Workshop Regional Decarbonisation Roadmaps

Decarbonisation of the EU Region

Singapore, 01 December 2025

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EU Steel Region Characteristics

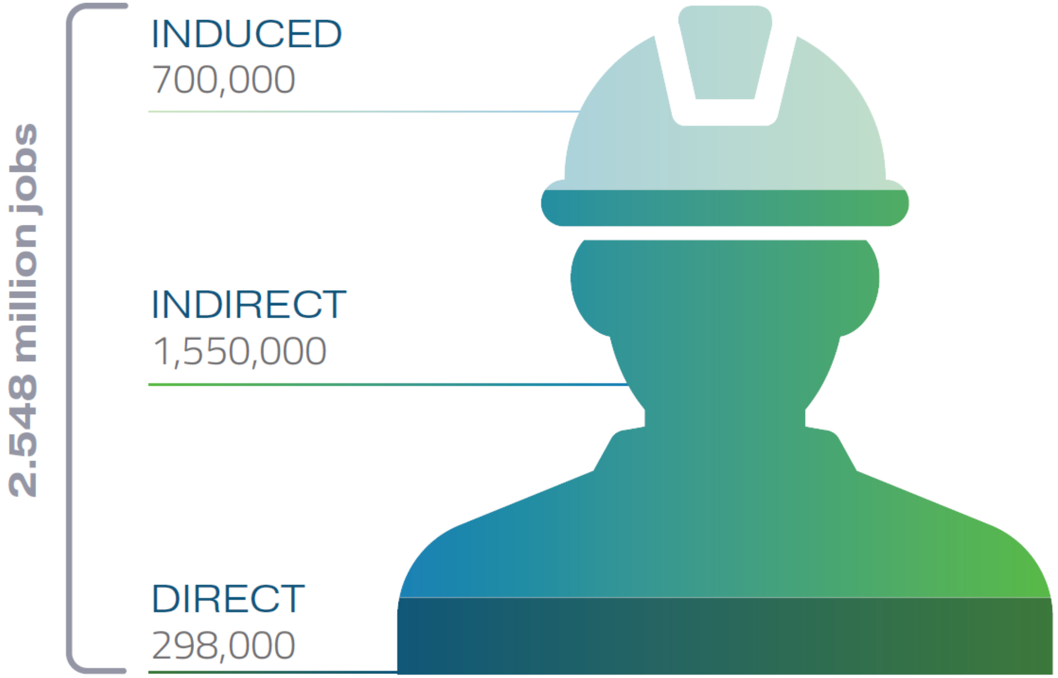
Employment and GVA in the EU steel industry

EMPLOYMENT

GRAPHIC • 2024

SOURCE: OXFORD ECONOMICS

The EU steel industry supports over 2.5 million jobs.

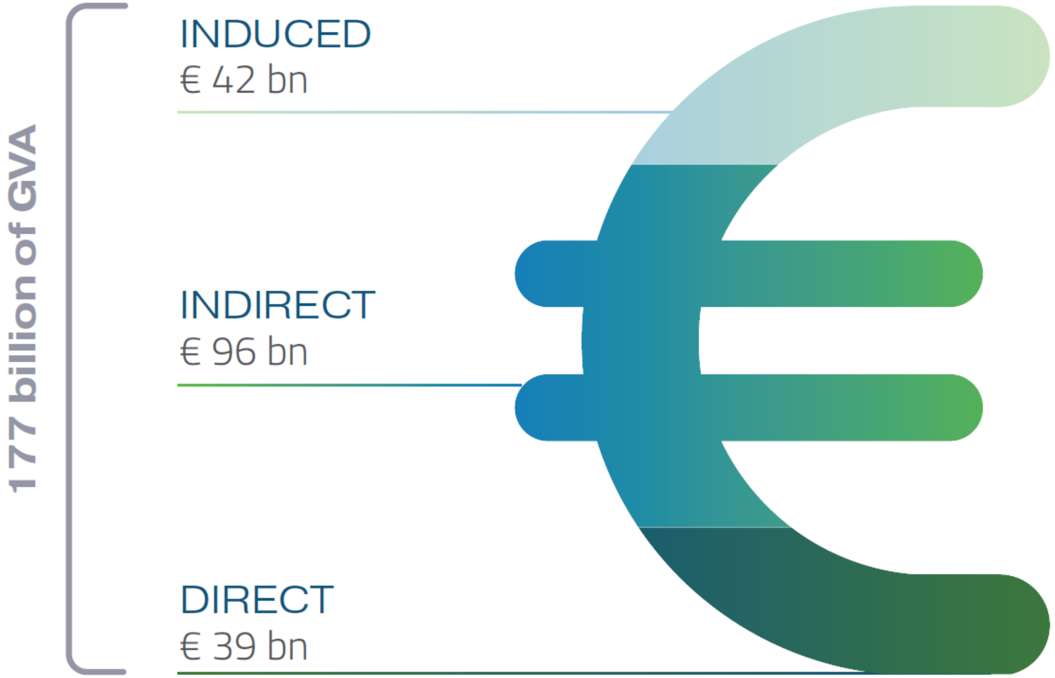


GROSS VALUE ADDED

GRAPHIC • 2024

SOURCE: OXFORD ECONOMICS

The EU steel industry creates around €177 billion of Gross Value Added.



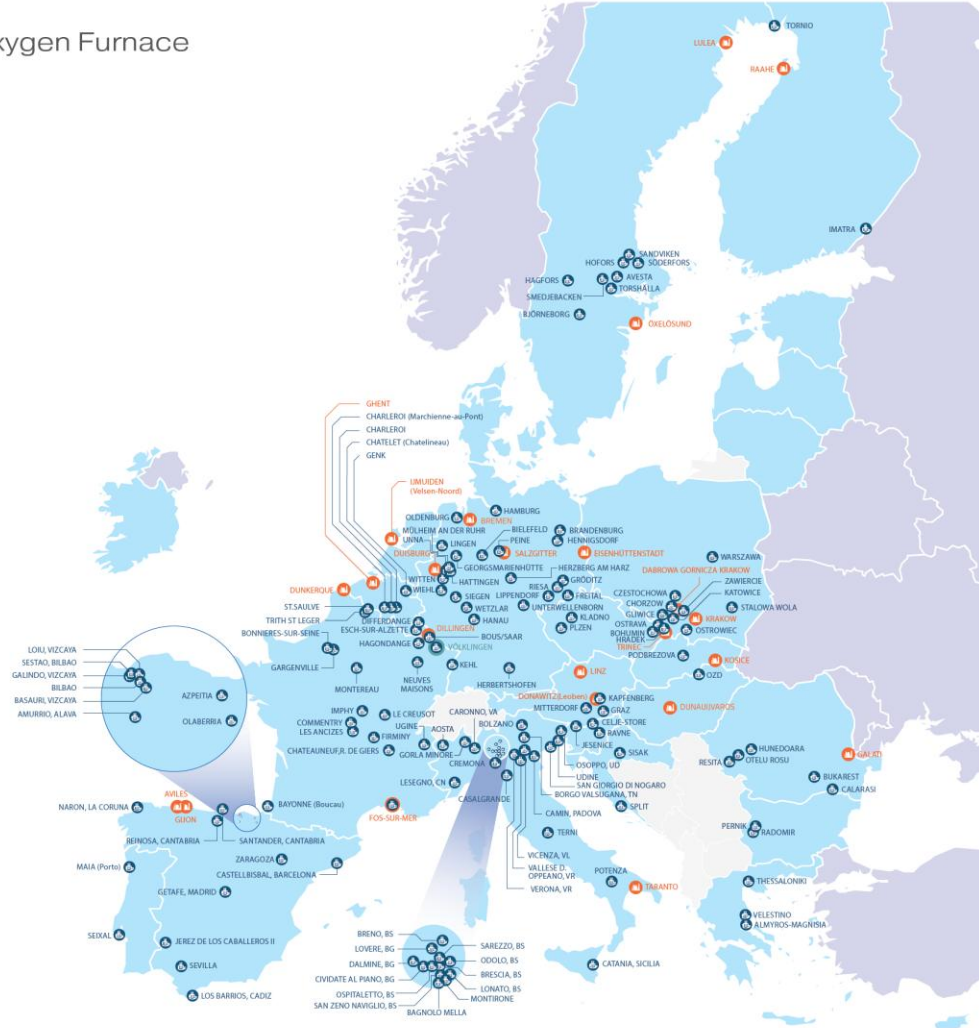
SOURCE: EUROFER

EU steel production sites

PRIMARY AND SECONDARY STEEL PRODUCTION ACROSS THE EU

Blast Furnace / Basic Oxygen Furnace

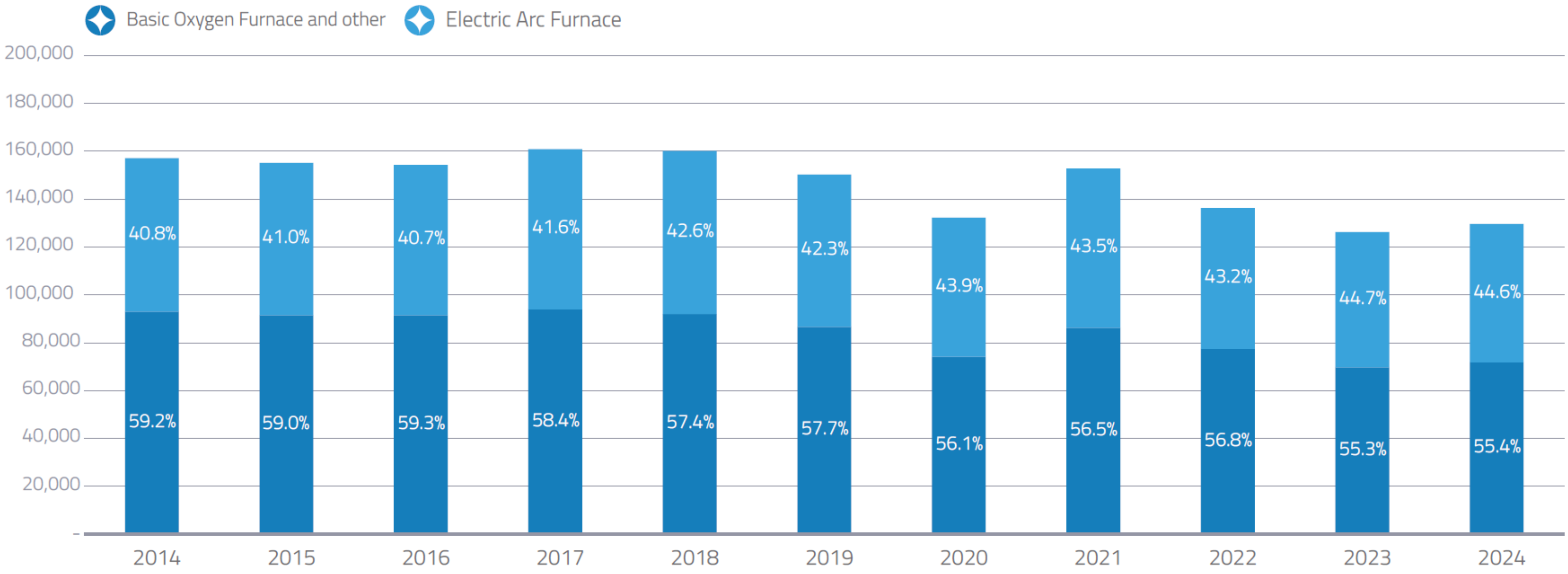
Electric Arc Furnace



MAP ⚬ 2024

SOURCE: EUROFER

EU steel production by production route



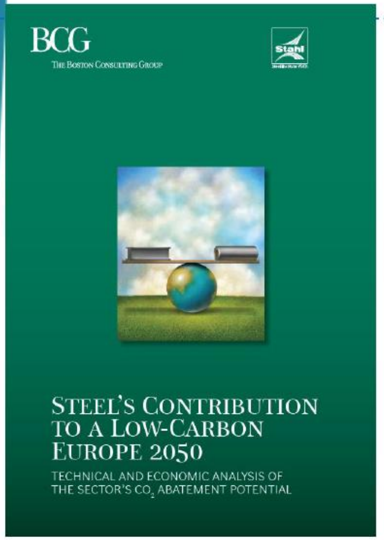
SOURCE: EUROFER

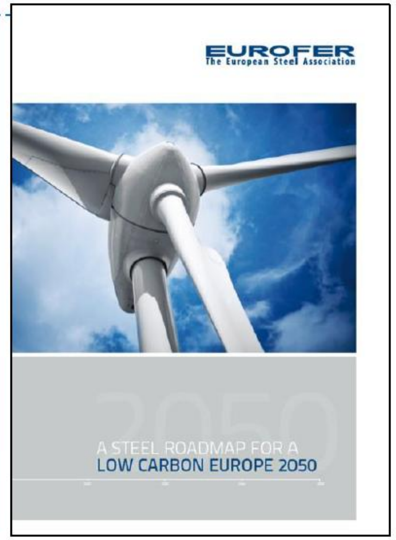
EU Steel Region Ambition

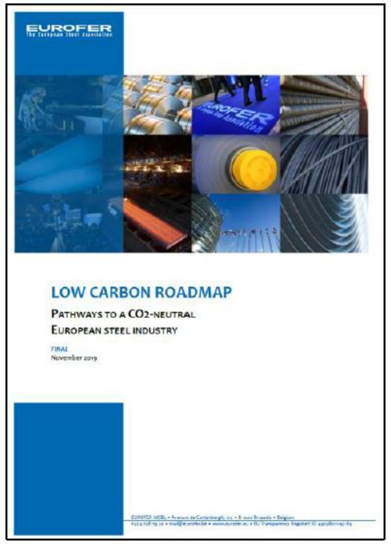
Policy targets and EU steel roadmaps

Innovation in and with EU steel:

Several roadmaps are publicly available

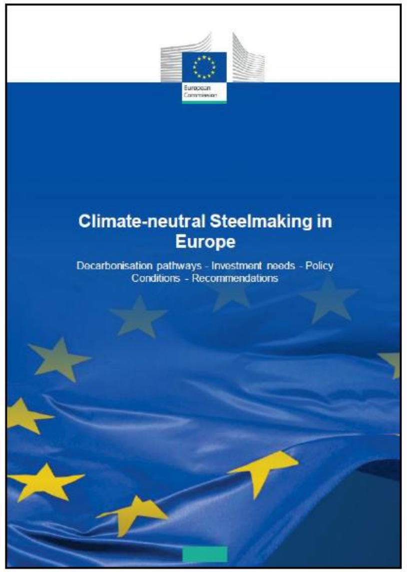


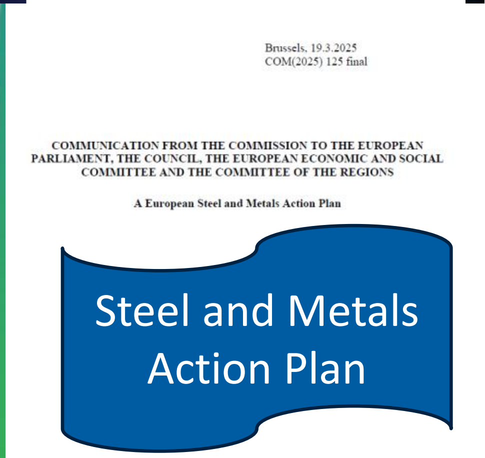




- https://www.eurofer.eu/publications/report
  pathways-to-a-co2-neutral-european-steel
- https://www.estep.eu/clean-steel-partners
- https://www.estep.eu/projects/estep-proje
  europe/publications

EUROFER

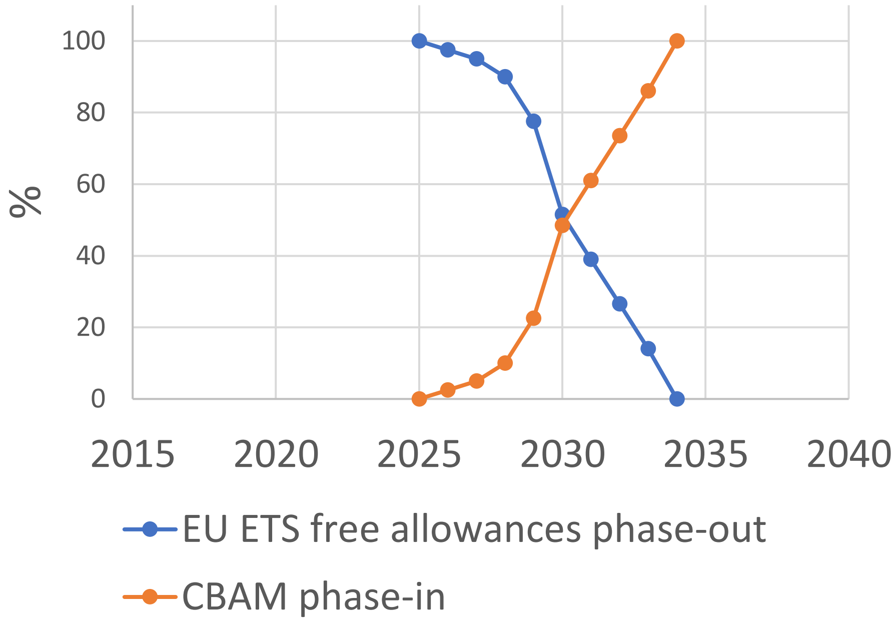




ESTEP
European Steel Technology Platform

Decarbinisation targets

- EU Industrial Green Deal + EU Climate target
  - All industry – not specific for steel industry
  - at least 55% reduction by 2030
  - 90% reduction by 2040
  - net- zero by 2050



- Dedicated instruments
  - 2026: phase out of free emissions allowances for the steel sector under the EU Emissions Trading Scheme ending completely in 2034.
  - 2026: Carbon Border Adjustment Mechanism (CBAM) starts
  - 2025: Publication of Steel and Metals Action Plan (SMAP)
    process electrification, switching to green hydrogen, and circularity, primarily through instruments already in place or under development.

Links: EU Industrial Green Deal, 2040 Climate targets, CBAM, SMAP

EU Steel Region Financing

Financing / funding schemes

- Funding instruments

Research, Development & Innovation

- Horizon Europe ★
- Horizon Europe Partnership ★
- Research Fund for Coal and Steel
- InnovFin

Demonstration & First of a kind

- Innovation Fund
- European Regional Development Fund
- LIFE Programme
- European Green Deal ★

Roll-out & Infrastructure

- Digital Europe ★
- Connecting Europe Facility
- Cohesion Fund
- Modernisation Fund

Invest EU

Just Transition Mechanism ★

Recovery Plan ★

Member State funding (including IPCEI)

Private funding

Source: GreenSteel4Europe final report (link)

State Aid to Help Steel Decarbonisation

2023-2025 decarbonisation projects received € 10 billion of state aid

2023	Belgium	ArcelorMittal	Ghent	Decarbonisation	280
2023	France	ArcelorMittal	Dunkirk	Decarbonisation	850
2023	Germany	ArcelorMittal	Duisburg	Decarbonisation	n/a
2023	Germany	ArcelorMittal	Hamburg	Demonstration plant	55
2023	Germany	Salzgitter	Salzgitter	Decarbonisation	1000
2023	Germany	Thyssenkrupp	Project tkH2Steel	Decarbonisation	2000
2023	Hungary	Dunaferr	Dunaferr	Employment costs	42
2023	Italy	Acciaierie d'Italia	DRI d'Italia	Pilot plant	35
2023	Poland	Jastrzebska Spolka Weglowa	JSW Plant	Energy cost support	4
2023	Slovakia	USSK	Kosice	Decarbonisation	300
2023	Slovenia	Slovenian Steel Group	SIJ Acroni	Energy costs	1
2023	Slovenia	Slovenian Steel Group	SIJ Metal Ravne	Energy costs	1
2023	Spain	ArcelorMittal	Gijon	Decarbonisation	450
2023	United Kingdom	Tata Steel	Port Talbot	Decarbonisation	580
2024	Czech Republic	Trinecke Zelezarny	Trinec	Capex support	20
2024	France	ArcelorMittal	Fos-sur-Mer	Capex support	15
2024	Germany	Stahl Holding Saar	Saarstahl and Dillinger	Decarbonisation	2600
2024	Germany	Vallourec	Pipe at Dusseldorf / Mulheim	Restructuring aid	3
2024	Sweden	H2GS	Boden plant	Green steel	265
2024	Sweden	SSAB	Lulea	Decarbonisation	128
2024	Switzerland	Swiss Steel / Beltrame	Gerlafingen / Steeltec	Energy cost support	20
2024	United Kingdom	British Steel	Scunthorpe & Teesside	Decarbonisation	345
2025	Germany	ArcelorMittal	Bremen & Eisenhüttenstadt	Decarbonisation	1300
2025	Italy	JSW Steel Italy	Piombino	Rail mill development	33
2025	Spain	ArcelorMittal	Aviles	Energy efficiency	4

https://www.steelonthenet.com/kb/state-aid.html

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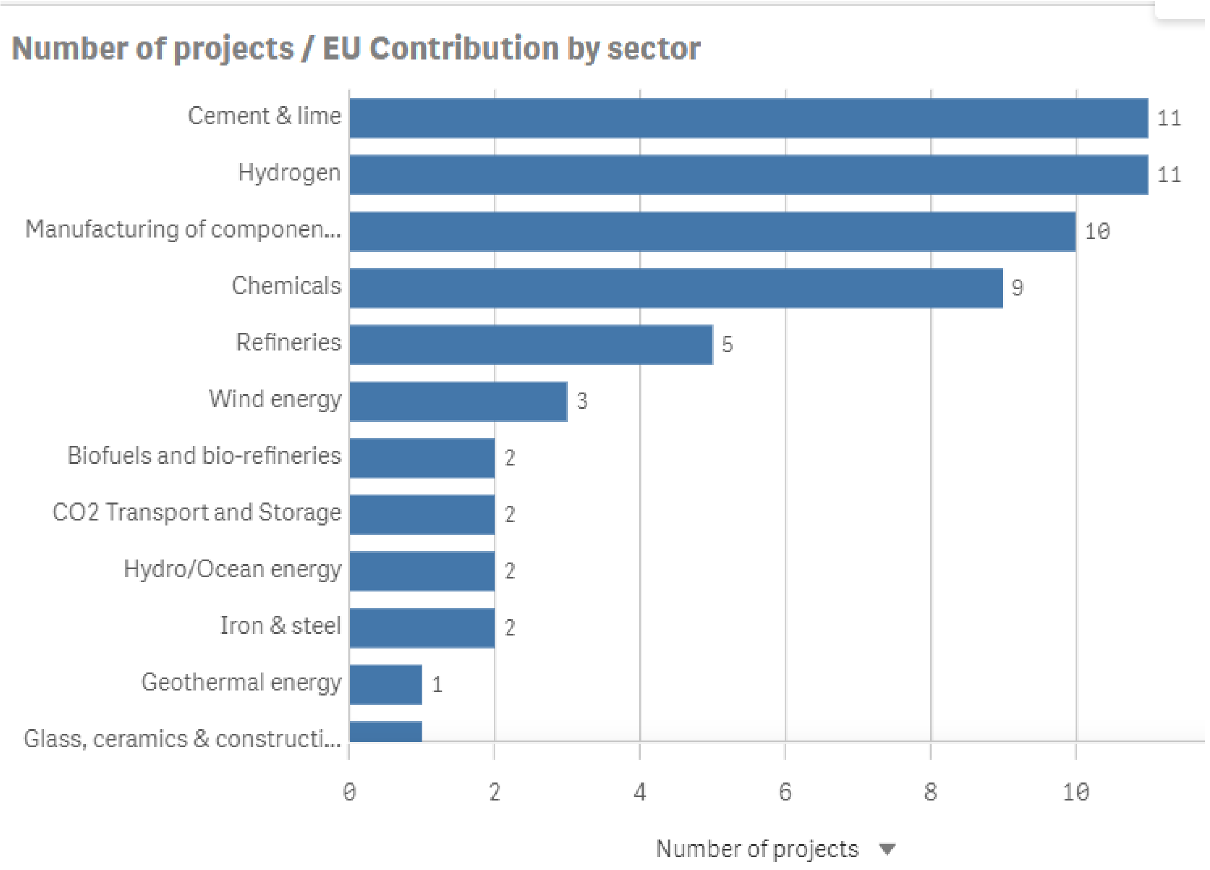
European Commission

Source: RFCS public consultation meeting, 19 June 2025

Innovation Fund

- Facts:
  - EU steel industry significantly contributes to Innovation Fund through CO2 taxes
    - estimate ±3 B€/yr (2022)
  - EU steel industry participates with about 5 – 8 large scale proposals per year.
  - In contrast to other EIIs (cement, lime, chemical) EU steel industry has limited success in launching large scale projects (around 100 – 300 million EURO)
    - 2021 – Hybrit (H2 steelmaking)
    - 2023 – H2GS (H2 steelmaking)
    - 2024 – ZESTA (H2 steelmaking)
  - No success for steel sector in first H2 auction (2024) within the Innovation Fund



EU Steel Region Approach and Projects

Company pathways towards low-zero steelmaking

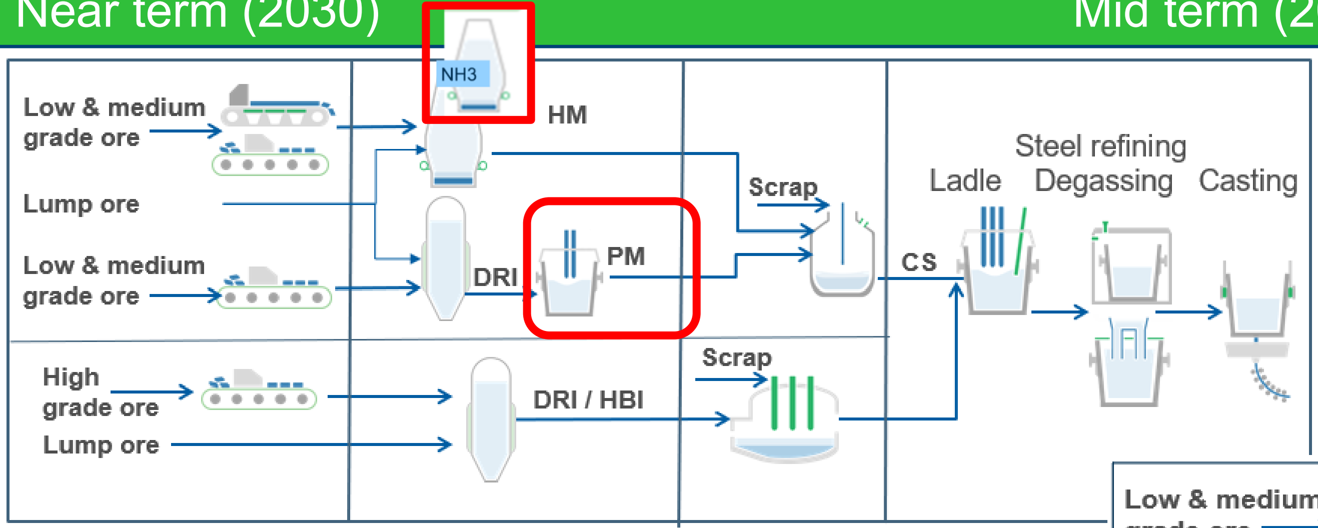
Pathways/ Groups	Circular Economy: Enhancing the recycling of steel (e.g. scrap in BOF/EAF*) and its by-products, Resource efficiency			
	Smart Carbon Usage (SCU)		Carbon Direct Avoidance (CDA)	
	Process Integration with reduced use of carbon (+CCS)	Carbon Valorisation/ Carbon Capture and Usage (CCU) (+CCS)	Hydrogen	Electricity
Description	Integration of process steps and internal use of process gases	Using CO/CO2 from steel mill as raw material (Chemical conversion of CO/CO2)	Use of renewable electricity in basic steelmaking, e.g. production of H2 to replace carbon	

*BOF= Basic Oxygen Furnace
EAF= Electric Arc Furnace

Transformation of EU steel industry

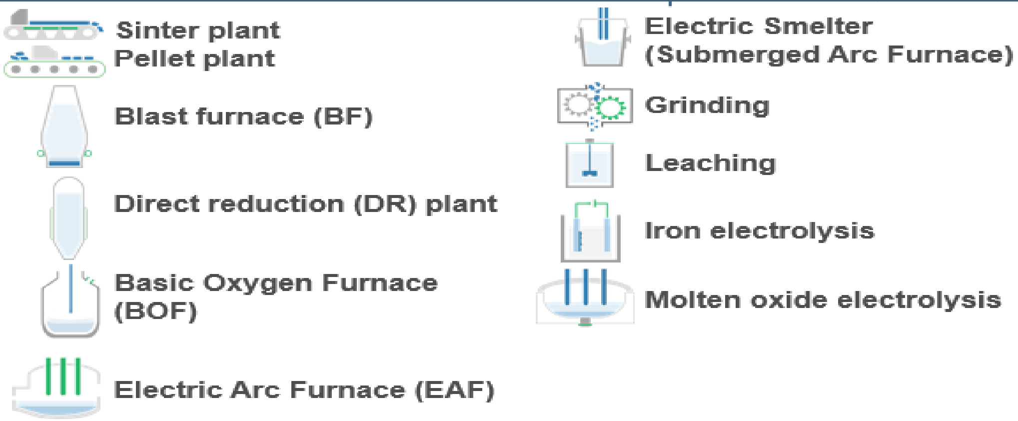
Co-existence of breakthrough and traditional steelmaking processes

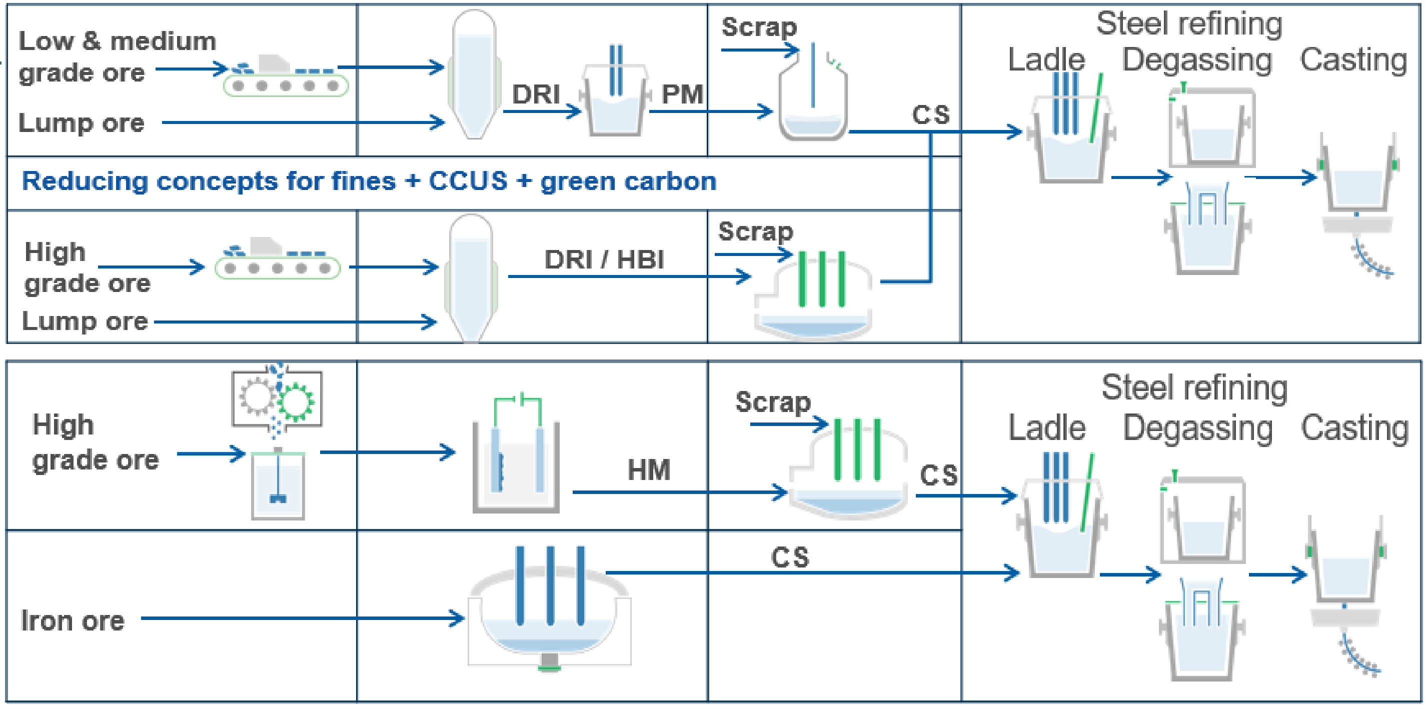
Near term (2030) | Mid term (2040) | Long term (2050)



New ideas generated since 2021 some **examples**

- Primary melter
- Hydrogen BF
- Flash Reactor





HM Hot Metal
DRI Direct Reduced Iron
PM Pre Melt

CS Crude Steel
HBI Hot Briquetted Iron
CCUS Carbon, Capture, Utilization and Storage

Source: sustainability summit 2022 + ESTEP + Green Steel 4 Europe

Two scearios developed in the GreenSteel4Europe project

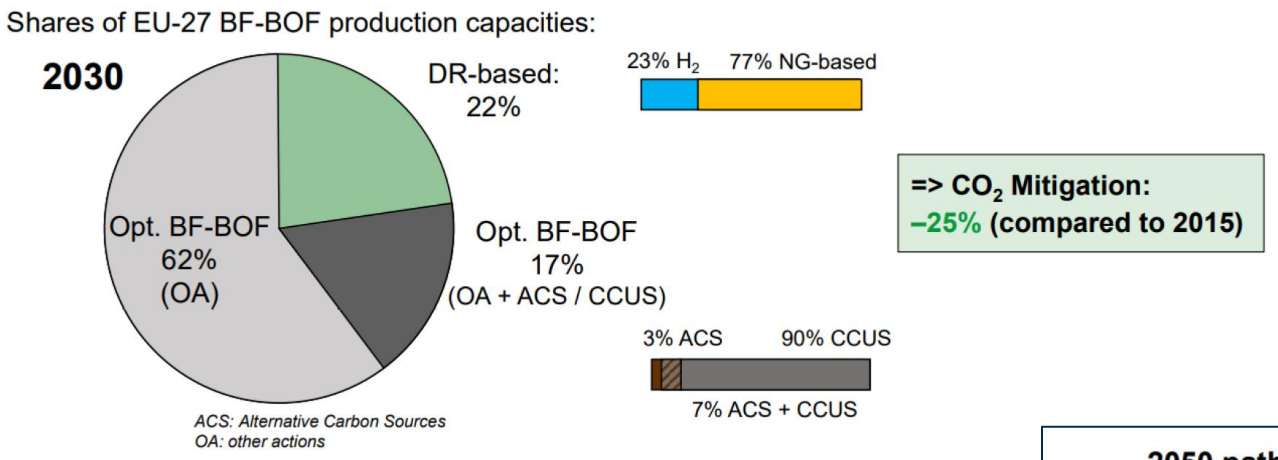


Figure 10: Pathway 2030 scenario – “Increased hydrogen availabi

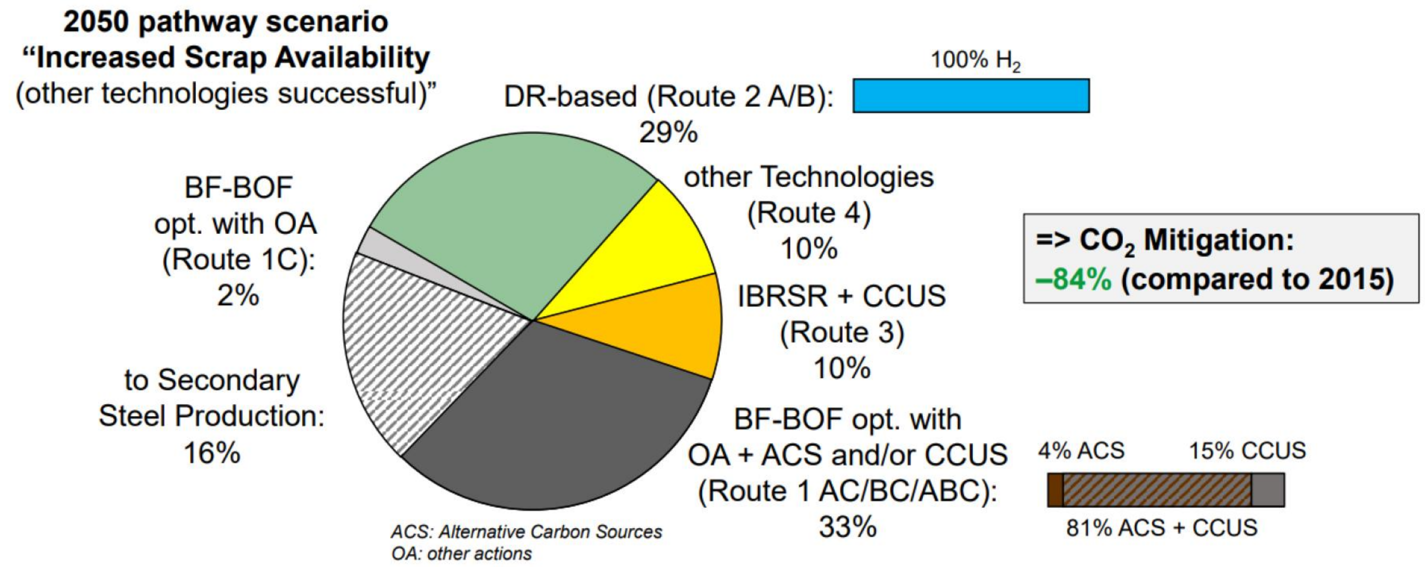
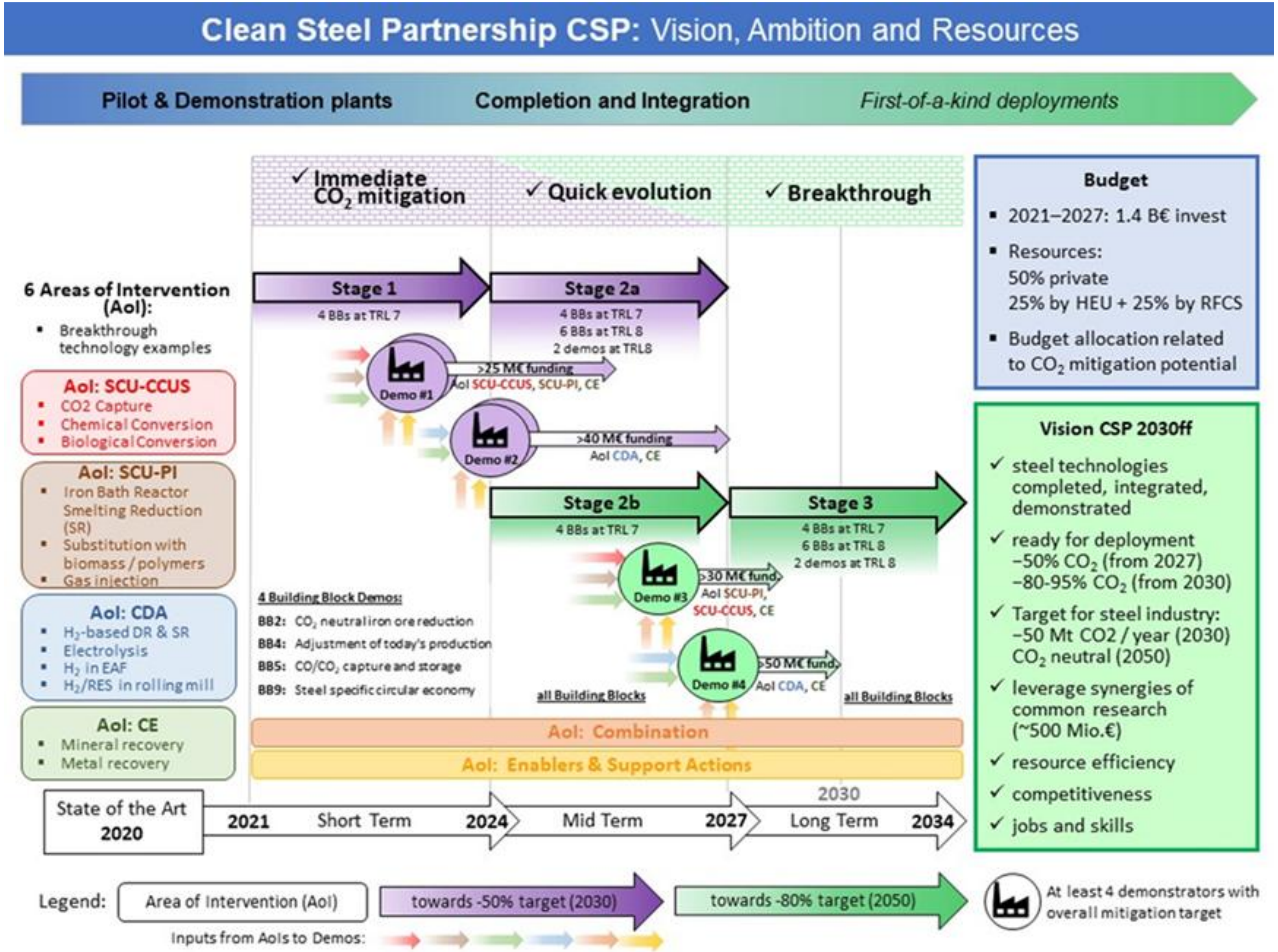


Figure 11: Pathway 2050 scenario – “Increased scrap availability”

Source: GreenSteel4Europe final report (link)

2020 approach: Innovation and Deployment for Decarbonisation



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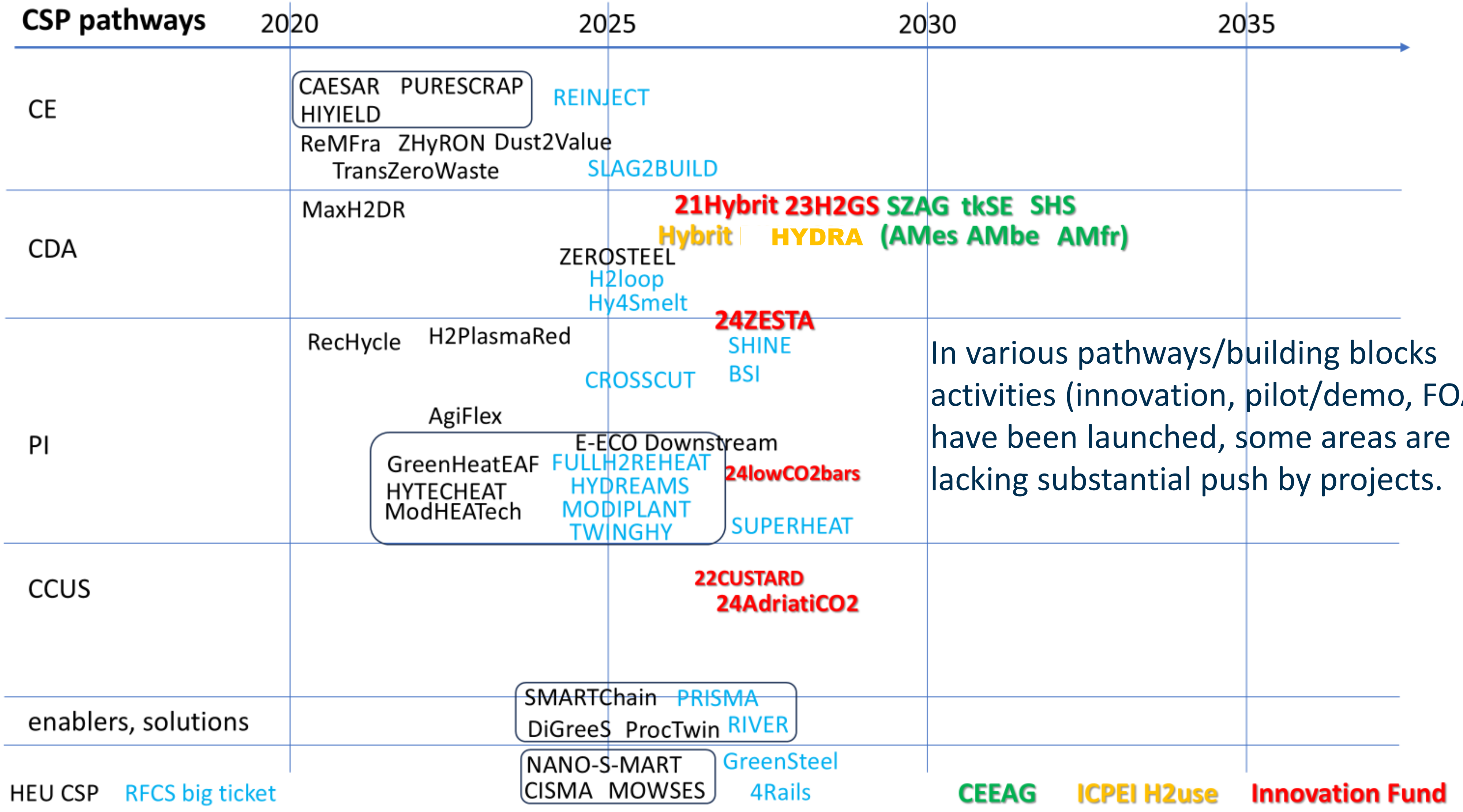
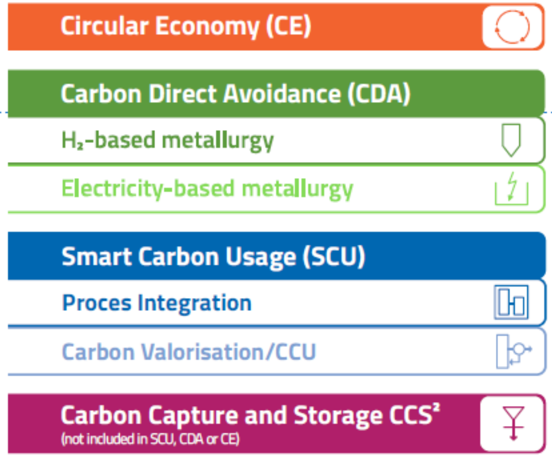
Moving ahead in the various pathways



In various pathways/building blocks activities (innovation, pilot/demo, FOAK) have been launched, some areas are lacking substantial push by projects.

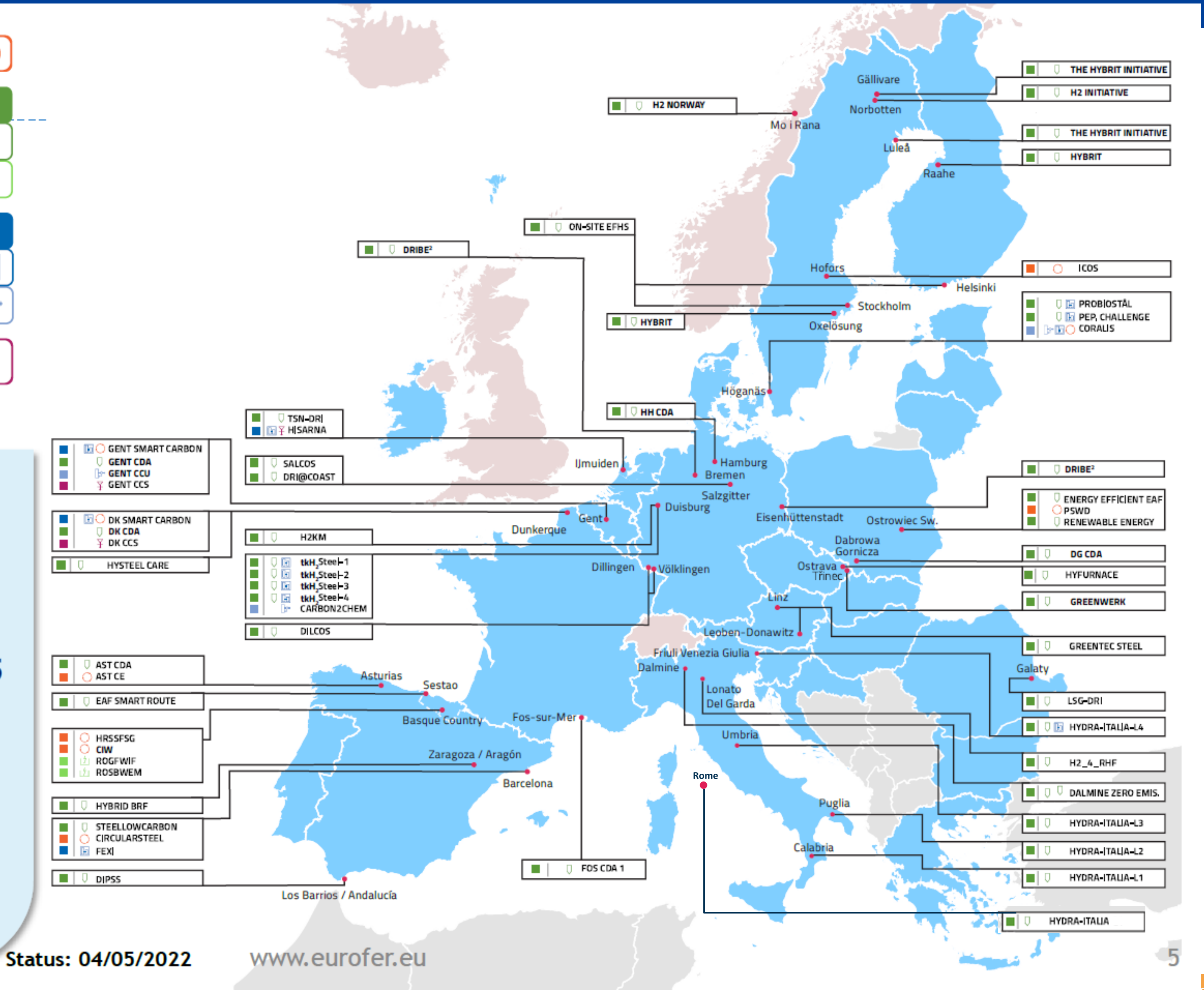
Source: CSP Partnershipboard meeting

Key low-CO_2 projects of the EU steel industry



- **60** projects
- Technology Readiness Level : at least **TRL 7**
- Starting year: almost all **before 2030**
- 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

Source: EUROFER



Concluding Remarks - Steel Decarbonisation of EU Region

- Many EU steel producers announced or started to invest in low CO2 technologies
  - H2-DRI (including starting with NG)
  - Smelter (feeding BOF)
  - EAF (mixed input)
  - CCUS

- Basket of low-CO2 technologies still growing
  - Iron ore electrolyses
  - Fluidised Bed Reactor
  - Advanced Blast Furnace

- Challenge to achieve overall economic viability
  - Low-CO2 energy (availability + affordability of hydrogen, electricity, etc.)
  - Global level playing field
  - Effective CBAM
  - Scrap availability + affordability

Thank you very much for your attention

European Steel Technology Platform

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