First Movers Coalition

FMC Commitment Overview: Steel Sector

September 2023

First Movers Coalition

Decarbonizing FMC sectors requires holistic decarbonization approach

Deep decarbonization technologies

Application of transformational technologies to fully decarbonize key industrial processes

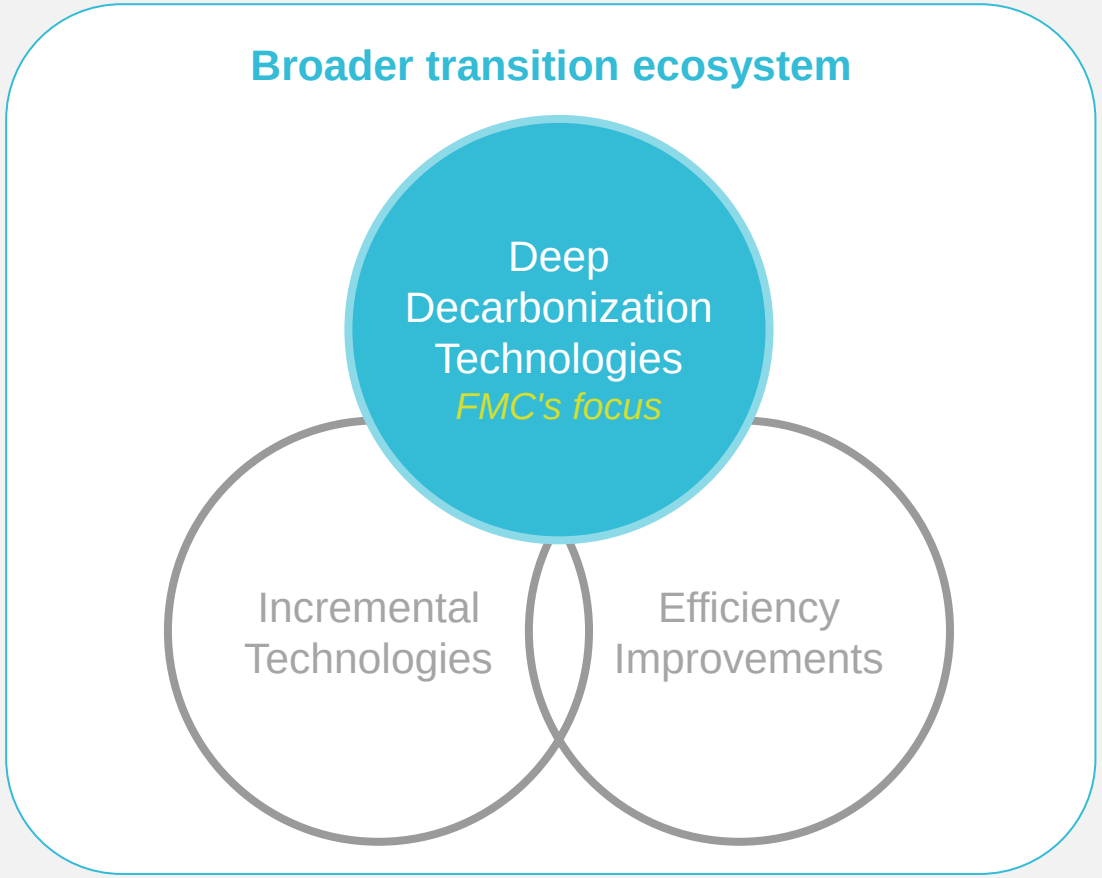
Incremental technologies

Adoption of less carbon-intensive technologies to bridge to fully decarbonized world

Efficiency improvements

Improvements on existing processes to lower energy usage in near-term

FMC seeks to play specific role within broader transition ecosystem

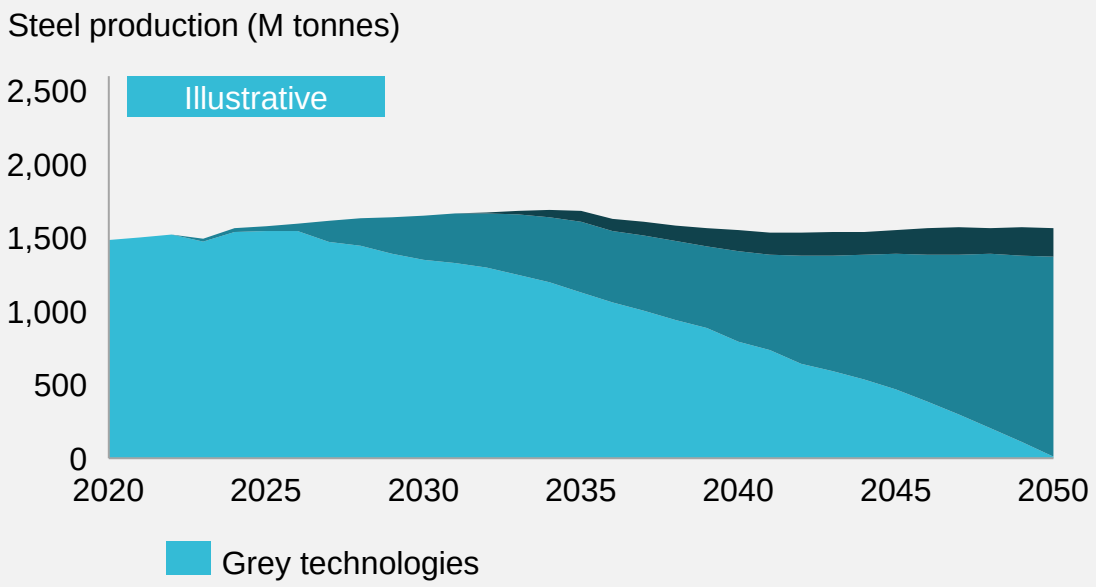


All levers and approaches will be critical to return to 1.5°C pathway, but distinct approaches are required to deliver desired outcomes

First Movers Coalition

7%	8%
global emissions today	*global emissions by 2050*

Steel: Commitment scope



Technologies in FMC scope

- Nascent green technologies
  - E.g., Electrowinning, Electrolyzer
- Advanced green technologies
  - CCUS and CCS with existing processes (E.g., BF-BOF)
  - Green H2 use to reduce iron ore (E.g., H2-DRI-EAF)

Ambition for a component manufacturer/final goods producer

> At least 10% (by volume) of all our steel purchased per year will be near-zero emissions by 2030

Note: representation excludes EAF volumes. Commitment scope includes both flat and long steel.
Source: Net Zero emissions by 2050 'Tech Moratorium' scenario from Mission Possible Partnership for Steel (Oct 2021)

Commitment review process ongoing

Steel: Detailed commitment

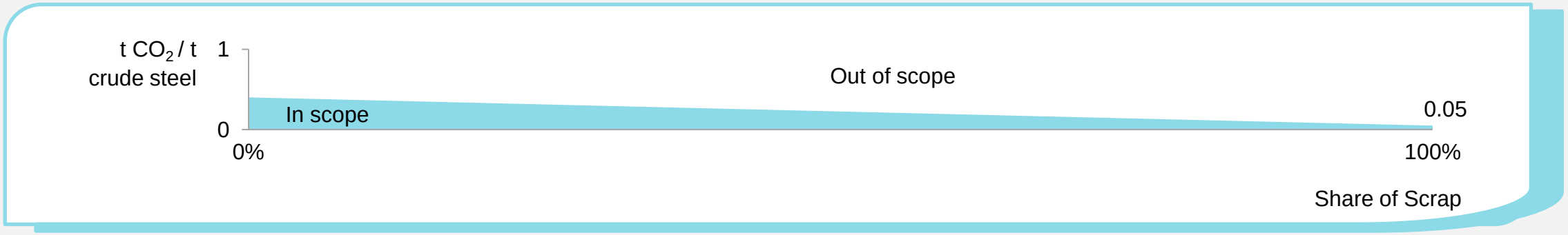
Subject of demand signal

The purchase of near zero-emissions steel, satisfying the following criteria:

- Crude steel from breakthrough technology production facilities. Per IEA guidance, the steel should emit ≤0.4 (0% scrap inputs) to ≤0.05 t (100% scrap inputs) of CO_2e per tonne of crude steel produced[1]
- The analytical boundary for emissions is cradle-to-gate, in alignment with IEA guidance *(see backup)*

Ambition

> "At least 10% (by volume) of all our steel purchased per year will be near-zero emissions (as per FMC definition) by 2030"



1. FMC set ambitious standards, including a fixed supply chain boundary inclusive of all raw material preparation through steelmaking and casting. This boundary was developed in coordination with partners and is similarly reflected in other standards, including IEA recommendations for G7 members. Maintaining alignment across standards helps FMC members stay in step with industry & customer expectations through 2030. FMC permits the use of virtual PPA to satisfy Scope 2 emission thresholds, if additionality is confirmed by independent expert third party.
Source: Mission Possible Partnership. Note: Commitment scope includes both flat and long steel.

First Movers Coalition

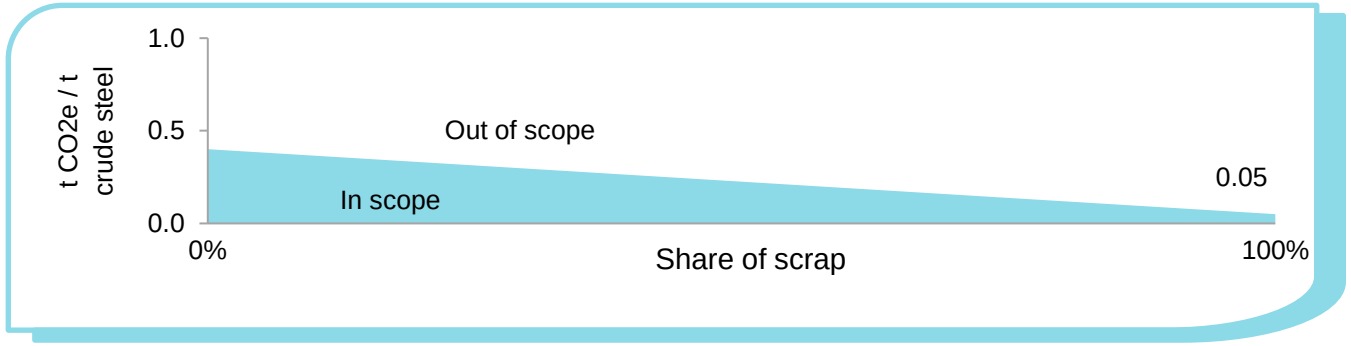
FMC threshold updated…

Old definition:

Crude steel emitting **<0.4** (0% scrap inputs) to **<0.1 t** (100% scrap inputs) of **CO_2** per tonne of crude steel produced

New definition:

Crude steel emitting **<0.4** (0% scrap inputs) to (A) **<0.05 t** (100% scrap inputs) of (B) **CO_2e** per tonne of crude steel produced



…to align with ecosystem

(A) Threshold adjusted to <.05 t of CO_2e to synchronize with IEA and ResponsibleSteel

- Divergence was due to slight variation in assumptions about the emissions tied to anode degradation in EAF furnaces
- IEA and ResponsibleSteel guidance on this topic is in-line with latest thinking

(B) Change to CO_2 Equivalent (CO_2e) to align wording with FMC's intent. FMC has always sought to have its metric be reflective of total GHG emissions (i.e., CO_2 and fugitive methane) as per best practice. This change reflects that and is aligned with IEA and ResponsibleSteel

First Movers Coalition

Two key areas adjusted in commitment review

1 Definitions

- **Why does FMC permit 100kg CO_2 per tonne of steel at 100% scrap while IEA permits 50kg of CO_2e?**
  - *Difference was from anode degradation assumptions. Given the IEA guidance was published later, FMC to align with members on change to 50 kg. FMC will also switch to CO_2e, aligning guidance.*
- **Did FMC remove the footnote from its commitment discussing supply chain boundary?**
  - *The footnote will be updated to reflect cradle-to-gate terminology*
- **Which emissions are included in the system boundary?**
  - *The system is inclusive of upstream scope 3 and scope 1 and 2. This follows the IEA G7 recommendations.*

2 Standards

- **Are there any 3rd party measurement methodologies that can be used to assess NZE steel in line with the FMC threshold?**
  - *FMC is not a standards reviewing body, however members have asked for sample measurement options. Although not exhaustive, FMC plans on providing some best practice options, detailed below:*
  - *ResponsibleSteel V2 certified emissions level 4 (which is fully assessed post-production, but may feature probability assessments pre-production)*
  - *ISO-14067 aligned PCF report, ideally in accordance with a PCR maintained by an international EPD program*

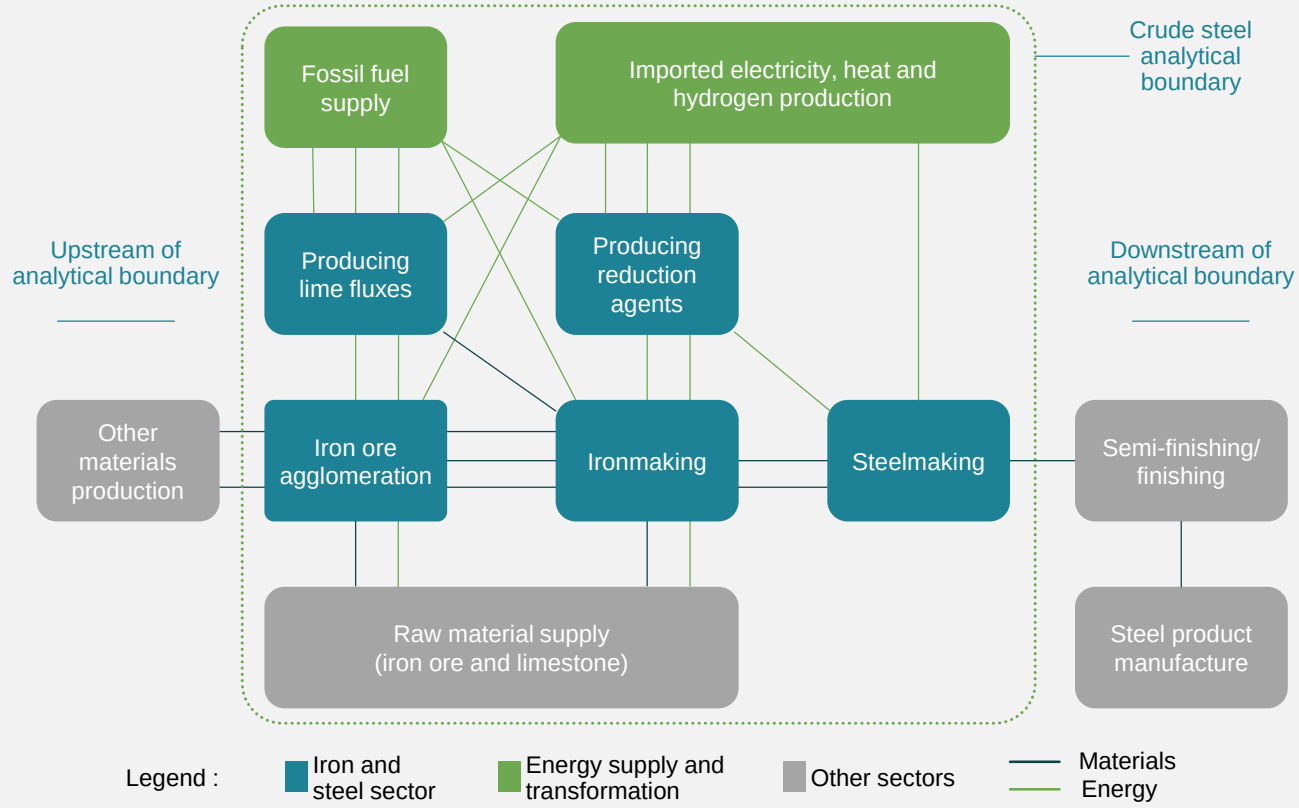
First Movers Coalition

FMC set ambitious standards, including a supply chain boundary inclusive of all raw material preparation[1] through steelmaking and casting[2]

This boundary has been developed in coordination with partners and is similarly reflected in other standards, including IEA's recommendations for G7 Members[3]

Aligning with the latest industry leadership helps FMC members stay in step with industry and customer expectations through 2030

IEA analytical supply chain boundary for defining near zero emission steel production[3]



1. Including extraction, transportation, and beneficiation; 2. Scope includes iron ore and limestone processing; does not include sorting and transportation of steel scrap; 3. See "Achieving Net Zero Heavy Energy Sectors in G7 Members" from IEA; 4. “Other materials production” refers to the production of material inputs to the iron and steel sector besides iron ore and limestone, including electrodes, alloying elements, and refractory linings. Source: IEA report - Achieving Net Zero Heavy Industry Sectors in G7 Members

First Movers Coalition

What emissions are included in FMC calculations?

To maintain consistency across supply sources, emissions are calculated for the entire steel production process **from mining to steelmaking & casting**, regardless of vertical integration or lack thereof.

	Raw material preparation[1,2]	Raw material processing[2]	Ironmaking	Steelmaking & casting	Rolling & processing	Manufacture / build	Use	Post-use
Scope 1	✓	✓	✓	✓	✗	✗	✗	✗
Scope 2	✓	✓	✓	✓	✗	✗	✗	✗

✓ Direct emissions included in FMC calculations

✗ Not included in FMC calculations

1. Mining, including extraction, transportation, and beneficiation; 2. Includes iron ore and limestone, does not include sorting and transportation of steel scrap

First Movers Coalition

Commitment review process ongoing

Methodologies and standards can ensure a product meets FMC's threshold

While FMC is not a standards body and does not seek to "pick a winner" on standards, it recognizes the value of providing examples of third-party avenues that allow members to unambiguously communicate their demand

To that end, FMC currently considers the following standards or methodologies as relevant ways of verifying that a product purchased meets the FMC commitment:

Responsible Steel standards & certification	ISO	**Other methods**

• The product meets the FMC threshold if it is marketed as being made from crude steel that meets ResponsibleSteel v2 'certified steel' Emissions Performance Level 4
  - Note: This requires a PCF in line with a recognized regional or international standard to be published
	• The steel product has a PCF certified according to ISO-14067 which shows that it is made from crude steel that meets FMC's benchmark
	  - If possible, best practice is that the PCF uses a relevant PCR used by an international EPD program
	• When requesting the PCF, FMC recommends the steel procurer request (in addition to the standard data):
	  - A partial PCF value calculated with downstream boundary where crude steel is first produced
	  - Data on the scrap content per tonne of crude steel and any assumptions on emissions from scrap sourcing and processing (the procurer may assume an emissions intensity of zero for any scrap content)
		• Other 3rd party assured methods may emerge that are in line with respected international organizations and standards
		• These methods are acceptable so long as the emissions boundary and definitions used are in line with the FMC commitment

First Movers Coalition

Responsible Steel standards & certification

ResponsibleSteel underpinning the credibility of the Near-Zero Steel 2030 Challenge

Our Work:

Our Mission is to be a driving force in the socially and environmentally responsible production of net-zero steel, globally

Our Membership includes representatives from across the steel value chain and civil society globally and covers ***15% of global steelmaking capacity***

The ResponsibleSteel International Standard comprises 13 ESG Principles including 4 progress levels for measuring GHG emissions intensity to drive the industry towards Level 4, near-zero steel

ResponsibleSteel Core Certification has already been achieved by ***61 steelmaking sites*** covering ***over 110 million tonnes of steel*** globally.

The Near-Zero Steel 2030 Challenge:

Compliance with ResponsibleSteel Level 4 GHG will be the measurement basis for high-potential contenders in the Near-Zero Steel 2030 Challenge

Pre-production assessment
ResponsibleSteel will develop a pre-production assessment toolkit to support the Challenge, enabling near-zero steel projects to establish whether their projected GHG emissions are likely to align with the ResponsibleSteel Progress Level 4 (near zero) once production commences.

Post production certification
No certification would be awarded pre-production, and projects will be encouraged to commit to ResponsibleSteel certification once production data is available for the project.

First Movers Coalition

Common scenarios for FMC commitment clarification

Scenario	FMC guidance	Recommended actions
1 Steel producer uses **VPPA to mitigate or eliminate Scope 2 emissions**	**VPPAs are allowed** for FMC commitments to reduce Scope 2 emissions	Discuss **opportunities to leverage VPPAs** to achieve FMC commitments
2 Aggregate Scope 1 and 2 for supplier reflects higher emissions than **specific product designed for FMC standard**	FMC calculations **may be disaggregated by products** – Emissions do not need to be averaged across all products	Connect with steel manufacturer to **understand specific emissions calculations** for product in question
3 Steel producer does not include Scope 1 and 2 emissions from **steel rolling and processing**	**Rolling and processing emissions are not included** in FMC commitments, but FMC strongly encourages decarbonization of this segment in the value chain	Encourage steel manufacturer to **decarbonize rolling and processing** to reduce total emissions of final product

First Movers Coalition

Common scenarios for FMC commitment clarification

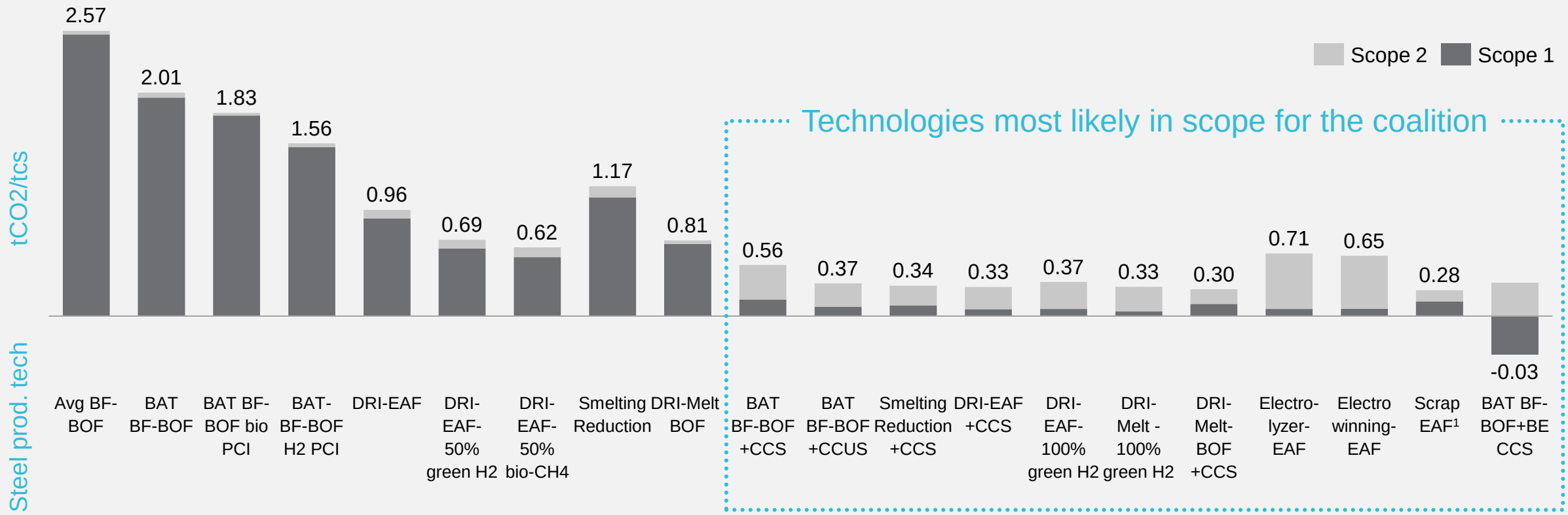
Scenario	FMC guidance	Recommended actions
4 Reported Scope 1 and 2 emissions do not account for **raw materials purchased from merchant market**	Scope 1 and 2 emissions should reflect *all* core steel production activities from **raw material preparation[1] through steelmaking and casting**	**Engage supplier for data on all Scope 1 and 2 emissions**, including raw material preparation and ironmaking portions of the value chain, regardless of entity
5 Reported Scope 1 and 2 emissions do not account for **HBI produced under separate legal entity**	Scope 1 and 2 emissions should reflect *all* core steel production activities **regardless of ownership or integration**	
6 Scope 1 emissions **offset partially or fully by carbon credits**	**Offsets are not permitted** in order to require mitigation of emissions in core processes	• Engage supplier on **roadmap to decarbonize core processes** • Encourage **use of CCUS** • Engage **additional suppliers** if needed

1. Includes iron ore and limestone, does not include sorting and transportation of steel scrap. Also includes mining (extraction, transportation, and beneficiation).

First Movers Coalition

Achieving FMC threshold will require mitigation of scope 2 emissions and implementation of new technologies

Steel production technologies' scope 1 & 2 emissivity in 2030 (in tCO2/ton of crude Steel)



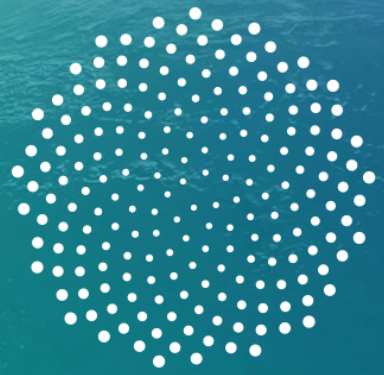
1. Scrap EAF route may not be in scope depending on mix of scrap and DRI inputs, and emissivity of source DRI path.
Note: scope 2 based on global grid average – coalition threshold will therefore require a low CO2 intensity of grid or PPAs
Source: Mission Possible Partnership

FMC commitment likely to require accelerated deployment of earlier stage decarbonization technologies

Baseline — Intermediate step — FMC commitments

	BF-BOF	DRI – EAF w/ NG	Scrap–EAF	DRI – EAF w/ green H_2	BF-BOF w/ CCUS	Electrolysis
Description	Blast Furnace-Basic Oxygen Furnace	Switch to Natural Gas Direct Reduced Iron-Electric Arc Furnace	Recycled scrap steel using Electric Arc Furnace	Switch to green H2 Direct Reduced Iron-Electric Arc Furnace	Retrofit BF-BOF with CCUS	Iron electrolysis followed by EAF
2020 maturity[1]	**9+** (System proven in operational environment)	**9+** (System proven in operational environment)	**9+** (Concept validated)	**6-8** (System demonstrated)	**4-6** (Concept validated)	**2-3** (Proof of concept)
2030 projected maturity[1]	**9+** (System proven in operational environment)	**9+** (System proven in operational environment)	**9+** (System complete and qualified)	**7-9** (System complete and qualified)	**6-8** (System demonstrated)	**4-6** (Concept validated)
t CO_2 / t crude steel[2] Blue likely to meet FMC commitment	1.80 - 2.57	0.53 – 1.77	0.13 - 0.67 *Does not meet 100% scrap benchmark (0.1), but may meet commitment if blended*	0.06 – 1.25	0.08 – 1.04	0.06 – 1.95

1. Based on NASA's TRL scale; 2. Bounds inclusive of both BCG analysis and MPP data, lower bound assumes best case scenario of zero Scope 2 emissions
Source: BCG analysis, MPP data, Green Steel for Europe – Technology Assessment and Roadmapping



First Movers Coalition

WORLD ECONOMIC FORUM