
# Green lead markets and key building blocks of a green steel definition

## Position paper

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## Executive Summary

On its way to climate neutrality, the steel industry is dependent on a consistent political framework. **Green lead markets**, which are already anchored in the German Steel Action Concept 2020, are a key building block for this. The basic idea is to stimulate targeted demand for climate-friendly steel which, although lower in $CO_2$ emissions, is currently significantly more expensive without factoring in its different properties from conventional manufactured steel. As long as **green steel** incurs significantly **higher operating costs** in production and no economic viability can be ensured, there will be a need for governmental start-up financing to unleash the steel sector's massive $CO_2$ reduction potential at comparatively low cost. This support for achieving climate protection targets can be minimised and in the long term even completely replaced by establishing green lead markets.

A **clear definition of the term "green steel"** is central to the establishment of green lead markets. The steel industry in Germany advocates building this on two pillars: firstly, the **product carbon footprint**, which makes $CO_2$ emissions in every steel product visible, comparable on the customer side and enables "tracking" along the entire value chain. This gives suppliers who already produce in a climate-friendly way a competitive advantage over producers who are getting started. In addition, a second pillar is needed in the form of a **labelling system for climate-friendly steel** which is simple and easy to understand. The main purpose of this is to encourage investment in green manufacturing processes.

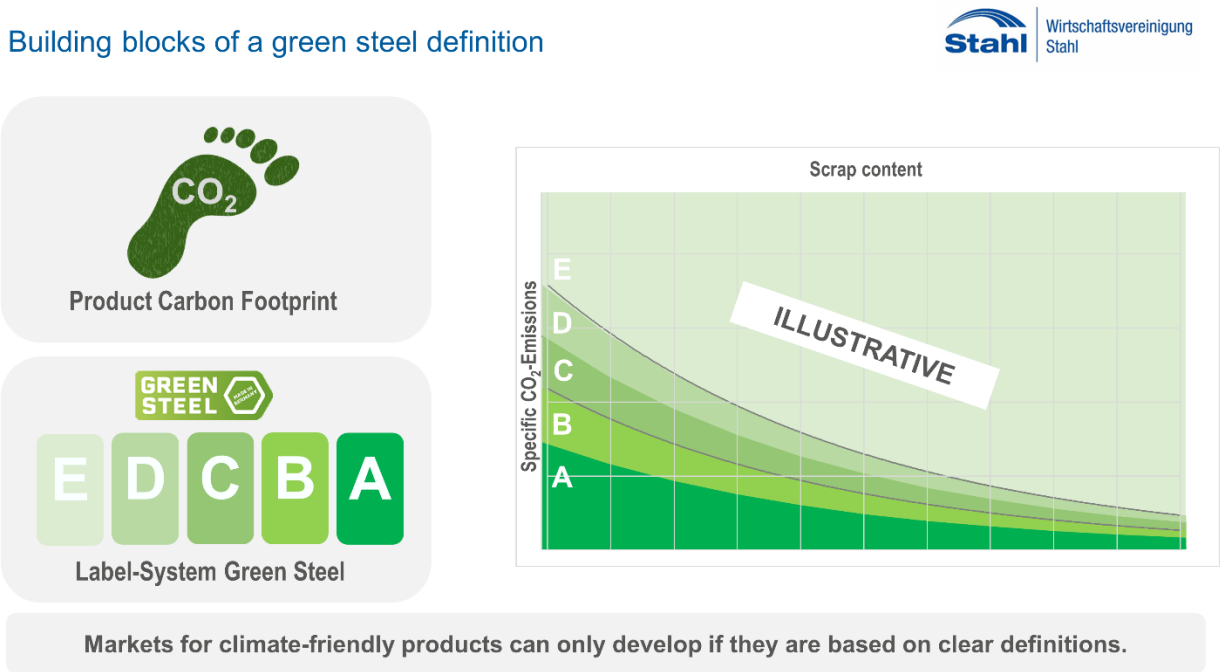


Figure 1: Building blocks of a green steel definition

When introducing such a categorisation, **difficult design issues** need to be clarified. These should be resolved with participation of the most important stakeholders. Germany as a steel making and industrial location with its strong steel-based value chains must play a leading role in this discussion, which must be conducted from the outset with a view to **international compatibility**. Work on this should begin quickly and ideally be well advanced under the German G7 presidency in 2022.

This paper outlines the **key points** to be considered in the definition of green steel from the point of view of the steel industry in Germany. The focus is not on formulating concrete thresholds. Rather, the initial aim is to agree on **fundamental principles**. These include that a system should consist of several categories which take the industry's **stepwise transformation path** into account. Furthermore, **efforts** to achieve sustainable $CO_2$ reductions should be **rewarded**, accounting options should not be permitted or should only be permitted in purely technically justified cases and within clearly defined limits, and all significant $CO_2$ emissions generated in steel production should be considered.

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# Green lead markets as a building block for the transformation of the steel industry

**The steel industry is at the start of a far-reaching transformation.** By 2045 at the latest, the industry wants to produce steel in a climate-neutral way. The basic technologies/processes for this are available. **Scrap-based electric steel production** already offers a low-$CO_2$ process with a very limited range of grades and dimensions on the flat steel side. However, the availability of the secondary raw material, steel scrap, is limited. The gradual replacement of coal-based primary steel making with **hydrogen-based (initially natural gas-fuelled) direct reduction** adds a new manufacturing route. Steel companies of both routes have developed a large number of projects with which the transformation towards climate neutrality can now be started and large amounts of $CO_2$ can be saved in the 2020s.

**In the transformation, however, steel producers are dependent on conditions that they cannot create by themselves.** They need a **consistent, supportive political framework**. This includes provision of infrastructural conditions as well as transitional state start-up financing for investment (CAPEX) and operating costs (OPEX), while at the same time ensuring the international competitiveness of companies in the transformation process. In the long term, purely market-based processes will replace governments' stimulus payments. In this political framework, the **creation of lead markets** is of particular importance.

**The task of green lead markets is to support the transformation on the demand side (pull factors):** the switch to climate-friendly production methods is typically associated with significant additional costs, without the product differing technologically from the reference product. Without political support, green products cannot initially compete with conventionally manufactured products. Green lead markets help to establish sales markets where green premiums can be obtained to offset companies' additional costs. Green lead markets thus complement other key transformation support instruments, such as carbon contracts for difference (CCfD), which are designed to create an initial supply of green steel. The compensation payments agreed via CCfDs are lower the higher the customers' willingness to pay for green steel compared with conventional steel.

**Green lead markets can thus provide sustainable relief for public budgets in financing the transformation.** They represent a bridge until climate-neutral products have become fully established on the steel market. And they need clear and binding incentives/rules on the part of users and customers so that demand can develop. These include requirements in the area of public procurement (green procurement), bonus models, incentive opportunities such as political sector coupling or minimum standards which become stricter over time. On the road to climate neutrality in 2045 standards should be set, according to which only climate-neutral basic materials may be sold and used in Germany and the EU.

**Financing green steel via the market is also advisable from an economic point of view because the additional costs – measured against the end product price – are comparatively small compared with other sectors and industries, but have a major impact in terms of $CO_2$ reduction.** The final product price of many steel-intensive products such as passenger cars, wind turbines or washing machines increases only very moderately if they are made entirely from green steel. At the same time, however, green steel makes a major contribution to reducing the overall emissions of steel-intensive goods. In the case of a car in the mid-range segment, the use of steel produced in a completely climate-neutral way can reduce around 25 percent of total production-related $CO_2$ emissions.

## Categorisation of climate-friendly steel for the management of green lead markets

**Markets for climate-friendly products can only be developed if they are based on clear definitions**. As a first step, it must therefore be possible for every customer to identify the $CO_2$ emissions contained in a finished steel product so that they can be tracked along the value chain. **Product carbon footprints** determined on the basis of relevant and accepted ISO norms and standards are therefore the first, central **building block** in a **definition of green steel**, from the steel industry's point of view.

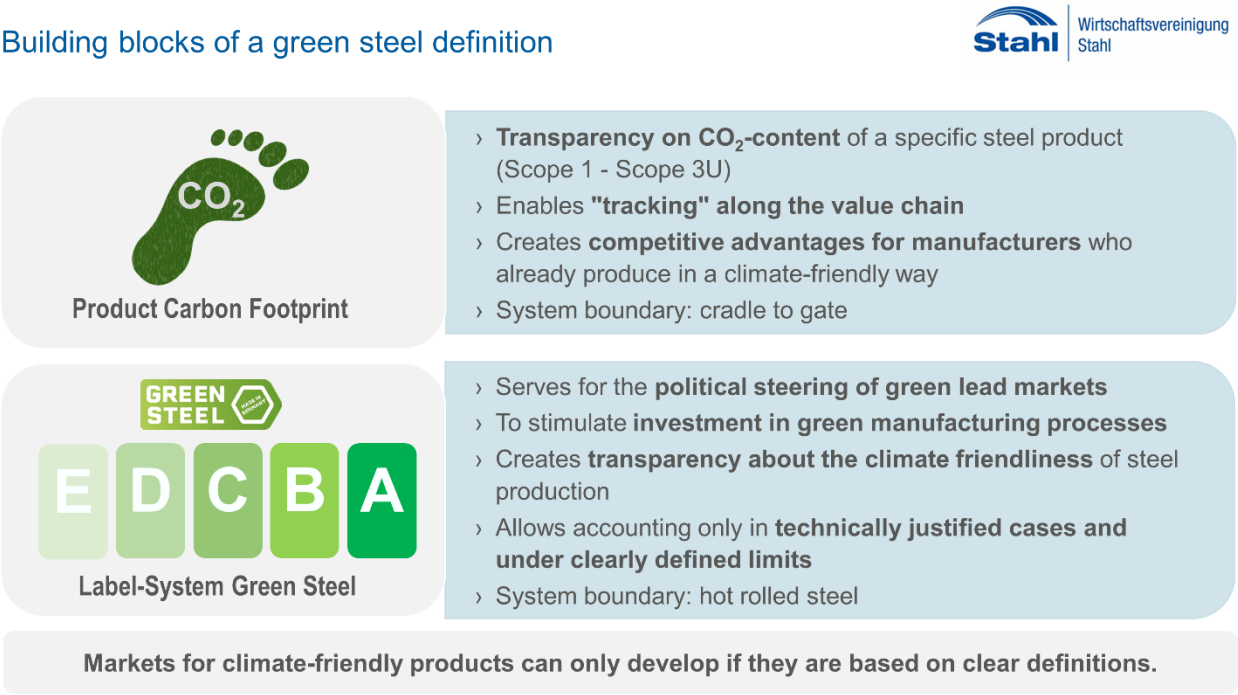


Figure 2: Building blocks of a green steel definition (properties)

In addition, the steel industry in Germany is proposing a **categorisation system for climate-friendly steel**. The primary aim of this is to enable development of green lead markets. To be fully effective, it must meet various criteria. These include in particular:

a) reflecting the industry's phased transformation process toward climate neutrality (**compatibility with market ramp-ups**),

b) being consistent with the level of ambition of climate targets (**effectiveness**), and

c) rewarding investment efforts in transformative processes (**paying-in to transform**).


Figure 3: Requirements for a green steel definition

It is of particular importance that any classification and categorisation of green steel is **internationally co-conceived** and **connectable** at global scale from the outset. Climate-friendly products are facing **international competition** with both green and conventional products **from abroad**. Green markets are also developing, albeit at different speeds, not only in the EU but globally. An internationally accepted green label could therefore become an important anchor point in **international climate policy cooperation** to (reciprocally) open green markets, for example in climate clubs. Categorisations and classifications must be certified on the basis of internationally established ISO standards.

The steel industry in Germany is in favour of not making the "climate friendliness of a product" solely dependent on its specific $CO_2$ content. In addition, the **use of steel scrap** must also be taken into account. The recyclability of steel makes it a key material in a circular economy and steel scrap is a valuable secondary raw material that is traded internationally. Electric arc furnace (EAF) steel production based on almost 100 percent scrap is therefore already an established climate-friendly process. On the other hand, the **availability of steel scrap** is limited and **iron ore-based primary steel production is indispensable**. The global climate targets cannot be achieved only by increasing the use of steel scrap. The aim must therefore be to encourage and establish a technology shift in primary steel production as a building block of climate-friendly steel production, alongside even lower $CO_2$ electric steel production. For this reason, from the point of view of the steel industry in Germany categorisations of green steel cannot be made independently of the scrap usage, input and content.

## Design considerations

There are difficult **design issues** to be solved in establishing a green steel label. A broad participation of stakeholders would be the best to ensure acceptance and credibility. From the steel industry's point of view, the following key points should be guiding principles:

a) **Accounting space and scope:** the system should be based on the $CO_2$ footprint from the sum of essential scope 1, scope 2 and upstream scope 3 emissions and related to specific products, e.g. hot rolled steel.

b) **Accounting:** the steel industry is generally in favour of a physical label, in particular in order to exclude green washing. Options for mass balancing should therefore only be permitted within narrow and clearly defined limits. This includes the case of a partial transformation within a steel works (replacement of a blast furnace by a direct reduction plant with subsequent further processing of the sponge iron) up to the complete transition to climate-neutral production.

c) **Labelling stages:** in order to take account of the stepwise transformation path in the steel industry, a five-level categorisation is suitable from the point of view of the steel sector in Germany, ranging from the first ambitionlevel D (state-of-the-art technology todau) to the highest level A (climate neutral or net zero). For the intermediate levels, the thresholds/limits should be set in a technology-open manner and be so ambitious that significant $CO_2$ reduction efforts are required to reach the next higher level.

d) **Dynamic design:** the threshold/limit values for the stages should remain unchanged over time. This is especially true for category A to provide clarity for the goal of climate neutrality. In order to incentivise and reward efforts towards more climate protection, it could be adjusted as the transformation progresses, e.g. which categories are to be classified as 'lead market' and at which point in time. By 2045 at the latest, only climate-neutral or 'pure' green steel (level A) should be permitted in Germany. In 2025, minimum standards, such as in public administration, could be formulated for category D steels, for example, and which would be tightened over time and line with climate policy targets.

e) **Consideration of scrap:** in order to stimulate the sustainable reduction of $CO_2$ emissions and avoid distortions on the scrap markets, the principle should apply that increased use of scrap alone does not lead to an improved classification. At the same time, it is imperative to ensure that the secondary route, which already uses up to 100 percent steel scrap, does not suffer any disadvantages in its business model as a result of this principle or that the circular economy is slowed down.

f) **A labelling system for all routes via a "sliding scale":** since the transformation paths for the production routes are different, there is a need for different threshold values for secondary and primary producers within the system. At the same time, there is no objective criterion for separating the routes, especially as they merge into one another in perspective[1]. The steel industry in Germany is therefore in favour of a so-called "sliding scale" approach, as proposed by the International Energy Agency among others. What is meant by this is that, when assessing the $CO_2$ input per tonne of steel as a function of the scrap input, continuously sliding transitions should be made possible in the defined limit values. To ensure such a continuous progression, an accepted formula for scrap consideration must be determined, something which is not currently available.

[1] Transformed plants in the primary steel route can also use increased and flexible scrap despite an upstream direct reduction plant (DRI plant). Vice versa, electric arc furnaces (EAF) without DRI production can also use imported HBI (Hot Briquetted Iron).

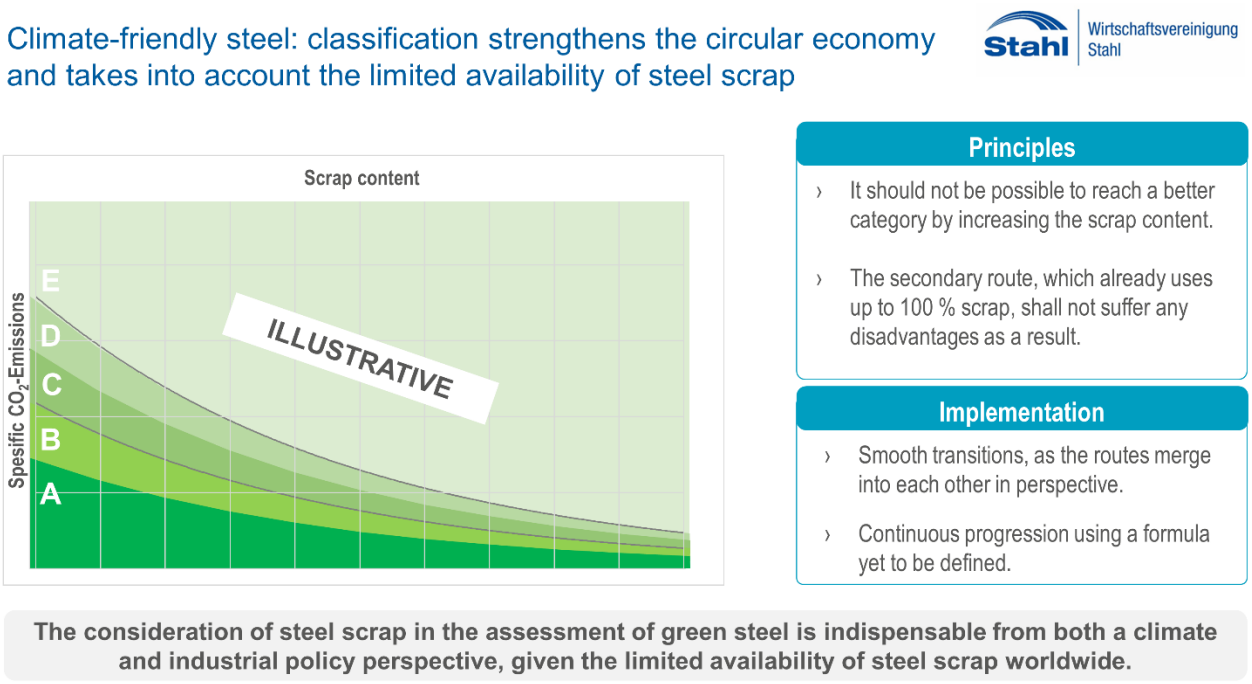


Figure 4: Classification of climate-friendly steel

## The way forward: the next steps

The steel industry in Germany advocates that work on a green steel definition, or a categorisation of climate-friendly basic materials should be initiated quickly. To this end, **climate policy initiatives** at national, European and global levels must be closely coordinated:

- At **national level**, the goal of establishing green lead markets should be anchored in the German government's immediate climate protection programme and the first steps toward establishing it should be defined. This includes, in particular, holding a **stakeholder dialog** with the aim of completing the process before the end of 2022. A focal point in the **climate emergency programme** – in addition to rules for determining the carbon footprint in steel-intensive goods – should also be the announcement of a system for classifying climate-friendly steel.

- At **European level**, the possibilities offered by the **Sustainable Product Initiative** (SPI) and the proposal for a new eco-design regulation should be developed further without delay. The aim must be to be able to define practical criteria for sustainable products in green lead markets as quickly as possible, while at the same time focusing on the $CO_2$ product footprint and a labelling system.

- At **global level**, the first key points for a green steel definition should ideally be agreed under the German **G7 presidency**. In 2023, an **internationally coordinated labelling system** should be established under Japanese leadership, which can form the basis for close **international cooperation in the area of green lead markets**, initially at G7 level.

- The **concept of environmental product declarations** offers another international option. Here, measures to stimulate demand for low-carbon industrial materials are already being worked on as part of the Industrial Deep Decarbonization Initiative (IDDI) coordinated by UNIDO. The approach of focusing on the construction sector on the basis of environmental product definitions (EPDs) should be supported in order to create green lead markets.

## Facts and figures: a climate-neutral steel industry perspective

- With around **40 million tonnes of crude steel production** per year, Germany is the **largest steel producer in the EU** and ranks 8th in a global comparison.

- Around **4 million people** work in **steel-intensive sectors** in Germany, around **85,000 of them directly in the steel industry**.

- At **58 million tonnes, steel production accounts for around 30 percent of industrial emissions and thus 7 percent of total emissions in Germany**. There is huge potential for a reduction for which the necessary technologies are available.

- **Around two-thirds of steel production takes place via the blast furnace-converter route** (primary steel production). This production process also accounts for a large proportion of $CO_2$ emissions. Achieving climate neutrality in steel here requires a technology shift to hydrogen-based production of direct-reduced iron (DRI).

- By converting one-third of primary steel production **by 2030, $CO_2$ savings of up to about 30 percent or 17 million tonnes $CO_2$ can be achieved compared to 2018 if hydrogen is fully used**. Until green or climate-neutral hydrogen is available in sufficient quantities, natural gas will be needed. The flexibility option of natural gas also creates demand for hydrogen that serves the system, supporting the ramp-up of the hydrogen economy.

- **Scrap-based electric steel production** is already an essential **building block** for **climate-neutral production**. It accounts for one-third of today's production. It closes the steel material cycle and is indispensable for the Circular Economy of the Green Deal.

- **Scrap-based electric steel production** is already relatively low in $CO_2$. Direct emissions in downstream processes (forge/rolling mill/heat treatment) need to be reduced through electrification and hydrogen use. In addition, substantial $CO_2$ reductions are possible through **the expansion of renewable energies**. $CO_2$-free electricity alone can reduce emissions (Scope 1 and 2) by two-thirds and generate largely climate-neutral electricity.

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