



**Outside:  
Steel experts**

**Inside:  
Climate caretakers**

More sustainable than you might think: With our steel production, we protect the climate - now and today.



**GREEN  
STEEL**  
GMH GRUPPE



**GMH GRUPPE**



## More sustainable products Made possible by steel

**The facts are clear:** Our planet's climate is changing, and this change has mainly been caused by human influences. Companies therefore must explore new avenues, as the demands on them and their products or services are increasing:

firstly, from **consumers**, who are paying more attention to a responsible approach to our environment and demanding sustainable offerings. Secondly, from **business partners** who are increasingly making sustainable management and products' carbon footprints a criterion for awarding contracts. And thirdly, from the **policy-makers** who have committed to reducing global emissions in the Paris Agreement.

GMH Gruppe steel plays a key role in how customers' products can become increasingly sustainable. **Our steel production at the Georgsmarienhütte site** is already more sustainable than that of many competitors, and it is becoming **more and more climate-friendly** through innovative technologies such as our electric arc furnace, efficient use of resources, effective recycling management and clear plans for how we can get even better.

### INNOVATION

Our steel production via the electric arc furnace makes us an industry pioneer - something we have been for more than 25 years.

**Page 4**

### EFFICIENCY

For example, we use 100% scrap as raw material - significantly more than the German industry average of 44%.

**Page 6**

### OPTIMISATION

We have clear plans for how we can make processes and products even more sustainable - up to climate-neutral steel by 2050.

**Page 10**



Our GREEN STEEL logo combines all the measures that make products more sustainable for our customers.

# Outside 25 years of production

# Inside 26 million tonnes of CO<sub>2</sub> saved

For over 25 years, we have been producing steel in the most sustainable way there is: in an electric arc furnace. As a result, we save over one million tonnes of CO<sub>2</sub> every year, and are just as much a pioneer in the industry now as we were in 1994.



### Technology saves CO<sub>2</sub> by the tonnes

An electric arc furnace emits five times less CO<sub>2</sub> than blast furnaces and converters. Each kilogram of crude steel from our electric arc furnace generates 1.3 kg fewer CO<sub>2</sub> emissions than crude steel from integrated iron and steelworks. In addition, our furnace can be filled with an optimal charge of recycled scrap and its output can be flexibly controlled as required. Since 1994, we have saved as much CO<sub>2</sub> this way as 12.4 million passenger cars emit each year. Electric steel is steel with a future: it currently accounts for 30 percent of crude steel production in Germany, but causes only 3 percent of emissions from the iron and steel industry.

### Innovative materials reduce emissions

With new materials, we make our customers' products and processes more sustainable; for example, components from our 46MnVS5 can be designed to be slimmer, contributing to lightweight construction. This saves on weight and reduces vehicle fuel consumption. Our bainitic steel 16MnCrV7-7 supersedes process steps such as quenching and tempering. This saves further energy and emissions.

**ELECTRIC STEEL - THE CO<sub>2</sub> SAVER:**

**5 times less**  
than the BF route



**CLIMATE PROTECTION COMPANY**  
GEORGSMARIENHÜTTE GMBH

 First steelworks to join trailblazing climate initiative  
Klimaschutz-Unternehmen e. V.

**CO<sub>2</sub> EMISSIONS**  
per tonne of  
**CRUDE STEEL\*:**  
**0.4 t** VERSUS INDUSTRY AVERAGE OF **1.4 t**

\* Scope 1+2



# Outside Scrap en masse

# Inside Bespoke steel

Scrap is the basis for our excellent products. For example, we use 100% scrap as raw material - significantly more than the German industry average of 44%. We also think in terms of optimised product and energy cycles and are constantly improving them - from the efficient reuse of by-products such as waste heat and slag, to logistics.

**WE CLOSE  
CYCLES:  
100%  
SCRAP CHARGE**  
(INDUSTRY AVERAGE  
IN GERMANY: 44%)

### Raw material cycle: 100% scrap as foundation

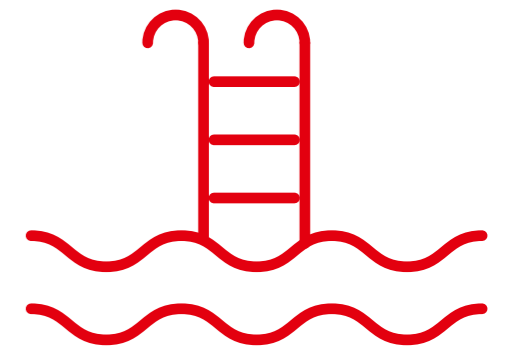
We melt steel in our electric arc furnace from 100% scrap - with no loss in quality. With every tonne of scrap, we save 1.3 tonnes of CO<sub>2</sub>. That corresponds to a 7,000-kilometre journey by car. We even recycle return scrap such as swarf, crop ends and other cutting waste, reducing our waste by 10%. Each recycling process improves our steel's carbon footprint.

### Recycling economy saves resources

We make efficient further use of by-products such as slag. For example, we reprocess slag for road construction, railway construction or steel production. Filter dusts are processed by external suppliers and used in production for other industries. This way, we return materials such as zinc to the economic cycles, where they are reused. We also make further use of process water from production, for example for slag cooling. All of this saves resources and reduces waste.

### Efficient use of waste heat

We use the waste heat from our operations for steel production, heating buildings and hot water preparation. This covers a large part of our overall energy requirements and, in turn, saves several tonnes of emissions. We also feed the waste heat into the district heating network for Georgsmarienhütte's public utilities. For this, we've been honoured by the German Energy Agency (dena) as a "beacon of energy-efficient waste heat utilisation".



**STEELWORKS HEATS  
PUBLIC SWIMMING POOL**  
TOWN SAVES **1,500** tonnes CO<sub>2</sub> per year.

**SCRAP RECYCLING  
STEEL PRODUCTION  
AND FURTHER PROCESSING**

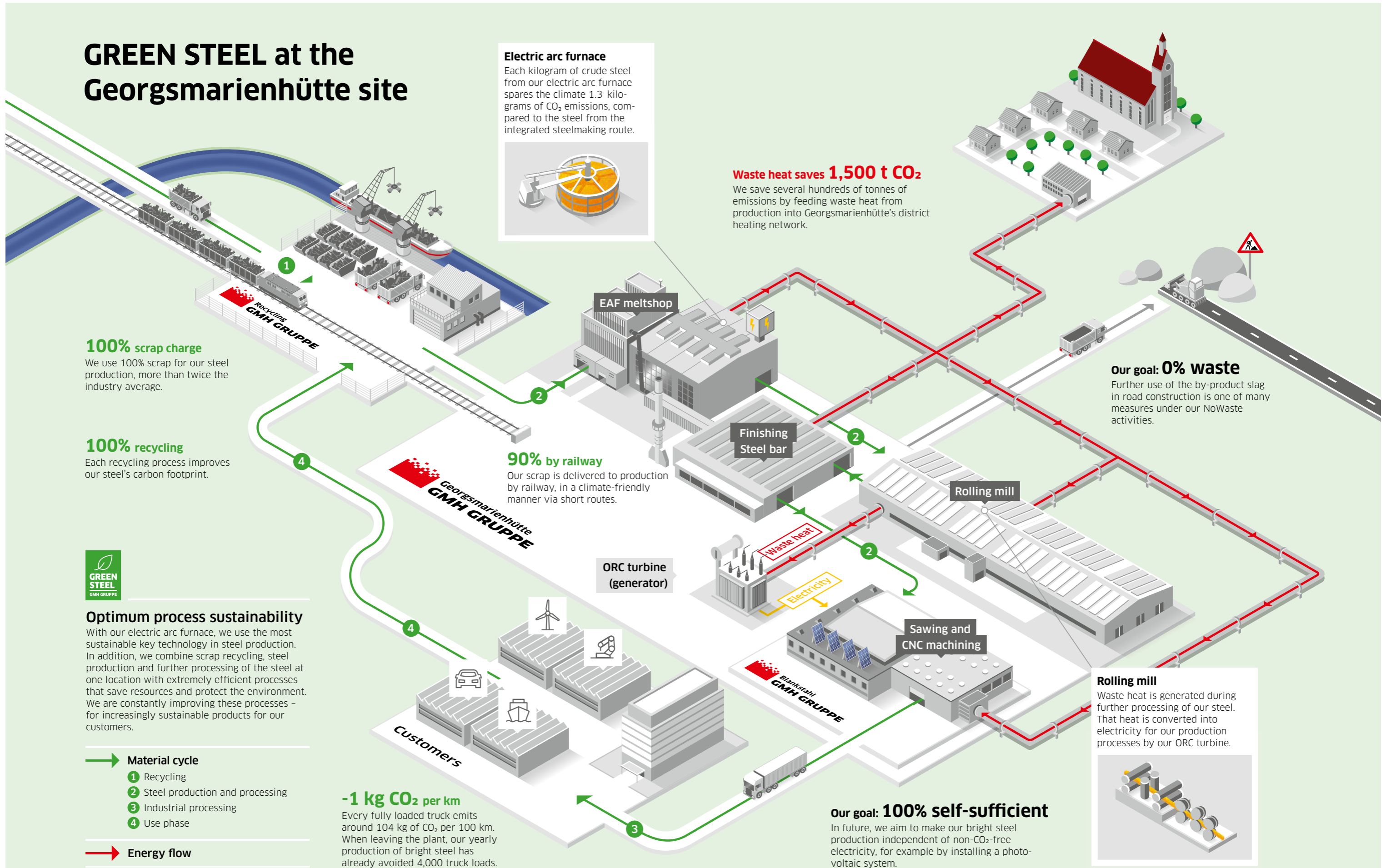
**in one  
location**

### Short route logistics

Scrap recycling, steel production and further processing of the steel at one location - it's how we avoid tonnes of emissions on short transport and freight routes and relieve pressure on the roads.

It's how we save the climate around 4,000 truck trips a year with the production of our approximately 100,000 tonnes of bright steel alone. In addition, we have no problem obtaining 90% of our raw material scrap regionally by railway and 10% by truck from the surrounding area. This ensures a better quality of life in our home country. We also deliver our materials to our customers by railways wherever possible, to relieve roads and motorways.

# GREEN STEEL at the Georgsmarienhütte site



## 100% scrap charge

We use 100% scrap for our steel production, more than twice the industry average.

## 100% recycling

Each recycling process improves our steel's carbon footprint.



## Optimum process sustainability

With our electric arc furnace, we use the most sustainable key technology in steel production. In addition, we combine scrap recycling, steel production and further processing of the steel at one location with extremely efficient processes that save resources and protect the environment. We are constantly improving these processes - for increasingly sustainable products for our customers.

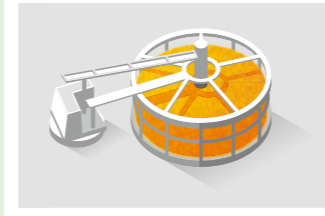
### Material cycle

- 1 Recycling
- 2 Steel production and processing
- 3 Industrial processing
- 4 Use phase

### Energy flow

### Electric arc furnace

Each kilogram of crude steel from our electric arc furnace spares the climate 1.3 kilograms of CO<sub>2</sub> emissions, compared to the steel from the integrated steelmaking route.



### Waste heat saves 1,500 t CO<sub>2</sub>

We save several hundreds of tonnes of emissions by feeding waste heat from production into Georgsmarienhütte's district heating network.

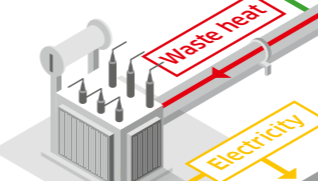
### 90% by railway

Our scrap is delivered to production by railway, in a climate-friendly manner via short routes.

### Our goal: 0% waste

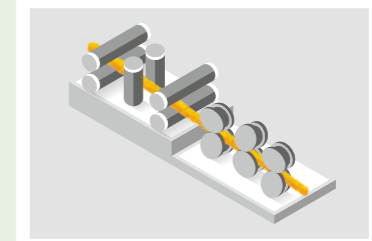
Further use of the by-product slag in road construction is one of many measures under our NoWaste activities.

### ORC turbine (generator)



### Rolling mill

Waste heat is generated during further processing of our steel. That heat is converted into electricity for our production processes by our ORC turbine.



### Our goal: 100% self-sufficient

In future, we aim to make our bright steel production independent of non-CO<sub>2</sub>-free electricity, for example by installing a photovoltaic system.

### -1 kg CO<sub>2</sub> per km

Every fully loaded truck emits around 104 kg of CO<sub>2</sub> per 100 km. When leaving the plant, our yearly production of bright steel has already avoided 4,000 truck loads.



**Outside**  
**As always**

**Inside**  
**Always improving**

**We have a clear goal, and we know how to achieve it.** Our steel production will be made climate-neutral by 2050. With our key technology of electric steelmaking and optimised processes, this is realistically feasible. It is not without reason that we have been a pioneer in the decarbonisation of the steel industry for over 25 years.

### How our steel will become climate-neutral by 2050

Our path to climate-neutral steel production essentially requires three steps:

#### Green electricity for green steel.

Our goal is to use exclusively green electricity in our production in the future. This will enable us to reduce our emissions by roughly two thirds.

#### From natural gas to green hydrogen.

We use natural gas as a bridge technology in thermal processes, and will switch to green hydrogen when it is sufficiently available.

#### Biomass instead of coal.

We use biomass for metallurgical purposes, thus replacing coal in steel production.

### Measures: We are always improving

**We are already working on numerous measures to make our processes progressively more sustainable:**

- We use the growing infrastructure for green electricity and green hydrogen in Europe
- We are further expanding our recycling of mineral secondary materials
- We are continuously working on reducing our energy requirements
- We regularly have our energy management system externally certified according to ISO 50001
- We actively involve employees, e.g. through our company suggestion scheme and training courses at the GMH Akademie
- We have established a sustainability management system connected to management as executive department which, together with other management systems, coordinates all sustainability issues
- We develop steels that enable leaner processes in further processing and the reduction of emissions during use

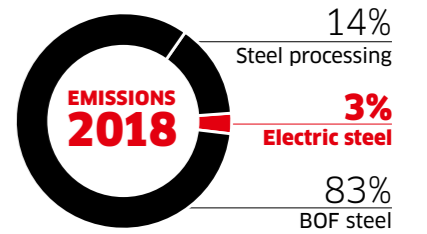


Electric steel -  
THE INDUSTRY CHAMPION:

**30%**  
OF STEEL PRODUCTION  
IN GERMANY,



**BUT ONLY 3%**  
**OF THE EMISSIONS**  
CAUSED BY THE IRON AND  
STEEL INDUSTRY





 **Recycling  
GMH GRUPPE**

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