



Green Steel Definition - A Labelling System for Green Lead Markets

Proposal of the Steel Industry in Germany

November 2022



Wirtschaftsvereinigung
Stahl

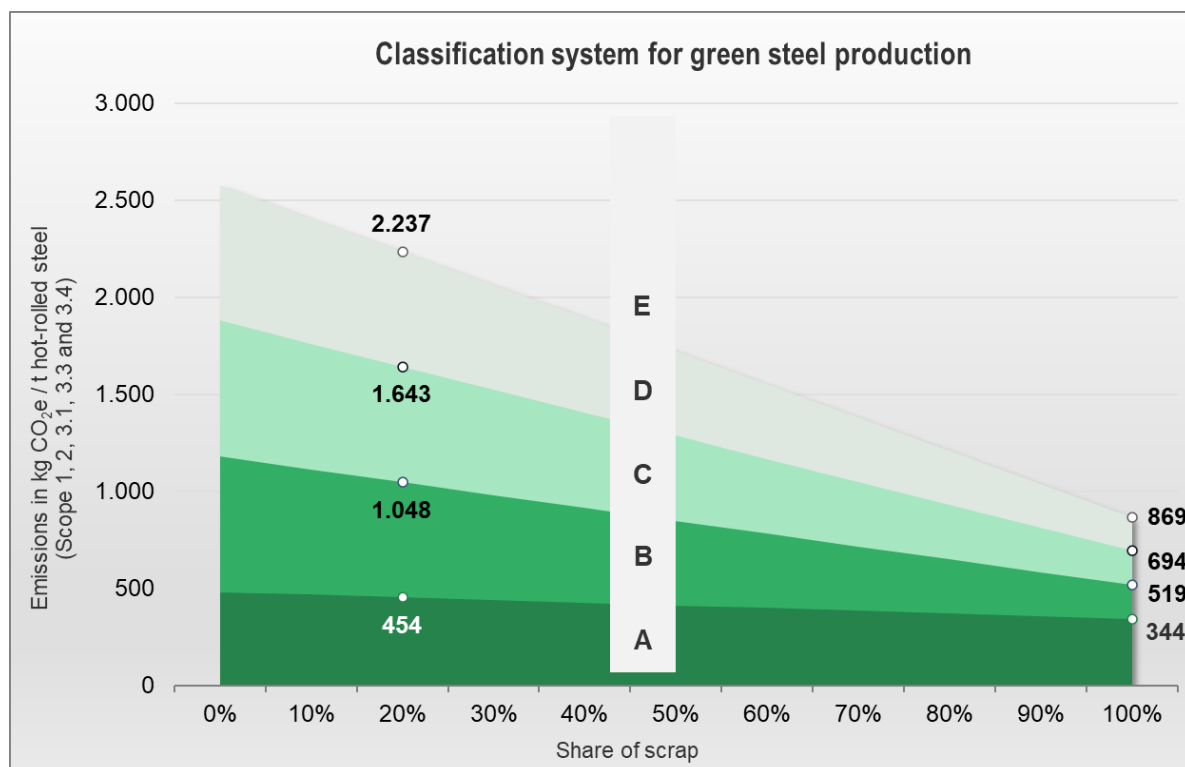
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Executive Summary

Green lead markets are a crucial building block on the way to climate-neutral basic materials in general and green steel in particular. They can only be developed if they are based **on clear definitions**. The German Steel Federation defined essential elements of a green steel definition in May 2022. With this **paper**, it is now presenting a concrete **proposal**. The core element of this proposal is a **classification system for green steel** that includes a scale of five levels ranging from state-of-the-art to near zero emission steel. This proposal was developed together with the consultancy FutureCamp and contains concrete threshold values for each level which were derived in a comprehensible and transparent manner and are described in more detail in an accompanying technical paper. The proposed system is compatible with and builds on the concept of the **International Energy Agency (IEA)** which it develops further on several essential aspects.

This proposal provides a basis for discussing how to establish lead markets for green steel. The proposed classification system can for example be used to define requirements and crediting modalities for the use of green steel which can be adjusted over time in line with climate policy ambitions. It can thus make a significant contribution to the ramp-up of green steel.

The steel industry in Germany invites policy makers to use this proposal as a basis for discussions with relevant stakeholders with a view to develop it further and feed into ongoing discussions at the European and global levels. Timely solutions are crucial to create planning security for companies that invest in climate protection and need clarity about the conditions under which their products can be recognized, credited and marketed as green.



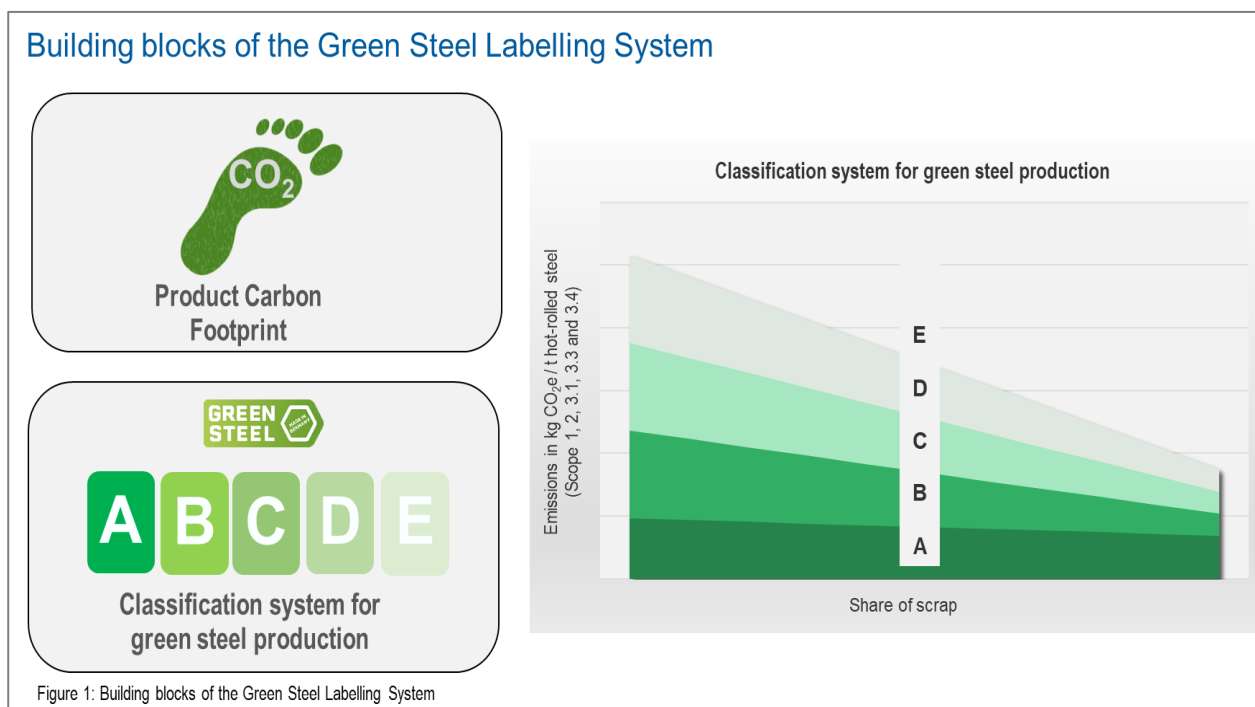
I. Objective: establishing lead markets for green steel

In order to manage the transformation of the basic materials industry towards climate neutrality, various policy instruments must work hand in hand to create a consistent policy framework that combines fair competition, carbon leakage protection and support for transformative processes. The concept of **green lead markets** as laid out in the German Steel Action Plan (2020) should be implemented to that effect. The basic idea is to stimulate the demand for green steel in certain market segments, such as public procurement and certain industrial sectors, through targeted regulatory measures. This would enable the emergence of a **green premium** that can justify the switch to climate-friendly processes with high investment costs and initially also higher operational costs. It would also reduce the need for public start-up funding which could then be replaced by private-sector financing on the market in the long term. A green steel definition is a prerequisite for the implementation of lead markets for **green steel**, enabling the uptake thereof in certain leading applications until climate-neutral basic materials have become fully established on the market.

II. The concept: a labelling system for green steel

In May 2022, the German Steel Federation (Wirtschaftsvereinigung Stahl) presented its initial ideas for essential **building blocks of a green steel definition (Figure 1)**. These include a **classification system for green steel** and a **customer-oriented labelling of climate-friendly steel**:

- The **classification system** is for the steering of green lead markets, i.e. to define requirements and crediting modalities for the use of green steel in different applications and adjusting these over time in line with climate policy ambitions.
- The **labelling** provides steel customers with information on the level of decarbonization of the related production process, supplemented by the **product carbon footprint** of the respective end-product



The idea of dividing steel into different categories of decarbonization of the related production process is to reflect the fact that the transformation to climate neutrality will take place in stages, also depending on the availability of green electricity and climate-neutral hydrogen.¹ The classification system intends to map this **step-by-step transformation process** and to stimulate/reward all transformation efforts and related expenditure in a targeted manner.

In order to implement this basic idea, we propose a **classification system** with five categories: the first **ambition level, D**, requires emission intensity beyond today's state-of-the-art production processes; the **highest level, A**, is for near zero emission steel, produced exclusively with renewable energy.² For the intermediate levels, the thresholds values/limits are defined in a technology-open manner and are set such as to require considerable CO₂ emissions reduction efforts to reach the next level.

A central element of our proposal is to account for the use of steel scrap by means of a so-called **"sliding scale"**³. This means that the CO₂ intensity of a ton of steel is set in relation to the share of steel scrap used in the production process. This is to reflect the limited availability of steel scrap worldwide as well as the lack of a clear threshold to distinguish between primary and secondary steel production. This is in line with other proposals for defining green steel production, such as recently put forward by the **IEA** in particular.⁴

III. Implementation: this is what a classification system for green steel production could look like in practice

Building on these initial ideas of May 2022, the German Steel Federation now proposes a grading system in which both **threshold values** for the different levels as well as the **progression of the curves along the "sliding scale"** are defined. The German Steel Federation has developed this proposal together with its members in an intensive process with the support of the consultancy **FutureCamp**. In this process, we also laid the foundations for a so-called **rulebook** for the system to work in practice, which we are in the process of developing further.

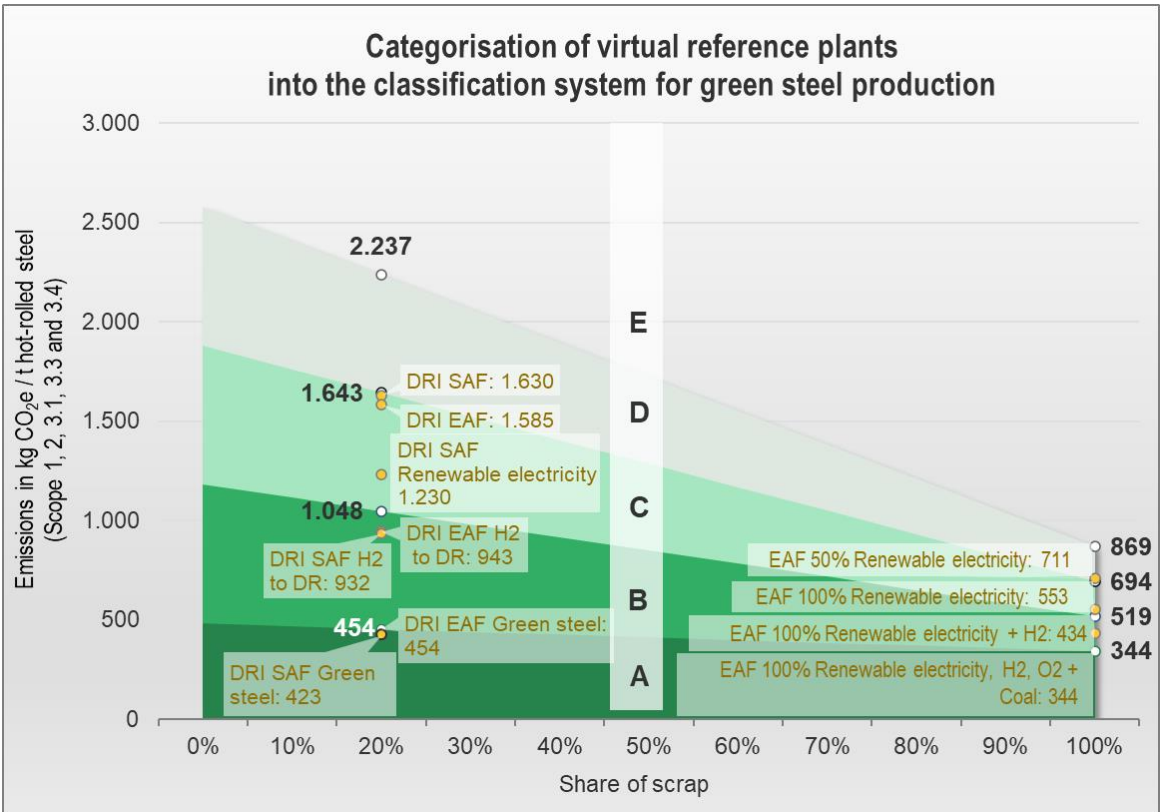
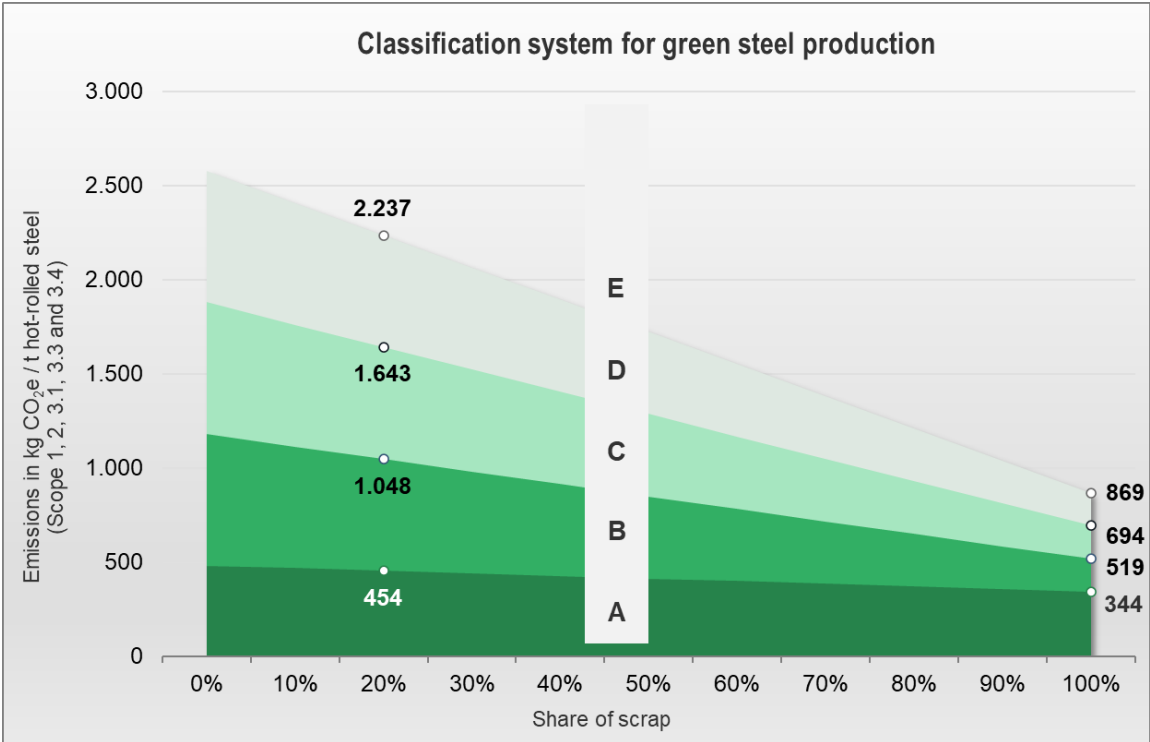
Methodologically, the thresholds for the different levels were derived from a **bottom-up approach** by defining virtual reference plants and future reference technologies for low CO₂ steel production. The **aim was to ensure a link between the proposed levels and what is technically feasible**. In a second step, we calculated possible plant configurations to illustrate how different technologies and transformation stages fit into the classification system.

¹ For integrated (primary) steel production, plants must be converted to the direct reduction process, which can be operated with natural gas and/or hydrogen. For electric (secondary) steel production, which is already low in CO₂, emissions can be further reduced by increasing the use of green electricity and by replacing natural gas, for example, with green hydrogen. With both production routes, the path to climate neutrality is associated with investments and considerable additional costs compared to the processes used today.

² In the context of the international climate policy agenda, green or climate-neutral steel is described as "nearly emission-free" (net-zero) because, according to the current state of the art, residual emissions as well as purchased emissions are unavoidable in the course of the supply chain.

³ On the "sliding scale" see also: BMWK (2022): Die G7-Route zur Grünen Industrie, Schlaglichter der Wirtschaftspolitik (August 2022), schlaglichter@bmwk.bund.de

⁴ Report "Achieving Net Zero Heavy Industry Sectors in G7 Members", Paris, May 2022; <https://iea.blob.core.windows.net/assets/c4d96342-f626-4aea-8dac-df1d1e567135/AchievingNetZeroHeavyIndustrySectorsinG7Members.pdf>



DRI=Direct Reduced Iron, SAF=Submerged Arc Furnace, DR=Direct Reduction, EAF=Electric Arc Furnace

The **final report of consultancy FutureCamp** is available on our website as a contribution to the discussion (www.stahl-online.de). It provides a detailed and transparent overview of the analytical boundaries, the product scope, the reference technologies used, as well as the way in which the threshold values and curves of the "sliding scale" were derived. The report also contains calculations for other virtual reference plants, illustrating how different reference technologies and combinations thereof perform within the system.

From the point of view of the steel industry, this means that a proposal is now on the table that:

- **supports the transformation of the steel industry in clearly identifiable steps:** key transformation steps and challenges are mapped. For both primary and secondary steel production, each step above the basic threshold starting with level D, and in particular final step A, is not achievable without considerable efforts. At the same time, policy requirements for the climate friendliness of steel production can increase in defined steps.
- **is ambitious:** even the transition to **stage D** requires full implementation of state-of-the-art technology with corresponding operational management. The highest-level A requires extensive transformation of the production processes and is only achievable with 100% renewable hydrogen and renewable electricity. This implies that this highest level of ambition of green or near-zero emissions steel is only achievable in practice when the corresponding prerequisites are in place.
- **ensures a fair balance:** the starting point is ambitious but achievable regardless of the production route. By taking the scrap content into account, the proposed system ensures that no disadvantages arise for either production route, also with regards to the circular economy.
- **is compatible with leading international initiatives:** at the G7 ministerial meeting, the IEA proposal was described as a robust starting point for further discussion. The methodology chosen here leads to similar results. Differences with the IEA proposal notably result from the broader analytical framework chosen and the bottom-up methodology used. The resulting proposal thus **further develops and firms up the IEA approach through its application to different plant configurations**.⁵
- **creates transparency:** the assumptions made provide the basis for a rulebook for the classification system, which itself is a prerequisite for the certification and classification of products.
- **can be further developed:**
 - o Partial transformations at site level can be mapped, and regular reviews ensure that possible changes in external framework conditions can be reflected.
 - o The proposed limit values apply to a basic steel grade from the blast furnace route and the electric arc route. Based on these values, a **rulebook** will be developed in the next step, so corresponding **limit values can** be determined for **all existing steel grades** by means of correction factors.

⁵ A detailed discussion and comparison of the approach chosen here with the IEA proposal can be found in the report on the final results.

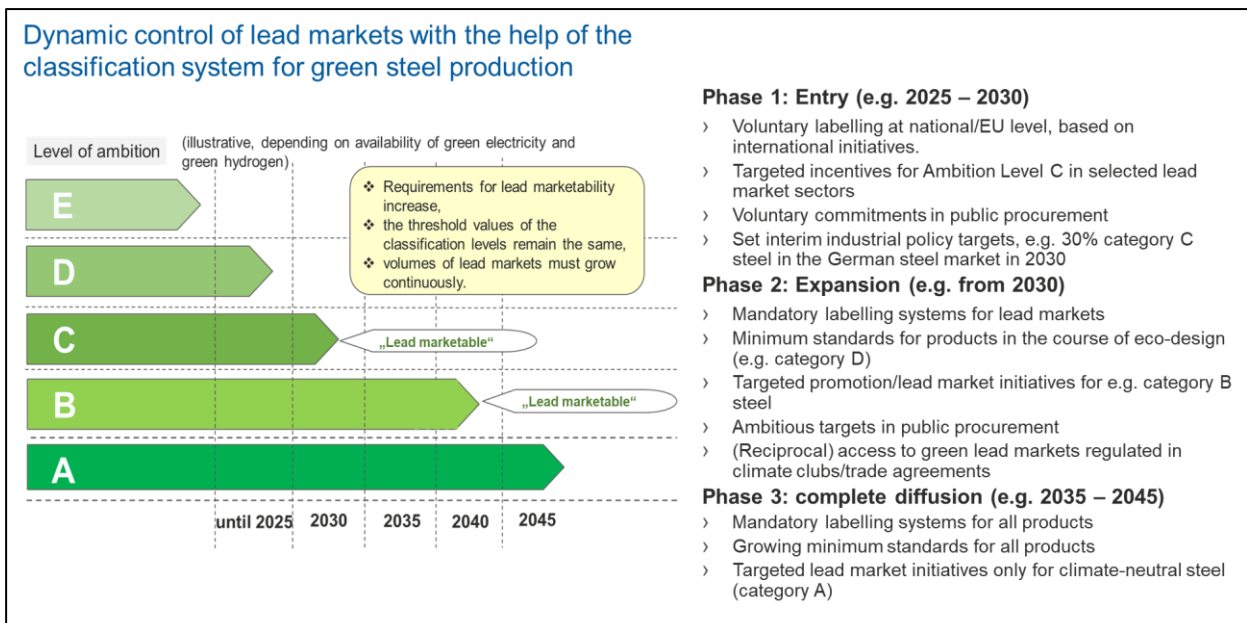
IV. Green lead markets: the way forward

The German steel industry is convinced that there is **great potential** associated with the **development of green lead markets** and that it is essential to provide regulatory support for their emergence from an industrial and climate policy point of view. The goal should and must be for Germany as an industrial location with its steel-based value chains to become both a leading supplier and a leading producer of green basic materials and in particular green steel.

This is why the steel industry believes in the importance of building **green lead markets** in a timely manner, initially in selected industrial sectors, which can be gradually extended to other sectors as the ramp-up of low-CO₂ steel progresses. The proposed **classification system for the different ambition levels in the production of green steel**, which was developed with the support, practical knowledge and technical expertise of the entire German industry, could provide an important building block for building green market for green steel.

From the point of view of the German Steel Federation, the proposal put forward herewith is suitable to:

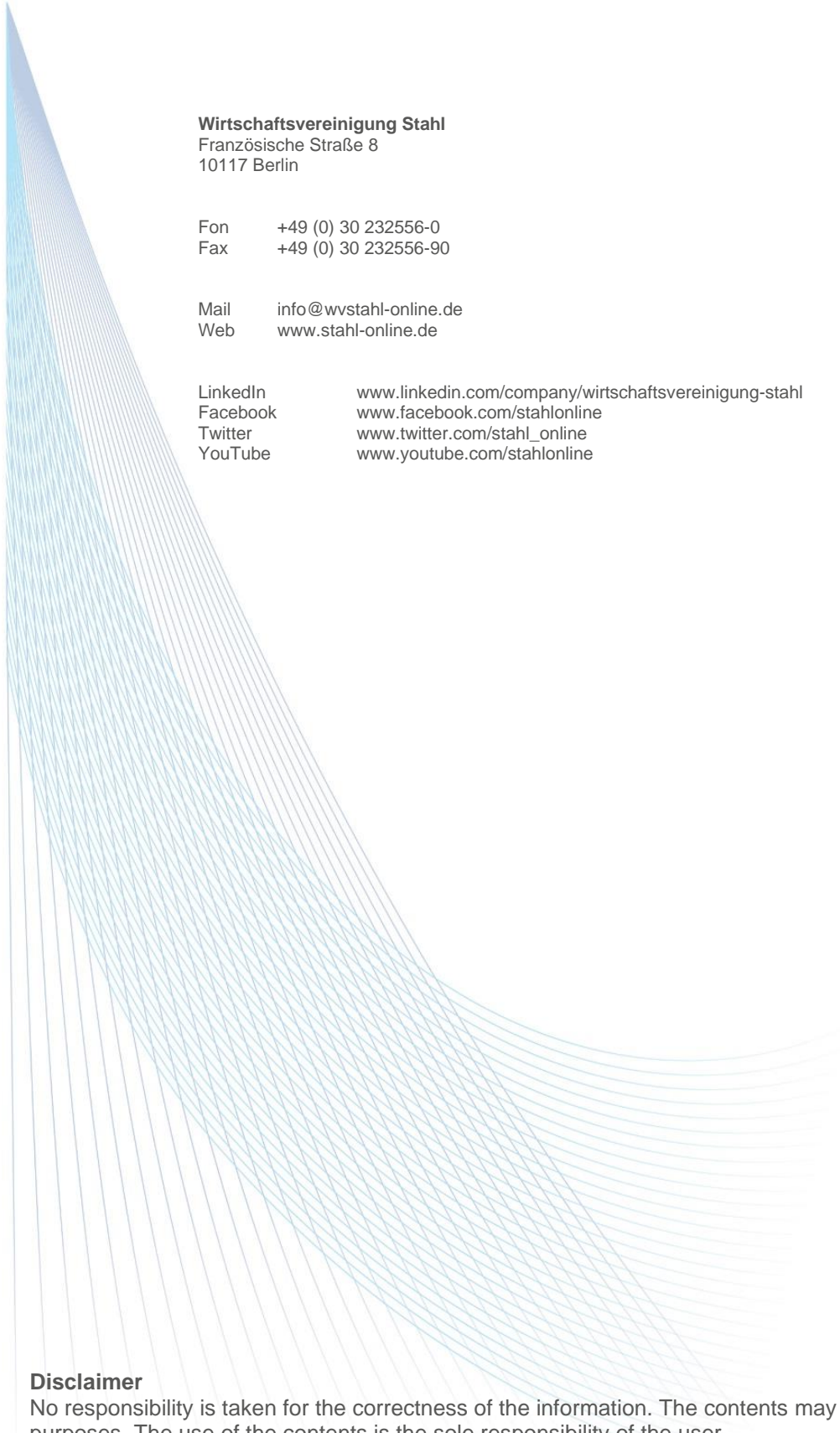
- **support the implementation of the concept of green lead markets as laid out in the German Steel Action Plan.** For example, lead market instruments such as premiums, tax breaks or requirements in public tenders can be oriented towards certain categories that are compatible with the ramp-up of green steel and in particular with the availability of green energy.
- **support the development of green lead markets** by creating transparency about the climate-friendliness of the production of the corresponding steel product through labelling. This can support B2B communication between steel producers and steel users, and complement the product carbon footprint, which primarily contains statements about the CO₂ content of the specific end product.



- contribute to the **monitoring of the ramp-up of green steel**. This could enable targeted industrial policy support, for example by formulating goals based on the classification levels. This in turn makes it possible to react to obstacles and undesirable developments in the ramp-up process at an early stage.

- **promote climate clubs and trade agreements** which will be important to open up international markets for green steel. A prerequisite for this is a common understanding of green steel definition and the labelling thereof. The IEA proposal of May, which has been recognized by G7 ministers as a robust starting point for further discussion, was a first milestone that will now be further developed by the steel industry in Germany.

From the viewpoint of the steel industry in Germany, the proposal for the classification of green steel should be discussed promptly with all relevant stakeholders in order to enable and feed into the ongoing discussions at European and global levels. Timely solutions are crucial to create planning security for companies that invest in climate protection and need clarity on the conditions under which their products can be recognized, credited and marketed as green.



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