DIW BERLIN

2167

Discussion Papers

Deutsches Institut für Wirtschaftsforschung 2026

Estimating Green Premiums Using Internal Carbon Prices

Till Köveker, Philipp Cremer

IMPRESSUM

DIW Berlin
German Institute for Economic Research
Anton-Wilhelm-Amo-Str. 58
10117 Berlin

Tel. +49 (30) 897 89-0
Fax +49 (30) 897 89-200
http://www.diw.de

ISSN electronic edition 1619-4535

Papers can be downloaded free of charge from the DIW Berlin website:
http://www.diw.de/discussionpapers

Discussion Papers of DIW Berlin are indexed in RePEc and Econstor:
http://ideas.repec.org/s/diw/diwwpp.html
https://www.econstor.eu/handle/10419/10

Estimating Green Premiums Using Internal Carbon Prices

Till Köveker*† Philipp Cremer‡

June 1, 2026

Abstract

Empirical evidence on price premiums for green intermediate products is scarce, especially for energy-intensive basic materials. Evidence on such green premiums is relevant, as they may affect companies incentives to invest in green production technologies. Moreover, green premiums are important for the design of green support programmes, as support levels could be adjusted for companies' green revenues. This paper proposes a new approach for estimating green premiums for basic materials. Basic material buyers' additional willingness to pay for green inputs is estimated based on their reported internal carbon prices. This green willingness to pay is used to construct a demand curve for green basic materials. Short- to medium-term green supply is derived from low-carbon basic material production facilities that have been announced or are under construction. The proposed methodology is then applied to estimate and predict green premiums in the steel sector. The results indicate that green steel premiums will be too low and too transient to generate significant incentives to invest in green primary steel production facilities. Other policies such as effective carbon prices and carbon contracts for difference are and will be central in driving the green steel transition. Green steel premiums may only play a complementary role in the first years of the transition.

JEL-Classification: Q02, L61, Q59

Keywords: Green Premium, Internal Carbon Price, Willingness to Pay, Green Steel, Steel Industry, Decarbonization, Climate Policy

[0] We thank Karsten Neuhoff, Jörn C. Richstein as well as participants at the DIW Berlin EVU-KLI Brown bag seminar and the WinIt seminar for helpful comments and suggestions. We would also like to thank Maike Schmidt, Alicia Höfler, Florian Raffelt and Paul Nusser for excellent research assistance. Support from the German Federal Ministry for Economic Affairs and Energy (BMWE) under the research grant "Verbundvorhaben: WinIt - Wissenschaftliche Analysen zur Industrietransformation; Teilvorhaben: Analyse zu regulatorischen Rahmenbedingungen der Industrietransformation“ (03KSVF10B) is gratefully acknowledged.

*DIW Berlin

†Technical University Berlin

‡Paris School of Economics

1 Introduction

Energy-intensive industries such as steel, cement and basic chemicals account for more than 15% of the EU's greenhouse gas emissions (Wyns & Khandekar, 2023), and, thus, play an important role in achieving the 2050 climate neutrality target. The EU's major industrial emitters have been regulated by the EU Emissions Trading System (EU ETS) since 2005. Under the EU ETS, most emission reductions and deployment of carbon-neutral technologies have, however, occurred in the power sector rather than in energy-intensive industries (Meadows et al., 2024). EU ETS carbon price levels have been too uncertain and not high enough to trigger significant deep decarbonization investments in energy-intensive basic material sectors such as steel, cement or basic chemicals (Richstein & Neuhoff, 2022).

Therefore, several contributions argue that complementary policies are needed to close the cost-gap between conventional emission-intensive production and carbon-neutral (henceforth *green*) production methods, and to accelerate the decarbonization of heavy industries (Agora Industry, 2024; Nilsson et al., 2021; Richstein & Neuhoff, 2022; Richstein et al., 2024; Vogl et al., 2021). In addition, it has been discussed, to what extent price premiums on green lead markets (*green premiums*[1]) for energy-intensive basic materials may provide additional incentives to decarbonize heavy industry (Köveker et al., 2023; Vogl et al., 2021; Wolf, 2025). It has further been argued, that green premiums may reduce the costs of complementary green support policies, such as subsidies or carbon contracts for difference (CCfDs), if the green support levels are adjusted for green premiums (Köveker et al., 2023). What role green premiums can play for decarbonizating energy-intensive industries, and to what extent they can reduce funding costs for green support programmes is however unclear due to the high uncertainty about current levels and the future development of green premiums (ibid.).

This paper fills this gap by proposing a novel approach to estimate green premiums for basic materials. We use public data on firms' internal carbon prices applied to procurement to estimate firms' additional willingness to pay for green inputs (henceforth *green willingness to pay*). Based on firms' green willingness to pay and basic material consumption we can construct a green demand curve. This green demand curve describes the quantity of green basic material demand as a function of the green premium. Intersecting this green demand curve with the supply of the green basic material allows us to estimate an equilibrium green premium.[2] Our approach focuses on voluntary private demand for green basic materials. Green premiums may also emerge from public demand (via green public procurement) or from mandated private demand (via green demand quotas). We focus on voluntary private demand for green basic materials, as neither green public procurement nor green demand quotas for basic materials have yet been implemented at a relevant scale. We nevertheless estimate the potential effect

[1] We refer to *green premiums* as the market price difference between a green product and the same product produced with conventional emission-intensive technologies.

[2] Our approach thus assumes perfect competition. There may exist considerable market power in some markets for green basic materials, which may lead to wedges between the actual green price premium and the competitive equilibrium. The analysis of the impact of market power on green premiums is however beyond the scope of this study and left for future research.

of green public procurement in an extension and qualitatively discuss the possible role of green demand quotas.

We apply this novel approach to estimate green premiums to the EU's primary steel market using firm-level data on internal carbon prices from the Carbon Disclosure Project (CDP). Not all steel-consuming firms report via CDP, and not all firms that have a green willingness to pay necessarily use internal carbon prices. Thus, we can only estimate the green willingness to pay for a subset of steel-consuming firms. Consequently, we cannot exactly pin down the green demand curve. However, we can extrapolate the green willingness to pay from the known subset of firms to the remaining firms under optimistic and pessimistic assumptions, thereby deriving upper and lower bounds of the green demand curve. This allows us to estimate an interval of the green steel premium and predict how it will evolve over time as green steel supply expands.

Our results indicate that green steel premiums are too low and too transient to provide significant incentives to invest in green steel production facilities. In all specifications, green primary steel supply exceeds the amount of steel demand with a positive green willingness to pay before 2030, such that green steel premiums fall (close) to zero. This also holds if EU countries use green public procurement to support green steel demand due to the relatively low scale of public primary steel consumption. Demand quotas for green steel consumption could in principle lead to higher green premiums; however, such quotas come with significant design and implementation challenges (Köveker et al., 2025; Vogl et al., 2021). Consequently, green steel premiums will likely only play a minor complementary role in incentivizing and funding the decarbonization of the EU steel sector's transition to carbon neutrality.

Several studies have investigated consumers' willingness to pay for low-carbon products, such as clean electricity (see Cerdá et al., 2024; Wang et al., 2024, for recent meta studies), food products (see e.g. Lin et al., 2024; Yanan Wang et al., 2025) or carbon offsets in air travel (see Wendt et al., 2024, for a recent meta analysis). Most papers studying final consumers' willingness to pay for low-carbon products, either rely on stated preferences based on surveys and unincentivized experiments, or on revealed preferences by observing consumption choices in incentivized experiments as well as in real world settings. However, it is difficult to elicit firms' willingness to pay for low-carbon basic materials using stated or revealed preference approaches. These approaches face the challenges that firms' tend to be reluctant to reveal their willingness to pay for their inputs (Arya et al., 2015, 2019), and prices of firm-to-firm green basic material transactions are seldom disclosed. We add to the literature on green willingness to pay estimation by proposing a novel approach that neither relies on stated preferences in surveys or experiments, nor on revealed preferences from observable choices in incentivized experiments or real-world transactions. Our approach instead uses firms' internal carbon prices to calculate their willingness to pay for low-carbon inputs.

Our paper is furthermore related to a literature estimating cost premiums of low-carbon basic material production (see e.g. Devlin & Yang, 2022; Glenk et al., 2026; Meng et al., 2025). These papers often refer to green premiums as the price difference between green and conventional products that would be needed to recover incremental costs. These green cost premiums can however not be used to infer market price premiums for green basic materials. The green price premium may be lower than the green cost premium if there are green support policies (e.g. green subsidies) that cover part of firms' incremental costs. Conversely, the green price premium may in theory also be higher than the green cost premium if green supply is very scarce relative to green demand. For green steel, prices are not yet publicly quoted. Therefore, the only available estimates of price premiums for green steel are based on confidential surveys and exchanges with market actors (Fastmarkets, 2026b; McKinsey, 2024). While this evidence is useful, these estimates are not based on replicable methods and could be biased if there are selection effects (not all actors may be willing to respond), or if some respondents do not respond truthfully. We contribute to the evidence on green premiums for basic materials by estimating price premiums for green steel based on publicly available data using a replicable estimation method.

We proceed by presenting the methodology and data sources used to estimate demand, supply and price premiums of green primary steel in Section 2. In Section 3, we present the results of our estimations. Finally, we discuss the implications of our results for incentives to invest in green primary steel production as well as for the design of climate policies to support the steel sector's transition to climate neutrality in Section 4.

2 Data and methods

In this section, we present the methods and data sources used to estimate green primary steel demand, supply, and price premiums in the EU.

Most steel products are traded globally. However, the majority of announced green primary steel projects are located in the EU (Hüttel & Lehner, 2024). Johnson et al. (2025) find using a global steel model that the EU will import almost no green steel until 2030. We therefore argue that it is a reasonable simplification to model the EU's green steel market as a closed market until then. We make this simplifying assumption as the data sources used to estimate green supply and green demand are more reliable for the EU than globally (see Sections 2.1 and 2.2).

Moreover, we focus on green premiums for primary steel which is mainly used to produce flat steel products.[3] We do not analyze green premiums for long products, which are mainly produced using secondary steel,[4] and can thus be easily decarbonized using green electricity. Consequently, there is no green premium to be expected for secondary steel (Fastmarkets, 2026a).

2.1 Green demand

We first present a conceptional framework of how internal carbon prices applied to procurement translate to demand for green basic materials. Then, we apply this approach to estimate demand for green steel.

[3] In the EU, 96% of flat steel is primary steel produced via the BF-BOF route (Braconi et al., 2020).
[4] In the EU, 79% of long steel is secondary steel produced via the EAF route (Braconi et al., 2020).

2.1.1 Conceptional framework

Assume a manufacturing firm procures an energy-intensive basic material input x, e.g. flat steel. The firm can procure a carbon-intensive version of the input produced via the conventional fossil-fuel based production route with emission intensity i_x per unit of input. Alternatively, it can buy a green low-carbon version of the input with emission intensity $i_g < i_x$. The choice variable $g_i \in [0, 1]$ is the share of low-carbon inputs in the firm's procurement. The market price for the carbon-intensive input is p_x and the price for the low-carbon input is $p_x + p_g$ such that p_g is the green premium. Furthermore, the firm applies a firm-specific internal carbon price v_i to the scope 3 emissions embedded in its procurement. Assuming that the firm is a price taker on input markets, the internal carbon price then appears in its cost function as follows:

$$\begin{aligned} C(x_i, g_i) &= p_x x_i + p_g g_i x_i + (x_i - g_i x_i) i_x v_i + g_i x_i i_g v_i \\ &= p_x x_i + p_g g_i x_i + x_i i_x v_i - g_i x_i (i_x - i_g) v_i \end{aligned} \tag{1}$$

The first derivative of the cost function $C(x_i, g_i)$ w.r.t. g_i is independent of the firm's choice of g_i and either positive (if $p_g > (i_x - i_g)v_i$) or negative (if $p_g < (i_x - i_g)v_i$):

$$\frac{\partial C}{\partial g_i} = p_g x_i - x_i (i_x - i_g) v_i \tag{2}$$

Since the firm is cost-minimizing, it chooses to buy all it's inputs from the low-carbon production route if the internal carbon cost savings $(i_x - i_g)v_i$ per unit of low-carbon input are larger than the green premium p_g. Conversely, the firm chooses to buy all of it's inputs from the conventional emission-intensive production route if the green premium is larger. Without loss of generality, we can thus reduce the firm's continuous choice variable g_i to a binary choice variable $g_i \in \{0, 1\}$. Moreover, we assume that the firm needs to procure a fixed amount $x_i = \mu_i$ of the input for its production. The firm's procurement cost-minimization problem then becomes a simple binary choice between only buying carbon-intensive inputs vs. only buying green inputs:

$$\begin{aligned} &\min_{x_i, g_i} \quad C(x_i, g_i) = p_x x_i + p_g g_i + x_i i_x v_i - g_i (i_x - i_g) v_i \;\; s.t. \;\; x_i = \mu_i \;\&\; g_i \in \{0, 1\} \\ \Leftrightarrow &\min_{g_i} \quad C(g_i) = p_g g_i - g_i (i_x - i_g) v_i \;\; s.t. \; g_i \in \{0, 1\} \end{aligned} \tag{3}$$

The firm now chooses to procure the low-carbon version of its input if:

$$\begin{aligned} C(g_i = 1) &\leq C(g_i = 0) \\ \Rightarrow v_i (i_x - i_g) &\geq p_g \end{aligned} \tag{4}$$

The condition for buying green is, thus, that the firm's internal carbon price multiplied by the carbon intensity difference between the carbon-intensive and low-carbon input is greater than or equal to the green premium. The firms' internal carbon price times the emission-intensity difference between the green and the emission-intensive input, $v_i(i_x - i_g)$, can be interpreted as its (green) willingness to pay for the green product attribute of its input. Using the condition for procuring green inputs from equation 4 we can now write down the demand function for the green input as follows:

$$D_g(p_g) = \sum_{i=1}^{N} \mathbb{1}\{v_i(i_x - i_g) \geq p_g\}\mu_i \tag{5}$$

where N is the total number of manufacturing firms procuring the input and $D_g(p_g)$ is the total quantity of green input procured as a function of the green premium, or the price differential between the green and emission-intensive input. A limitation of estimating green demand via internal carbon prices is that some firms that do not use internal carbon prices may nevertheless have a green willingness to pay for their procured inputs. In that case, equation 5 would only give a lower bound estimate of the total green market demand curve. Ideally, one has information or estimates on the green demand of firms that do not use internal carbon prices and adds their green demand to the green demand curve in equation 5. However, having access to this information unlikely for basic materials, as most basic material consumers are firms which usually do not disclose their willingness to pay for inputs.

In our application to the steel sector, we therefore resort to estimating lower and upper bounds of the green demand curve. First, we estimate a lower bound of the green demand curve using the approach based on internal carbon prices in equation 5. We then estimate an upper bound by extrapolating from the green demand of firms using internal carbon prices to other firms with climate transition plans, and to firms that were not surveyed by CDP (see the following section for details). The true green demand curve very likely resides between the two bounds.

2.1.2 Application to green steel demand

To estimate the demand curve for green steel as in equation 5 we need firm-level internal carbon prices, v_i, firm-level steel consumption, μ_i, and the difference in emission intensities between emission-intensive steel and green low carbon steel, $i_x - i_g$.

We use firm-level data on internal carbon prices from CDP's Corporate Response Dataset on Climate Change to estimate firms' willingness to pay for green steel.[5] There exist different types of internal carbon prices, and not all of them lead to a willingness to pay for emission reductions in procured inputs. We only consider shadow prices, internal fees, and internal trading, excluding firms that use implicit pricing as the latter is a mere accounting device (see Appendix A.1 for an overview and description of the different types of internal carbon prices). Moreover, to create demand for green inputs, the internal carbon price must be applied to the relevant scope of emissions. Therefore, we only consider firms that report that their internal carbon price is applied to the relevant categories of scope 3 emissions (i.e. category 1: purchased goods and services and category 2: capital goods) according to the definitions of the Greenhouse Gas

[5] To our knowledge, the CDP database is the only global firm-level dataset containing information on firm-level internal carbon prices.

Protocol (World Resources Institute & World Business Council for Sustainable Development, 2013).

As we assume that the EU's green steel market will be a closed market until 2030, we only select firms that have operations in the EU and in steel consuming sectors. We identify the steel consuming sectors from EUROFER (2025) which breaks down steel consumption in the EU into eight sectors.[6] The most granular sector classification in the CDP dataset is firms' *primary activity*; there are 200 different primary activities. Using EUROFER's mapping of its steel consuming sectors to NACE 4-digit codes and CDP's mapping of primary activities to NACE 4-digit codes, we generate a mapping of CDP primary activities to EUROFER sectors (see Appendix A.3). Since we focus our analysis on primary steel we exclude the EUROFER *construction* sector as its steel demand can be largely served with secondary EAF steel, due to lower quality requirements. We also exclude the EUROFER *tubes* sector, because a large share of steel tubes are used for construction and infrastructure. Furthermore, it was not possible to precisely map CDP primary activities to the EUROFER *tubes* sector.

Next, we estimate firm-level steel consumption μ_i of the selected firms, which apply internal carbon prices to the scope 3 emissions of their procurement and operate in relevant sectors in the EU. Lacking data on firm-level steel consumption, we estimate a firm's steel consumption based on the sector-level steel consumption from EUROFER (2025). We assume that a firm's EU steel consumption is a share of its sector's EU steel consumption corresponding to its revenue share. We calculate the firms' sector-specific revenue shares as a firm's EU revenue[7] over the sector's total EU net turnover.[8]

Several firms only apply the internal carbon price to a share of their total emissions. The CDP dataset indicates what percentage of a firm's emissions is covered by the internal carbon price. We account for this fact by multiplying a firm's steel consumption by its share of emissions covered by the internal carbon price. We use this downscaled steel consumption to construct the demand curve, to account for the fact that some firms apply the internal carbon price only to a subset of their emissions, and, thus, only to a subset of their procured inputs. The last element needed to construct the demand curve for green steel is the difference in emission intensities between emission-intensive steel and green low carbon steel, $i_x - i_g$. Following the *Low Emission Steel Standard, LESS* (Theuringer et al., 2025), we assume that the total emissions (scope 1-3) emitted during the production of a ton of steel via the H2-DRI-EAF route using green hydrogen are 1.945 tons lower than emissions from a ton of steel produced via the reference BF-BOF route.

We can now calculate firm-level green willingness to pay by multiplying a firm's internal

[6] These sectors are construction, automotive industry, mechanical engineering, metal goods, tubes, domestic appliances, other transport, and other sectors.

[7] The primary data source for firms' EU revenues is Bloomberg. If EU revenue data is not available on Bloomberg, we used the Bloomberg information on revenue in Europe or the EMEA region. For the remaining firms without Bloomberg data on revenue in the EU, Europe or EMEA, data on EU revenues was obtained via online research, from firm websites or annual reports. In some few instances, when EU revenues could not be found, EU revenues were inferred from global revenues assuming that the EU revenues are proportional to the share of a firm's employment or a firm's number of locations in the EU.

[8] Sector-level EU net turnover is obtained from Eurostat.

carbon price with the emission intensity difference of low-carbon and conventional primary steel, $v_i \cdot (i_x - i_g)$. To construct the lower bound of the green steel demand curve, we arrange the firm-level green willingness to pay estimates in descending order and assign the respective firm's steel consumption to its green willingness to pay (see Figure 1).[9]

The resulting green demand curve is a lower bound estimate, since not all steel consuming firms who have a willingness to pay for a reduction of their procurement-related scope 3 emissions necessarily use an internal carbon price. Moreover, not all firms that consume steel and have a green willingness to pay for their steel procurement respond publicly to the CDP. However, the latter problem is likely small, as there is a selection of firms with environmental preferences into reporting via CDP. Moreover, the coverage of the CDP database in Europe and the EU is high: 89%[10] of European market capitalization and 79%[11] of revenue in EU's steel consuming sectors are covered by CDP.

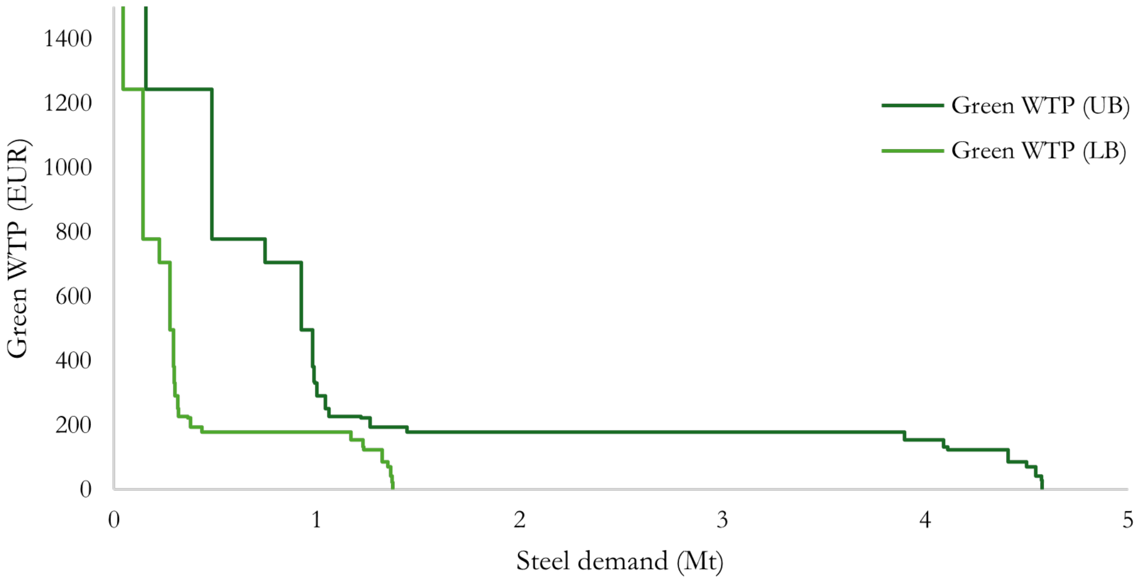
As we cannot precisely correct for these two issues, we do not attempt to precisely pin down the green demand curve, and instead estimate its upper bound. We first acknowledge that firms which have a climate transition plan[12] but do not use internal carbon prices may nevertheless have a green willingness to pay for their inputs. We account for this by scaling the green demand curve by multiplying each steel quantity that is associated with a certain green willingness to pay by the ratio of the sum of revenues of firms with climate transition plans and firms with internal carbon prices over the revenue of firms using internal carbon prices.[13] Second, we account for the fact that the CDP database only covers 79% of the EU's steel consuming sectors in terms of revenue. We thus further scale the green demand curve by multiplying the associated steel quantities with the ratio of the total revenue of steel consuming sectors in the EU over the revenue of CDP firms in steel consuming sectors. This implicitly assumes that firms not represented in the CDP dataset have the same distribution of green willingness to pay as firms covered by CDP. This assumption is optimistic, as firms not covered by CDP in reality most likely have a lower green willingness to pay, because firms with environmental preferences select into disclosing via CDP. Therefore, this approach provides us with an optimistic upper bound estimate of the green steel demand (see Figure 1) in addition to the lower bound estimate described above.

2.2 Green supply

We estimate green steel supply until 2030 using data from the Green Steel Tracker (LeadIT, 2025) on green steel projects that have been announced or are under construction. The Green Steel Tracker claims to in principle cover all publicly announced green steel projects that use

[9] For a distribution of green willingness to pay by sector see Figure A.1.
[10] This number refers to the 2023 CDP dataset (CDP & Oliver Wyman, 2024). For the 2025 CDP dataset, the exact share of European market capitalization covered is not available.
[11] Own calculation based on CDP data and Eurostat data.
[12] We only consider climate transition plans that are at least aligned with a 2°C target.
[13] This approach implicitly assumes that firms with climate transition plans (but no internal carbon prices) have the same distribution of green willingness to pay for their procured inputs as firms that use internal carbon prices.

Figure 1: Green steel demand



Notes: The figure shows the upper and lower bound estimates of the green steel demand curve.

green hydrogen for the direct reduction of iron (Morales & Nykvist, 2025).[14] We conclude that the Green Steel Tracker covers all publicly announced full scale low-carbon steel projects in the EU, as the green hydrogen-based DRI-EAF route is widely considered to be the most relevant and most cost-efficient production route for low-emission primary steel (Johnson et al., 2025).

Estimating green steel supply via projects that are announced and under construction is obviously problematic for the medium to long term as many projects that will produce green steel in the future are not yet announced today. However, from the Green Steel Tracker data we see that full scale H2-DRI-EAF projects need at least 5 years from initial project announcement to start of production. It is thus very unlikely that we miss any primary green steel production facilities starting production in the EU before 2030.

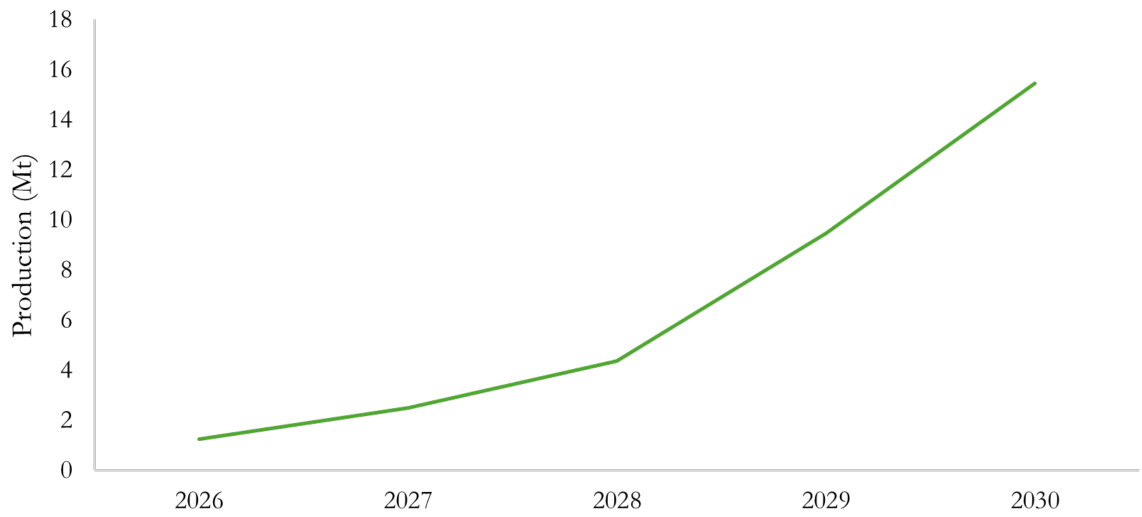
For the estimation of green steel supply, we only consider projects where capacity information and a start of production date have been published. We also only consider full scale projects with an annual production capacity over 0.1 Mt., thus excluding small scale demonstration and pilot projects. Several announced green primary steel projects have been cancelled or postponed in 2025, in particular projects by Arcelor Mittal. We therefore manually double checked the status of all selected projects and updated the information in the Green Steel Tracker dataset, if more recent information was available. For three projects, we also found more recent information on annual production capacity and updated the information in the Green Steel Tracker dataset accordingly.

[14] The methodology document of the Green Steel Tracker acknowledges that due to language barriers, some green steel project announcements may be missed (Morales & Nykvist, 2025). As the Green Steel Tracker has been developed and maintained by a team of mostly European researchers, we assume that it provides full coverage of publicly announced steel projects in the EU using green hydrogen, as they will be made public in one of the languages spoken by members of the Green Steel Tracker team (English, Spanish and Swedish).

In some cases, the Green Steel Tracker dataset only reports iron production capacity and no steel production capacity. For these projects we assume that the DRI-EAF plant is operated with 20% scrap input which corresponds to the DRI-EAF virtual reference plan of the LESS-standard (Theuringer et al., 2025). Assuming 0.9 tons of steel output per total metal input (Kirschen et al., 2021), we set the steel production capacity for these projects to 1.125 tons of steel per ton of DRI capacity.

Finally, DRI-EAF plants are complex industrial facilities which need time after completion of construction before they can produce at full capacity. To account for ramp-up times, we assume that plants only operate at 50% in the year of completion of construction and start operating at full capacity in the first year after commissioning.

Figure 2: Green steel supply



Notes: The figure shows the estimated evolution of green steel production.

2.3 Green premium

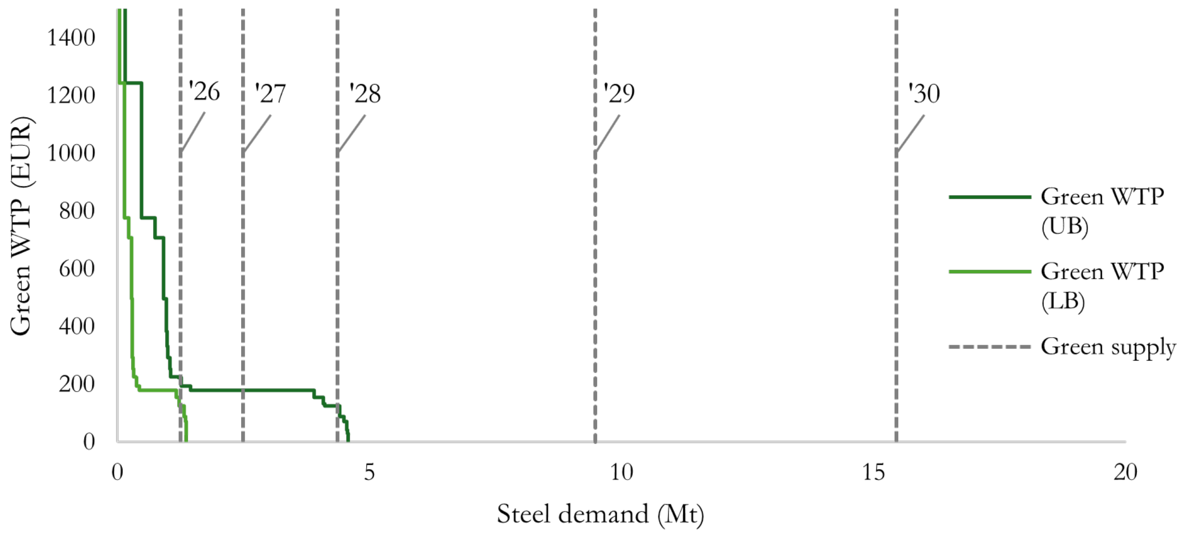
If the suppliers and buyers of the green basic material both act as price takers, then the green premium will be given by the intersection of the green demand curve and the green supply curve. Especially in its initial years, the production of (and possibly also the demand for) green steel will be relatively concentrated. Firms may therefore be able to exert market power leading to some deviations of the market price from the perfectly competitive equilibrium. The analysis of the effect of market power on green premiums is however beyond the scope of this analysis, and, thus, left for future research.
We therefore estimate green steel premiums under the assumption of perfect competition by intersecting the estimated green demand curve with the green steel supply. The resulting green steel premium estimates over time and under different (policy) scenarios are presented in the next section.

3 Results

3.1 Green steel premium estimates

Green steel supply is only sufficiently scarce to generate significant green premiums in the very early years of the transition to green primary steel making. Figure 3 shows that only in 2026 the green steel supply crosses the lower bound of the green demand curve. Once the Stegra Boden plant (which is the first green steel project scheduled to be completed in 2026) produces at its full capacity of 2.5 Mt in 2027, the steel supply of this one plant already exceeds the lower bound estimate of steel demand with a positive green willingness to pay.

Figure 3: Green steel demand and supply over time

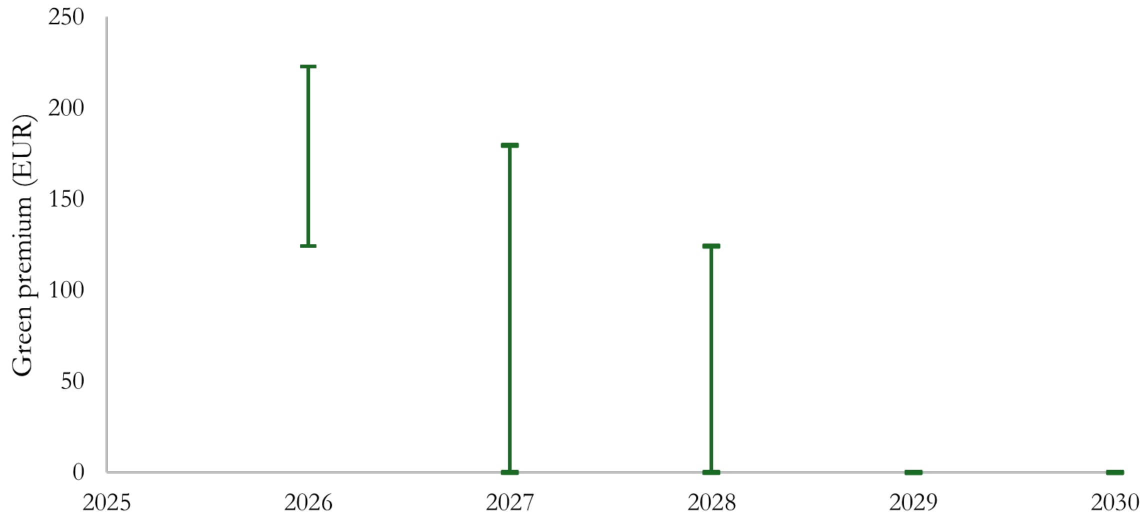


Notes: The figure shows upper and lower bounds of green steel demand and how green steel supply is expected to evolve from 2026-2030.

Thus, green steel premiums are only strictly positive in 2026, and are estimated to lie between 124 EUR and 223 EUR in that year (see Figure 4). This estimated price range is similar to green steel premiums currently reported by market participants.[15] In 2027, with the Stegra Boden plant expected to produce at full capacity, the lower bound of the green steel premium falls to zero. Also the upper bound of the estimated green steel premium decreases to 180 EUR in 2027, and further down to 88 EUR once additional green steel plants start producing in 2028. From 2029 onwards, the green steel supply exceeds the upper bound estimate of steel demand with a positive green willingness to pay, and, thus green steel premiums are estimated to be zero from 2029 onward.

[15] Fastmarkets publishes a green steel premium based on interviewing market participants. In 2025, the green steel premium reported by Fastmarkets was always between 100 EUR and 200 EUR (Fastmarkets, 2026b).

Figure 4: Green steel premium over time



Notes: The figure the estimated evolution of green steel premiums from 2026-2030.

3.2 Green hydrogen availability and green steel premiums

In our main specification, we assume that green hydrogen will be scarce until 2030. We therefore assume that green steel projects which plan for initial operation with natural gas and a later green hydrogen phase-in completely operate on natural gas until 2030. These green steel projects have, thus, been excluded from the green steel supply until 2030 in our main estimation.

Alternatively, we can optimistically assume that these plants run on green hydrogen from the start (see Figure A.2 in Appendix A.4). This optimistic assumption on green hydrogen availability leads to an increase of green steel supply which exceeds green demand even earlier than in the main specification (see Figure 5). In this specification, green steel premiums already fall to zero in 2027 (see Figure A.3 in Appendix A.5).

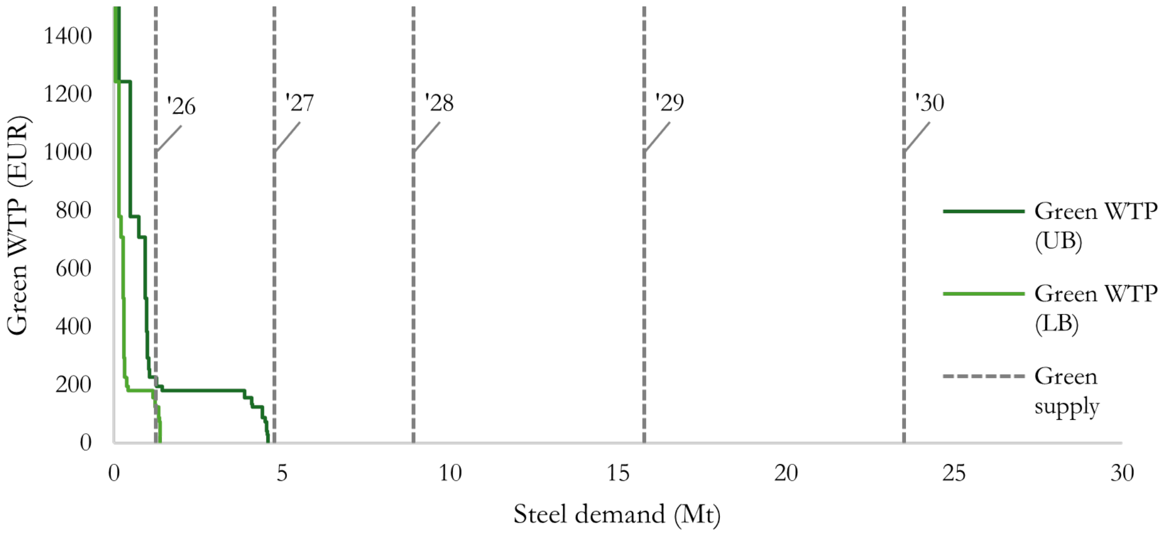
3.3 The effect of green public procurement on green steel demand

Green public procurement (GPP) is often discussed as a potential initiator of green lead markets (Agora Industry, 2024; Chiappinelli et al., 2021; Wyns et al., 2024). Therefore, we simulate how GPP would affect green demand, the relative scarcity of green steel and resulting green steel premiums.

To our knowledge, there is no estimate of the share of public primary steel consumption for the EU. However, (Wyns et al., 2024) estimate that in the construction industry, the share of green public procurement is on average 11% in the EU – ranging from about 5% in Germany to about 20% in Ireland. As most public steel procurement is for infrastructure and construction projects, which uses large amounts of secondary steel (Vogl et al., 2021), the share of public procurement in the EU's primary steel consumption is likely much lower than 11%.

To obtain an upper bound estimate of the potential demand pull effect from GPP, we nevertheless assume that public procurement accounts for 10% of total primary steel consumption

Figure 5: Green steel demand and supply over time



Notes: The figure shows upper and lower bounds of green steel demand and how green steel supply is expected to evolve from 2026-2030.

in the EU. We further assume that the public sector commits to source all of its primary steel from green production.

Under these assumptions, the volume of green primary steel demand that could be generated via GPP in the EU amounts to 6.7 Mt[16], thus shifting the green demand curve outward by the equivalent amount. Even under these optimistic assumptions on how much green primary steel demand can generated via GPP, the supply of green steel would exceed total demand by 2030 and green premiums would accordingly fall to zero before the end of the decade (see Figure 6).

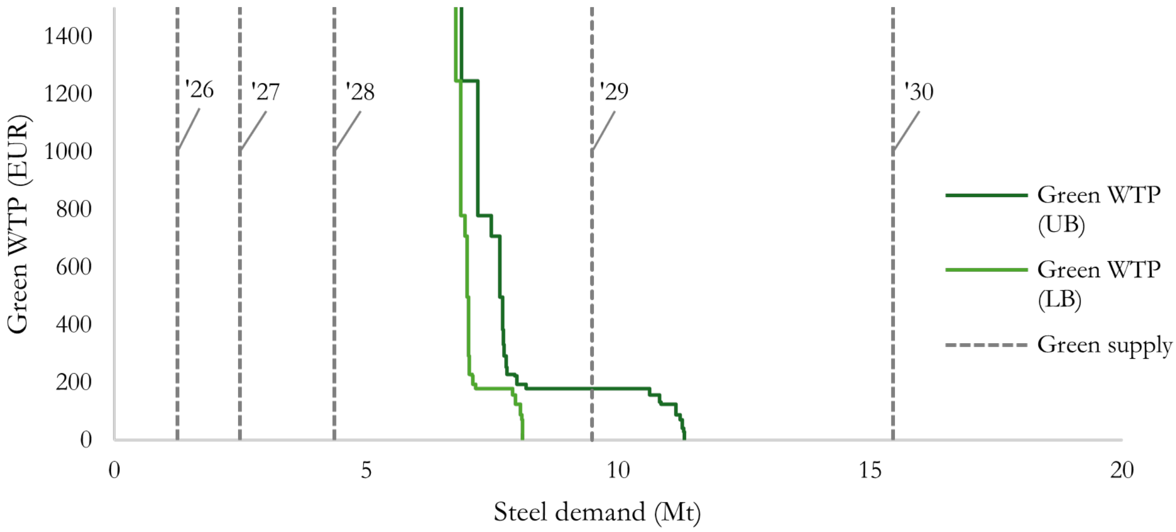
4 Discussion

Green lead markets have been discussed extensively in academic and policy debates (see e.g. Agora Industry, 2024; BMWK, 2024; Köveker et al., 2023, 2025; Vogl et al., 2021). These discussions usually call for certification and labeling of green products, such that consumers can clearly identify low-carbon products and thus create a *demand pull* to incentivize green production, or at least a green premium which can contribute to covering part of the incremental costs of green production (see e.g. Agora Industry, 2024; Muslemani et al., 2021).

This line of argument is based on the implicit assumption that the demand with a positive willingness to pay for green product attributes exceeds the supply of clean products. Otherwise, the price for the green product attribute or the green premium would be close to zero and no green demand pull would emerge. However, estimates of consumers' green willingness to pay and resulting green premiums are highly uncertain (Köveker et al., 2023). Moreover, the most emission-intensive products are energy-intensive basic materials which are mostly traded

[16] Total primary steel consumption in the EU is about 67 Mt (own calculations based on EUROFER (2025)).

Figure 6: Green steel demand and supply over time with green public procurement



Notes: The figure shows upper and lower bounds of green steel demand and how green steel supply is expected to evolve from 2026-2030.

between firms. Firms are mostly reluctant to disclose their willingness to pay for and actual prices of inputs (Arya et al., 2015, 2019), making it even more challenging to obtain information on green demand and green premiums. As green basic material prices are mostly not yet publicly quoted, the green premium can also not be estimated based on available price data. We have proposed an approach that circumvents this data availability issue by inferring firms' willingness to pay for green basic materials based on firms' internal carbon prices for embodied emissions in procured inputs.

Our approach to estimate green willingness to pay via firms' internal carbon prices faces the limitation that it only allows us to estimate the green demand for the subset of firms using and publicly reporting their internal carbon prices. While we cannot compute a precise estimate of the green demand curve, the approach allows us to estimate its lower and upper bounds. By intersecting the resulting range of green demand curves with the green supply, we can derive an upper and lower bound of the green premium.

Applying this approach to green steel, we find that the estimated interval of green steel premiums is only significantly positive in the very early years of the green steel transition. The lower bound of the interval falls to zero once the first full scale green steel plant operates at full capacity. Even the upper bound of the green steel premium interval rapidly declines and falls to zero before 2030 in all specifications. While green premiums rapidly decline in our main specification, they fall even faster in an alternative scenario with optimistic green hydrogen availability due to a faster expansion of green steel supply.

Even though the estimated interval of green premium interval is quite wide in the initial years of the transition, our results nevertheless provide the important insight that green premiums alone are insufficient to cover incremental costs of green steel production. This is even true for the earliest stages of the transition. Once the first green steel plant is fully operational, the estimated green premium interval ranges from 0 EUR – 180 EUR in our main specification. Thus, even the upper bound of this comparatively high early stage green premium is smaller than incremental costs of green steel production which are above 200 EUR per ton of steel according to most estimates for central Europe.[17] As more green steel plants start production, green steel supply increases and green premiums will decrease even further below incremental costs. Firms likely anticipate that green steel premiums will only – if at all – be significant in the early stages of the transition and become nominal before 2030. When making an investment decision, they will spread the expected green revenues over the expected lifetime of the plant. As steel plants operate for 40 years on average[18] (IEA, 2020), the average green premium per unit of production will be very low, even if the firm expects positive green premiums in the first years of production. Thus, it is unlikely, that green premiums have been pivotal in the investment decisions of green steel plants that are currently under construction or planned.

Green premiums will play an even lower role for future investment decisions of green steel plants, as these projects will only start production after 2030[19] when green steel premiums will have fallen close to zero according to our estimates. Clearly, green premiums from private sector demand alone are insufficient to cover the cost gap between green and conventional primary steel production. Thus, additional policies, such as effective carbon prices, dedicated support for green production facilities via subsidies or CCfDs, are needed to decarbonize green primary steel production in the EU. As long as effective carbon prices are too low to close the cost gap between green and conventional steel production, green premiums may, however, contribute to covering the remaining cost gap. They may, thus, reduce the costs for other complementary policies, such as subsidies or CCfDs, as long as they correctly factor in firms' green revenues. Nevertheless, this cost reducing effect of green premiums will likely be small and limited to the very first years of the green steel transition due to the transient nature of green steel premiums.

Green public procurement is often mentioned as an important complementary tool to unlock green lead markets (Agora Industry, 2024; Chiappinelli et al., 2021). Our analysis has shown that even under very optimistic assumptions about the scale of GPP, the upper bound of the green demand curve falls to zero at around 11 Mt. of green steel (see Figure 6), which less than one fifth of the EU's current primary steel production (72 Mt. per year (EUROFER, 2025)). This underscores that the scale of GPP alone is too small to create a sufficient demand pull to drive the decarbonization of the EU's primary steel sector. 11 Mt. is also lower than projected green steel supply in 2030, such that the upper bound estimate of green steel premiums still decreases to zero before 2030. Thus, even with GPP green steel premiums will likely insufficient to create strong incentives for green primary steel investments.

As the incentives to decarbonize basic material production coming from private demand

[17] Richstein et al. (2024) calculate incremental costs of about 260 EUR and Agora Energiewende et al. (2022) obtain incremental costs of about 220 EUR per ton of green steel.

[18] They typically require a major interim reinvestment after around 25 years (IEA, 2020).

[19] Full scale primary green steel projects have a time horizon of at least 5 years from project announcement to start of production (in the Green Steel Tracker database, a a project's planned commission date is in most cases at least 5 years later than the project announcement).

are limited, several contributions discuss green demand quotas to mandate demand for green products (Agora Industry, 2024; BMWK, 2024; Vogl et al., 2021; Wolf, 2025). However, in practice green demand quotas face several challenges, such as high bureaucratic costs related to monitoring, reporting and verification for both the public administration and for firms (Köveker et al., 2025; Vogl et al., 2021). Moreover, like most other climate policy instruments, green quotas face the problem of limited regulatory commitment. The resulting regulatory uncertainty is a challenge for investments in long-lived low-carbon production capital. This problem of regulatory commitment and resulting uncertainty is exacerbated in the case of green demand quotas due to their downstream nature. For the quota to work effectively, actors along the value chain need to believe in the quotas long-term effectiveness in order to make long-lived investments based on it. Actors thus need to believe that the regulator will uphold to the quota in the long-run and will not renege on it in the future. These are the demanding prerequisites for the quota to function effectively along the value chain. If they are not fulfilled, downstream actors will not be able to obtain the green inputs needed to meet the quota, or upstream actors cannot sell their intermediate products at a sufficient green premium to cover their incremental costs.

Some caveats apply: First, it is unclear if private sector demand for green basic materials will expand or rather contract in the coming years.[20] To avoid making assumptions on the direction of change of green demand, we have assumed that green demand will stay constant until 2030. Even though green preferences and green demand will likely grow or decline to some extent in the coming years, these changes would need to be very substantial to alter the core result, that green premiums are too low and too transient to provide significant investment incentives for clean primary steel production. Currently, steel demand with a positive green willingness to pay only accounts for 1.37 Mt.–4.58 Mt. or 1.9%–6.4% of EU primary steel production. It would therefore take a very strong shift of firms' green willingness to pay to create enough green demand to generate sizable green premiums beyond the initial period of the green steel transition.

Second, green steel supply may evolve differently than in our main specification. We have illustrated the effects of a faster expansion of green steel supply due to better green hydrogen availability in Section 3.2. On the other hand, green supply may also grow more slowly than in our main specification, if projects that are planned or currently under construction are delayed or canceled altogether. Such delays of green capacity growth may prolong the existence of sizable green premiums, as long as the EU green primary steel market remains a niche segment with no more than 1–2[21] full scale plants in operation. However, our analysis has shown that green premiums will quickly decline as soon as the green steel transition picks up speed and more than 1–2 plants produce at full capacity.

Finally, public policies may affect the demand for green steel and consequently alter the

[20] In a recent survey of 75 of the large EU and US companies, Cooper and Hawkins (2025) find that 19% of companies are currently reducing their sustainability efforts, while 28% are reaffirming their existing commitments, and 13% are even increasing their efforts. This divided picture underscores the uncertain future evolution of environmental preferences and green private sector demand.

[21] The lower bound of the green demand curve crosses the x-axis at 1.4 Mt. which is a bit lower than the capacity of most full scale plants. The upper bound of the green demand curve crosses the x-axis at 4.6 Mt. which roughly corresponds to the capacity of two full scale plants (see Figure 1.

evolution of green steel premiums. We have seen in Section 3.3 that the effect of GPP is limited. Green demand quotas could in principle have large effects on green steel premiums. As discussed above, their effective implementation however comes with significant challenges. Therefore, we do not expect that effective demand quotas for green steel will be implemented in the short- to medium term, and, thus, also not exert a big impact on green steel premiums before 2030.

Our analysis has shown, that green private demand and green public procurement can only provide limited incentives for investments in green primary steel production. While a mandatory green quota could in principle create private demand at sufficient scale, it faces several challenges to its effective implementation. Therefore, most incentives for investments into green primary steel production need to come from effective carbon pricing and targeted support mechanisms such as green subsidies or CCfDs. Green premiums may however play a complementary role in the first years of the green steel transition, especially in reducing subsidy or CCfD payments needed to close the cost gap between conventional and green primary steel making.

References

Agora Energiewende, Future Camp, & Wuppertal Institut. (2022). Transformationskostenrechner Stahl. Retrieved March 18, 2026, from https://www.agora-industrie.de/daten-tools/transformationskostenrechner-stahl.

Agora Industry. (2024). *Creating markets for climate-friendly basic materials. Potentials and policy options* (tech. rep.).

Arya, A., Mittendorf, B., & Sudbury, A. (2015). Forward contracting and incentives for disclosure. *Review of Accounting Studies*, *20*(3), 1093–1121.

Arya, A., Mittendorf, B., & Yoon, D.-H. (2019). Public Disclosures in the Presence of Suppliers and Competitors. *Contemporary Accounting Research*, *36*(2), 758–772.

BMWK. (2024). *Leitmärkte für klimafreundliche Grundstoffe* (tech. rep.).

Braconi, A., Kleimt, B., Malfa, E., Peters, K., Praolini, F., Schweiger, A., & Snaet, D. (2020). Green steel by EAF route: A sustainable value chain in the EU Circular Economy scenario.

CDP. (2025). Full Corporate Questionnaire: Modules 1-6. Retrieved April 7, 2026, from https://assets.ctfassets.net/v7uy4j80khf8/2vwnUxFROogGypKMp6P5wq/39a028b0f0385eef77e1fbe5253a16fa/Full_Corporate_Questionnaire_Modules_1-6.pdf.

CDP & Oliver Wyman. (2024). Get the money moving: Meeting the European corporate transition challenge. Retrieved March 28, 2026, from https://downloads.ctfassets.net/v7uy4j80khf8/5ByW4zmV2M6bihpAFbs3QP/5d18a15841f3e4dbe42a780f2e6773ab/get-the-money-moving-meeting-the-european-corporate-transition-challenge.pdf.

Cerdá, E., López-Otero, X., Quiroga, S., & Soliño, M. (2024). Willingness to pay for renewables: Insights from a meta-analysis of choice experiments. *Energy Economics*, *130*, 107301.

Chiappinelli, O., Gerres, T., Neuhoff, K., Lettow, F., de Coninck, H., Felsmann, B., Joltreau, E., Khandekar, G., Linares, P., Richstein, J., Śniegocki, A., Stede, J., Wyns, T., Zandt, C., & Zetterberg, L. (2021). A green COVID-19 recovery of the EU basic materials sector: Identifying potentials, barriers and policy solutions. *Climate Policy*, *21*(10), 1328–1346.

Cooper, K., & Hawkins, N. (2025). "Constancy of Purpose" Under Pressure: An Observational Study Examining How Political Shifts Are Transforming Corporate Sustainability and DEI.

Devlin, A., & Yang, A. (2022). Regional supply chains for decarbonising steel: Energy efficiency and green premium mitigation. *Energy Conversion and Management*, *254*, 115268.

EUROFER. (2025). European Steel in Figures 2025. Retrieved February 25, 2026, from https://www.eurofer.eu/publications/brochures-booklets-and-factsheets/european-steel-in-figures-2025.

Fastmarkets. (2026a). European green steel demand stalls as buyers resist premiums, spot activity dries up. Retrieved March 30, 2026, from https://eurometal.net/european-green-steel-demand-stalls-as-buyers-resist-premiums-spot-activity-dries-up/.

Fastmarkets. (2026b). The path to price parity in Europe's green steel market. Retrieved February 27, 2026, from https://www.fastmarkets.com/insights/the-path-to-price-parity-in-europes-green-steel-market/.

Glenk, G., Meier, R., & Reichelstein, S. (2026). Constructing Carbon Abatement Cost Curves. *The Accounting Review*, 1–33.

Hüttel, A., & Lehner, J. (2024). Revisiting Investment Costs for Green Steel: Capital Expenditures, Firm Level Impacts, and Policy Implications. *SSRN Electronic Journal*.

IEA. (2020). Iron and Steel Technology Roadmap - Towards more sustainable steelmaking.

Johnson, C., Åhman, M., Nilsson, L. J., & Li, Z. (2025). Emerging green steel markets surrounding the EU emissions trading system and carbon border adjustment mechanism. *Nature Communications*, *16*(1), 9087.

Kirschen, M., Hay, T., & Echterhof, T. (2021). Process Improvements for Direct Reduced Iron Melting in the Electric Arc Furnace with Emphasis on Slag Operation. *Processes*, *9*(2), 402.

Köveker, T., Ballesteros, F., Klaucke, F. K., Kurz, A., Neuhoff, K., Niemöller, P., & Selvaraju, S. (2025). *Industry transition to climate neutrality: Comparing policy approaches in times of geopolitical fragmentation* (tech. rep.). DIW Discussion Papers.

Köveker, T., Chiappinelli, O., Kröger, M., Lösch, O., Neuhoff, K., Richstein, J. C., & Sun, X. (2023). Green premiums are a challenge and an opportunity for climate policy design. *Nature Climate Change*, *13*(7), 592–595.

LeadIT. (2025). Green Steel Tracker. Retrieved February 2, 2026, from https://www.industrytransition.org/green-steel-tracker/.

Lin, W., Nayga Jr., R. M., & Yang, W. (2024). Preferences and willingness to pay for a novel carbon label: A choice experiment in the United States. *Journal of the Agricultural and Applied Economics Association*, *3*(2), 346–357.

McKinsey. (2024). Materials 'green' premia: Trends and outlook to 2030. Retrieved March 28, 2026, from https://www.mckinsey.com/industries/metals-and-mining/our-insights/materials-green-premia-trends-and-outlook-to-2030.

Meadows, D., Quinn, M., & Yordi, B. (2024). The EU Emissions Trading System. In *Delivering a Climate Neutral Europe*. Routledge.

Meng, J., Zhao, W., Li, J., Ma, S., Wu, X., Guo, S., & Zhang, X. (2025). Technologies and gaps in deep decarbonization of hard-to-abate industrial sectors. *Nature Reviews Clean Technology*, *1*(8), 578–595.

Morales, E. T., & Nykvist, B. (2025). Green Steel Tracker 2.0: Methodology for tracking and classifying announcements of low-carbon-emission projects in the iron and primary steel sectors. Retrieved February 2, 2026, from https://www.industrytransition.org/content/uploads/2024/04/lead-it-green-steel-tracker-methodology-final-v1.2.pdf.

Muslemani, H., Liang, X., Kaesehage, K., Ascui, F., & Wilson, J. (2021). Opportunities and challenges for decarbonizing steel production by creating markets for 'green steel' products. *Journal of Cleaner Production*, *315*, 128127.

Nilsson, L. J., Bauer, F., Åhman, M., Andersson, F. N. G., Bataille, C., de la Rue du Can, S., Ericsson, K., Hansen, T., Johansson, B., Lechtenböhmer, S., van Sluisveld, M., & Vogl, V. (2021). An industrial policy framework for transforming energy and emissions intensive industries towards zero emissions. *Climate Policy*, *21*(8), 1053–1065.

Richstein, J. C., Anatolitis, V., Blömer, R., Bunnenberg, L., Dürrwächter, J., Eckstein, J., Ehrhart, K.-M., Friedrichsen, N., Köveker, T., Lehmann, S., Lösch, O., Matthes, F. C., Neuhoff, K., Niemöller, P., Riemer, M., Ueckerdt, F., Wachsmuth, J., Wang, R., & Winkler, J. (2024). Catalyzing the transition to a climate-neutral industry with carbon contracts for difference. *Joule*, *8*(12), 3233–3238.

Richstein, J. C., & Neuhoff, K. (2022). Carbon contracts-for-difference: How to de-risk innovative investments for a low-carbon industry? *iScience*, *25*(8).

Theuringer, D. M., Beckmann, M., & Betzenbichler, W. (2025). Rulebook for the classification system of the Low Emission Steel Standard (LESS). https://lowemissionsteelstandard.org/downloads.

Vogl, V., Åhman, M., & Nilsson, L. J. (2021). The making of green steel in the EU: A policy evaluation for the early commercialization phase. *Climate Policy*, *21*(1), 78–92.

Wang, Y., Wu, L., & Zhou, Y. (2024). Household's willingness to pay for renewable electricity: A meta-analysis. *Energy Economics*, *131*, 107390.

Wendt, N., Kipperberg, G., & Lindhjem, H. (2024). Consumer willingness to pay for emission reduction in air travel: A meta-analysis. *Transportation Research Part D: Transport and Environment*, *134*, 104347.

Wolf, A. (2025). The uncertain costs of decarbonization policies: A risk analysis for the European steel industry. *Journal of Industrial and Business Economics*, *52*(4), 913–934.

World Resources Institute & World Business Council for Sustainable Development. (2013). Technical Guidance for Calculating Scope 3 Emissions: Upplement to the Corporate Value Chain (Scope 3) Accounting & Reporting Standard.

Wyns, T., Kalimo, H., & Khandekar, G. A. (2024). *Public Procurement of Steel and Cement for Construction. Assessing the potential of lead markets for green steel and cement.* (tech. rep.). Brussels.

Wyns, T., & Khandekar, G. (2023). Energy-intensive industries in the EU: Overcoming barriers to transition? In *Handbook on European Union Climate Change Policy and Politics* (pp. 289–304). Edward Elgar Publishing.

Yanan Wang, Zhiwen Zhang, Yalin Xu, Rui Li, & Wei Chen. (2025). Motivation, preference, and willingness of Chinese consumers to purchase carbon-labeled eggs. *Carbon Footprints*, *4*(2).

A Appendix

A.1 Types of internal carbon prices

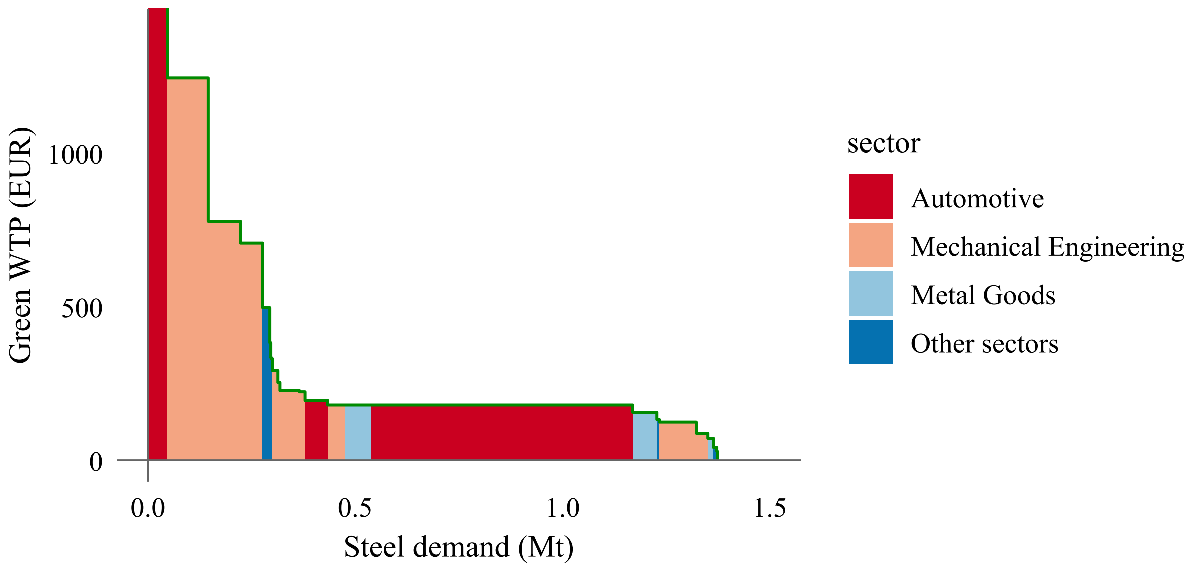
Type of ICP	Description	Generates green WTP
Shadow price[22]	*"Shadow price: where a hypothetical cost of carbon is attached to each ton of CO2e to reveal hidden risks and opportunities throughout the organization's operations and value chain and to support strategic decision-making related to future capital investments. A shadow price can be used in investment decisions or to set budgets, but no actual financial flows are generated."* (CDP, 2025, p. 373)	Yes
Internal fee	*"Internal fee: mechanisms which charge responsible internal business units for their GHG emissions. An internal fee mechanism approach results in actual financial flows as the collected revenue is reinvested back into clean technologies and other activities that help transition the entire organization towards lower-carbon operations and investments."* (ibid.)	Yes
Implicit price	*"Implicit price: where the cost of emissions abatement is divided by the tons of CO2e abated. An implicit price is calculated retroactively, after the organization achieves its desired emissions reductions. This calculation helps quantify the capital investments required to meet climate-related targets and is frequently used as a benchmark for implementing a more strategic internal carbon price. Some organizations may also internalize the cost of purchasing carbon credits to set an implicit carbon price."* (ibid.)	No
Internal trading	*"Internal trading: mechanisms which allow internal business units to trade allocated carbon credits."* (ibid.)	Yes

Notes: The table shows the different types of internal carbon prices and their descriptions according to the CDP 2025 Questionnaire (CDP, 2025). It also indicates if the type of internal carbon price generates a green willingness to pay for displays the mapping of steel consuming sectors in EUROFER (2025) to CDP primary activities.

[22] CDP's official description of shadow prices states that they refer to capital investments. However, many companies explicitly indicate that they apply their shadow price to scope 3 emissions from purchased goods and services. In these cases, we assume that companies also apply their shadow price to guide procurement decisions, and, hence, that the shadow prices leads to a green willingness to pay for procured inputs."

A.2 Green Willingness to Pay by Sector

Figure A.1: Green willingness to pay by sector



Notes: The figure shows the distribution of green willingness to pay by EUROFER sector.

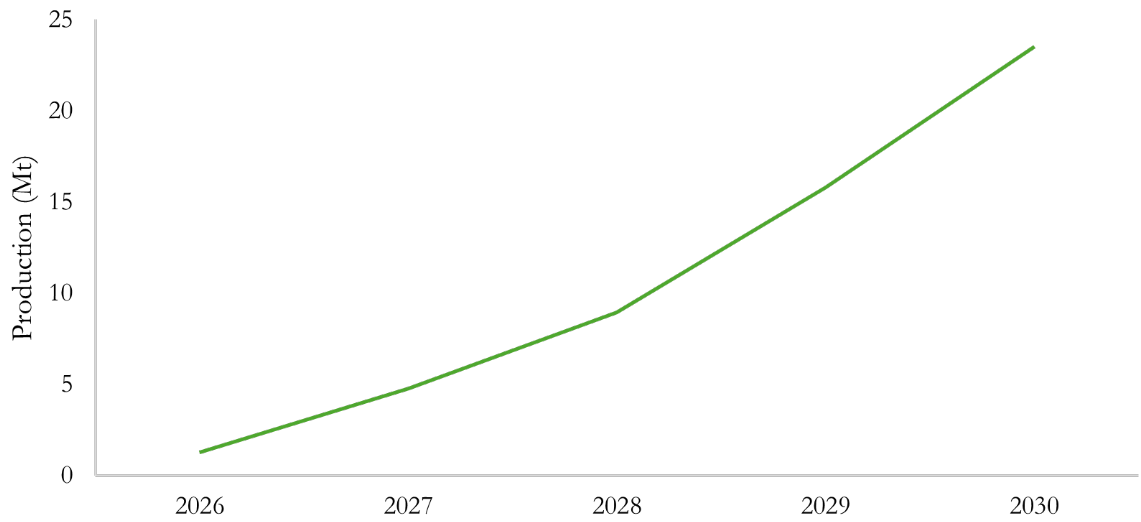
A.3 Mapping of CDP primary activities to EUROFER sectors

EUROFER sector	CDP primary activity
Automotive	Automobiles
Automotive	Recreational vehicles
Automotive	Heavy vehicles
Automotive	Automotive interior
Domestic Appliances	Household appliances
Mechanical Engineering	Engines & motors
Mechanical Engineering	Industrial machinery
Mechanical Engineering	Other renewable energy equipment
Mechanical Engineering	Other vehicle equipment & systems
Mechanical Engineering	Electrical equipment
Mechanical Engineering	Agriculture, construction & mining machinery
Metal Goods	Munitions
Metal Goods	Fabricated metal components
Metal Goods	Metal containers & packaging
Other sectors	Electronic components
Other sectors	Computer hardware
Other sectors	Electronic equipment
Other sectors	Communications equipment
Other sectors	Batteries
Other Transport Equipment	Shipbuilding
Other Transport Equipment	Railroad rolling stock
Other Transport Equipment	Aerospace

Notes: The table displays the mapping of steel consuming sectors in (EUROFER, 2025) to CDP primary activities.

A.4 Green steel supply with optimistic green hydrogen availability

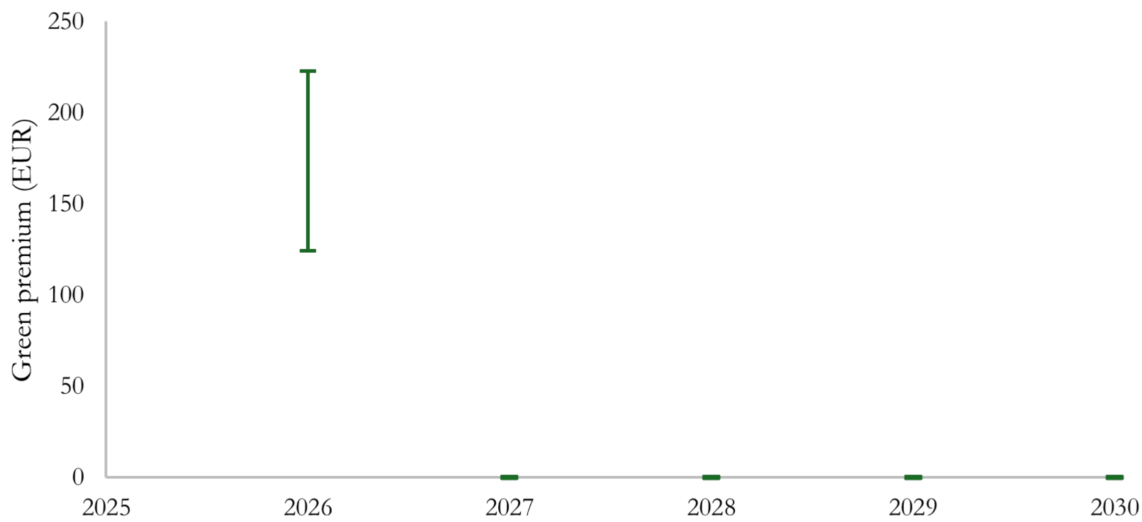
Figure A.2: Green steel supply



Notes: The figure shows the estimated evolution of green steel production.

A.5 Green steel premium over time with optimistic green hydrogen availability

Figure A.3: Green steel premium over time with optimistic green hydrogen availability



Notes: The figure the estimated evolution of green steel premiums from 2026-2030.