The steel industry's pathways to decarbonisation

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Research & Innovation for Clean Industrial Deal

For a better future

Steel

Essential to the green, resilient economy and the EU's strategic autonomy

- ✓ Steel : **backbone of EU** : annual production 126Miot/y – 2.5Mio jobs

- ✓ Steel industry: 20-25% of industrial **CO_2 emissions**

- ✓ Steel is **100% recyclable & the most recycled** material in the world (85% in EU)

- ✓ **Innovation** : 3500 types, 75% developped in the last 25 years
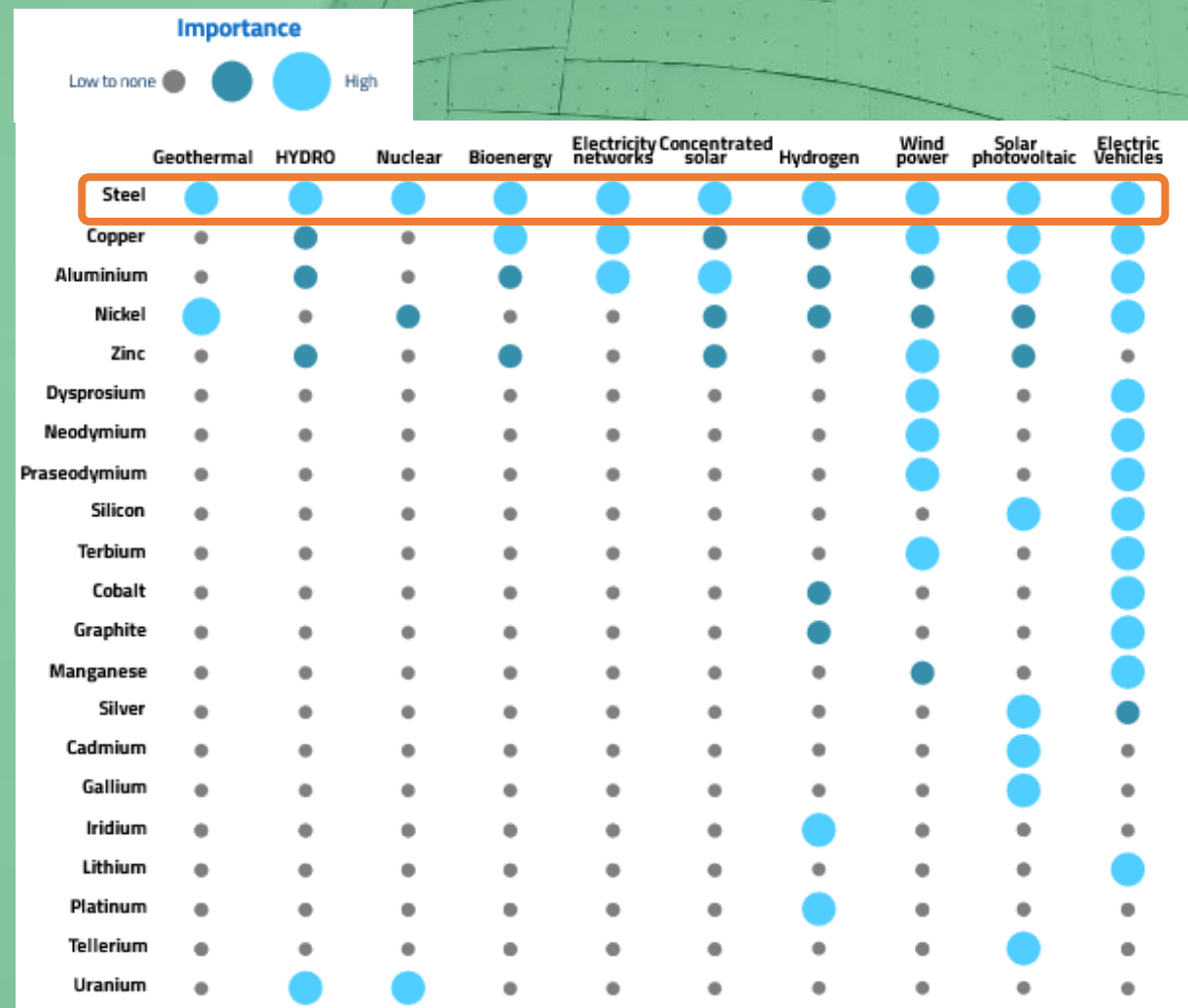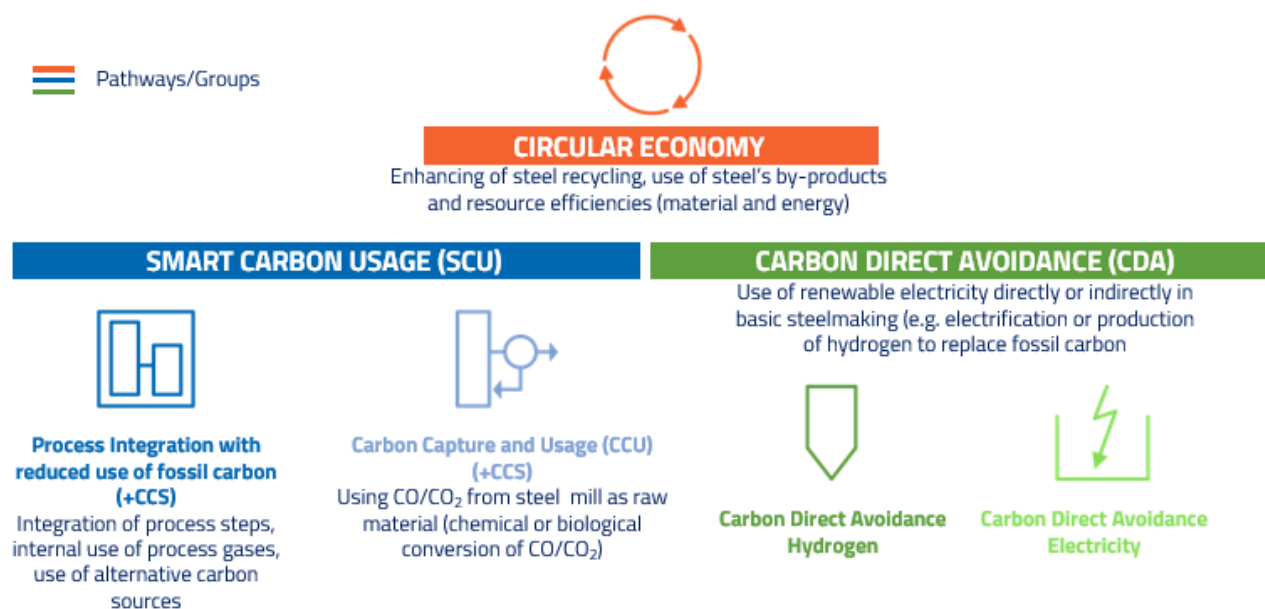

Source: Critical raw materials for strategic technologies and sectors in the EU, a prospective study, European Commission, 9 March 2020; The Role of Critical Minerals in Clean Energy Transitions, IEA, May 2021; McKinsey Analysis

Decarbonisation in steel sector
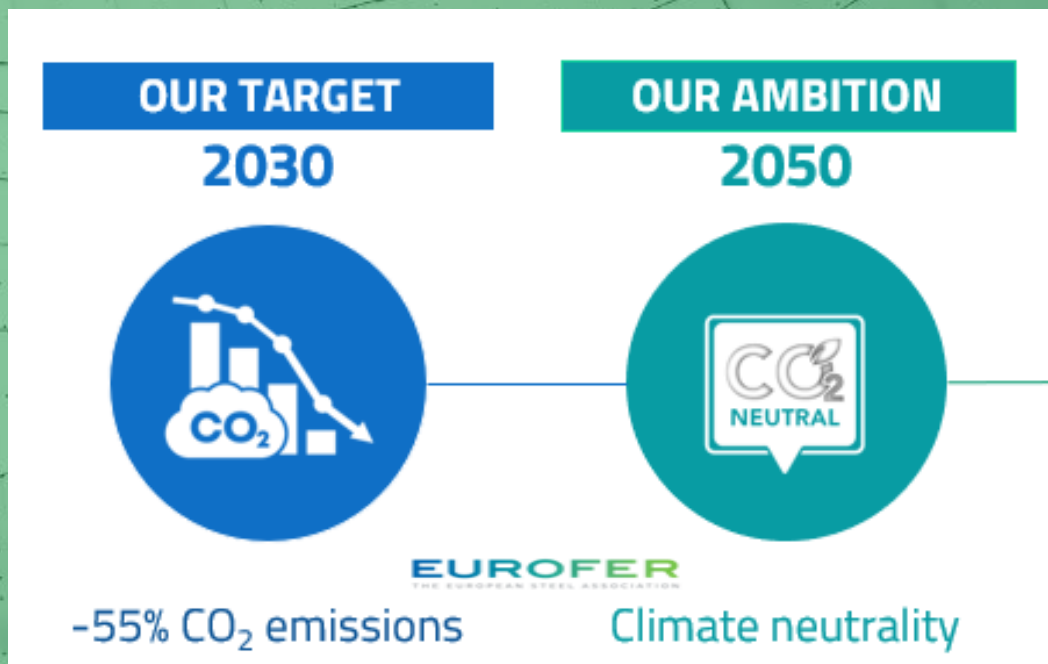
While remaining competitive !

Pathways for decarbonisation

For a better future

Research & innovation for CID

A **complete & unique** set of tools, from low to high TRL

High **involvement of industry (RFCS)** → industrial implementation & impact

Co-funded by the European Union

RFCS	CSP	RFCS big ticket	Innovation fund
-> TRL 4/5 50-60% funding	-> TRL 7 60-100% funding	-> TRL 8 50% funding	Funded by the European Union

Regional & national and private funding

50-70 active steel projects

Research Fund for Coal and Steel
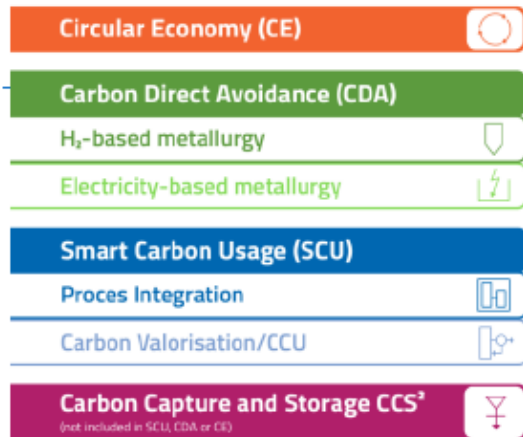A summary of the findings of the Steel Research Technical Groups - 2023

Horizon Europe

No.	Project Acronym	Funding call	Area of Intervention	EU Funding (mln Euro €)	No.	Project Acronym	Funding call	Area of Intervention	EU Funding (mln Euro €)
1	MaxH2DR	HEU 2021 #18	CDA	4.2	15	Agiflex	HEU 2023 #43	SCU	4.7
2	HIYIELD	HEU 2021 #19	CE	3.6	16	H2PlasmaRed	HEU 2023 #43	PI	6.0
3	RemFRa	HEU 2021 #19	CE	4.8	17	Dust2Value	HEU 2023 #45	CE	4.6
4	CAESAR ★	HEU 2021 #19	CE	5.6	18	ZHyRON	HEU 2023 #45	CE	4.5
5	RecHycle	HEU 2021 #22	COMB	6.2	19	MEDALS	HEU 2023 #45	CE	5.7
6	PURESCRAP ★	HEU 2022 #13	CE	5.0	20	SMARTChain	HEU 2024 #44	ENA	5.0
7	TransZeroWaste	HEU 2022 #13	CE	5.0	21	DiGreeS ★	HEU 2024 #44	ENA	5.0
8	GreenHeatEAF	HEU 2022 #16	PI	3.6	22	ProcTwin	HEU 2024 #44	ENA	4.8
9	ModHEATech	HEU 2022 #16	PI	3.4	23	NANO-S-MART	HEU 2024 #46	CE	3.1
10	HyTecHeat	HEU 2022 #16	PI	3.4	24	E-ECO Downstream	HEU 2024 #46	CE	5.0
					25	ZEROSTEEL	HEU 2024 #46	CE	5.0
					26	MOWSES	HEU 2024 #46	CE	4.6
					27	CISMA ★	HEU 2024 #46	CE	4.5

RFCS

No.	Project Acronym	Funding call	Area of Intervention	EU Funding (mln Euro €)	No.	Project Acronym	Funding call	Area of Intervention	EU Funding (mln Euro €)
11	MODIPLANT	RFCS BT 2022	PI	8.0	28	SLAG2BUILD ★	RFCS BT 2024	CE	4.6
12	FULL2REHEAT	RFCS BT 2022	PI	8.6	29	Hy4Smelt ★	RFCS BT 2024	CDA	18.0
13	HYDREAMS	RFCS BT 2022	PI	4.3	30	H2Loop ★	RFCS BT 2024	CDA	6.2
14	TWINGHY	RFCS BT 2022	PI	4.5	31	CROSSCUT ★	RFCS BT 2024	SCU	5.0
					32	PRISMA ★	RFCS BT 2024	ENA	5.1

INNOVATION FUND — Deploying innovative net-zero technologies for climate neutrality
ZESTA: Zero Emission Steelmaking at ArcelorMittal

INNOVATION FUND — Driving clean innovative technologies towards the market
HYBRIT Demonstration: Swedish large-scale steel value chain demonstration

INNOVATION FUND — Deploying innovative net-zero technologies for climate neutrality
Stegra: Stegra

Example: key low-CO$_2$ projects of the EU steel industry

Legend:
- Circular Economy (CE)
- Carbon Direct Avoidance (CDA)
  - H$_2$-based metallurgy
  - Electricity-based metallurgy
- Smart Carbon Usage (SCU)
  - Proces Integration
  - Carbon Valorisation/CCU
- Carbon Capture and Storage CCS^2 (not included in SCU, CDA or CE)

- **60** projects
- Potential CO$_2$ abatement in 2030: **81.5 Mio tons/year** (over 1/3 of current direct and indirect CO$_2$ emissions)
- **Capex** needs: **31 bn EUR**
- **Opex** needs: **54 bn EUR**
- **Energy** needs in 2030: **165 TWh** electricity, of which **90 TWh for hydrogen** production (2.12 Mio tons) via water electrolysis

EUROFER
THE EUROPEAN STEEL ASSOCIATION

Status: 04/03/2025   Source: h https://www.eurofer.eu/issues/climate-and-energy/maps-of-key-low-carbon-steel-projects
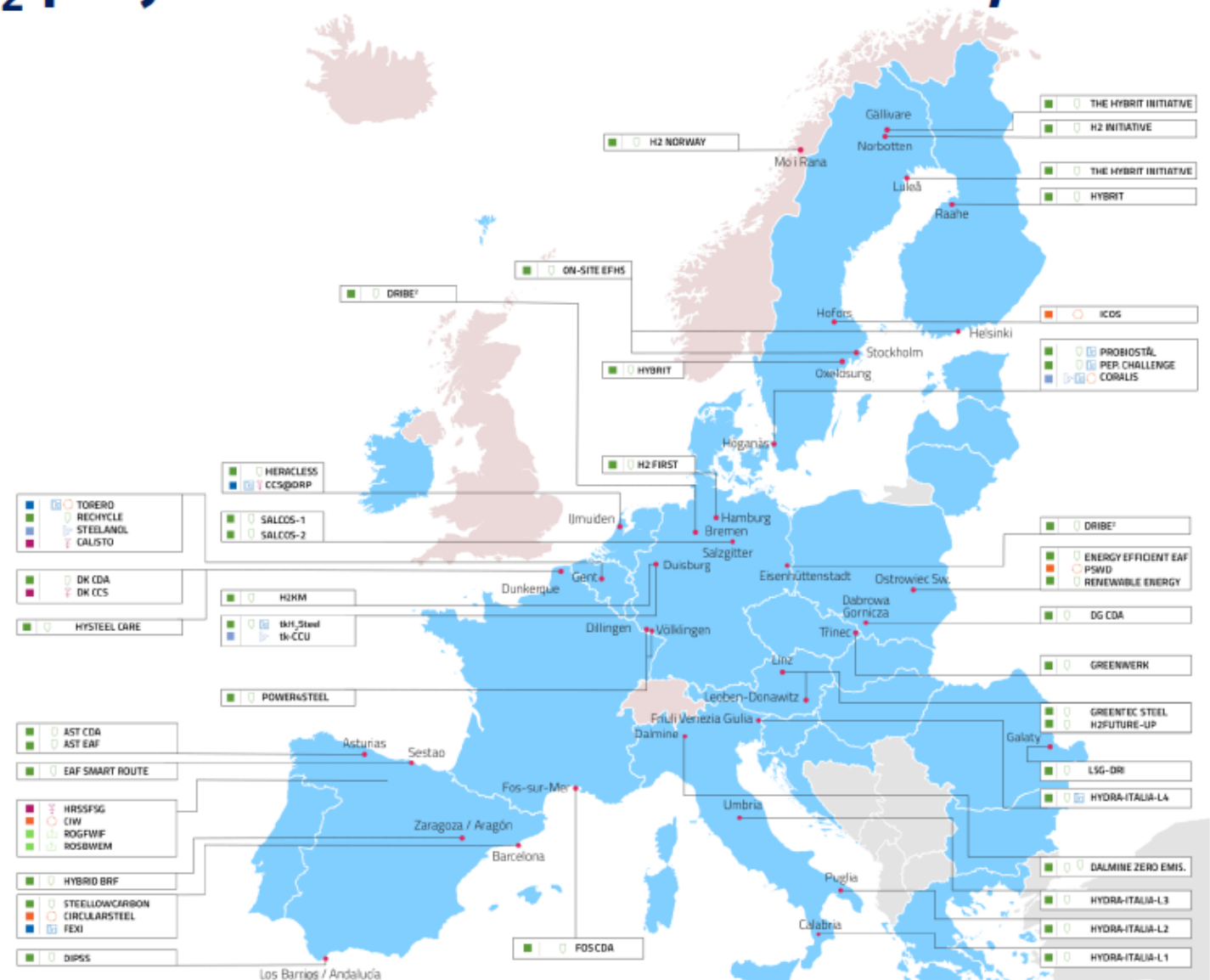
EU is leading the decarbonisation
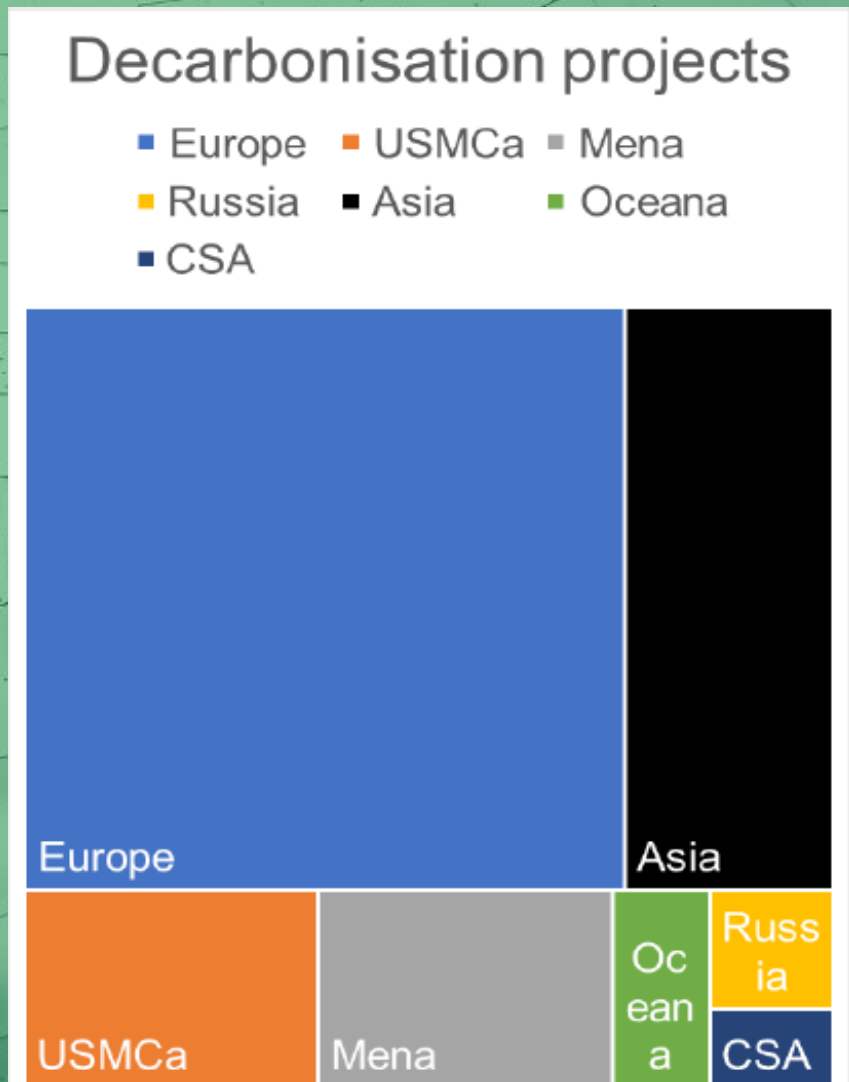
To maintain this leadership

Decarbonisation projects
- Europe
- USMCa
- Mena
- Russia
- Asia
- Oceana
- CSA

Source : Primetals

Sustainable decarbonisation goes beyond technology innovation and needs

- Availability of affordable green electricity & H2

- Effective CBAM & trade measures

- Availability of scrap

- Market for 'Green Steel'

- A continuous, predictable support for research

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THANK YOU

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