistant surface that is available in smooth or non-slip finishes and any color desired.

Steuler Equipment Engineering

Steuler Equipment Engineering

Steuler Equipment Engineering designs and delivers plants and equipment for exhaust air purification and surface treatment. In the exhaust air purification segment, we specialize in plants and equipment for the catalytic, thermal, physical and/or chemical removal of pollutants from waste gases. In the area of surface treatment, our focus is on complete plant systems for finishing metal surfaces and the treatment and conditioning of industrial wastewater – including the recovery of raw materials and water – as well as regeneration plants for process media.

Waste and flue gas treatment

To protect the health of the population and prevent negative environmental impacts such as Waldsterben (forest dieback), flue gases typically emitted by power plants or waste and hazardous waste incineration plants and waste gases typically discharged by chemical plants must be purified. For this purpose, Steuler supplies the necessary waste gas treatment plants, which deliver the highest separation efficiency for pollutants according to state-of-the-art technical standards. The plants can remove various acids and nitrogen oxides (SOx, HCl, HF, NOx), particulates, heavy metals and organic compounds (e.g. dioxins, furans and hydrocarbons) from the waste gas. This reduces these pollutant levels to below the maximum allowable emission limits before the gases are released to the atmosphere.

Surface engineering

Steuler Equipment Engineering designs plants and equipment for the surface treatment of various materials. These systems include:

- Tunnel and overhead monorail pickling lines for wire
- Tunnel and autoclave pickling lines for pipe and tubing
- Roll pickling lines for profiles, rods and sheet metal

The technologies applied here are specifically designed to achieve high treatment quality, optimize the consumption of chemicals and energy, minimize operating costs and capital investment, and reduce environmental impacts.

Catalytic waste gas treatment in combination with CO_2 fertilization

Large greenhouses often use natural gas-fired combined heat and power units that make use of the motors' waste heat while generating power at the same time. The installation of a catalytic waste gas treatment system from Steuler Equipment Engineering also makes it possible to feed the CO_2-enriched waste gases into the greenhouse to promote plant growth. This form of CO_2 gas injection has been standard practice for more than 25 years.

Sustainable Approaches to Product Development

03

Animation of the SALCOS direct reduction plant. The Salzgitter AG steelworks can be seen in the background.

With regard to its product development, the Steuler Group aims to:

- develop products for new fields of application
- use the most sustainable components possible
- extend the service life of applied systems to their technical limits
- use chemicals that present minimal potential risk to the environment
- reduce potential occupational safety risks associated with the production and processing of the products.

Every business segment within Steuler Linings and Steuler Equipment Engineering is working to achieve these goals.

Development of a solvent-free product line

Our industry has been using styrene as a reliable reactive diluent for decades. Known to have potential environmental impacts, this solvent is released during production and, most notably, while applying our materials. For this reason, we have now developed an epoxy novolac vinyl ester resin-based product line that contains no styrene as reactive diluent. That makes us the world's first manufacturer and processor with the ability to use a solvent-free technology in extremely high-strength laminates, coatings and mortars. We continue to conduct research into other solvent-free formulations or ones that at least have low solvent content.

Refractory systems for the steel industry

The manufacture of high-quality steel, particularly in the context of so-called "clean steel," requires precise control of the metallurgical processes to inhibit the formation of ceramic inclusions. Otherwise those inclusions could impede or even prevent the downstream processing of ingots by means of rolling or forging. That makes preventing these impurities essential to ensuring the high quality of the final product. With the introduction of the so-called "Smartcast spider brick," the central distributor block of an ingot casting system, the molten steel can now achieve laminar flow during the casting process. By significantly enhancing the surface quality of the cast ingot, this helps make the casting process more efficient.

Decarbonizing steel production

Under the program name SALCOS® (Salzgitter low-CO_2 steelmaking), steelmaker Salzgitter AG has been working for years now on how to use hydrogen to produce nearly climate-neutral steel. Developed in 2015, the concept comprises the individual steps used to manufacture green steel. Elements include the production of the hydrogen itself as well as the conversion of steel production from blast furnaces to direct reduction, first using natural gas and eventually using hydrogen. By converting entirely to direct reduction plants, hydrogen can completely replace the carbon previously used for steel production. This will cut the CO_2 emissions generated during steel production by more than 95 percent. The sustainable concept establishes a model for the entire industry. With one billion euros in government subsidies, this concept is now being put into practice. At the core of the project is the direct reduction plant, which will produce up to 2.1 million tons per year of raw iron at temperatures of more than 1,000°C. The contract for the complete refractory lining of this plant was awarded to the Steuler Group in 2024.

The materials required for this were developed by Steuler in Höhr-Grenzhausen. The company's own purpose-built pilot plant at the Höhr-Grenzhausen site is the only one of its kind in the world. It can simulate required process conditions, such as those in the direct reduction plants. That means not only the gas mixtures comprising hydrogen, carbon monoxide and methane that are prevalent during the process, but also the process temperatures and pressures. This plant enables the advanced development of our materials through in-situ analyses. Suitable for use in hydrogen direct reduction, these new products constitute the new material group "HIRON." To manufacture these new materials, Steuler started up a new high-temperature tunnel kiln in 2023 (see Chapter 04) and is confident that this technology prepares it well for a secure future. The direct reduction plants that operate with hydrogen (or initially with natural gas) can be fed only with pre-sintered iron ore pellets. The feedstock is sintered in special rotary kilns at temperatures of up to 1,350°C. In the future these kilns, too, must be operated without fossil fuels. To ensure sufficient resistance when using hydrogen or also biogas as fuel, Steuler is developing new "PRION" series materials that provide greater resistance to hydrogen. Along with that, the Group is also applying better-insulating lining concepts that are generally designed to save energy.

Materials for sintering furniture and sintering furnaces

Sintering furnaces are high-temperature kilns used in the metal and ceramics industries: they use heat to densify powder materials to form solid components. The sintering process transforms metals, ceramics and alloys into stable and homogeneous finished products. Steuler manufactures linings and accessories such as support racks for use in sintering furnaces. We are currently working on improved formulations for these ceramic components, notably by raising the spinel content and adding new additives to improve thermodynamic properties. Moreover, the design of the material structure is playing an increasingly important role. A special grain size distribution is being used to optimize pore distribution.

This facilitates lightweight construction in the design of accessories. Lighter accessories are easier for our customers to handle and lower weight reduces energy consumption in the sintering furnaces. Along with improved materials for sintering furniture, our development department is working on materials that make sintering furnace linings significantly more energy-efficient.

Materials for manufacturing batteries for electric vehicles

In addition, we are developing special materials used as auxiliary agents in the production of cathode active material for Li-NMC batteries. Most electric cars and pedelecs use this type of battery, which is more formally referred to as a rechargeable or storage battery. The designation Li-NMC stands for the lithium nickel manganese cobalt oxide that these batteries use as cathode active material.

Optimizing the design of custom-made piping and process equipment

Over the past three years, Plastic Linings has placed special emphasis on the static design of piping and process equipment. The designs are developed by an in-house department. By sharing their experience internally and refining their calculation methods, the engineers can optimize the design of components. The goal is to create components that achieve the required static strength with a minimum and effectively budgeted cost of materials. These measures extend the service life of the products while ensuring safe and reliable operation at all times.

Product development at Steuler Equipment Engineering

In the Equipment Engineering Division, about two thirds of sales revenues are generated through classic engineering services. This includes pickling units and industrial exhaust air purification plants, where each system is one of a kind and built to order for the customer. In this segment, we have no manufacturing operations of our own nor do we market our own products. Accordingly, we also have no product development in the original sense of the term. About one third of sales revenues in Equipment Engineering are generated by so-called “systems business.” Here we collaborate with specialized suppliers to offer standardized products, which are modified if necessary to meet customer-specific requirements.

Most of the products in the systems business are used in the catalytic removal of nitrogen oxides from waste gases. We have been supplying denitrification plants (deNO_x units) for the industry since the 1990s. This technology was then applied to the waste gases from combined heat and power plants. The process equipment that we developed converts the nitrogen oxides of the heating exhaust into the natural components of air (nitrogen and water). As a result, the carbon dioxide-enriched waste gases can be used to accelerate and strengthen plant growth. This form of CO_2 fertilization has been employed successfully for more than 25 years now. We are proud to say that we not only fully developed this technology for use on an industrial scale, but also made it a standard practice for greenhouses. We developed a system for removing particulates, sulfur dioxides and nitrogen dioxides from the exhaust gases of ocean-going vessels as well. Because maritime operations use inexpensive heavy fuel oil, the pollutant content of the exhaust gas from the combustion process is higher than that of road traffic using conventional fuels. Demand for this technical solution has not yet materialized, however.

Steuler Equipment Engineering builds catalytic waste gas treatment units marketed under the brand name ECO2PRO. These units enable efficient use of the CO_2-enriched waste gases and make it possible to accelerate and strengthen plant growth.

04

Corporate Environmental Responsibility

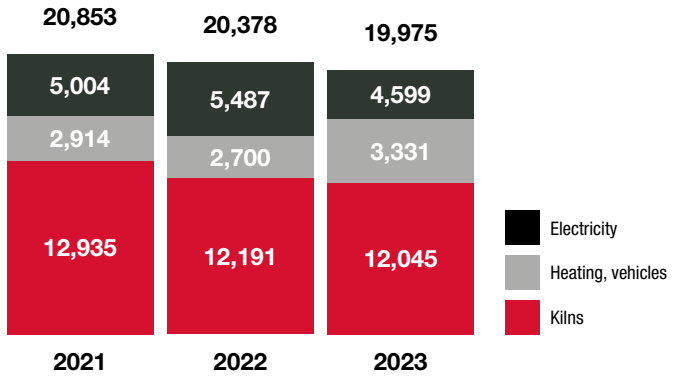
Manufacturing Processes and Plants

The Steuler Linings Division operates production facilities at five locations in Germany. There are additional factories in Spain, Belgium and China. As a pure engineering firm, Steuler Equipment Engineering has no manufacturing site of its own. In Breitscheid and Höhr-Grenzhausen, Germany, kilns are operated to manufacture refractory and acid-resistant bricks and kiln furniture (Refractory Linings). The products are fired in continuously operated tunnel kilns and in discontinuous shuttle kilns at temperatures of between 1,280 and 1,740°C. Products for the Plastic Linings business are manufactured in Höhr-Grenzhausen and Mogendorf, Germany, and in Vilanant, Spain. Those sites manufacture vessels, process equipment and pipe from glass-fiber reinforced plastics based on polyester, phenolic or furan resins. In some cases, our patented KERA® thermoset is also used. For the Surface Protection Linings business, in addition to the aforementioned acid-resistant bricks we also produce rubber sheets, resin mixtures and other components for coatings and brick linings at our Siershahn and Höhr-Grenzhausen sites. At our Chinese site, we produce rubber sheets and coatings.

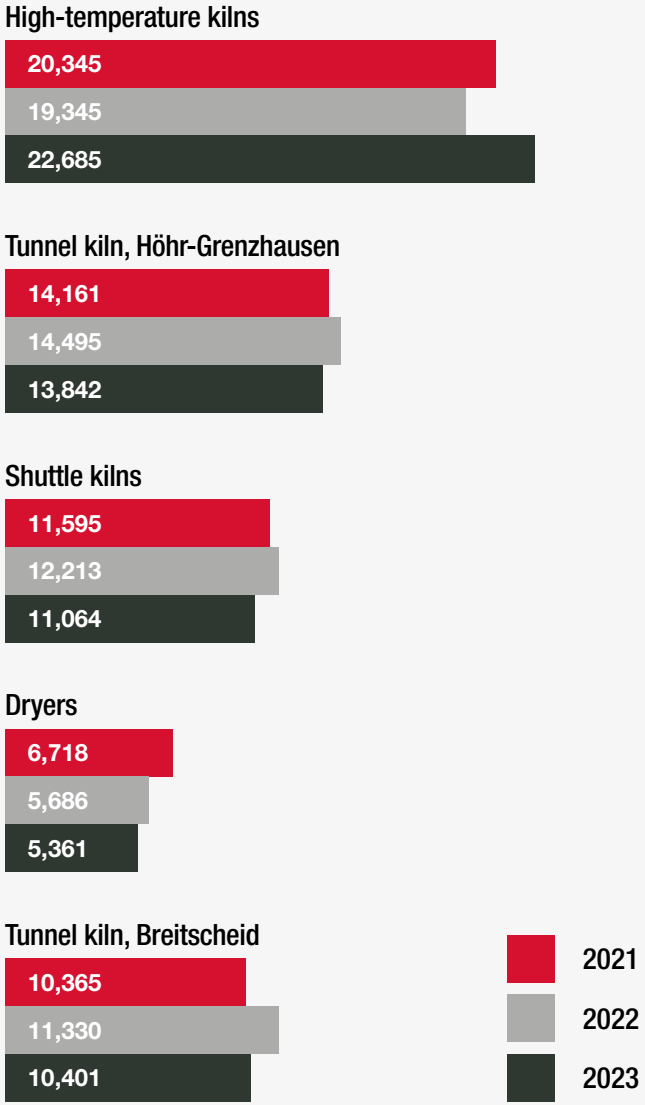
Energy consumption and greenhouse gas emissions

As in the ceramics industry as a whole, by far the greatest environmental impact of our production processes is due to CO_2 emissions. Most of these emissions are generated by our kilns, which burn natural gas to reach the temperatures required for manufacturing the bricks. In addition to this, there are also direct emissions from heating systems and motor vehicles. Of all direct emissions in the reporting year, 63 percent were covered under the European Emissions Trading System. Indirect CO_2 emissions due to electricity consumption (Scope 2 emissions) are substantial too. By 2025, we want to reduce our annual CO_2 emissions by 4,000 tons compared to 2021. We took a major step toward achieving that goal in 2023 with the completion of a high-temperature tunnel kiln at the Höhr-Grenzhausen site. By taking over kiln capacities from the more energy-intensive high-temperature shuttle kilns, it reduced CO_2 emissions by 2,400 tons for the same quantities and products. As compared to 2021, however, production quantities in 2023 rose by six percent. Moreover, the share of products fired at high temperatures increased. As a result, the actual reduction in CO_2 emissions in 2024 will be less than previously projected. In other words, quantity and assortment effects are impeding the absolute reduction in CO_2 emissions. Along with natural gas, suitable quantities of electricity are needed: Annual power consumption is approximately 11,500 MWh. This corresponds to the average consumption of 3,400 German households.[1] To reduce the associated CO_2 emissions and our costs, in the summer of 2023 we installed a 30,000-m^2 photovoltaic system at the edge of our company grounds in Höhr-Grenzhausen. The system has a capacity of 3.7 MW peak and produced approximately 3,100 MWh of electricity in the first 12 months. That corresponds to about 45 percent of the site's power requirements. We are only able to use about 2/3 of the total electricity generated, however: on weekends and holidays we feed power to the grid. We have additional photovoltaic systems installed at our sites in Mogendorf and Kielce, Poland; Vilanant, Spain; and Townsville, Australia. In 2023, around 15 percent of the total power consumed by all production facilities was generated on site. A new PV system to be installed at the Breitscheid site is currently in the planning stage. Along with these major projects, other smaller measures are also helping to reduce our CO_2 emissions; refer also to page 43-44 in the Sustainability Program.

CO_2 emissions (tons) [2]



Gas consumption - kilns (MWh) [2]



Energy (MWh) [2]	2021	2022	2023	Δ vs. 2022
Electricity purchased (external)	12,139	12,606	11,539	-9 %
Internal generation from PV	541	615	1,724	+180 %
Gas	71,406	68,766	70,812	+3 %
Heating oil	821	659	694	+5 %
Saturated steam	497	461	797	+73 %
Fuels – gasoline	29	93	102	+11 %
Fuels – diesel	2,527	2,794	2,672	-4 %

[1] In 2021, the average electricity consumption per German household was 3,383 kWh. (Source: destatis)

[2] For 2021, the previous Sustainability Report listed a ten percent higher gas consumption and three percent higher CO_2 emissions. The reason for this is that the gas consumption figures were calculated using the higher heating value (HHV) whereas the present report uses the lower heating value (LHV) as specified by the European Sustainability Reporting Standards (ESRS).

Air pollution control

When firing ceramics, compounds bound in the mineral raw materials are released and subsequently removed from the exhaust gases using suitable filters. When manufacturing vessels, process equipment and pipes made of glass-fiber reinforced plastics that use polyester, phenolic or furan resins, volatile organic compounds (VOCs) are released. When the concentrations of those compounds are too high, they are harmful to health and the environment in general. We are striving to lower these emissions with new formulations. Nonetheless, our German facilities have been releasing roughly 4,400 kg of these volatile organic compounds each year. To protect the health of our workers, extraction units are installed in the production buildings concerned.

Water consumption and groundwater protection

Many of our raw materials and products are classified as hazardous to water as defined in the German Ordinance on Facilities for Handling Substances Hazardous to Water (AwSV). Accordingly, they must be handled with extreme care. Specially licensed facilities are required for their storage, and this includes our in-house gas stations and production facilities. Our hydraulic presses in the ceramic production unit, for example, are equipped as plants in accordance with the AwSV. Moreover, our warehouse in Siershahn, Germany, is subject to the German Hazardous Incident Ordinance (Störfall-Verordnung). Pertinent information for employees and residents is available on our website at https://linings.steuler.de/de/sicherheit (in German language).

Water (m^3)	2021	2022	2023	Δ vs. 2022
Water extraction from the drinking water system	16,765	14,113	13,426	-5 %
Discharge into the sewer system	14,971	11,998	11,447	-5 %

These values differ from water figures listed in the previous Sustainability Report. At that time, we could only report the data of the Breitscheid and Höhr-Grenzhausen sites. Now we include the consumption data from all production sites worldwide.

Waste management

Like other companies, Steuler knows that waste avoidance is better than recycling and recycling is better than disposal. Most of our waste is non-hazardous. Only around 25 percent of it is classified as hazardous waste, whose storage and disposal are subject to special conditions. Even some of the waste subject to special monitoring is recycled. One example of this is hydraulic oil. Our waste management is supervised by waste management officers and monitored as part of our integrated waste management system.

In 2020 and 2021, due to the demolition of the old tunnel kiln, we had a disproportionately high volume of both non-hazardous and hazardous waste. Now quantities fluctuate within the normal range again. In 2022 and 2023, construction activities also generated greater quantities of waste, most of which was non-hazardous. Those increased volumes of waste can be seen in the figures for “Volume of waste (total)” and “Non-hazardous waste.”

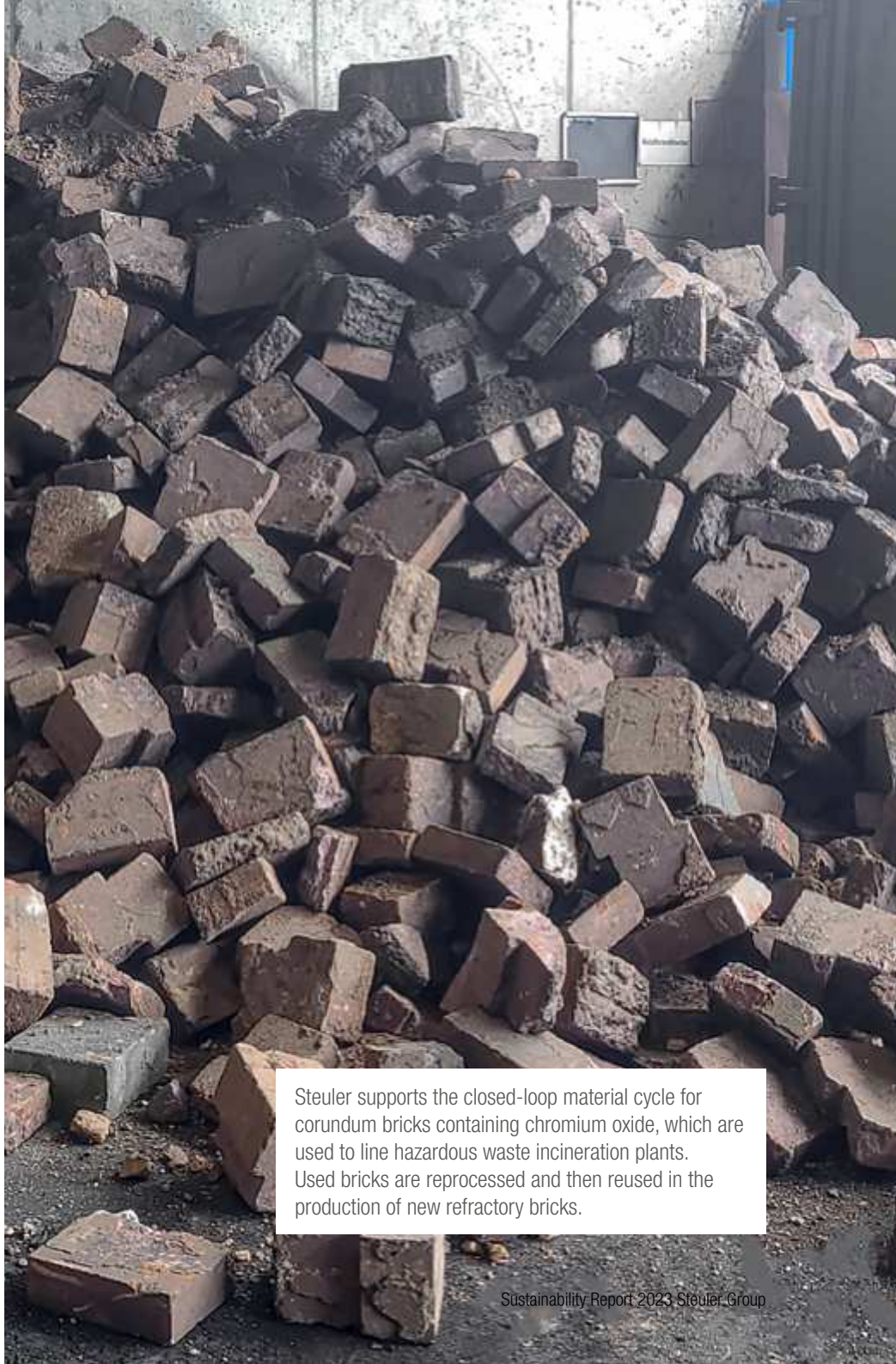
Waste (tons)	2021	2022	2023	Δ vs. 2022
Volume of waste (total)	2,853	1,764	2,021	+15 %
Hazardous waste	1,379	419	427	+2 %
Non-hazardous waste	1,474	1,344	1,595	+19 %
Waste sent for recycling (recovery)	1,597	1,140	1,040	-10 %

Recycling of refractory linings

Some of our customers' manufacturing processes require the refractory bricks in their kilns to be replaced at regular intervals. This results in substantial quantities of used bricks. While the surfaces that were in contact with liquid steel, for instance, are partially contaminated with slag, the back sides of the bricks remain chemically unaltered. It is therefore common practice nowadays to reprocess used refractory bricks by removing the contaminated front face and cleaning and grinding the other sections. This reprocessing work is performed by specialized companies. We participate in this closed loop by purchasing the reprocessed material and using it as a feedstock in our processes. For certain products, we have initiated a closed loop of our own. This notably includes corundum bricks containing chromium oxide, which are used to line hazardous waste incineration plants. In all other cases, we have developed formulations that allow the inclusion of recyclates. We also recycle a large proportion of the factory rejects and scrap produced during the manufacture of refractory bricks. As a result, 25 percent of all the feedstock used in the refractories sector is regenerated material. Moreover, we use renewable raw materials year after year. The biggest item by far here is natural rubber, which is used to manufacture rubber linings.

Raw materials used in production (tons)	2021	2022	2023	Δ vs. 2022
total	54,489	61,135	57,850	-5 %
of which recycled raw materials	11,670	14,047	13,763	-2 %
of which renewable raw materials	490	634	739	+17 %

The tonnage figures differ from the 2021 report because internal raw material streams such as the reuse of foundry returns are no longer taken into account.



Steuler supports the closed-loop material cycle for corundum bricks containing chromium oxide, which are used to line hazardous waste incineration plants. Used bricks are reprocessed and then reused in the production of new refractory bricks.

05

Responsibility for Employees

Composition of the Workforce

The Steuler Group employed approximately 2,200 people in the reporting year 2023, some 800 of whom worked at our sites outside of Germany. In addition, there were more than 130 contract workers.

In conjunction with two projects at the end of 2023, our Chilean subsidiary posted a high number of employees under fixed-term contract. Our Spanish subsidiary Tecresa also used fixed-term employment contracts specifically designed to address personnel requirements for individual projects.

It is not uncommon for employees to stay with us for 20, 30 or sometimes even 50 years – often from the time they join us as apprentices. We attribute this to our open and friendly corporate culture that reflects our character as a family-run business in its fourth generation.

Employees (FTE, full-time equivalent)	**2021**	**2022**	**2023**	**Δ vs. 2022**
Employees	2,071	2,165	2,222	+3 %
Employees under fixed-term contract for projects	385	483	564	+17 %
Contract workers	153	133	133	0 %

Gender of Employees (headcount*)	**2021**	**2022**	**2023**	**Δ vs. 2022**
Male	1,751	1,902	1,961	+3 %
Female	320	263	262	-1 %
Non-binary/not specified in survey	0	0	0	0 %
Total number of employees	2,071	2,165	2,222	+3 %

Apprenticeships in Germany (headcount*)	**2021**	**2022**	**2023**	**Δ vs. 2022**
Female trainees	12	11	10	-9 %
Male trainees	32	35	39	+11 %
Total	44	46	49	+7 %
Trainee percentage (%)	2 %	2 %	2 %	

* Including dual study program participants

Dual education at Steuler

On average, the Steuler Group companies in Germany employ some 50 apprentices all together. As the need arises, we currently qualify apprentices in eleven professions, including chemical laboratory technicians, industrial ceramics specialists, process engineers, and electronics engineers, as well as IT and industrial management assistants. Over the course of their apprenticeship, trainees are posted to various sites and companies within the Steuler Group so they become familiar with the full spectrum of Steuler's products and processes. All trainees at Steuler are paid according to the collective labor agreement. We also promise to employ them for at least three months upon successful completion of their studies.

Work placement at Steuler

To acquire practical experience, students from the ninth grade and up can participate in a work placement in any of the jobs for which Steuler offers training. Suitable internships are also available for students who need one to qualify for technical college entrance. Three times a week over the course of a year, they gain insights into various technical and scientific professions at the Steuler Group. Moreover, career changers can get first-hand experience with our internal operations through a vocational work placement. Steuler has received the Koblenz Chamber of Commerce and Industry's "Best Apprentices – Trained by Us" award on multiple occasions – and did so again in 2022 and 2023. This seal of approval is conferred on companies whose trainees achieve an overall finishing grade of "very good." Due to demographic change and the continuing interest in pursuing higher education, Steuler has put in place a systematic recruitment strategy. Student internships, "taster" work placements, and encouraging our own employees to apply for training places are cornerstones of the program.

Student training

In dual study programs, students acquire in-depth knowledge of the subject matter by applying and consolidating their new-found theoretical knowledge during the practical phase at a company. In 2023, Steuler trained ten students enrolled in dual study programs at the Mainz University of Applied Sciences, VWA Koblenz, and DHBW Mannheim. In the previous year (2022), there were eleven dual study program participants. So-called "cooperative study programs" also combine higher education with practical training. In this case, students are offered a contract for their remaining time at a college or university. Then they also work at Steuler, usually outside the lecture periods. In return, the company assumes the costs of tuition and pays an additional remuneration. The Steuler Group is currently training four students from Koblenz University of Applied Sciences via this model. In addition, we offer technical university work placement and final project work (bachelor's and master's theses) for students at colleges and universities.

Further education and training

Today's workplace requires a broad range of capabilities, competencies and interpersonal skills. Given the pace of technological progress, employees should never stop learning. Further education and training programs at Steuler cover a wide spectrum ranging from advanced technical training (e.g. courses on sales and marketing, law, or new processes) and career advancement programs (e.g. further education as a master craftsman) to management training programs and mandatory training courses (on occupational health and safety or environmental protection, for example). We are continuously developing additional training offerings to address the requirements of the Group and meet the needs of the employees.

Training of new installation technicians in the acid protection field

Steuler Linings Division's German companies employ some 500 installation technicians who work at our customers' worksites. Newly hired installation technicians receive 16 weeks of training at our training centers in Höhr-Grenzhausen and Schwedt. Among other things, that training includes background information about how the products work. There are also installation technicians who first work on "normal" deployments, and only attend this installation technician training later on, after that initial on-the-job experience.

E-learning system

It is no longer possible to deliver the large number of required training programs solely via classroom-based courses. This is why Steuler has been using an e-learning system for the past few years. Nevertheless, classroom-based courses as well as combinations of e-learning and in-person events continue to be offered.

Further education and training (hours)	2021	2022	2023	Δ vs. 2022
Women	1,390	8,686	3,109	-64 %
Men	26,095	16,160	31,796	+97 %
Total	27,485	24,846	34,906	+41 %

The higher number of training hours logged by male employees in 2023 is due to the SCC recertification in early 2024. Women made greater use of language course offerings in 2022.

Junior staff development program

To develop technical specialists and management staff from within the company, the Steuler Group has a junior staff development program for the "high achievers of tomorrow." Its participants take part in various training courses and practical phases over the course of about one year. Among other things, they develop their communication and presentation skills, and learn about time, project and change management.

Networking in the Steuler Group

The purpose of the "Junge Wilde" program is to further improve interaction and interdepartmental cooperation and make it easier for new employees to network within the company. The program is aimed at all Steuler Group employees under 35 years of age who have been with the Group for less than six years and are based in the Westerwald region of Germany. It creates a fertile environment for creative ideas that challenge conventional wisdom.

Equality, family, career and working hours

Equality and balancing family life with career are important to men and women in equal measure today. Even people who have no family of their own often prefer flexible working hours or want to work from home. The topics "family and career" and "work/life balance" have merged to become "work/life integration." Steuler offers part-time models developed in collaboration with employees, managers, the Works Council, and HR. And for employees providing nursing care for immediate family members, we also offer solutions that extend beyond the legally required options. The prevalence of mobile working and home office arrangements have increased significantly – not least as a consequence of the Covid-19 pandemic. As at other companies, this involves a range of challenges, such as ensuring equal treatment (not all tasks can be performed from home), maintaining team spirit, and also enabling informal networking and idea generation – during breaks, for example. The company regularly puts together individual training and development programs, the hours for which can be built up in advance and/or worked off afterwards. Employees can also take special leave or training leave – and they can do so even if the courses are not recognized under the German Educational Leave Act *(Bildungsfreistellungsgesetz)*. The programs are aimed at everyone, irrespective of gender, and take into account the different life circumstances of the employees. An employee's personal life situation is also taken into consideration in their personal development plan and in-house mentoring arrangement in order to best reconcile private interests, family and career.

We have set up an emergency daycare service with flexible and dedicated childminders for employees at our sites in the Westerwald region. Whenever an employee has a problem with their own childcare arrangements, they can use this free service on an hourly or daily basis. Two more examples from subsidiaries outside of Germany: At Steuler Técnica based in Zamudio, Spain (near Bilbao), and a subsidiary in Huelva (near Seville), there is a flex-time arrangement. Employees are also able to work from home one day per week. In the summer, when it gets very hot in the south, office hours are shifted forward to the early morning and shortened by an hour. These deficit hours are made up for in the winter. The company and an insurance company signed a framework agreement that allows all Steuler Técnica employees to take out an affordable supplementary health insurance plan. Another Spanish subsidiary – Técnicas de Refractarios – is based in Bilbao and has five other locations in Spain. It offers its employees online courses on a variety of subjects, including personnel management, risk prevention, and foreign languages. In order to offer unemployed people new career prospects, the company has been providing refractory installation training in collaboration with the job center since 2022. These courses are held at a training center operated by the City of Bilbao.

Measures to ensure equal pay

The unions and management in the refractory and acid protection industry negotiated a collective agreement already in the 1990s. It groups workers into pay categories according to their job function and thus establishes the basis for equal pay and equity. Of course workers are classified on a gender-neutral and performance-oriented basis: only the job function of the employee matters. Moreover, all classification and reclassification of non-exempt employees are subject to the right of co-determination, i.e. the agreement of the responsible Works Council. The HR department monitors operations for any disparities and intervenes when necessary.

Health promotion

All measures to promote the health of Steuler Group employees are consolidated in the SIGA health program. This includes traditional measures such as free eye exams and flu shots and various health programs ranging from anti-stress seminars to circuit training. For further details on the activities from 2022 to 2024, refer to the Sustainability Program on page 45. Some sites outside of Germany have put measures in place to promote the health and team spirit of the workforce. At our Chinese subsidiary Shanghai STEULER-KCH Anticorrosion Engineering, for example, they hold regular exercise sessions during breaks.

Personal counseling by specialists

The Steuler Group cooperates with Median Health Service and AMD *(Arbeitsmedizinischen Dienst TÜV Deutschland/Occupational Health Services TÜV Germany)* to provide employees with a comprehensive health and counseling service for matters relating to life in general, the work environment, and especially mental health and dependency issues. The personal and confidential counseling sessions are organized by HR at the request of the employee. This offer is available to all German sites of the Steuler Group.

Occupational safety

Each of the companies of the Steuler Group has its own occupational safety organization comprising occupational safety professionals, safety officers, first responders, and fire and evacuation wardens. These management systems are integrated into the Safety, Health and Environment (SHE) organization of the relevant company. In order to achieve and maintain the highest possible standards of safety, all measures required by law, and some that even go beyond them, are being implemented. Within the management system, we have implemented policies requiring the verification of subcontractors' and contract workers' qualifications, occupational safety standards, and reliability. As a result, uniform requirements apply with respect to working conditions and safety.

This includes, among other things, briefings, instructions, personal protective equipment and occupational medical care. We investigate work accidents in a timely manner using the "5 whys" investigation method. It determines not only the obvious causes of an accident (direct causes), but also any underlying causes of an accident (root causes). Based on that analysis, necessary measures are defined, put into practice and audited for effectiveness. The occupational safety management system and its external certification reflect the different characteristics of the workplaces. We differentiate here between installation at the worksites and production in our factories. Office workplaces have no separate organization; rather, they share coverage by the safety organization implemented there on site, depending on the specific Group company. All occupational safety-related tasks are coordinated by the Occupation Safety Officer.

Installation

In Our large installation companies have processes and standards that are certified according to SCC (Safety Certificate for Contractors), the prevalent German occupational safety management system in our customer markets. The SCC certifications are applicable for all installation companies in Germany. Companies that work for us as subcontractors on worksites in Germany or Belgium must be reviewed according to the SCC criteria "occupational safety organization and qualification of the workers" or present their own SCC certification. Our installation companies in France, Spain, Great Britain and Italy also have certified management systems for safety and health and/or will conduct a certification audit in the spring of 2025. Some of these certifications involve national systems, such as MASE in France, or the internationally applicable ISO 45001.

Production

In our German factories too, we have an occupational safety management system integrated within the Safety, Health and Environmental (SHE) organization, which essentially complies with the requirements of ISO 45001. In regularly scheduled SHE meetings, managers, Works Council members, safety officers, company doctors, occupational safety professionals and other experts as needed discuss current developments. The goal is to exchange experience, identify areas where action is needed, and reach decisions by mutual agreement. This role also includes regular occupational health checks, workplace inspections and evaluations by company doctors. Other SHE success factors include the systematic organization and performance of risk assessments as well as the job-specific training and briefing of all employees. At the Chinese production site in Shanghai, the occupational safety system has also been certified according to ISO 45001.

Recent developments

Already in the Sustainability Report 2021, we had to state that the number of work accidents has increased since 2019. At that time, in other words before Covid, we had 65 work accidents and an accident rate of 22. Then in 2021, the number of accidents rose significantly and the accident rate was 28. In 2022, we set ourselves the goal of reaching an accident rate of 20. To achieve that goal, we undertook several measures. Among other things, in 2022 we implemented a new software system for occupational safety management, which enables us to make more detailed statistical analyses and reduce the administrative effort required. Furthermore, we added personnel resources to enable us to do more prevention work. Initially we had also planned for the entire Group to be certified according to ISO 45001 in an iterative fashion. We have since decided otherwise. Instead, we are using those resources for prevention (see also Sustainability Program on page 45). Meanwhile, we can report some successes and the accident figures have continued to decrease in 2024. The work accident figures reported here exclude accidents while commuting to and from the workplace (the company only tracks the latter internally).

Work accidents	2021	2022	2023	Δ vs. 2022
Work accidents (number of accidents resulting in an absence of more than one day – LTI)	102	100	98	-2 %
Fatal work accidents (number)	0	0	0	0
Accident rate (work accidents resulting in absence per 1,000,000 man-hours)	28.3	26.3	26.1	-1 %
Days of absence due to work accidents	1,922	2,021	2,113	5 %

Employee rights and the equal treatment of contract workers

Works Council and co-determination

For co-determination and representation of employee interests, there are Works Councils in Germany – both for companies and for locations of the Steuler Group – that meet at regular intervals. In addition, there are regular works meetings. The Works Councils are involved on behalf of the workforce in management decisions concerning the following:

- Social affairs
- Personnel affairs
- Economic affairs
- Occupational safety, health and environmental protection
- Workplace design
- Work routine and work environment

A whole series of works agreements have been concluded with the Works Councils, including the payment of vacation bonuses, the provision of workwear and equipment, and additional benefits during training. In 2021, in response to the Covid-19 crisis, the existing agreements were supplemented by a works agreement for mobile working. The establishment of bodies to represent employees at the Steuler Group's sites outside of Germany is subject to the laws of the respective country. Some Spanish sites with a relatively large workforce, for example, have elected employee representative bodies comprising up to five members. At our Italian subsidiary CIMA, there is an employee representative body for safety that is elected by the employees.

Equal treatment of contract workers

When performing their job, contract workers are subject to the same working conditions as our own employees. And if found to be suitable, contract workers often soon accept a permanent position in the company.

Code of Conduct and management guidelines

Policies and principles

We all know that motivated, competent and responsible employees are essential to the success of a company. With that in mind, and also guided by the ethical values of the Management and the owners, Steuler attaches great importance to respectful interaction and a good work climate. These values are anchored in writing, notably in our corporate philosophy and corporate values, and in our understanding of corporate social responsibility. These values are transmitted through leadership. Among other things, the management principles adopted for this purpose call on managers to demonstrate exemplary reliability, openness, trustworthiness and willingness to change. The Steuler Group has a Code of Conduct that applies to all employees. It reflects Steuler's culture, which has continually evolved over the course of the company's more than 115-year history. This Code of Conduct is intended to give all Steuler Group employees a secure understanding of behavior that is appropriate and behavior that is inappropriate – even if not every conflict of interest can be individually addressed. The Steuler Group's Code of Conduct makes it clear that any discrimination whatsoever in the context of hiring and employment is impermissible. It explicitly mentions discrimination based on the following criteria: ethnic, national or social origin, skin color, gender, age, nationality, ideology, political opinions, membership in an employees' organization, physical or mental disability, and sexual orientation. Not explicitly mentioned, but nevertheless covered under this proscription, is also discrimination on the basis of race as cited in the ESRS S1. Harassment is indisputably a part of discrimination and thus impermissible as well. Furthermore, the Code of Conduct calls on employees to maintain good work relationships with one another. All employees, regardless of function, rank or influence, have the right and the obligation to report violations of the Code of Conduct. For more information about this, refer to the chapter "Compliance." In addition, we have Works Councils, disability officers, and youth and trainee delegations, who serve alongside supervisors and others as contact persons.

Points of contact regarding problems in the workplace

The first person to contact to voice complaints and resolve problems is the direct supervisor. The Management Guidelines, which apply throughout the Group, oblige supervisors to be open to complaints and to handle them constructively. Employees in Germany can also turn to the responsible Works Councils and the corporate HR department. In case of possible violation of the Code of Conduct, ombudspersons and a law office are available to the German companies. Whenever an employee raises or reports an issue, the information is always handled confidentially and the employee may rest assured that they will suffer no negative consequences. This standard practice is also explicitly documented in the Management Guidelines, Code of Conduct, and Performance Review Guidelines.

Procedures for involving employees and employee representative bodies

As with our services for our customers, we also never stop looking for ways to improve our collaboration with one another. Employees' actual or potential stresses in the context of employment are identified and assessed in different ways. Key instruments in this context include performance reviews, employee surveys and collaboration with the Works Council. At Steuler, performance reviews are a voluntary offering for all employees of the German companies. We recommend conducting such discussions at least once per year. Because these discussions are voluntary, managers do not report the results to the HR department. Employee surveys take place at four-to-six-year intervals. The most recent survey was conducted in 2023 and included all employees of the German companies. In all, nearly 650 employees participated. As compared with the surveys from 2006, 2011 and 2017, the findings indicated improvement in the evolution of our management culture. This also confirms that the qualification measures that we have implemented in the past few years have paid off. Improvement suggestions concerning working conditions can also be submitted via the employee suggestion system, which is available to the employees of the German companies.

Employees can also turn to the Works Councils when they are dissatisfied with work-related matters or have questions. The members of the respective local Works Councils, the Head of HR and Legal Affairs, and the Head of HR meet about once per month in a routine meeting. In addition to this, there are cases required by law, in which the relevant Works Council must be informed or heard, or even a consultation or agreement is required. While performing work for the Works Council, the employees are released from their normal work duties. In most cases, this is handled without a fixed time budget. At the Siershahn site, two Works Councils with a total of 1.7 FTEs are released from normal work duties. At the Höhr-Grenzhausen site, the three members of the Works Council with a total of 1 FTE are released from normal work duties. To gain insights into the perspectives of employees who are particularly susceptible to potential shortcomings in working conditions, or who could be marginalized, there is an Equity Officer, to whom employees can report cases of discrimination. There is also a Disability Officer, who is simultaneously a member of the Works Council and who represents the interests of severely disabled persons. Furthermore, the HR department and the Works Council are available for consultation on such matters. There are no explicit mechanisms for determining how effective the aforementioned communication channels are in identifying problems or risks for the employees. In our view, this seems unnecessary, because we experience in practice, time and again, that the communication channels work. The findings obtained from the processes described above are documented in aggregated form, with due regard for confidentiality, and discussed in the relevant HR departments of the companies (e.g. HR Department Germany, HR Tecresa) together with representatives of the relevant management boards. Good working conditions are ensured and promoted primarily by the managers and by the employees in the HR department. The named group of persons perform this work in combination with other tasks.

Turnover

With the measures described in this chapter, we want to achieve a high level of satisfaction and motivation among our employees. These soft factors can be measured by surveys. Another indicator is employee turnover. The turnover figures for the German locations exhibit significant fluctuations, which we still attribute to the effects of the Covid-19 pandemic, among other things. Because while the pandemic adversely affected us all, it was far more difficult to change jobs. In general, the rate of turnover at Steuler is very low, which leads one to conclude that we have a good corporate culture.

Turnover (in Germany)	**2021**	**2022**	**2023**	**Δ vs. 2022**
Employees who left the company (resignation)	24	62	49	-21 %
Employee turnover (%)	1.7 %	4.2 %	3.2 %	

In 2023, the employer branding “Arrive. Thrive. Steuler” was developed with the participation of all of the employees. To be a part of the Steuler Group means being a part of a strong community that is there for each other, builds on each other’s strengths, and supports each other in all living situations. The large-scale employer campaign features motifs that give genuine employees a chance to express their views.

Responsible Procurement

06

Our customers and the legislators are setting ever higher standards with respect to sustainable business practices. This has an impact on our supply chain management, too. Moreover, a reliable supply of raw materials, technical goods and services at competitive prices is essential for our performance.

Procurement in practice

The purchasing departments of the Steuler Group procure raw materials (chemicals, rubbers, refractories), semi-finished goods made of metal and plastics, process equipment (e.g. pumps), subcontractor services, finished goods, energy, and other consumables and supplies. The quality of the goods and the reliability and competitiveness of our suppliers play a decisive role in our performance. And with a purchasing volume of over 150 million euros, Purchasing also has a significant impact on the cost and cashflow situation. The largest purchasing department of the Steuler Group is Steuler Linings' Central Purchasing Department. It is responsible for procurement for the German companies of the division. Steuler Equipment Engineering and the companies outside of Germany have their own purchasing departments. In Steuler Linings' purchasing department of the German companies, 13 employees coordinate the procurement of over 40,000 articles from around 2,000 suppliers. In Equipment Engineering, five employees handle the project-based procurement of 5,000 articles from around 900 suppliers. Because the goods to be procured and the quantities per order differ significantly between Steuler Linings and Steuler Equipment Engineering, only certain guidelines apply throughout the Group. There is a Group-wide Standard Operating Procedure for Purchasing, for example, which serves as the basis for the division-specific purchasing policies, purchasing guidelines and standard operating procedures. For the past several years now, more and more customers insist that we take environmental protection and working conditions into account also in our procurement practices. Now there are new regulations that place high demands on the management in purchasing. Specifically, these include the German Supply Chain Due Diligence Act (*Lieferkettensorgfaltspflichtgesetz* or LkSG), the European Corporate Sustainability Due Diligence Directive (CSDDD), the EU Regulation on Deforestation-free Products (EUDR) and the Carbon Border Adjustment Mechanism (CBAM). Irrespective of this, it is in our own interest to actively ensure that environmental protection and good working conditions are observed in our supply chains. Because shortcomings on the part of our suppliers can lead to supply disruptions, quality problems and higher costs.

Modern procurement processes and supplier management

In view of the economic importance of purchasing and of the increasingly demanding sustainability requirements, the procurement processes of Steuler Linings' Central Purchasing Department have been modernized and consolidated in a supplier management system. For this new supplier management system, we have compiled a purchasing policy, purchasing guidelines, and the standard operating procedures "Purchasing" and "Supplier Management." They also contain the requirements related to environmental protection and working conditions. These guidelines are integral to Steuler Linings' procurement process and are observed in day-to-day purchasing activities. Steuler Equipment Engineering has its own process documentation for purchasing. From its strategic suppliers in Germany, Steuler Linings regularly collects information and data on quality, logistics, communication, certifications, and sustainable business practices. These data are collected by means of questionnaires and help us manage our procurement processes.

As part of the survey conducted in 2024 on the ISO 9001 and ISO 14001 management systems and on occupational safety, we also documented whether Steuler Linings' strategic suppliers have implemented a sustainability concept. The results of that survey showed that of Steuler Linings' 141 strategic suppliers

- 66 % have implemented a sustainability concept in their company
- 22 % are currently establishing a sustainability management system in their company
- 12 % will implement a concept in the future.

The survey also found that some suppliers have invested in photovoltaic systems and adopted energy efficiency measures. Steuler Equipment Engineering collects relevant key data from its strategic suppliers at 24-month intervals. As part of that process, it also asks them to present their management system certificates according to ISO 9001 (quality management) and ISO 14001 (environmental management). This also occurs when conducting business for the first time with new suppliers.

Supplier Code of Conduct

Introduced in 2021, the Steuler Group's Supplier Code of Conduct specifies basic requirements related to sustainability, including environmental protection. Working together with the suppliers, we aim to improve environmental protection in the supply chain and prevent irregularities. For that reason, we require that our suppliers fully comply with applicable laws and internationally recognized standards in the area of environmental, social and governance (ESG). Moreover, we expect our suppliers to make reasonable efforts to establish these standards at their own suppliers as well. Certain elements of this Code of Conduct address the individual needs of the Linings and Equipment Engineering Divisions, so there are two target group-specific versions. We require our suppliers to support and comply with our Supplier Code of Conduct – or to document and ensure their commitment to the principles listed in our Code of Conduct, e.g. with a Code of Conduct of their own. The strategic suppliers of both Steuler Linings and Steuler Equipment Engineering must promise to comply with this Code of Conduct and, since 2022, must also confirm this in writing. Steuler Linings' Central Purchasing Department uses the supplier self-assessment form to verify compliance with the principles and requirements of the Steuler Supplier Code of Conduct. In addition to this, on-site audits can be conducted – in coordination with the supplier – by Steuler Linings employees or third-party agents. In Equipment Engineering, acknowledgment of the Supplier Code of Conduct is requested together with the order and confirmed upon order confirmation unless the supplier objects.

Supplier Code of Conduct

Our Supplier Code of Conduct contains provisions concerning the following topics:

- Human rights: Prohibition of forced or child labor, promotion of equal opportunities, protection against discrimination, freedom of association
- Working conditions: Working hours and vacation, health and occupational safety
- Prohibition of corruption and bribery
- Fair and free competition
- Data protection and confidentiality
- Environmental and climate protection

On accepting our Code of Conduct, our suppliers commit to enforcing our conditions within their own supply chains, too. Because some requirements apply only to certain product categories, there are division-specific versions of the Supplier Code of Conduct.

Supplier Code of Conduct – Steuler Linings:
https://linings.steuler.de/en/about-us/purchasing-department.html
Contractor Code of Conduct – Steuler Equipment Engineering:
https://engineering.steuler.de/en/gtc/supplier-documents.html

Supplier audits

Steuler Linings' strategic suppliers are subjected to random and, if necessary, event-driven supplier audits. The evaluation of the supplier is conducted on site, and the company receives the results the same day. A questionnaire is used to collect information about the existing management systems, e.g. for quality assurance and environmental protection. The questionnaire includes a separate section that addresses sustainability issues. Besides the evaluation itself, these regular supplier audits are also designed to ensure continuous improvement in processes and workflows. Based on the documentation of weaknesses and deficiencies, we work together with the supplier to develop an action plan for improvement. In 2023, 38 audits were conducted at existing and new suppliers, down from 44 audits in the previous year.

German Supply Chain Due Diligence Act

Since 2024, the Steuler Group too must comply with the German Supply Chain Due Diligence Act (*Lieferkettensorgfaltspflichtengesetz*, or LkSG). The basic requirement constitutes a new due diligence obligation: Companies must implement suitable measures to identify, prevent and minimize risks of human rights violations, environmental damage, and the violation of social standards in their supply chains. In addition, the law includes requirements related to transparency and reporting. Companies should compile reports on their supply chain activities at regular intervals. Those reports should also provide information about actions taken to minimize risk and about their effectiveness. To comply with LkSG requirements, an internal project was initiated. Furthermore, a special LkSG software was acquired to support Purchasing in connection with this.

In the context of the mandatory risk assessment, we analyze our supplier structure to identify which suppliers might be at higher risk of violating social standards (human rights, working conditions) and of causing serious environmental damage.

We will be particularly careful with regard to these suppliers in the future. In March 2024, the EU Member States adopted the EU Supply Chain Directive, also known under its formal designation as the Corporate Sustainability Due Diligence Directive (CSDDD). In the future, the LkSG will be replaced by this EU directive; we expect that this will involve some changes.

EU Deforestation-free Products Directive

The EU Deforestation-free Products Directive, which enters into force in 2025, is designed to ensure that certain products placed on the market in the EU do not contribute to deforestation and forest degradation in the EU and elsewhere in the world. The rubber that Steuler Linings uses to manufacture rubber linings falls under this directive. For this reason, the suppliers from whom we procure rubber must now certify to us that the rubber they supply was produced on land that has not been deforested after December 31, 2020 and that the rubber plantations are operated in accordance with the applicable local statutory regulations. We started working on the implementation of this new requirement in 2024.

07

Compliance

Steuler Group views compliance with applicable law and with external and internal regulations as an integral part of its corporate culture. With its Code of Conduct, the Steuler Group commits to comply with all of the laws to which it is subject – both national and international. By the same token, we also adhere to all relevant internationally recognized standards and guidelines – including those of the United Nations and International Labour Organization (ILO). In this positive respect, we influence the behavior of our employees. Serious breaches of the Code of Conduct can lead to specific disciplinary action.

Every employee has the right and the obligation to identify and address violations of the external and internal regulations. Should our employees have reasonable grounds to suspect that there has been a breach of our Code of Conduct, they are urged to inform the responsible manager or to contact the designated ombudspersons.

Pursuant to the provisions of the German Whistleblower Protection Act, the Steuler Group has established an external point of contact by commissioning a law firm. Both the ombudspersons and the external attorney are sworn to secrecy in order to ensure that whistleblowers have the necessary protection. We expect our suppliers to observe the same standards that we set for ourselves. Additional information can be found in the chapter "Responsible Procurement".

Steuler Code of Conduct topics

- Compliance with laws, recognized standards and guidelines
- Bribery and corruption
- Accounting
- Anti-trust and competition law
- Confidentiality and data protection
- Treatment of company property
- Working hours
- Remuneration
- Child and juvenile labor, forced labor
- Diversity and equal opportunity
- Environmental protection

The Code of Conduct applies to all Steuler Group companies and all Steuler employees worldwide, regardless of function, rank or influence. It is available for download in English and German from the Steuler Group website.

Sustainability Management

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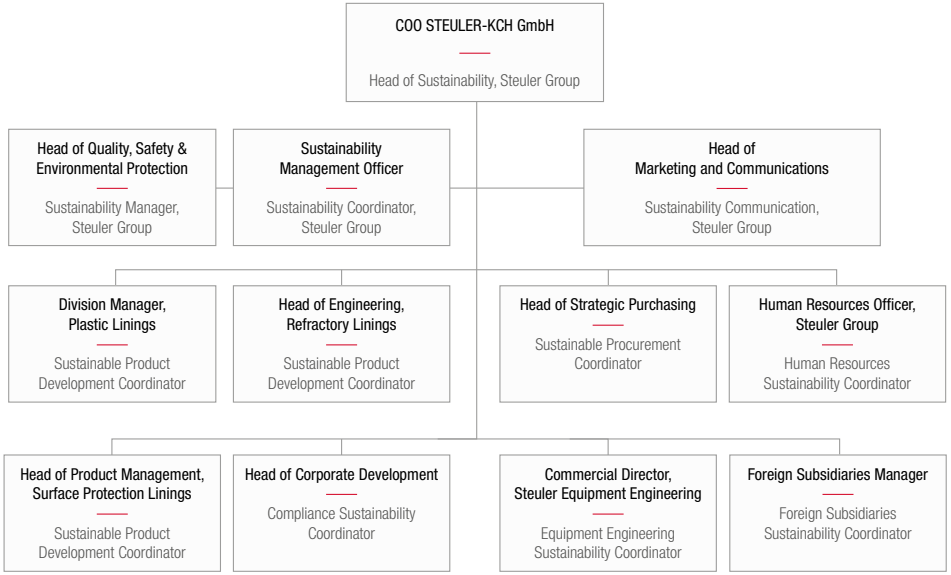
The Sustainability Management of the Steuler Group is based on the corresponding management structure, which was implemented at Steuler Linings in 2022. The Chief Operating Officer (COO) of the Steuler Linings Division leads the sustainability activities of the Steuler Group. The organizational and coordinating tasks lie within the remit of the Head of the "Quality, Safety and Environmental Protection" Department, who thus serves as Sustainability Manager of the Steuler Group.

Teams and committees

Sustainability coordinators have been appointed in the departments involved in sustainability. The Head of Communications of the Steuler Group is responsible for sustainability communication. Together, this group of people forms the Sustainability Team. The Sustainability Team meets annually to discuss external developments, the implementation of the sustainability program, and ideas for new projects. Over the next two years, Sustainability Management will become actively involved in implementing the comprehensive and complicated European Sustainability Reporting Standards (ESRS). The reason behind this is that, pursuant to the European Corporate Sustainability Reporting Directive (CSRD), the Steuler Group must incorporate a sustainability report into its group management report starting from 2026. To that end, further functions will also be added to the sustainability organization. Finally, the topic of sustainability is included once a year as a separate item on the agendas of the Supervisory Board and Shareholders' Committee of Steuler Holding GmbH, which is responsible for the Group. Relevant developments that arise over the course of the year are also reported there as needed.



Management systems

All of the Linings Division's German companies have implemented an integrated management system for quality, occupational safety and environmental protection. This management system incorporates key requirements of ISO 14001 environmental management systems and ISO 9001 quality management systems. These include clearly defined responsibilities, an environmental and energy team with managers at each site, and an action program that is continually updated. Fifteen of the Linings Division's companies are ISO 9001 certified (quality management). The environmental management system at STEULER-KCH Materials GmbH is certified according to ISO 14001, because this company operates the majority of our plants in that business segment.

STEULER-KCH Polska Sp.z o.o. and Shanghai Steuler-KCH Anticorrosion Engineering Co. Ltd. also have certified environmental management systems. The findings from the external audits conducted for certification are used for the entire integrated management system. Across-the-board ISO 14001 certification would incur significant additional administrative overhead – without achieving improvements in environmental protection. Instead, we conduct internal audits at all German production facilities and on customer worksites to ensure adherence to our standards and compliance with statutory health, safety and environmental protection regulations. Four of our German companies have large installation departments and also employ subcontractors. Each of these companies has a certified occupational safety management system, mainly according to the provisions of the Safety Certificate for Contractors, or SCC for short. In addition, the Spanish subsidiary TECNICAS DE REFRACTARIOS, S.A.U. (TECRESA) and the Chinese company Shanghai Steuler-KCH Anticorrosion Engineering Co. Ltd. have implemented an occupational safety management system that is ISO 45001 certified. The Italian subsidiary CIMA plans to obtain ISO 45001 certification in 2025.

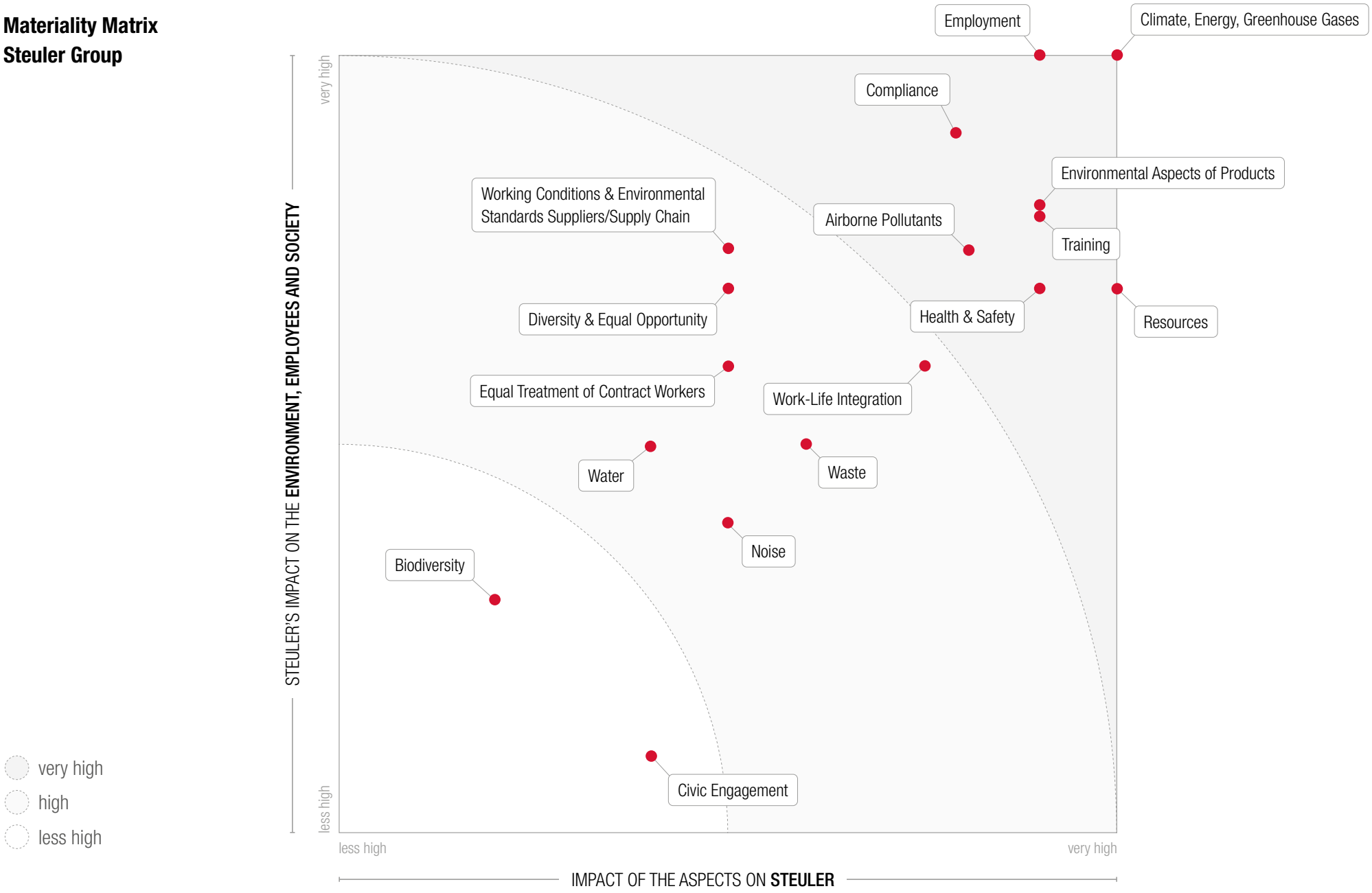
Audits – internal and external

In 2023, 14 external monitoring and recertification audits of environmental protection, occupational safety and sustainability performance were conducted at the Steuler Linings Division's German companies. In 2022, 12 such audits were performed. We also conducted 15 internal audits in 2023 (previous year: 10 audits).

Key sustainability aspects

The key sustainability aspects for Steuler Linings, which form the basis of the sustainability management system, were determined during an internal workshop in 2021. The classifications established at that time remain valid and can be transferred to the entire Group. The European Sustainability Reporting Standards (ESRS), however, require the implementation of a far more elaborate and complex process. We will implement the analysis with the required procedures in 2025. We are anxious to learn whether this will result in significant changes. The issue of "climate and energy" will no doubt remain the most urgent sustainability topic. Likewise, we will continue to focus on the topics of employment, compliance and training, as well as the environmental aspects of the products. For more complete details of the present materiality analysis, please refer to the Linings Division's Sustainability Report 2021.

Materiality Matrix
Steuler Group



Sustainability Program

09

In our Sustainability Program, we report about our sustainability-related goals and activities, i.e. the projects that we are implementing to reach those goals.
This year's program of the Steuler Group is largely a continuation of the Sustainability Program of Steuler Linings, which was published in the Sustainability Report 2021. It reveals the extent to which the measures that were planned at that time have been implemented and our estimation of the progress made toward achieving the goal. New measures are also planned now, of course, and the activities of the Equipment Engineering Division have also been incorporated as well.

Environmental protection

Goals and actions	Deadline	Status	Notes
GOAL: Reduce greenhouse gas emissions by 4,000 t of CO_2 per year compared to 2021.	2025		As compared to reporting year 2021, the measures implemented reduced our annual CO_2 emissions by 3,900 t (annual effect). Because some measures were not implemented until the second half of 2023, the calculated effect for calendar year 2023 is 977 t. Due to a counteracting increase in the quantity of energy-intensive fired goods, the absolute reduction in 2023 was 879 t, which was about 98 t less than projected.
Upgrade and optimize the heat recovery system for the drying chambers at the Breitscheid plant	2022		The improved heat recovery system was put into operation in Q2 2022. Thereafter, one heating system could be shut down. Gas consumption savings: 410 MWh/year, which corresponds to 80 t of CO_2 per year.
Replace the gas-operated heat-shrink oven with a stretch-wrap unit at the Höhr-Grenzhausen site (annual CO_2 savings: 30 t)	2022		The previous heat-shrink unit was gas-operated. The new electric stretch-wrap unit reduced gas consumption by 200 MWh/year. Taking electricity consumption into account (CO_2 emissions of the German electricity mix), this saves 39 t of CO_2 per year.
Energy Scouts project for apprentices in collaboration with Koblenz CCI. The project began in June 2021.	2022		The Energy Scouts project will be continued indefinitely.
Install a photovoltaic system at the Höhr-Grenzhausen site	2022		The freestanding system with 3.7 MW peak was put into operation at the end of July 2023. The system produced approx. 3,100 MWh of electricity in the first 12 months, which corresponds to about 45 percent of the site's power requirements. Once the German electricity mix is factored in, the PV system reduces the site's CO_2 emissions by approx. 1,200 t per year.

Goals and actions	Deadline	Status	Notes
Check whether there are areas at the production sites suitable for photovoltaic or solar-thermal systems and whether such systems can be operated cost-effectively under the prevailing national framework conditions	previously: 2022 now: 2025		STEULER-KCH Australia installed a PV system at its Townsville site (80 KW peak) and Alphaplast Spain installed one at its Vilanant site (30 KW peak). The PV system in Australia has an estimated payback period of about 3.5 years. That rapid return on investment is due to the site's high rate of electricity consumption, in part due to air conditioning equipment. A PV system is also planned for the Breitscheid works.
Installation of a freestanding photovoltaic system with more the 1 MW peak at the Breitscheid site	2025		—
Hold an innovation workshop with a view to generating process and product innovations in the manufacturing area	previously: 2022 now: 2024		—
Improve energy efficiency at the Breitscheid and Höhr-Grenzhausen sites (e.g. drying chambers)	2022		In 2022 and 2023, some of the drying chambers at Höhr-Grenzhausen were replaced. The construction of additional new drying chambers is planned.
Procurement a new high-temperature tunnel kiln (annual CO_2 savings: > 2,000 t)	2023		In October 2023, the newest high-temperature tunnel kiln (HTTK) went into operation. As compared with previous production in shuttle kilns based on the same quantities and products, the new HTTK consumes approx. 12 GWh less gas per year, reducing CO_2 emissions by approx. 2,400 t per year. Due to increased production volumes and greater demand for certain products, the actual reduction is lower.
Reduce firing temperatures for refractory ceramics through modified formulations (the aim is to reduce CO_2 emissions by 500 t/a 2025)	2025		—
Source more raw materials from the local and/or European market and less from overseas through modified formulations (impact on scope 3)	2025		—
GOAL: Further expand our market leadership position in the direct reduction plant refractory linings sector (green steel)	2025		—
Energy optimization of rotary kilns for the iron ore pellets urgently needed for the direct reduction processes	2025		We are optimizing the energy requirements using detailed heat transfer calculations and relevant engineering changes.
GOAL: Further increase the ratio of recyclates used in the manufacture of refractory materials to 30% in 2025	2025		According to the results of the trials conducted, the target recyclate ratio increase cannot be achieved without sacrificing quality.

Goals and actions	Deadline	Status	Notes
GOAL: Reduce solvent emissions during production and processing	2022	✓	—
Increase the use of the OXYDUR iVE family as a replacement for solvent-containing monomer-releasing systems (standard VE, furan and phenolic resins) from 5 t to 25 t	2022	✓	—

Employees

GOAL: Reduce the accident rate to below 20 LTIF (work accidents with loss of work time per 1,000,000 man-hours)	2022 + following years	◷	Despite various new measures implemented since 2021, the accident rate in 2023 was 26.1 LTIF, i.e. significantly above the target maximum. For this reason, additional measures have been and will be implemented (see below).
Launch a digital information platform for collecting, documenting and statistically analyzing accident notifications and reports	2022	✓	—
Appoint an additional specialist in the field of sustainability, occupational safety, environmental protection and quality	2022	✓	—
Implement an ISO 45001-compliant occupational safety management system with a focus on the German production sites	2023	✗	The certified management system was not implemented because the cost/benefit ratio was suboptimal. Instead, personnel resources were added in the area of occupational safety, i.e. to reinforce accident prevention.
Establishment and staffing of an additional position for occupational safety at the Höhr-Grenzhausen site	2024	✓	—
Implement an ISO 45001-compliant occupational safety management system at the Italian subsidiary CIMA S.r.l.	previously: 2023 now: 2025	◔	The audit is planned for Q1/2025.
Conduct a communication campaign on occupational safety	2025	⊕	—
GOAL: Expand health promotion services	2025	◔	—
Implement the health program “Strong in turbulent times” in cooperation with a health insurance provider	2022	✓	In 2022, the health program included a seminar for managers on how to handle stress, a resource check consultation, and other offerings. Health programs emphasizing different priorities are implemented every year.
Organize a Health Day	2024	✓	The Health Day was held in April 2024.

Goals and actions	Deadline	Status	Notes
GOAL: Improve training	continuous		—
Launch an event calendar with automated workflow for the approval of training course applications	2022		—
Launch a new training course on project management	2022		The course will be conducted again in the fall of 2024.
Launch a digital feedback system for training courses and employee surveys	previously: 2022 now: 2025		The project has been delayed because the service provider prioritized the event calendar.
Concept development of management training for level 3 (team leader and master level)	2023		The training for Level 2 management was successfully completed. The foremen in the refractory production (FKW) have already been trained. In some areas, the training of the foremen was postponed to 2025 due to the high volume of orders.
Start of management training for level 3 (team leader and master level)	previously: 2024 now: 2026		—
GOAL: Improve recruitment process	2023		The employment application process via our job portal was greatly simplified and streamlined, so that just uploading a résumé now suffices for a candidate to be considered in the application process.
Modernize recruitment ads	2022		—
Optimize on- and offboarding processes	2022		—
Launch additional social media channels for employer marketing	2023		We now make use of LinkedIn, Xing, Facebook and Instagram. TikTok is planned for 2025.
Implement active sourcing through own employees	2023		—
Optimize the internal job portal in SAP	2024		Our job portal in SAP SuccessFactors (SAP SF) will be improved. The job postings and the search function for open positions in the Steuler Group will be redesigned to make them more attractive and more user-friendly.
GOAL: Increase employee satisfaction	continuous		—
Complete the roll-out of mobile time tracking in the assembly area	2022		—

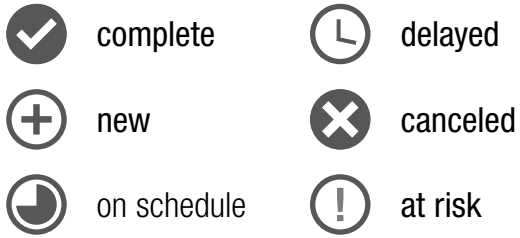
Goals and actions	Deadline	Status	Notes
Implement the “JobRad” bike system: In the future, employees will be offered a bike for private use. The leasing costs will be financed via deferred compensation.	2022	✓	—
Roll out work-time accounts in the industrial area	2023	✓	Work-time accounts have now been implemented throughout the Steuler Group.
Implement a new time management system including workflow for salaried employees and hourly workers	2025	⊕	—
GOAL: Establish an employer branding	2024	⊕	—
Design employer branding for Steuler	2023	✓	To develop the employer branding, an online survey and workshops were conducted, among other things. The result is “Arrive. Thrive. Steuler.”
Implement the employer branding (internal and external communication)	2024	⊕	The employer branding has been communicated internally since April 2024 and externally since August 2024.

Purchasing

GOAL: Exclude irregularities in working conditions and environmental protection at suppliers even more effectively	previously: 2023 now: 2026	🕒	Due to the European Corporate Sustainability Due Diligence Directive (CSDDD), additional measures are required by 2026.
Train purchasing staff on the new due diligence obligations in the purchasing area (Steuler Linings)	2022	✓	—
Conduct supplier audits depending on the Covid-19 situation (Steuler Linings)	2022	✓	Audits are being conducted continuously.
Procure a software system to support compliance with the provisions of the German Supply Chain Due Diligence Act (LkSG) and the European Corporate Sustainability Due Diligence Directive (CSDDD) (Steuler Group).	2024	⊕	—

Goals and actions	Deadline	Status	Notes
Check the supplier base in all product categories to verify compliance with the German Supply Chain Due Diligence Act (LkSG) (Steuler Group)	previously: 2023 now: 2025	delayed	The verification of the supplier structure will be handled by the new software (see above).
Establish a monitoring system to implement the German Supply Chain Due Diligence Act (Steuler Group)	previously: 2023 now: 2025	delayed	The monitoring system will be implemented with the new software (see above).
Implement the requirements of the EU Deforestation-free Products Directive. Notably, obtain certificates from the rubber suppliers (Steuler Linings)	2025	new	—
Expand supplier audit checklists to comply with CSDDD requirements (Steuler Equipment Engineering)	2025	new	—
Modify supply contract templates and extend scope of existing contracts to comply with CSDDD requirements (Steuler Equipment Engineering)	2025	new	—
Issue sustainable procurement guidelines (Steuler Equipment Engineering)	2025	new	—

Key to “Status” column



Imprint and Information about the Report

This is the second sustainability report published by the Steuler Group. The first report covered the Steuler Linings Division and was published in 2022.

Except where indicated otherwise, the information relates to the business years 2022 and 2023. The report was compiled based on the standards of the Global Reporting Initiative (GRI).

Wherever not specifically labeled, the information in this report relates to the companies consolidated in the financial statement of Steuler Holding GmbH. Notwithstanding this, the environmental figures relate only to the production facilities of the Steuler Group, i.e. the Höhr-Grenzhausen, Siershahn, Mogendorf and Breitscheid sites in Germany as well as Gent in Belgium, Vilanant in Spain and Shanghai in China.

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This report is available for download on our website:
https://www.steuler.de/en/sustainability/sustainability-report

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STEULER

Cover picture
In October 2023, the newest high-temperature tunnel kiln at the Höhr-Grenzhausen site went into operation. During an ignition ceremony, to the applause of the invited guests, an employee used a torch to light the interior of the kiln. The kiln reached its target temperature of up to 1,650°C two weeks later.

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