CLIMATE GROUP
STEELZERO

SteelZero Commitment and Procurement Framework

SteelZero's approach to mass balance and considerations for its role in a credible transition pathway to decarbonise the steel industry

In partnership with

Responsible Steel | standards & certification

Contents

Background

In this position paper, we explain the concept of mass balance, outline its use within the steel industry and its potential impact on decarbonisation goals, and identify a set of rigorous principles that must be adhered to if mass balance is to be used in line with the SteelZero Commitment Framework.

This paper is intended for use by SteelZero members and steel buyers to support their supply chain conversations on lower emission steel procurement, and to provide guidance to customers for requiring transparent data to make informed decisions. The paper also clarifies SteelZero's position on mass balance to inform industry stakeholders and our network of partners and collaborators – highlighting our call for integrity, additionality, transparency and traceability as the guiding principles for the steel industry in progressing towards a credible net zero transition.

Introduction

The steel industry remains a major contributor to global emissions, accounting for around 8% of annual greenhouse gas emissions. It is crucial that we decarbonise the steel sector.

That's why SteelZero brings together more than 40 steel users globally to make a public commitment to buy and use net-zero steel. By harnessing their collective buying power and influence, we're sending a clear message to steelmakers, policymakers and investors to speed up widescale production of net-zero steel.

Steel producers are responding to these demand signals, increasingly reviewing and investing in their transition strategies to net-zero steel production. To enable credibility in this transition, standards and definitions for lower emission steel production have emerged over the last five years. The ResponsibleSteel International Production Standard is the most globally applicable and comprehensive sustainability standard for the steel industry, covering 13 environmental, social and governance principles in its site certification scheme. Other similar standards, which cover greenhouse gases (GHG) only, include the Low Emission Steel Standard (LESS aisbl), and the China Iron and Steel Association's 'Methods for the assessment of China decarbonised ecological future-oriented steel'.

There is also widespread global recognition of the definition for near zero emission steel[1], including by SteelZero, represented by ResponsibleSteel Decarbonisation Progress Level 4. To create a mass market shift in the near term (by 2030) towards the production and purchase of progressively lower emission steel, SteelZero uses the lower emission steel threshold[2], aligned with ResponsibleSteel Decarbonisation Progress Level 2.

1. Near-zero emission steel is steel that meets the threshold ranging from 400 kg CO2e per tonne of crude steel with 0% scrap inputs (100% iron) to 50 kg CO2e per tonne of crude steel with 100% scrap inputs. IEA Definitions for near-zero and low-emissions steel and cement, and underlying emissions measurement methodologies, November 2024

2. Lower emission steel is the GHG emissions threshold ranging from 2000 kg CO2e per tonne of crude steel with 0% scrap inputs to 350 kg CO2e per tonne of crude steel with 100% scrap inputs. SteelZero commitment framework v1.1, June 2024

However, the lack of an internationally recognised definition or standard for decarbonised steel production has led several steel producers to create and interpret their own green steel product "certification" methodologies for meeting customer demand. This has further resulted in the fragmented use of accounting methodologies and certification systems.

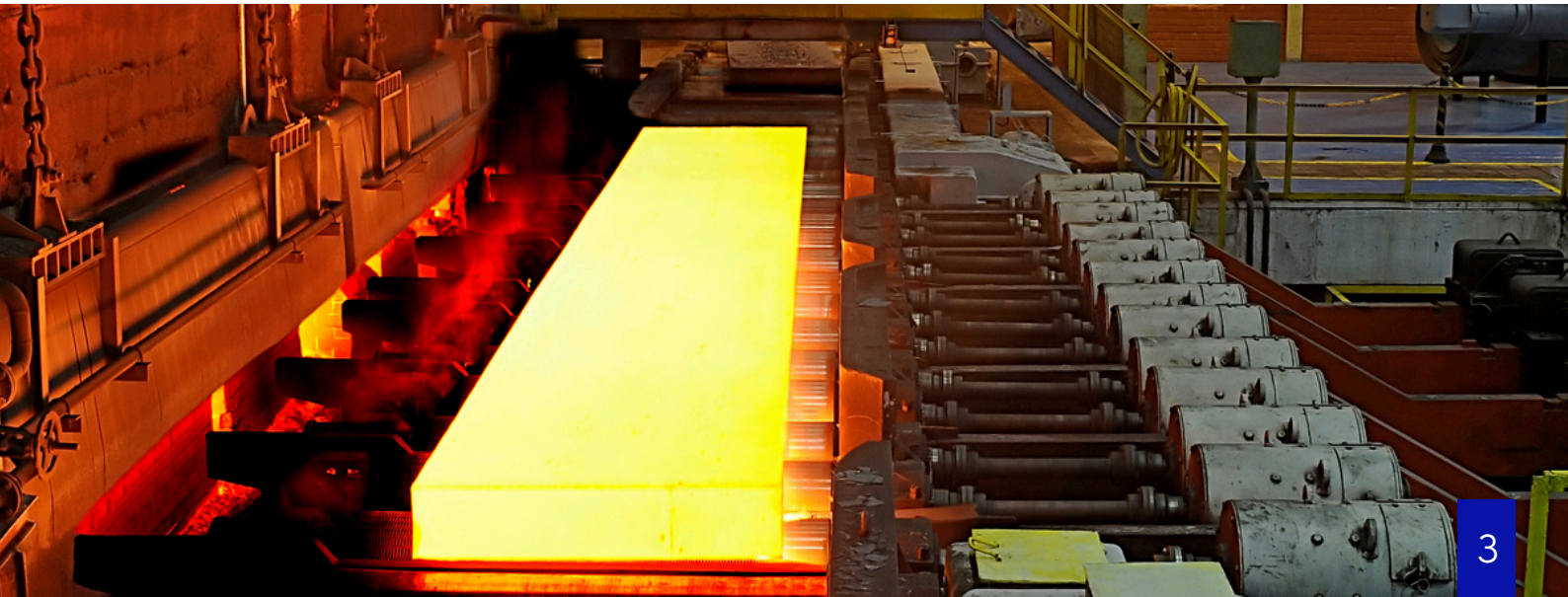
The methods adopted by steel producers have given rise to two distinct approaches to measuring lower emission steel products emerging in the market today:

1. **Embodied emissions accounting:**
Based on real inputs and outputs within an organisational or operational boundary, and using inventory accounting.

2. **Avoided emissions accounting:**
Based on interventions beyond "business-as-usual", measured relative to a baseline scenario using project or consequential (emissions reduction resulting from interventions across the life cycle) accounting.

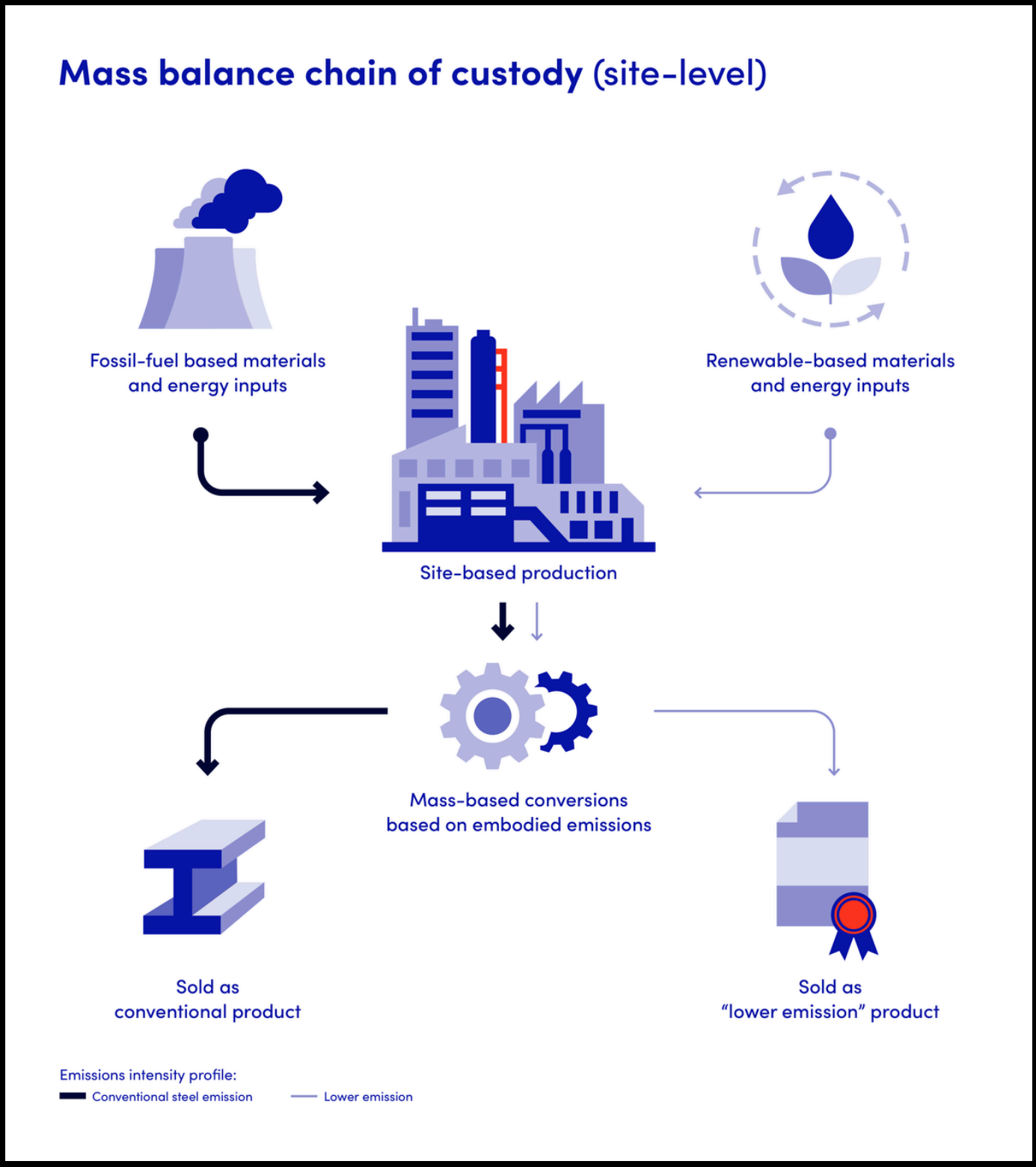
The concept of mass balance

Mass balance is a widely used method in various industries that allows for the mixing of conventional and certified sustainable materials in a production process and ensuring that the proportion of materials used is tracked. There are different interpretations and approaches emerging on the use of mass balance accounting in steel claims, which is causing significant complexity and confusion for customers, policymakers and investors – especially when creating and incentivising a market for credibly decarbonised steel.



Mass balance as a Chain of Custody[3] model (CoC):

Materials or products with a set of specified or certified sustainability characteristics are mixed with materials or products without that set of characteristics[4]. Mass balance in these circumstances is a method of embodied emissions accounting of physical material flows in a system with specific attributes, ensuring that the total mass entering equals the total mass leaving, plus or minus any accumulation or loss within the system.



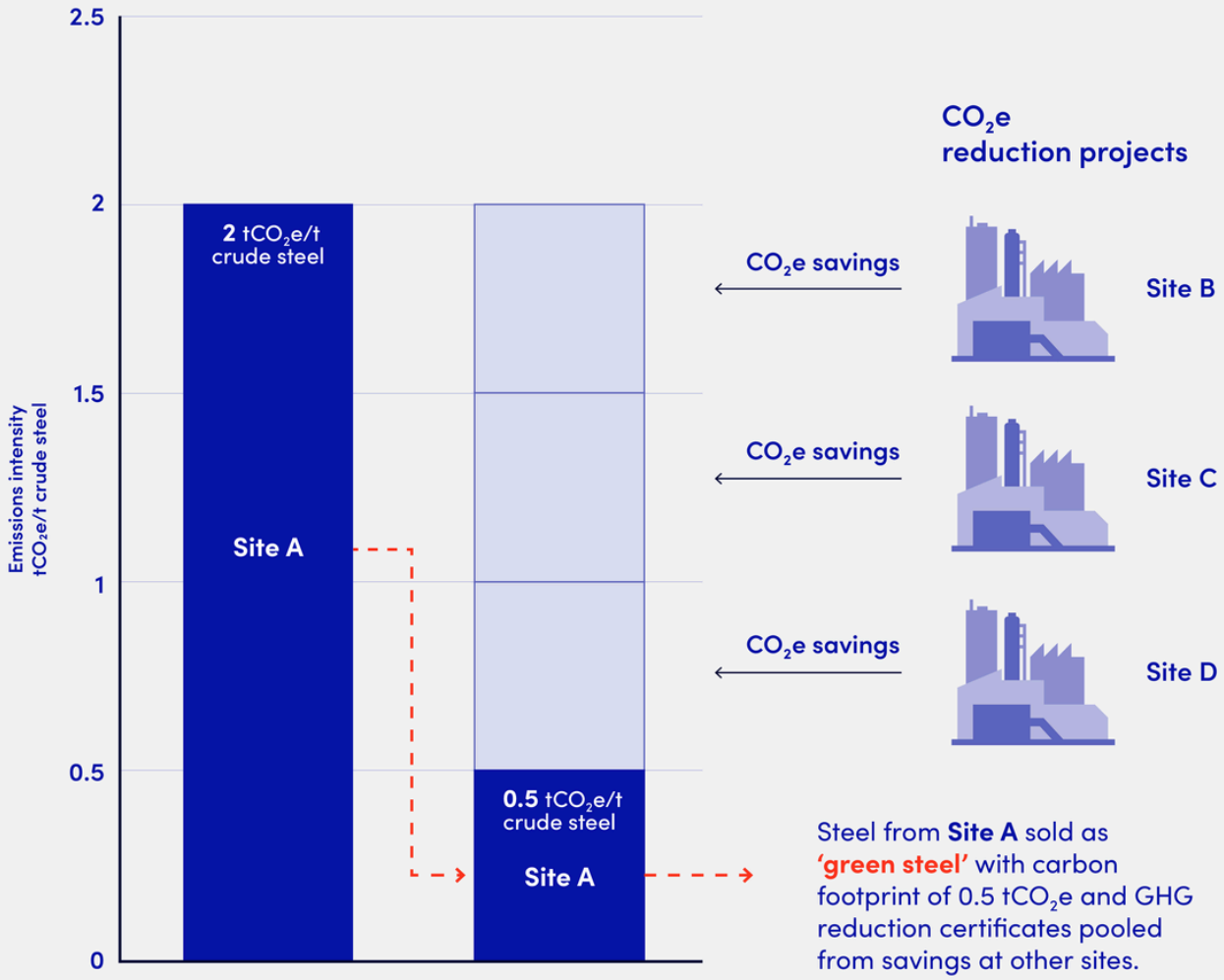
3. Chain of custody model is the approach taken to demonstrate the link (physical or administrative) between the verified unit of production and the claim about the final product. ISEAL Chain of custody models and definitions v2 (2025)

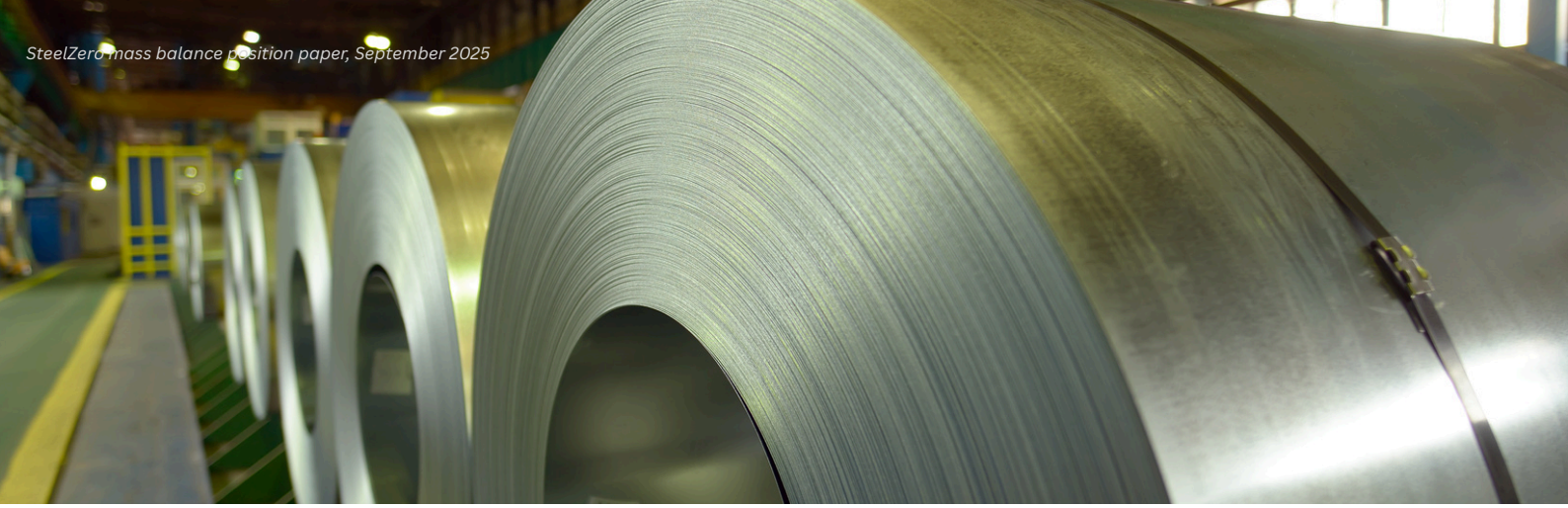
4. ISO 22095:2020 Chain of Custody – General terminology

Mass balance with pooled GHG reduction certificates (credits):

Based on the accumulation of GHG emissions reductions using certificates of GHG attributes that are de-bundled from physical goods using avoided emissions accounting.

Mass balance 'credits' – pooled GHG reduction certificates (organisational boundary)





The impact of mass balance credits on credible steel sector decarbonisation

We are seeing an increase in "green steel" products commercialised and promoted by steel producers. Often these products, and the steel producers creating them, use a mass balance crediting approach which has enabled emissions reduction achieved across a production site (or even within a wider corporate boundary) to be pooled and selectively allocated to specific products, and then sold as "green steel" with a premium.

For example, the Japan Iron and Steel Federation[5] is applying the mass balance credit approach describing it as "a method of pooling greenhouse gas (GHG) emission reductions or CO2 emission reductions from emission reduction projects with additionality implemented by companies, allocating the reductions to any product, and supplying steel products with certificates that are capable of reducing customers' Scope 3 emissions."

Additionally, worldsteel published the first version of its guidelines for GHG chain of custody[6] approaches in the steel industry (November 2024), specifically guiding the use of GHG reduction certificates. The guideline underwent consultation in June 2025 and SteelZero's response to worldsteel highlighted the need for a clear distinction between traditional chain of custody approaches (including mass balance CoC) and pooled GHG reduction certificates (mass balance credits). This is especially critical as we're yet to see the emergence and use of a consistent interpretation to distinguish between mass balance CoC and mass balance credits, in the steel industry.

Civil society organisations[7], buyers[8] and several stakeholders[9–10] have highlighted concerns and risks associated with the use of mass balance credits, specifically the lack of independent oversight and environmental rigour, and the ability of credits to drive true and credible decarbonisation of the steel industry. There is substantial risk that a mass balance credits approach could be misused to overstate environmental benefits - ultimately undermining transparency and trust in steel decarbonisation. Buyers have voiced that they need assurance that claimed emissions reductions are real.

5. JISF guidelines on green steel v3.1, April 2025 (available in Japanese)
6. worldsteel guidelines for GHG chain of custody approaches in the steel industry, v 1, November 2024
7. Published on 5 June 2025, 30 global civil society organisations have written an open letter opposing greenwashing of coal based steel using "mass balance" accounting schemes
8. Volvo Cars position on chain of custody models, January 2024; Siemens Energy, Stepping up green steel transition efforts using the mass balance approach, February 2024
9. ECO Platform Public Statement on the use of the Mass Balance Approach, December 2023
10. Renewable Energy Institute (Japan), Rethinking the mass balance approach promoted by Japan's steel industry, December 2024

Our concerns on this topic were summarised in the Policy Brief[11] we jointly prepared for the G7 Industrial Decarbonisation Agenda:
"Towards a Credible Global Definition of Green Steel - Ensuring Integrity in Decarbonisation Pathways".

Misleading environmental claims:

The approach undermines traceability and risks enabling misleading environmental claims, as steel products certified under this system are not linked to physical emissions reductions. The corporate-based approach—where emissions reduction from across an entire organisation can be attributed to select products—is especially contentious and widely viewed as lacking credibility.

Lack of standardised application criteria:

Mass balance is currently adopted in various approaches ranging from project-based to corporate-based models. These inconsistencies allow producers to design their own carbon accounting frameworks and parameters, including baseline settings and calculation methods. In many cases, emissions reduction are deducted from internal projects without clear standards or geographical boundaries to assess the legitimacy of the projects, or the rationale for allocating those reductions to specific products.

Limited transparency in methodologies:

The lack of methodological transparency under the approach places a heavy burden on third-party verifiers and significantly limits opportunities for public scrutiny, cross-comparison, and accountability. Credit schemes also threaten to avoid the development of transparent market data on lower emission steel based on embodied emissions.

Lack of rigour:

Companies have varying emissions reduction thresholds, or at worst no minimum thresholds, regarding which reductions can be aggregated and then allocated to specific products.

11. Policy brief led by GR Japan and supported by SteelZero and 6 other civil society organisations, June 2025

Insufficient product-level emissions data:

The absence of independently verified product-level carbon footprint data under the mass balance approach framework makes it difficult to assess the actual environmental performance of steel products. This weakens incentives for producers to achieve measurable, physical reductions at the product level over the long term.

Competitive disadvantage on early adopters of clean technologies:

Steelmakers investing in genuine decarbonisation are undercut by competitors using credit mass balance to claim low-emission labels at lower costs. When mass balance credit steel captures market share and green premiums, it weakens the incentive structure intended to drive investment in truly low-emissions technologies.

Principles that must underpin a credible mass balance approach

SteelZero has taken a thorough, evidence- and science-based approach to setting the technical criteria that reinforce our demand-side commitment framework – to ensure that real emissions reduction is driving global steel sector decarbonisation. This approach to demand market creation is crucial for the steel industry, governments, and financial institutions to implement, incentivise and deliver credible climate-compatible decarbonisation in the near term.

SteelZero takes the position of not automatically recognising procurement of any mass balance steel claims under our commitment framework, at the time of publishing this position paper.
We do however recognise that meeting certain criteria, such as providing rigorous, transparent data and information, may enable us to consider and acknowledge the use of credible mass balance CoC (using embodied emissions accounting) efforts as a transition step in the near-term as steelmakers progressively decarbonise their production portfolio. But our framework does not accept a mass balance credit approach (avoided emissions accounting).

The principles that must be followed, to assess the applicability of mass balance CoC approach and any potential near-term transitionary role in achieving a net-zero steel industry, are:

Integrity Resulting in a true, credible, deep decarbonisation of steel production	• The steel producer has a science-based 2050 net zero transition roadmap and targets, validated by or aligned with Science Based Targets initiative (SBTi) or meeting the 1.5°C-aligned climate trajectory. • The steel producer is, or will be, investing in deep decarbonisation of its steel production, aligned with near-zero emission steel production pathways (e.g. Green H2-DRI-EAF, NZE-scrap-EAF). • The steel producer is only using a mass balance CoC scheme for transition in the near-term. The aim is to state actual embodied emissions data, underpinned by traceable CoC systems – identity preservation and physical segregation.
Additionality Resulting in genuine net reduction in emissions through implementation of new additional technologies and/or low carbon inputs	• Lower emission claims should be restricted to the lowest level of emissions reduction that can be delivered by the technology operational at the time, i.e., the mass balance CoC product must not overclaim near- or net-zero emissions if the actual technology isn't delivering that level of reductions. • If there has been an increase in the use of constrained resources, e.g. scrap, this has been enabled by an equal or greater sustainable increase in the recovery and/or recycling of scrap material. SteelZero will then require the proportion of scrap input and steel emissions intensity to meet our lower emission steel threshold.
Traceability and Transparency Enabling customers to understand how emissions reduction has been achieved	• There must be a site-level production link between the emissions reduction project and any/all products that use a mass balance CoC approach. • The implemented projects must be robust and relevant (leading to a net zero transition), with clear disclosure of emissions reduction achieved – calculated against an actual baseline prior to project implementation. • Clear and detailed information about how the generated emissions reduction have been attributed to a product follows a credible standard, verified by a 3rd-party and disclosed transparently to customers.

SteelZero will regularly review its position as industry standards and guidelines emerge, to ensure that our framework supports and aligns with a true, credible, climate-compatible net-zero trajectory for the global steel industry.

The role of customers in asking for transparent data disclosure, to make informed decisions:

Demand-side companies as the customers of steelmakers have an influential role to play in requiring clear information and data from their suppliers. Especially where a mass balance approach may have been used, customers must require steelmakers to provide data (stated below) to enable them to make an informed decision on assessing the claims and how they may meet their requirements (for instance, in conjunction with their SteelZero commitment).

Customers must require steelmakers to provide details on:

- The carbon footprint (CFP) of the steel product – disclosed as GHG emissions intensity of a tonne of steel. Additionally, steelmakers should also provide the scrap share as a percentage of the metallic inputs.
- For mass balance CoC claims, details on
  - The standard followed for calculating emissions reduction
  - The implemented emissions reduction technology or low carbon inputs
  - How the emissions reduction has been allocated to the steel product, with guarantees that the steel product is from the same site.

Conclusion

SteelZero's mission is to support the steel industry's net zero transition by creating and scaling market demand for lower emission steel by 2030 and net-zero steel by 2050. We acknowledge that mass balance CoC could be one of the systems that may be appropriate to decarbonise the steel industry in a transitionary capacity. However, it is imperative that it is credible and truly aligned with a climate-compatible decarbonisation trajectory of the industry.

SteelZero's position, at present, is to not automatically recognise either a mass balance CoC or credit approach under our commitment framework. We do recognise that meeting the principles we have laid out may enable us in future to consider the use of mass balance CoC (using embodied emissions accounting) as steelmakers make progressive efforts to decarbonise their production portfolio. However, we have established that the mass balance credit approach (avoided emissions accounting) doesn't have sufficient credibility.

Our key message to customers is to ask for rigorous, verified and quantified steel emissions data and to ask questions about any steel products that come with mass balance claims. **And our key message to steelmakers** is to transparently disclose such data and information. With enhanced disclosure, it's then possible to qualify if and how any products and claims made meet our principles and may in future adhere to SteelZero's commitment criteria.