Draft label proposed under ESPR for iron and steel – ECOS methodological analysis of JRC paper and recommendations

Brussels, September 2026

Authors

- Jean-Luc Wietor, Head of Buildings & Industry, jean-luc.wietor@ecostandard.org
  All comments, questions or requests for background data should be addressed to the author.

Acknowledgements

- Thomas Trevisan, Programme Manager
- Joren Verschaeve, Senior Programme Manager

The present analysis (Part A) is based on a document we sent to the European Commission within a stakeholder consultation period. Additional context and information have been added for clarity. Part B has been added recently: it uses the JRC's methodology but applies the corrections suggested in Part A.

Contents

Executive summary

On 1 April 2026, the Joint Research Centre (JRC) shared with stakeholders a document proposing labelling systems for five types of steel products based on the carbon intensity of their production, for the implementation of the Ecodesign for Sustainable Products Regulation (ESPR). This is an important step towards decarbonising a sector with a very high climate impact, which the EU promised to take in the Industrial (Decarbonisation) Accelerator Act.

The proposed performance classes presented in the document would unintentionally have regarded almost all steel on the EU market as green (i.e. within the top two classes out of five) and would therefore have had little impact on demand for decarbonised steelmaking.

Part A of this report analyses the JRC's proposal and analyses its shortcomings. The JRC's proposal aims at *ensuring that the classes drive continuous progress*. However, in our view, it will not drive decarbonisation of steel production but rather stifle innovation and investment. The JRC's proposed system classifies most products on the EU market (likely more than 90%) into the two top categories out of five. Legal provisions in other legislations direct public procurement to the two top classes of labelling system; meaningless public procurement obligations would be triggered if the proposed label became law without changing the market.

The JRC's proposal strongly diverges from other labelling systems set out to provide transparency on carbon footprint and incentivise decarbonisation. We therefore tried to understand the underlying methodological reasoning and provide recommendations on how to tackle those.

The proposed classification aims at including 30% of steel on the EU market in the top two categories, but it is unlikely that this will happen, because:

- Unrealistically high emission intensities for many production plants blur the picture. The lack of transparency of the methodological approach and the impossibility of reverse-engineering the calculations do little to improve the situation.
- While the ESPR targets steel on the EU market, global production volumes are used instead, leading to over-representation of emission-intensive production outside the EU.
- The analysis overlooks the CBAM-induced phenomenon of resource shuffling, which will inevitably keep products with the highest emissions off the EU market.
- Reported CBAM data were not used to recalibrate the data and review assumptions.

Part B of this report applies some of the proposed corrections to the JRC concept. Using data from the CRU database (also used by the JRC), we reconstruct the JRC method and apply it to steel on the EU market, rather than looking at global production. By using the CRU data as such, we demonstrate that the JRC's proposed thresholds would have classified no less than 95% of steel on the EU market in the two top categories, rendering the classification system useless and counterproductive. An upper boundary for the second class of 1.95, instead of 2.66 tCO_2eq/t would effectively have included 30% of steel in the top two classes, as intended.

We therefore recommend that future proposals:

- Use ETS data for European production and CBAM data as a basis,
- Use transparent and realistic corrections where the scope diverges from ETS and CBAM.
- That distributions of GHG intensities are weighted according to presence on the EU market.
- That CBAM-induced resource shuffling is considered for imports,
- Follow other labelling proposals and set cut-offs in sparsely populated ranges of emission intensities.

Part A: Analysis of the JRC's proposal for a steel label

Why this label is important

Steel production accounts for around 5% of greenhouse gas (GHG) emissions globally. The bulk of these emissions, and the bulk of crude steel produced, stem from blast-furnaces (BF), where coke ("purified coal") and iron ore are reacted to crude iron and CO_2. The BFs are generally coupled to a basic oxygen furnace (BOF) that turns (pig) iron into crude steel, by lowering its carbon content.

Virgin steel can also be produced by direct reduction of iron ore (DRI): coal, natural gas (NG), or hydrogen are used to turn the iron ore into "sponge iron" without melting the iron. When green hydrogen is used, GHG emissions can be slashed by around 90%. Currently, several H2-DRI plants are being constructed in both the EU and in China; the DRI technology builds on long-standing experience with NG-DRI.

Secondary steel production – producing new steel from scrap – is also used at a large scale, and its emissions are several times lower than with BF-BOFs. Scrap, however, cannot cover all current steel production as humankind's steel stock keeps increasing – furthermore, lower quality scrap practically limits steel recycling mostly to long products.

Currently, the downstream customer or final consumer receives little to no straightforward information regarding the GHG footprint of the steel they buy and of how it fares against other products on the market – often within a more complex product such as a car or a house. Therefore, GHG savings are difficult to market, and green cost premiums (which continue to exist as long as effective carbon prices are low) cannot be turned effectively into green price premiums. A simple, transparent and trustworthy labelling system could improve the information flow down the value chain.

The Industrial Accelerator Act (IAA) promised a simple labelling system for steel that would send a clear signal to investors, namely that competition on lowest climate impacts is becoming possible, and that the EU intends to walk the talk on industrial decarbonisation. The same labelling system should also have provided the basis for more refined labelling systems under other EU legislation, such as the Ecodesign for Sustainable Products Regulation (ESPR) and Construction Products Regulation (CPR). This was also the preferred option when the IAA proposal was published in March 2026[1] (cf. IAA impact assessment), although not the selected option: the Commission chose to delegate the task of defining "low-carbon steel"[2] (Art. 10 (1)). The text does not explicitly task the ESPR and the CPR to set up labelling systems based on classes, although – or because – these laws are already empowered to set up such systems, which will in turn entail obligations for incentives and public procurement (CPR Art. 82 and 83, ESPR Art. 65).

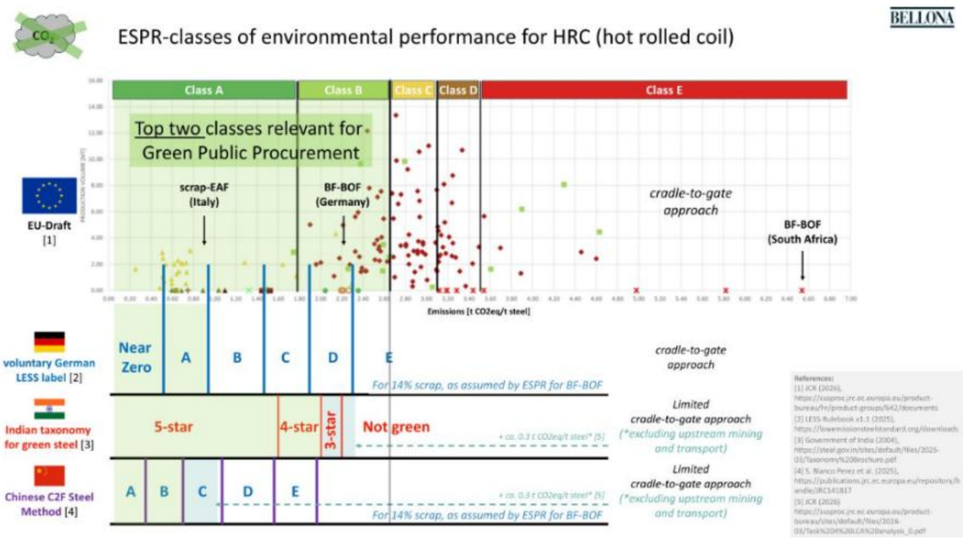
Questionable emission thresholds and classes of performance

The JRC study proposes this classification into five classes for hot-rolled coil (HRC steel). Its most serious issue is the numerical values (cf. table 6). Best-in-class HRC should have up to 1.8 tCO_2eq/t of emissions. And class B, still eligible for public procurement (under ESPR Art. 65) runs through 2.66 tCO_2eq/t of emissions. However, most people familiar with steel will situate blast furnace (BF-BOF) steel around 2 tCO_2eq/t.

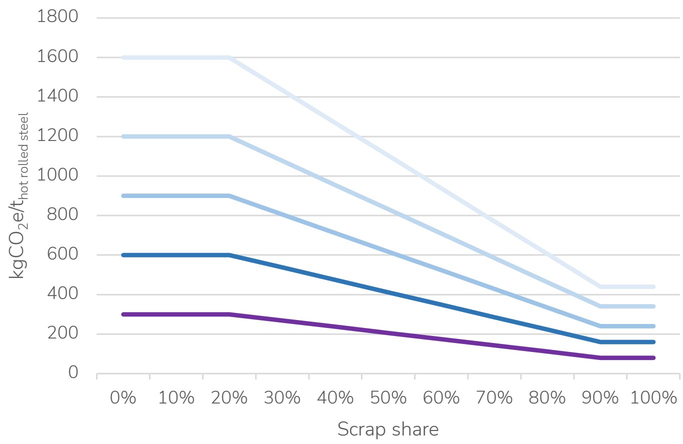
Table 6. Thresholds for the classes of performance of HRC steel.

Class	Carbon footprint range (t CO_2eq/t HRC)	Description
Class A	0.00 – 1.79	Best-in-class
Class B	1.79 – 2.66	High performing
Class C	2.66 – 3.10	Mainstream
Class D	3.10 – 3.75	High emitting
Class E	≥ 3.75	Worst-in-class

A comparison of labelling systems, developed by Bellona, shows what the best two classes mean for other labelling systems: 0.95 for LESS for BF-BOF steel, 2.3 for the Indian taxonomy (often ridiculed for calling almost everything green), and just above 1 for the Chinese C2F method – after adding 0.3 for upstream emissions to the Indian and Chinese scales, to compare like for like.[3] It goes without saying that the limits for the other classes are also much higher than in other labelling systems.



Furthermore, ahead of the draft JRC study proposal, the European Commission impact assessment for the IAA suggested an example of a classification, setting the limit for HRC to 0.9 tCO_2eq/t (after applying Bellona's correction factor),[4] making it difficult to understand how such different findings can be mutually consistent.



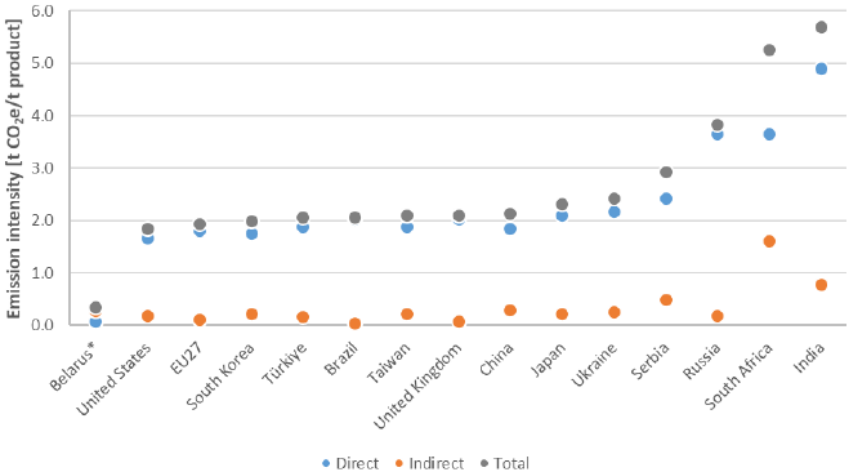
Given the strong discrepancy between the JRC's proposal and other labelling systems designed to provide transparency on carbon footprint and incentivise decarbonisation, we have tried to

understand the underlying methodological reasoning with a view to propose improvements to the ongoing process. In the absence of underlying data and more details on calculation methods, this remains challenging. Nonetheless, we have stumbled upon several methodological issues that we believe need clarification or fixing to improve the ESPR labelling of steel moving forward.

The implausibility of the cut-off in the JRC's proposal should not distract from another issue: the large number of data points between 3.0 and 3.5 tCO_2eq/t. These emission intensities are between 50 and 75% higher than the values one would expect from experience (i.e. roughly 2.0), and which is also confirmed as the best for BF-BOF production routes in the JRC data.

In other words: most blast furnaces would be much less performant than the best ones, according to the reasoning behind the proposed label. Coal – as the origin of the bulk of the emissions – represents a substantial amount of operating cost, and natural gas, although used at a much lower scale, is more expensive than coal per energy unit. In a market reportedly dominated by low margins, it would be economically odd for many operators to be wasting fossil fuel input at such a level. Indeed, simple forms of steel are traded at ca. 600 $/t, and the cost of coal for a tonne of steel in the BF-BOF process was until recently in the order of 100 $ (for ca. 1 tonne of coal for a tonne of steel). Wasting 0.5 t_{coal}/t_{steel} due to inefficiencies would add ca. 50 $/$t_{steel}$, making it likely uncompetitive, and absorbing a substantial part of the producer's gross margin.[5]

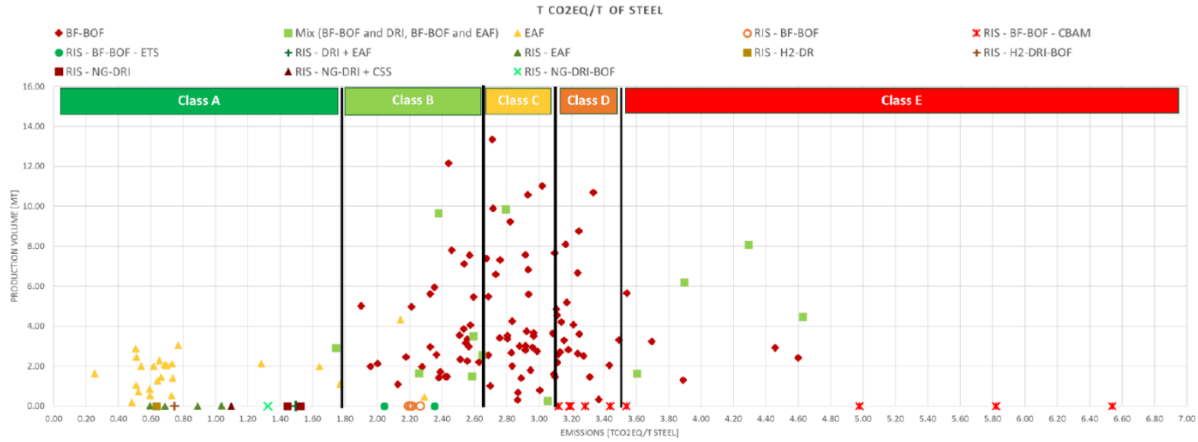
In 2023, the JRC[6] published average emission intensities between 1.9 and 2.5 tCO_2eq/t for several of the EU's top trading partners, totalling 4.7 Mt HRC[7] out of 9.2 Mt total HRC imports. Average values are close to 2.0[8]. The practical optimum for BF-BOFs is also in this range, which means that data points for BF-BOFs cannot be substantially below this value. In turn the worst deciles in terms of carbon intensity can hardly be extremely high, i.e. above 3.0. See also this section.



A further very problematic point (see also this section) is that **resource shuffling due to CBAM is not factored in.** Since January 2026, exporters to the EU have been paying the full ETS carbon price (of the order of magnitude of 70 €/tCO_2eq) for emissions above the benchmarks – adding heavily to production cost when emissions are 1.0 or 1.5 tCO_2eq/t higher "than necessary". The generally recognised phenomenon of resource shuffling means that such suppliers will be rapidly replaced by suppliers of equivalent products with emission intensities closer to the benchmark. In other words, e.g. Indian producers exporting to the EU under CBAM will be those emitting close to 2.0 tCO_2eq/t, while channelling their more carbon intensive steel products to other markets without carbon border adjustment mechanisms in place.

"Some blast furnaces are green"

Let us first give some issues a closer look, before trying to understand them. Let us take figure 9 on p. 35 in the JRC report, showing data points on HRC.



First of all, there are two types of data points:

- Data points on plants (yellow triangles, green squares and dark red diamonds).
  Let us focus on the red diamonds, corresponding to BF-BOFs across the globe. These data points have an x value (their emission intensity) and a y value (the production volume of the plant). The x and y values are based on data from a commercial database by company CRU. *Based on* does not mean *taken from*, as scope 3 emissions are added subsequently, and the final result is then "scaled up" (see this section). The crude data from CRU cannot be accessed freely, but the JRC acknowledges in section 2 that some transformations were made to these data. See also this section.
- Data points on "Reference Installation Scenarios"; these are the other symbols, all located on the x-axis. These data points correspond to fictitious plants with specific production techniques and geographical locations, built using a bottom-up methodology described in section 3. See also this section of the present document.

The study subsequently claims to set the classes in such a way that 30% of the production volume falls into the two top classes.[9] It is worth mentioning that according to table 1 (p. 33), the actual percentage is 36.1%; **the reason for adding a further 6.1% is not clear.**

It is equally worth mentioning that HRC is typically a product family produced via the BF-BOF route in the EU, and in most other geographies. The high copper contaminations in most scrap qualities are problematic for hot rolling into flat products.

By sticking to the 30% (or 36.1%) logic (see also this section of the present document)**, inevitably the JRC study allows some BF-BOF into the top two classes, while the same report states that the label should be "*ensuring that the classes drive continuous progress*"** (p. 3). This makes the document internally inconsistent, considering also that **blast furnaces are supposed to be phased out**. However, one could argue (but we would not) that continuous improvements from poor blast furnaces to state-of-the-art blast furnaces also reduce emissions.

But can incremental improvement of the worst emitting installations be squared with climate goals and planetary boundaries? And do the top classes really correspond to the top 30% percent? If indeed the emission intensities are as adventurously overestimated as they appear at first sight, much more than 30% (arguably more than 90%) of the effective HRC on the EU market will be in the two top classes.

There are reasons to believe this is not the case, because:

- The emission intensities represent (a subset) of global production, not of the EU market, (see this section)
- The emission intensities are likely not the actual CRU data, (see section 6.2) nor close to reality (see this section)

- The phenomenon of resource shuffling for imported goods is ignored, (see this section).

What is the legal basis for this steel label?

The legal basis for the label is the ESPR, which provides a sound legal framework that should be reflected in its implementation. And Art. 65 (3) obliges public buyers to procure products from the top two classes in an ESPR label by setting minimum requirements in the tender documents. Likewise, Member State incentives are limited to the two top classes (Art. 64), providing they are populated.

The rules on defining labels can be found in Art. 16: ESPR labels may contain, or not contain, classes of performance. No indication is given on how classes of performance should be distributed. In the earlier mentioned guiding document (Senatore 2025), among many other aspects relevant to defining labelling schemes, different approaches to populating performance classes are presented and assessed. No recommendation or prescription is made to put the 30% best performers in the top two classes. In one case, Senatore (2025) even puts forward an example which leaves class A empty and class B with <10% of the products.

However, the document clearly acknowledges the relevance of the EU market - not of global production, which we do believe is a valid approach. However, the Energy Labelling Directive's practice of rescaling labels is mentioned, "*if 50% of the units [...] fall into the top two energy efficiency classes (A and B) and further technological development can be expected*." **With 36.1% of considered global capacity being in class A and B, a substantially higher share of EU production, and likely almost all of import, the proposed label is definitely eligible for rescaling, before being adopted.**

What market and what production volumes?

A theoretical look at the situation...

The ambition of the JRC study is to use the EU market as the basis – this is clearly stated on p. 9. This is sound, as the ESPR's scope is the EU. However, from the figure shown here, it seems that this is not the case.

We count 118 BF-BOF plants (red diamonds) plus 11 mixed plants (likely rather sites), i.e. at least 129 blast furnaces. **The EU has fewer than 50 operating blast furnaces.**[10] **The bulk of the furnaces, at least 70, is therefore non-European, which is fair, as the EU also imports HRC.**

Another inconsistent point, on the side: on p. 9 of its report, the JRC claims that "[the CRU] database covers approximately 80% of global steelmaking installations". However, there are currently more than 1000 operating blast furnaces alone.[11] 80% of blast furnaces would therefore correspond to more than 800 data points, which does not align with the 129 data points presented in the study.

The bigger inconsistency, however, resides in **distorting the footprint of products on the EU market by using a clearly skewed proportion of EU production as a proxy for "products on the market":** the EU imports around 12% of its hot-rolled coil.[12] However, at least 53% (69 out of 119) of the data points in the JRC study are non-European. Many people claim that steel production in some non-EU countries is more emission-intensive, which is confirmed by data from other JRC reports, see also here. **The over-representation of non-EU production plants therefore likely leads to an inflated average of emissions.**

To provide a more realistic estimate, we recommend the JRC study apply a lower weight to production plants outside the EU.

As a methodological minimum, a weight of 12% should be applied. To be more realistic, a weight corresponding to effectively imported volumes should be applied to data points depending on the country of production:[13] For instance, a terrible BF-BOF in Russia is irrelevant for the EU market as

Russia does not export any steel to the EU. To be even more correct, the EU plants could also be unweighted for exported volumes of HRC, although these are around four times lower than imports.

No attribution of data points to different geographies is possible because of the lack of primary data and calculation methods in the JRC proposal. We therefore cannot ourselves provide more realistic estimates. Very importantly, the phenomenon of resource shuffling due to CBAM will mean that highly intensive products (and trade partners) will be practically removed from the EU market. (see also this section), which should therefore be taken into account in the proposed study.

...and applied to a practical sample

To assess if materials on the EU market would follow the JRC's very broad and high-mean distribution of production volumes, we checked available Environmental Product Declarations (EPDs) for HRC. Production stages A1-A3 correspond to cradle-to-gate emissions, with emissions from raw material extraction and production in A1 and transportation in A2.

Company	Country	A1-A3	JRC Class
		GWP total - kgCO2eq/t	
Arcelor Mittal/Nippon Steel	India	2580	B
Arcelor Mittal Regular	EU	2350	B
Arcelor Mittal X Carb	EU	600	A
Cliveland Cliff (Cleveland Works)	US	2250	B
Cleveland Cliff (Burns Harbour)	US	2040	B
Cleveland Cliff (Riverdale)	US	1870	B
Hyunday	South Korea	2090	B
Nippon Steel	Japan	2200	B
Posco	Indonesia	2260	B
SSAB Zero	US	469	A
SSAB	Sweden/Finland	1900	B
TATA	India	2860	C
ThyssenKrupp	Germany	2080	B
Toscelik	Türkiye	624	A

While the above summary table by no means intends to present the findings of an exhaustive assessment of all EPDs for HRC; nor applied a relative weighting to their relative market shares, it does confirm our intuition that almost all products on the EU market fall in class B of the proposed labelling system. Almost all performers are regarded as best performers and the label will fail to drive decarbonisation.

The scaling-up exercise

What does the JRC study mean by "scaling up"?

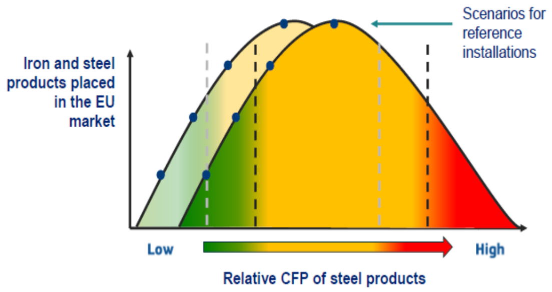
Scaling up is an ad hoc term which has been applied in the draft report; it is not part of commonly used data corrections or manipulations. On p. 9-10, the JRC study summarily explains the concept:

PCF values and associated production volumes for these categories of products were compiled using the CRU platform[9]. This database covers approximately 80% of global steelmaking installations and provides site-level Scope 1[10] and Scope 2 emissions for HRC and WR products.

However, CRU model data are limited compared to the reference scope proposed under the ESPR for PCF declarations, which adopt a **cradle-to-gate** system boundary including **Scope 3 emissions**. Therefore, it was necessary to **scale up** the CRU data to align with the scope of the ESPR, meaning a life-cycle-based approach that includes all emissions generated throughout the value chain of the five representative steel intermediate products.

Figure 2 provides an overview of this scaling process.

Figure 2. Scaling up CRU database with scenarios for reference installations

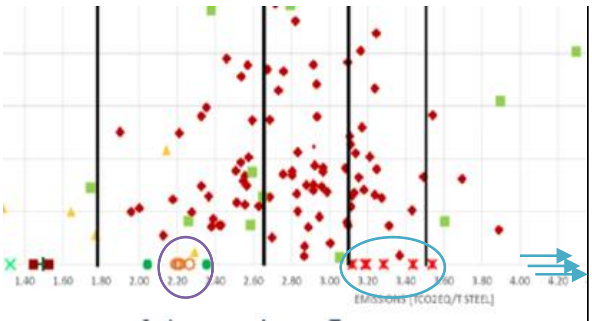


Source: JRC elaboration

The scaling was performed using **Reference Installation Scenarios (RIS)** developed from the **LCA models included in Task 4** of the preparatory work for EU products and CBAM default values for the quantification of CO_2 emissions for imported products. As previously mentioned, CO_2 emissions are quantified using a life-cycle-based approach, which includes Scope 1, 2, and 3 emissions. However, the CRU data only account for Scope 1 and 2 emissions and are subsequently scaled to estimate Scope 3 emissions. Similarly, when using EU ETS and CBAM data[11], missing emissions are incorporated to reflect life-cycle emissions[12]. Specifically, three types of scenarios were considered:

It should be noted that the reference frame for the CRU database is different from the one used by the JRC study: **coking and sintering emissions, for instance, count as scope 1 in the JRC study, but as scope 3 in the CRU database. Emissions from mining and transportation are not included**; it is therefore coherent with the JRC's cradle-to-gate approach to add those scope 3 data.[14] Methane emissions from coal mining are gaining increased attention for their underestimated importance, therefore the JRC's intention is understandable.

However, it is unclear how the raw data were transformed in the JRC's study. Based on the graph in Figure 2, **the scaling up exercise appears to be simply a horizontal shift of the distribution, i.e. adding a constant value of emissions intensity to all data points**. The wording "the scaling was performed using RIS" gives no information, thanks to the mathematical vagueness of the word "using", and the lack of any information on calculation formulae.



A simple shift by adding a constant value would not explain the extraordinarily wide spread of the JRC data other than by an extraordinarily wide range in the CRU data. Adding a constant value to all intensities would also mean that the same value would be added to BF-BOF and an EAF. This in turn would imply that coal mining (corresponding to the correction made to BF-BOF data points) and scrap recovery (that made to EAF data points) would have been considered to coincidentally have the same carbon footprint. The simple shift by adding a constant value is therefore not a plausible hypothesis.

Alternatively, different values could be used to shift the different groups of CRU data, although this would not correspond to what the coloured pseudo-Gaussians in Figure 2 illustrate. But let us stay with that hypothesis, which appears technically more sound. In this case the Reference Installation Scenarios (RIS) for BF-BOF (the orange circles in the light blue circle for the EU, and the red crosses in the purple oval and another three data points[15] with much higher intensities for imports) would need to be used as a reference for the horizontal shift. Let us therefore have a closer look.

Reference Installation Scenarios

The RIS are bottom-up constructed values illustrating the emissions intensities of the different production routes in the different geographies. As of p. 14 of the JRC report, the method is superficially explained. The "scenarios should be built using real EU ETS benchmark emissions and CBAM-declared emissions as primary data sources".

While EU RIS would use the life-cycle analysis (LCA) data of task 4,[16] the RIS for imports would use CBAM default values for the "representativeness and CO2 emissions of extra-EU countries". **Surprisingly and without explaining the reason**, within 14 text lines **the JRC switched from "CBAM-declared emissions" (generally real data, therefore useful data for this purpose) to "CBAM default values".** Also, the JRC does not specify here if the default values for the transitional period are meant, or those for the definitive period,[17] although footnote 11 on p. 10, as well as text on p. 64, clarifies that they are transitional-period defaults.

Table 1 on p. 16 (excerpt shown here) describes in very short terms what input data for the RIS were used. Let's only focus on non-EU countries: for all 9 non-EU countries, CBAM default values are reported to be used, and complemented (likely by raw material production and transportation data) to cover all life-cycle stages in question. Some datasets for natural gas have been used, but it is not clear how, nor why – as little natural gas is used in the BF-BOF route.

Table 1. Reference installation scenarios results for HRC.

Scenario	Description of the scenario	Datasets (for electricity and natural gas)	Result (kg CO_2eq/t HRC)
BF-BOF (EU base case)	HRC is manufactured from slab produced in a BOF using 14.2% scraps + 85.6% pig iron from BF + 0.2% sponge iron from NG-DRI	EU mix for electricity and natural gas	2,207
HRC from BF-BOF (South Korea)	HRC is manufactured from slab produced in a BOF. CBAM default values (scope 1 and 2 emissions) have been used and completed to cover all life cycle emissions.	South Korea's dataset for natural gas	3,120
HRC from BF-BOF (Brazil)	HRC is manufactured from slab produced in a BOF. CBAM default values (scope 1 and 2 emissions) have been used and completed to cover all life cycle emissions.	Brazil's dataset for natural gas	3,191

When these scenarios receive their numerical application (Figure 15 on p. 64), the very high carbon intensities reappear, with South Africa using more than three times what is necessary in terms of carbon input (and hence: output)! Incidentally, South African HRC represented only 0.03% of HRC on the EU market in 2025.

Scenario	kg CO_2eq/t HRC
EU	
BF-BOF (EU base case)	2,207
BF-BOF (Germany)	2,214
BF-BOF (France)	2,192
BF-BOF (Poland)	2,264
BF-BOF EU-ETS average all installations	2,353
BF-BOF EU-ETS average 10% most efficient installations	2,042
Non-EU	
BF-BOF (Türkiye)	3,188
BF-BOF (UK)	3,189
BF-BOF (South Korea)	3,120
BF-BOF (Brazil)	3,191
BF-BOF (Ukraine)	3,539
BF-BOF (China)	3,284
BF-BOF (Japan)	3,438
BF-BOF (Russia)	4,977
BF-BOF (South Africa)	6,539

In addition, the CBAM default values for the transitional period are not country-specific (as opposed to the ones for the definitive period)[18] – they are the same for all countries! This obviously begs the question of where the diverging RIS for non-EU countries are coming from, or what the values represent. Same CBAM default values, similar values for excavation and transport, and irrelevant files on natural gas – but very dissimilar outcomes.

CN code	Description	Default values (tonne CO_2e/tonne goods)		
		Direct emissions	Indirect emissions	Total emissions
	600 mm or more, hot-rolled, not clad, plated or coated			
7209	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, cold-rolled (cold-reduced), not clad, plated or coated	2,03	0,36	2,39
7210	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, clad, plated or coated	1,97	0,39	2,35
7211	Flat-rolled products of iron or non-alloy steel, of a width of less than 600 mm, not clad, plated or	See below		

In summary: we do not know what the CRU-based data look like. The JRC study designed RIS leading to values that are inconsistent with the methodological information shared, but country-specific disparities appear without proper explanation. The RIS values were then used to "scale up" (a word associated with an unknown mathematical operation) the CRU data to generate a cloud of unallocated data points, expecting us to assume this to be generating incorrect and unrealistic data and results.

A short digression on EU production

EU production of HRC sits at 2.207 tCO_2eq/t in the RIS "EU base case", which was "built using real EU ETS benchmark emissions" (p. 14). This value is plausible and it has been corroborated by real-life verified emissions at 2.353 tCO_2eq/t.

A look at the benchmark curves[19] for coking, sintering and steel making gives an estimate of the spread of the best and the worst plants, and to estimate in what classes the EU-produced products would appear.

Percentile	P0	BM	P10	Mean	P90	P100	Weight
BM2 Coke	0.10	0.29	0.17	0.28	0.40	0.96	0.6 t_{coke}/t_{steel}
BM3 Sintered ore	0.15	0.16	0.19	0.26	0.33	0.49	1.37 t_{sinter}/t_{steel}
BM4 Hot metal	1.28	1.33	1.43	1.52	1.70	2.60	
Weighted sum	**1.55**	**1.71**	**1.79**	**2.04**	**2.39**	**3.85**	

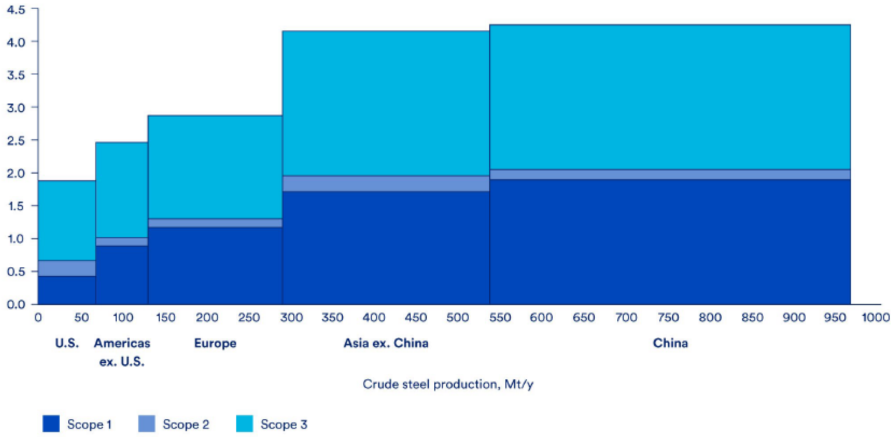
Let us conservatively assume that best coking plants would be associated with best sintering plants and with best BF-BOFs, and likewise for worst ones. In this case the emissions intensity of the best EU product and the 10% worst would be 0.85 tCO_2eq/t apart. The best BF-BOF produced HRC would have a footprint of 1.55 tCO_2eq/t excluding raw material excavation and transportation (0.3) and hot rolling. The best data points in the CRU-based data could very well be from the EU. This means that the worst ones from the EU would be around 2.85, i.e. in the middle of class C.

Are the CRU data realistic?

This is the big question. And given that we do not know the values of a single data point, a geographical assignment of any of them, nor do we understand how the CRU data were "scaled up" to the final data – neither what mathematical operations were carried out, nor what numerical values were used, it is difficult to assign the cause of the flawed distribution of emission intensities to a single cause (let alone to multiple causes).

However, the adjustment for emissions from mining and transportation is likely not the cause, as a constant value was probably added. Neither is the "scaling-up" exercise, as it presumably added a constant value as well, namely the transitional CBAM default value.

The CRU data, obscure in its proprietary nature, remains at this point a plausible cause of oddly high values. Figure 13 of the CATF report mentioned in footnote 13 also shows very high total emissions – in this case for crude steel.[20] In Europe, roughly 40% of crude steel is produced in EAFs, with emissions mostly below 0.5 tCO_2eq/t. A weighted average of ca. 2.8 means that the EU's blast furnaces would have an average intensity of 4.4 tCO_2eq/t! While this figure would be in line with CRU's values for Asia, including China, it would contradict ETS data, the JRC's recent LCA approach, the JRC's 2023 report,[21] and many other sources.



This is another clear inconsistency that needs to be resolved to ensure a robust and correct labelling system. We believe this is possible by providing more clarity on the actual values derived from the CRU database.

Was resource shuffling forgotten?

Resource shuffling occurs when goods from less carbon-intensive production facilities outside the EU are redirected to the EU.[22] Thereby CBAM cost is reduced, while there is no immediate emission reduction. This phenomenon has been recognised in theory for years and was also a frequently raised argument against CBAM from the side of trade partners. Hence, it is plausible and likely that resource shuffling exists in practice since CBAM has entered its definitive phase. It will be very difficult to observe in practice, but that does not invalidate the soundness of the economic reasoning behind the theory.

Let us apply this concept to steel to illustrate the phenomenon. HRC imported into the EU in 2025 – i.e. without practically paid CBAM duties – was traded for roughly 550 €/t on average.[23] The CBAM benchmark for several CN codes of HRC is 1.370 tCO_2eq/t. As of 2025, importers must pay the carbon cost for the difference between the benchmark and real emissions. A producer of HRC in the middle of class B (at 2.23) would pay 62 €/t_{steel}, in the middle of class C (at 2.88) would pay 108 €/t_{steel}, and in the middle of class D (at 3.43) even 146 €/t_{steel}.

In 2026,[24] with CBAM in place, a tonne of "centre-B" HRC would be traded on average at 612 €, while a tonne of "centre-D" HRC would be at 696 €, i.e. at a price premium of 14%! No market actor would be willing to pay such a premium for an extended time, and with no functional benefit on the product. Customers in the EU would quickly look for cheaper suppliers, from the same country or from another country – let us not forget that CBAM duties depend on the product's carbon footprint at the production level, not at the country level.

The JRC study should consider the concept of resource shuffling, and provide estimations about effective shifts in carbon footprints, or simply assume that products from e.g. the 10% best installations worldwide will get to the EU thanks to CBAM.[25]

What about real CBAM data?

The JRC study stated (p. 14) that "CBAM-declared emissions" should be used to build the RIS scenarios, for the sake of data robustness and validity of the assessments.

> related to input data, electricity sources, and scrap content play a central role in shaping the results and ensuring consistency across scenarios. However, it is crucial to emphasise that the RIS scenarios should be built using real EU ETS benchmark emissions and CBAM-declared emissions as the primary data sources for scenario calculations. This approach would enhance the robustness and validity of the assessments, as these values are derived from verified, primary emissions data.

However, **the JRC study did not use real CBAM data to assess the emission intensity of steel goods on the EU market. However, these data exist**: before CBAM became fully operational in January 2026, the transitional period of CBAM,[26] between October 2023 and the end of 2025, was used to collect data. According to Art. 35 of CBAM, importers submitted quarterly reports to the Commission on CBAM goods imported. These reports contained information on "the actual total embedded emissions [...] per tonne of each type of goods". As the Commission holds that data, the JRC, part of the Commission, should use them.

Conclusions

The above analysis showed that substantial doubts remain regarding the JRC's analysis backing the classes of performance proposed during the second stakeholder workshop under the ESPR for iron and steel. While it is difficult to methodologically trace the flaws of the analysis due to the lack of background materials, the results put forward for this draft study suggest:

- implausibly high emission intensities for many production plants. This blurs the picture, given the fluid use of different datasets without a clear methodological explanation.
- little transparency of the JRC's approach, preventing reverse-engineering the calculations to meaningfully submit feedback to improve the situation.
- the presence of inconsistencies and other issues (e.g., assumptions not justified or explained).
- the overlooking of CBAM-induced phenomenon of resource shuffling, which will inevitably keep products with the highest emissions off the EU market.
- no attempt made to use reported CBAM data to recalibrate the data and review assumptions.

We are well-aware the EU is a pioneer in rolling out Ecodesign requirements for industrial goods like steel, and the many challenges that come with it. Therefore**, it is crucial to have a sound and robust methodology in place that can be applied to other industrial goods in the EU, as well as be exported to other geographies in the world keen on embarking on a similar endeavour.**

Part B: applying the corrections to the label

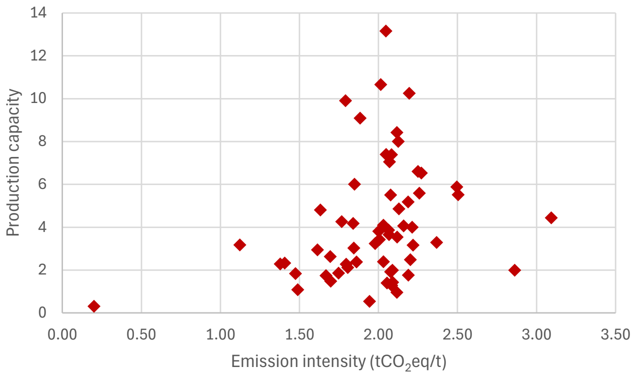
In part A, we recommended the following three main corrections to the data analysis at the basis of the proposed label:

1. **production capacities of production plants in the data set should be weighted for their relative market share on the EU market, to ensure the analysis covers the EU market, not the global market;**
2. **production intensities may be corrected to include assumed upstream emissions such as those from mining and transportation, but no other "upscaling" should take place;**
3. **data on emission intensities should be checked against real CBAM data.**

As no real CBAM data are available publicly, correction (3) was not carried out. However, we applied corrections (1) and (2) to a dataset of emission intensities purchased from CRU. This dataset was designed with the explicit wish to be able to reverse-engineer and correct the JRC's approach.

Are the CRU data realistic?

This heading is deliberately the same as on p. 13 – in this case, however, answering the question rests on an actual dataset provided by CRU, limited to BF-BOF plants. **A simple plot shows that emission intensities are centred around 2.0 tCO_2eq/t, as one would expect.[27] Intensities above 2.5 tCO_2eq/t come from outliers, not from the centre of the distribution as in the JRC's graphs.**



It is therefore obvious that the higher mean and broader spread of the JRC data can only be linked to the process of "upscaling".

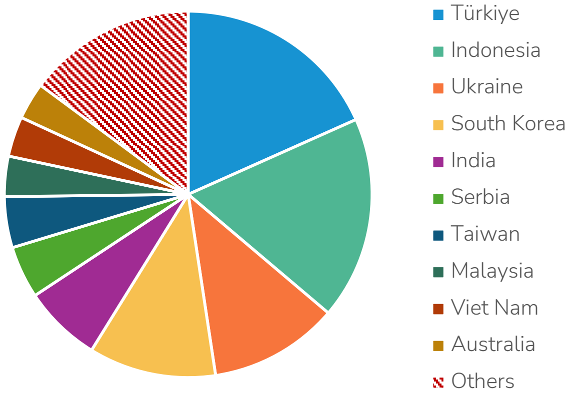
Weighting intensities for presence on the EU market

To gain a realistic view of the GHG intensity of steel on the EU market, certain assumptions and approximations were necessary. As suggested in this section, we have applied different weights to data points from EU and non-EU production, to account for their presence on the EU market.

The mix of origins on the EU market was approximated as follows:

- Trade data for HRC to the EU market were taken as 8.2 Mt of imports, 1.9 Mt of exports and 60.1 Mt of domestic production in 2025.[28] The EU market can therefore be regarded as 66.4 Mt, of which 58.2 Mt (88%) are domestically produced and 8.2 Mt (12%) are imported.[29]
- The relative volumes imported from different producing countries were then taken from the COMEXT database, CN code 7208.[30] The top 10 exporting countries to the EU cover around 85% of imports into the EU.
- The CRU dataset contains emission data from plants from many exporting countries; however, their relative weight in production capacity in the sample must be made to reflect import intensity. As an example, the sample contains a high number of data points from the United

States, but the US only exports a small share of HRC to the EU. The weight of the US data points must therefore be scaled to match the share of exports. Countries without a data point in the CRU dataset cannot be scaled properly; their contribution to the whole volume of exports was considered zero, while the weight of countries with data was increased to keep the overall share of imports realistic.



The very limited presence of HRC from the US on the EU market (a mere 0.002% of the volume) also means that EAF production plants (the yellow triangles in the JRC's graph), prevalent in the US, can be disregarded entirely for HRC.

Numerical application for illustration

This section is for transparency on the details of the calculation method. It can be skipped.

To give a numerical example of the method used, let us consider the following fictitious dataset from fictitious data provider DSV:

Plant	Country	Production capacity (Mt/y)	Emission intensity (tCO_2eq/t)	Weighted relative capacity*
A	DE	2.30	1.75	2.30/4.80×0.88 = 0.4217
B	FR	2.50	1.65	2.50/4.80×0.88 = 0.4583
C	Ukraine	3.20	1.85	0.114/(0.114+0.045)×0.12 = 0.0860
D	Taiwan	1.70	1.72	1.70/(1.70+1.30)×0.045/(0.114+0.045)×0.12 = 0.0192
E	Taiwan	1.30	1.68	1.30/(1.70+1.30)×0.045/(0.114+0.045)×0.12 = 0.0147
(no data)	India	n/a	n/a	n/a

* see bottom of this section

Total production capacity with data amounts to 11.0 Mt/y, of which 4.80 Mt/y in the EU and 6.20 Mt/y outside the EU. It is clear that non-EU production is overrepresented, as imports only represent 12% of HRC on the EU market.

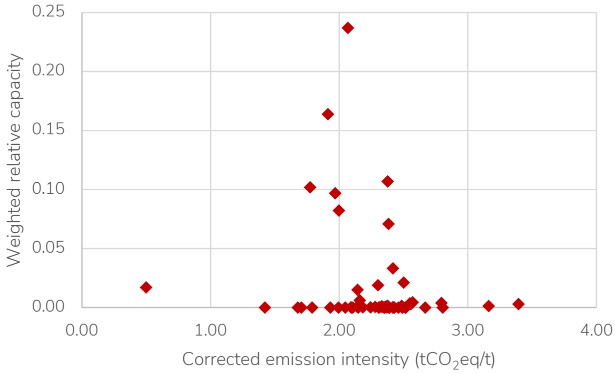
The capacity of plant A is therefore multiplied by a factor of 2.30/4.80×0.88 = 0.4217. In other terms, production from plant A will be considered to represent 42.2% of the HRC on the EU market. Likewise, plant B will have its production capacity weighted by 2.50/4.80×0.88 = 0.4583, i.e. representing 45.8% of HRC on the EU market.

Capacities from non-EU countries will be adjusted likewise, taking into account that for certain countries (such as India in this example), no data are available. Ukraine represents 11.4% of imports and Taiwan 4.5%. As no other non-EU data are available in the DSV dataset, Ukrainian production capacity will be weighted 0.114/(0.114+0.045)×0.12=0.0860, to represent 8.6% of HRC on the EU market. Its single production facility in the DSV dataset will therefore have its production capacity multiplied by 0.0860/3.20=0.0269. For plants D and E located in Taiwan, their respective production capacities must also be weighted so that the overall contribution of Taiwan represents 12-8.6=3.4% of HRC on the EU market. Plant D will see its production capacity scaled to 1.70/(1.70+1.30)×0.045/(0.114+0.045)×0.12=0.0192.

Note that the sum of all weighted relative capacity factors equals 1.

Outcome

When this weighting is applied to the data in the CRU sample, **the distribution of production intensities looks as follows.** Note that a correction factor of 0.3 was added to all plants to account for upstream emissions form mining and transport, as suggested by Bellona (see also this section).

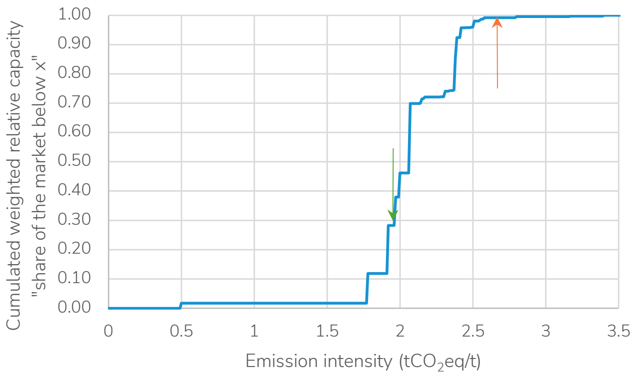


It is evident that most data points, being situated outside the EU, have only a minor contribution towards the EU market, with only a handful of data points of substantial weight.

Plotting the cumulative share of HRC on the EU market below a certain emission intensity against the emission intensity (mathematically: the integral of the "curve" in the previous graph) gives a clearer picture. This approach could be improved by having more data points from plants in the EU, making the cumulative curve smoother, e.g. by integrating effective ETS data.[31]

Conclusion

When 30% of the HRC on the EU market should fall in the two top categories, the cut-off between classes B and C should now be at an intensity of ca. 1.95 tCO_2eq/t (green arrow) **– far away from the JRC's proposal of a cut-off at 2.66** (orange arrow)**. It now becomes evident that such a threshold would have meant that more than 95% of the HRC on the EU market would have qualified as classes A or B.**



Following the JRC's methodology – among others to have 30% of market volume in the top two classes, and applying our corrections, a classification scheme could look like this:

	Carbon footprint range (tCO_2eq/t)	
Class	JRC	after correction
A	0.00-1.79	0.00-1.00
B	1.79-2.66	1.00-1.95
C	2.66-3.10	1.95-2.35
D	3.10-3.75	2.35-2.75
E	≥3.75	≥2.75

However, such a classification system would still show major shortcomings: many production facilities would be close to the B-C frontier. Incremental process improvements (e.g. by decarbonising reheating before hot rolling) could likely move production plants from "medium" class C to "rather good" class B, which would rather protect BF-BOF activities than encourage their replacement by decarbonised production techniques – especially where substantial volumes of product would be procured publicly (although this is likely not the case for HRC).

We therefore recommend setting cut-offs in sparsely populated ranges of GHG intensities. This would generate less opposition and horse-trading from individual operators.

Summary of findings from our analysis

1. The report uses unsound emission intensities: 1.79 tCO_2eq/t for "best-in-class" and 2.66 for "high performing" steel plants. Following our analysis, the second class's upper boundary should be around 1.95 tCO_2eq/t.
2. The proposed JRC label sets much higher limits for classes than several other established labels introduced by the industry (e.g. LESS) or international organisations (e.g. Responsible Steel), thereby making the labelling less granular and less effective.
3. The proposed JRC label limits the two top classes to 2.66 tCO_2eq/t, when a label published by the Commission a month ago used 0.9 tCO_2eq/t. This discrepancy should be acknowledged and addressed.
4. In the JRC analysis, many plants emit 50-75% more CO_2 than the best BF-BOFs, which means that they would be wasting vast amounts of coal, and money. A plausibility check on such "grey premiums" should be carried out.
5. In a 2023 JRC analysis,[32] BF-BOFs in the EU and in many trade-partners were distributed much more narrowly, and with much lower emission intensities. The discrepancies between the two data sets should be discussed and reconciled.
6. The JRC study did not consider resource shuffling, referring to a CBAM induced dynamic whereby lower-emission products are channelled to the EU market. Taking into account resource shuffling as a real-life phenomenon would make estimations of carbon intensities of steel on the EU market more realistic.
7. The 30% top products should be in the two top classes, according to the JRC. But their cut-off production volume is at 36.1%, not 30%. For consistency, the cut-off should be adjusted so that 30% of the volume is effectively considered. However, according to our analysis, the share of steel on the EU market falling effectively into the two top classes will be closer to 90%, not 30%.
8. The JRC study wants the two best classes to drive "continuous progress" but considers many blast furnaces as "high performing", i.e. effectively "good enough". The JRC should reconcile those two statements.

9. The JRC study claims that the CRU database covers 80% of all steel production facilities but only uses around 13% of the number of blast furnaces for the analysis. It should be clarified why other data were not considered.
10. The EU imports 12% of its Hot Rolled Coils (HRC), but in the JRC's analysis 53% of installations are outside the EU. This lack of representativity of the sample should be discussed and addressed.
11. The JRC study proceeds to "scaling up" the CRU data, using Reference Installation Scenarios (RIS) built on CBAM (transitional) default values. But it is difficult to understand what that means, mathematically speaking. Calculation formulas used in the data treatment process should be transparently shared.
12. A small sample of products effectively on the market almost all fall into class B. This indicates that the label would not be able to properly differentiate steel based on carbon intensities.
13. The JRC study announces to use "CBAM-declared emissions" and then uses "CBAM default values". Effectively declared CBAM emissions should be used to validate and recalibrate the model used.
14. The RIS are based, among others, on national "datasets for natural gas", although it is not clear why natural gas is relevant or what data is meant.
15. Of the three highest-intensity data points used to "scale up" the CRU data, one cannot be attributed to an actual RIS in the study. The two other ones correspond to South Africa and Russia, corresponding to 0.03% and 0% of the HRC market in the EU, in 2025. This inconsistency should be clarified, and irrelevant data points should be removed or properly weighted.
16. In the LCA part of the study, the JRC finds that the BF-BOF route in the EU has a footprint of 1.874 tCO_2eq/t, and 1.989 for imports, but they do not try to reconcile the two surprisingly divergent approaches.
17. CBAM default values cannot be blamed for the broad range in calculated emission intensities, as the default value used is that for the transitional period of CBAM – and that value is not country-specific. The JRC should clarify what data was effectively used.
18. The crude CRU data assigns realistic emission intensities to blast furnaces. The JRC's extremely high values can only be linked to the process of "upscaling" which likely consists in simply adding to the actual intensities a number with no physical reality.
19. If 30% of the HRC on the EU market should be included in the top two classes, the cut between the 2^{nd} and 3^{rd} class should be around 1.95 tCO_2eq/t. However, we would recommend that cuts between classes be placed in sparsely populated ranges of GHG intensities. This would generate less opposition and horse-trading from individual operators.

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[1] Impact Assessment to the IAA, available here: the preferred policy option 2 (p. 79) introduces a steel label; however, the IAA does not and therefore does not follow the preferred policy option.
[2] Whereby low-carbon steel does not denote steel with low carbon content, but steel with low embodied carbon, i.e. low emitted quantities of GHGs.
[3] Bellona estimated that including upstream emissions from mining and transport adds about 0.3 tCO_2eq/t to the emissions intensity.
[4] Published in the Impact Assessment to the IAA, p. 267, available here. The "preferred option" label set the limit for the 2nd class to 0.6, using the system boundaries from ETS and CBAM. This limit becomes 0.9 tCO_2eq/t, when Bellona's correction is applied. We have redrawn the graph from the Impact Assessment to make it more legible.
[5] In the case of Arcelor Mittal, used as an example for illustration, adding 50 $ to each tonne of the 55.6 Mt of crude steel it produced in 2025 would lead to extra costs of 2780 M$. This can be compared with a gross margin of ca. 4400 M$, which would be reduced by almost 40%. See Arcelor Mittal's financial statement of 2025, p. 3 and 172, available here. Arcelor Mittal's blast furnaces can be expected to have an average carbon intensity of around 2.3-2.4 tCO_2eq/t, based on overall emissions and relative tonnages produced by BF-BOF and EAF.

[6] JRC 2023 (report referred to in footnote 1), Fig. 7. This report was the basis for the transitional default values under CBAM.
[7] Imports from Türkiye, Ukraine, South Korea, Taiwan, Japan, China, Brazil and the UK.
[8] Conceivably, average values around 2.0 would be conceivable despite many data points above 3.0, if the best ones were not around 1.9 (roughly the practical minimum for BF-BOFs), but much lower (0.6-0.8). This would imply that HRC were produced in EAFs with most scrap, and some pig iron as input, which is common practice in the US, but not in markets that strongly export to the EU. If EAFs covered substantial parts of top exporting market's production share, one would not expect their averages to cluster just above 2.0. The similarity of the average values can be more plausibly interpreted as similarity in effective emission intensity of BF-BOFs.
[9] The method corresponds to "method 3" described in an earlier JRC document (Senatore 2025). The JRC ESPR study states on p. 8 that the method is based on both method 1 and 3, which appears wrong, but ultimately irrelevant.
[10] According to Eurofer's map available here.
[11] According to data by the Global Iron and Steel tracker, available here.
[12] According to Eurofer's "European Steel in Figures 2026", available here, data points for "hot rolled wide strip" p. 18 for production, p. 35 for imports and p. 41 for exports. In the earlier version of this report shared with the JRC, we used a figure of 27% based on data on p. 27 of the same report. However, this figure refers to too highly aggregated data.
[13] Eurostat's COMEXT database provides exact data on volume (and value) of goods imported per trade partner. The correct CN codes for HRC (720810, 720825-27, 720836-39) can easily be selected.
[14] A clear analysis based on CRU data can be found in the CATF's 2025 report "Decarbonization Pathways and Policy Recommendations for the United States Steel Sector", available here. This study also sheds light on the system boundaries and scope 1,2,3 definitions used in the CRU database.
[15] Oddly, the data point at 5.80 does not correspond to any RIS at all.
[16] Another section of the JRC's work, which concludes that HRC produced via the BF-BOF route in the EU has a footprint of 1.874 tCO_2eq/t, and 1.989 for imports. While these data are plausible, they surprisingly do not trigger major questionings regarding their irreconcilability with the PCF data.
[17] The former are average values used in the transitional period (2024-2025) of the CBAM, to replace actual data when these were not available. As no financial obligations were tied to the CBAM declarations, their purpose was to make CBAM reporting easier and to get the market used to the process. The latter, however, were set in Implementing Regulation 2025/2621 to "ensure that embedded emissions are not underestimated when applying default values" (recital (3). In other words, they are punitive, or worst-case scenario values for each country. They were determined to respond to the co-legislators' change to Art. 7 (2) during Omnibus I, which made the use of default values a full alternative to real emissions.
[18] The Commission document of 22 December 2023 containing the transitional default values can be downloaded here.
[19] Available here.
[20] It should be noted that scope 3 emissions include coking and sintering, but not mining or raw material transportation. The reheating and hot rolling stages are not included in scope 1 and 2 emissions in this case.
[21] See footnote 5.
[22] The Commission's Staff Working Document on CBAM, available here, explains the phenomenon in section 5.2.1.10.
[23] This data can be obtained easily from Eurostat's COMEXT database.
[24] As set out in Regulation 2025/2620, available here.
[25] In case the reader wonders if there is enough "cleaner" steel on the market: imports (of all steel products) into the EU are at 27 Mt in 2025, out of more than 1700 Mt non-EU production. This is a mere 1.5% of non-EU production.
[26] Regulation 2023/956, available here.
[27] The data points below 1.5 tCO_2eq/t are linked to plants at sites hosting EAFs as well as BF-BOFs, and where input from both routes are blended, as well as to a plant undergoing major changes in manufacturing processes, leading to lower integration of operations.
[28] According to Eurofer's "European Steel in Figures 2026", available here, data points for "hot rolled wide strip" p. 18 for production, p. 35 for imports and p. 41 for exports.

[29] One may object that a high share of HRC does not reach the market, or final market, because it is further transformed e.g. by cold rolling. While this is doubtlessly true (and more than half of the volumes according to Eurofer), the ratio between domestic and imported volumes will remain the same in first approximation.
[30] This code is denominated "Flat-rolled products of iron or non-alloy steel, of a width >= 600 mm, hot-rolled, not clad, plated or coated", which appears to correspond to HRC (wider than 60 cm). However, the total import volume in 2025 is 11.5 Mt, rather than the 8.2 Mt reported by Eurofer. It is therefore likely that the definitions, and consequently the import shares are do not coincide exactly. However, given the limited representativeness of plants and the absence of data for several producing countries, this did not appear as a major source of error.
[31] Analysis of verified ETS data is difficult as emissions from different activities (coking, sintering, BF-BOF, hot rolling, cold rolling) may be integrated into the same line item; however, the available data does not show which of these activity levels are included, nor free allocations per activity. Such disaggregated data would allow calculating production volumes based on prior years activity levels.
[32] JRC's study "Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners", available here.