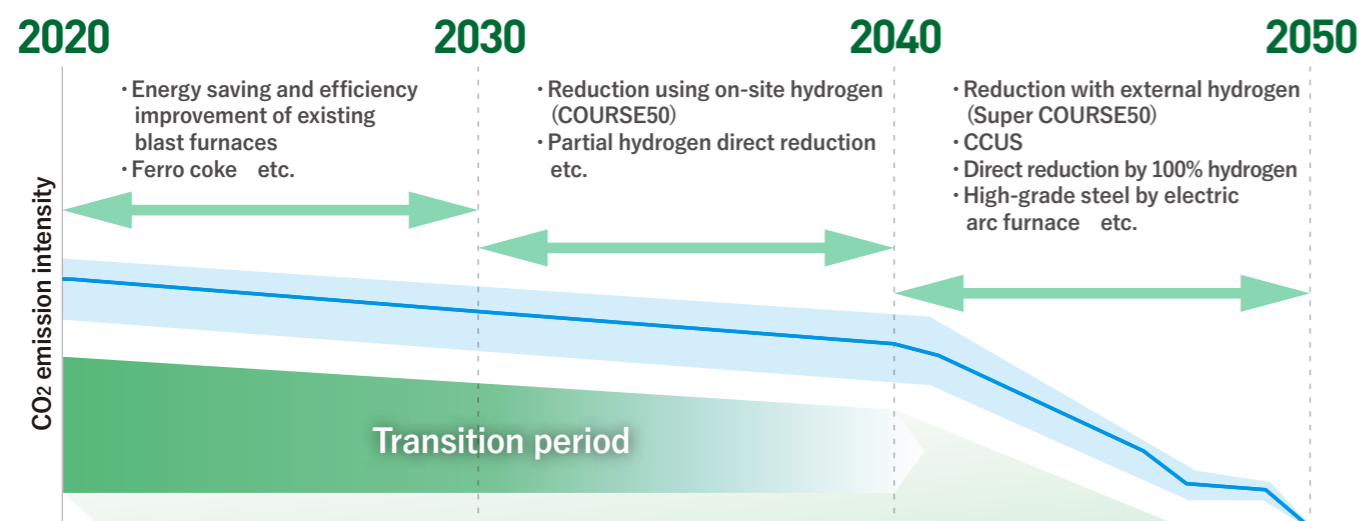


Role of Green Steel upon the application of the mass balance approach in the pathways toward carbon neutrality

Japan's steel industry has achieved the world's highest level of energy efficiency, but to achieve carbon neutrality by 2050, it will be necessary to commercialize innovative technologies such as hydrogen-reduced ironmaking, high-grade steel production using electric arc furnaces, and CCUS (CO₂ capture, utilization, and storage). Huge capital investment will be required too.

Currently, there are no steel companies in the world capable of producing steel products that can immediately and significantly reduce CO₂ emissions, and commercialization is expected to finally become possible around 2040. During the transitional period until then, **providing Green Steel upon the application of the mass balance approach is the only way to meet the green material needs of customers.**

CO₂ emission reduction (images/examples)



Source: JISF based on METI documents

Importance of Green Steel during the transition period

- Emission reductions in the steel industry require large capital investments and significant increases in manufacturing costs. As compensation for the environmental value provided by green steel, we think it is unavoidable to share the cost of emission reductions throughout the entire value chain and throughout society as a whole.
- Major international and domestic steel companies such as Nippon Steel, JFE Steel, and Kobe Steel have already branded their Green Steel based on the mass balance approach and begun selling some of them.
- JISF members will promote CO₂ emission reduction projects consistent with the roadmap established by the Japanese government, such as the "GX Promotion Strategy".

GREEN STEEL

Greenhouse gases (GHG) constitute a group of gases contributing to global warming and climate change. Scope 1, Scope 2, and Scope 3 emissions are categories used to classify greenhouse gas emissions based on their sources.

Scope 1 Emissions: Direct emissions from sources

Scope 2 Emissions: Indirect emissions from the generation of purchased electricity, heating, and cooling consumed by the organization

Scope 3 Emissions: Indirect emissions from activities that occur outside the organization's own operations but are related to the organization's activities

Carbon Footprint (CFP) refers to the amount of greenhouse gases emitted throughout the lifecycle of products and services, from raw material procurement to disposal and recycling.

GREEN STEEL

UPON THE APPLICATION OF THE MASS BALANCE APPROACH

Mass Balance Approach
Allocate CO₂ emission reductions from the project with additionality to designated steel products as environmental value

Green Steel
Steel products that help customers reduce Scope 3 emissions

Steel products are used in a wide range of applications and are indispensable in modern society. Steel demand will steadily increase as the world population and emerging economies grows. Steel scrap can be recovered and recycled into new steel products, but this is not sufficient to meet demand.

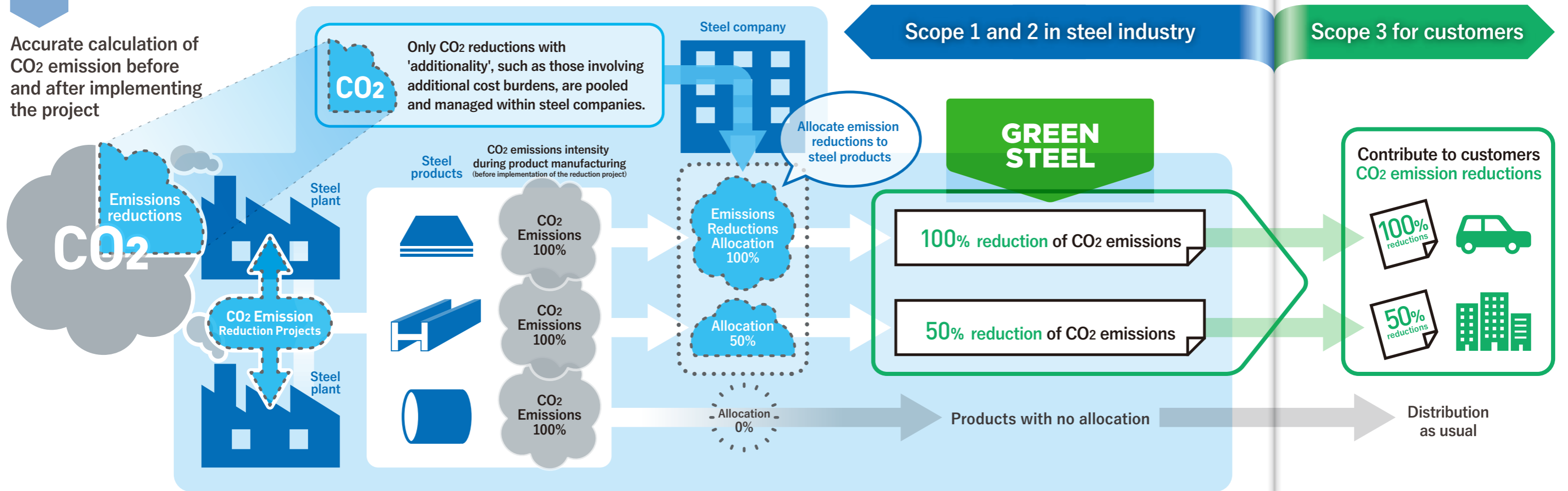
Current technology uses carbon (C) to reduce iron ore, which emits large amounts of carbon dioxide (CO₂). Establishing carbon-free technologies will take time and cost. Although achieving decarbonization in the steel industry is very challenging, we are developing innovative technologies to achieve significant emission reductions in the future while continuing steady efforts to reduce CO₂ emissions.

Today, a wide range of customers, both domestic and international, are increasingly

demanding the supply of steel products with reduced emissions. **Green Steel upon the application of the mass balance approach** is the answer to their demand. Steel manufacturers implement projects to reduce greenhouse gas emissions, including CO₂, at a cost that exceeds economic rationality, and evaluate the reductions with third-party certification, which is attached to any steel product. Reducing CO₂ emissions" in the steel industry is crucial to the decarbonization of not only Japan but the entire world. During the long and difficult decarbonization transition period of steel industry, Green Steel upon the application of mass balance approach is an important solution to exchange emissions reductions with economic value, enabling priority supply of green steel to customers who appreciate the value of the reductions.

Concept: Steel mass balance approach

GREEN STEEL
UPON THE APPLICATION OF
THE MASS BALANCE APPROACH



Step 1 Calculate CO2 emissions intensity of the steel products

- Comply with ISO 20915 or JIS Q 20915 (Life cycle inventory calculation methodology for steel products standard)
- CO2 emissions calculated in Step 1 excludes reduction effect of CO2 emission reduction projects

Transparency ensured by the third party verification

Step 2 Identify CO2 emission reduction project and determine CO2 emission reduction amounts

- Comply with ISO 14064 (Greenhouse Gas)
- CO2 emission reduction projects must be i) within the organization, ii) with additional cost burden and iii) with calculable actual emission reductions
- The requirements for the CO2 emission reduction projects is constantly verified

Step 3 Issue reduction certificate Supply steel products with reduction certificate

- Refer to the mass balance model in ISO 22095 (Chain of custody)
- CO2 emissions reductions from reduction projects are provided to the customers in the form of **emission reduction certificate** along with the steel products. Emission reduction credits cannot be allocated, certified or issued in excess of the total project reductions.
- Customers who purchase a product with an emission reduction certificate can reduce their Scope 3 Category 1 emission
- The reduction certificates by themselves should not be distributed in the market

No double counting of emission reductions for EPD/CFP and reduction certificates

Mass balance approach is an important solution to enable supply of Green Steel to customers during the transition period toward carbon neutrality