

# ESTEP und Clean Steel Partnership

Klaus Peters, Secretary General ESTEP

17 October 2023

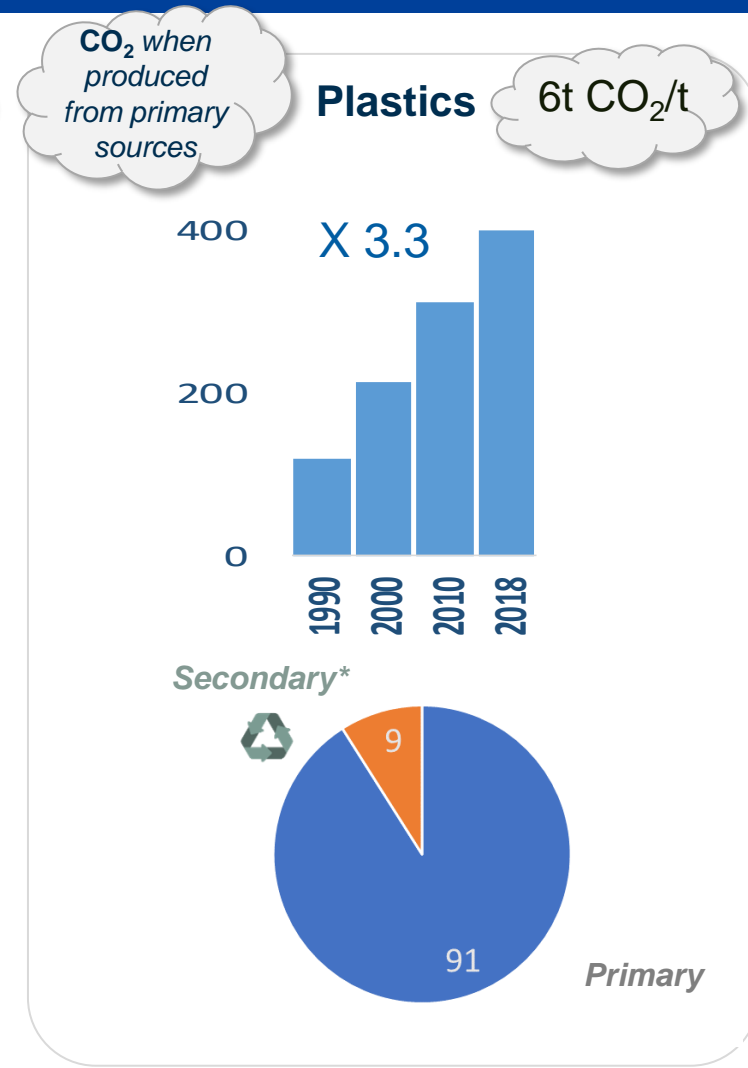
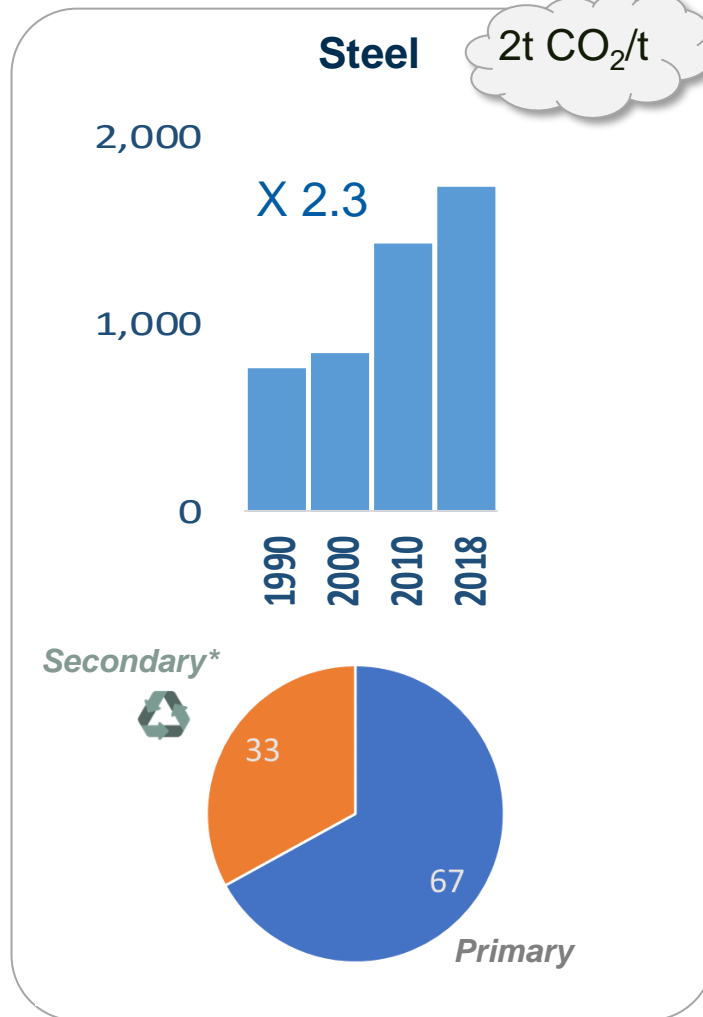
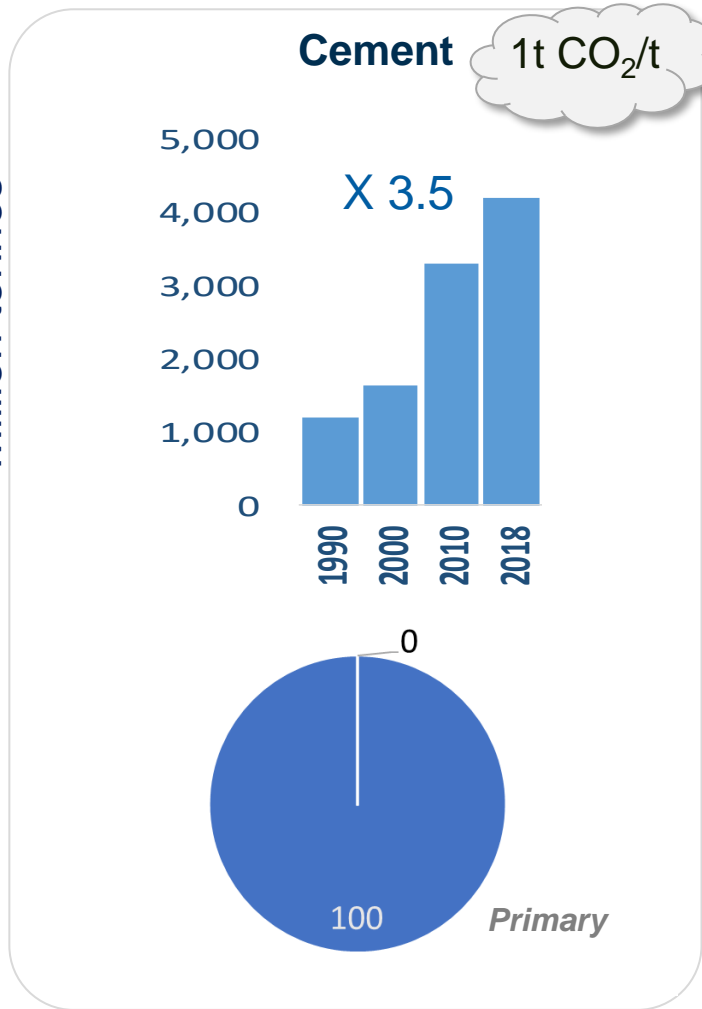
4. Aachener Ofenbau- und Thermoprozess-Kolloquium



### Global production

Million tonnes

### Sources



Materials are responsible for 25% of GHG and demand has tripled over the last 30 years.

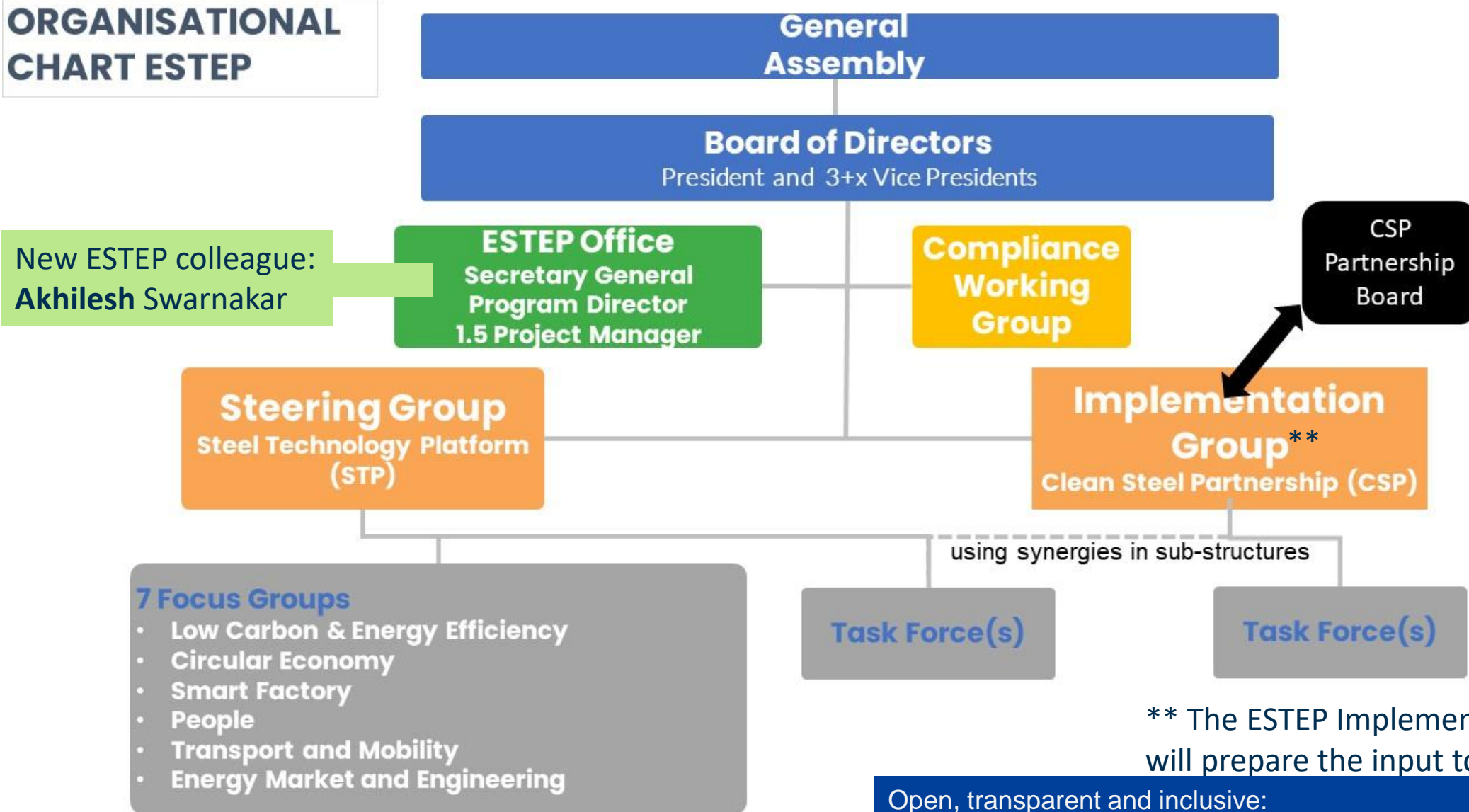
\* Defined as end of life material recycled to make same material again  
 Sources: WSA, Plastics Europe, ArcelorMittal Corporate Strategy analysis

- Partnership in the frame of Horizon Europe (HEU) in 2021 to 2027/2030
  - Unique setting due to synergies of public financial pillars (HEU + Research Fund Coal+Steel)
  - Memorandum of Understanding signed by ESTEP + European Commission (RTD+Grow)
- CSP-Budget: € 1.7 billion
  - €350 million from Horizon Europe
  - €350 million from assets of the ECSC\* in Liquidation (source of RFCS funding)
  - At least matched by steel sector (expected €1.000 million)
- Projects
  - size: € 10-100 million
  - Developments starting at TRL 6 to end up with TRL 8 (Technology Readiness Level)  
exceptional start at 5 to end up with at least TRL 7
  - 2 + 2 demonstrators showing CO<sub>2</sub> emission reduction potential of at least 50% (80%)
- Strategic Approach by 12 Building Blocks
  - Building Blocks define collaborative research areas
  - Impact by linking the Building Blocks with company pathways
    - Carbon Direct Avoidance
    - Smart Carbon Usage (Process Integration and CCUS)
    - Circular Economy



\*ECSC=European Coal and Steel Community (grandfather of the EU)

### ORGANISATIONAL CHART ESTEP



New ESTEP colleague:  
**Akhilesh Swarnakar**

\*\* The ESTEP Implementation Group will prepare the input to the PB.

Open, transparent and inclusive:

- All members attend Steering Group and Implementation Group
- Minutes of SG + IG + Board are shared with all members

## • European Technology Platform (EU 2020)

- Created in **2004** (ULCOS) and reconfirmed by EC in 2013
- Legal entity (AiSBL): incorporation by 13 founders in March 2018
- Members almost 5-fold by 2023: 64 members (Apr 2023)
- Open for organisations from EU + associated countries (steel producer, technology provider, university, RTO, SME, ...)

## • ESTEP mission

Collaborative EU actions (projects) on innovative technology to tackle EU challenges (renewable energy, climate change (CO<sub>2</sub>), Circular Economy) in order to create a sustainable EU steel industry

## • Collaborative work in 6 Focus Groups

- Thematic mini-conferences
- Initiate proposal writing
- Road mapping and publication
- Work towards standardisation

## • EU Clean Steel Partnership (CSP)





## 3 Technology Pathways for decarbonization

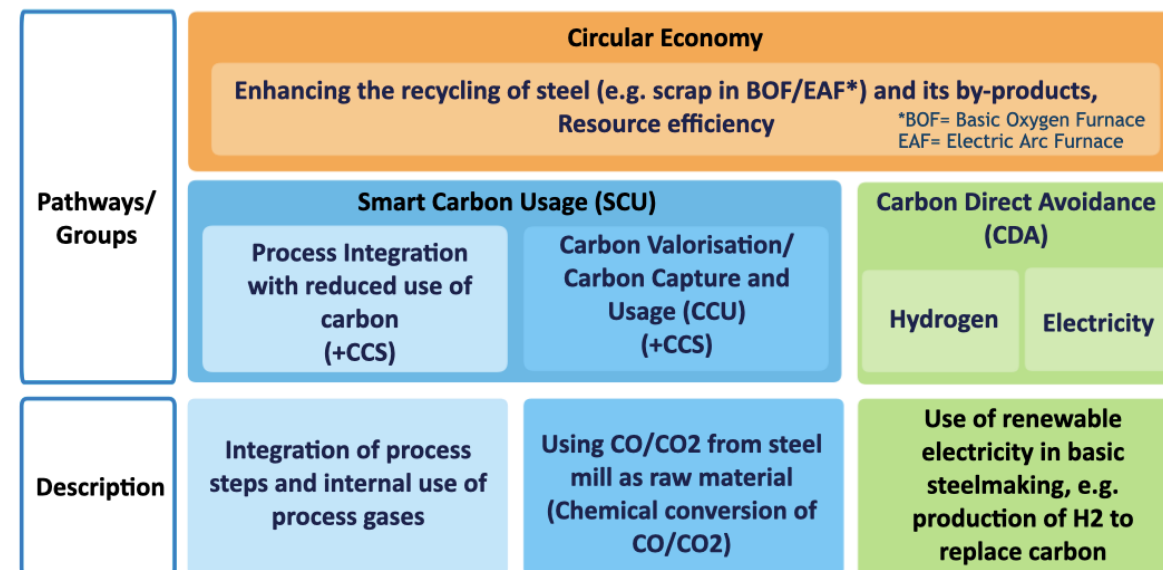
- Carbon direct avoidance (CDA)
- Smart carbon Usage (SCU)
  - Process Integration (PI)
  - Carbon, Capture, Storage, Utilization (CCUS)
- Circular Economy (CE)

## 6 Areas of Intervention

- Integrating Building Blocks into the 3 Pathways
- CDA, SCU-PI, SCU-CCUS, CE, combination
- Include enablers (**Digitalisation** + Social Innovation)

## 12 Building Blocks (BB)

- Bring to TRL8 at large scale



## MoU


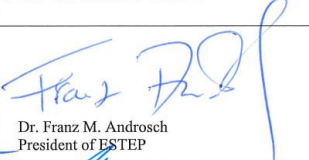


EN  
Annex 3

### Memorandum of Understanding for the Co-programmed European Partnership for Clean Steel - Low Carbon Steelmaking

The ESTEP aisbl, representing the partners other than the Union (its constituent entities<sup>1</sup>), the registered offices of which are in Avenue Cortenbergh 172, 1000 Brussels, Belgium, hereafter referred to as the “Partners other than the Union”, and the European Union, represented by the European Commission, (jointly hereinafter referred to as “the Partners”),

Considering that:

- Parts of Horizon Europe – the Framework Programme for Research and Innovation (‘Horizon Europe’)<sup>2</sup> – may be implemented through Co-Programmed European

FOR THE EUROPEAN COMMISSION	FOR THE ESTEP AISBL
	
Mariya Gabriel	Dr. Franz M. Androsch President of ESTEP
	
Z. Mihail	VICE-PRESIDENT of ESTEP

## SRIA

Have your word  
into the SRIA!



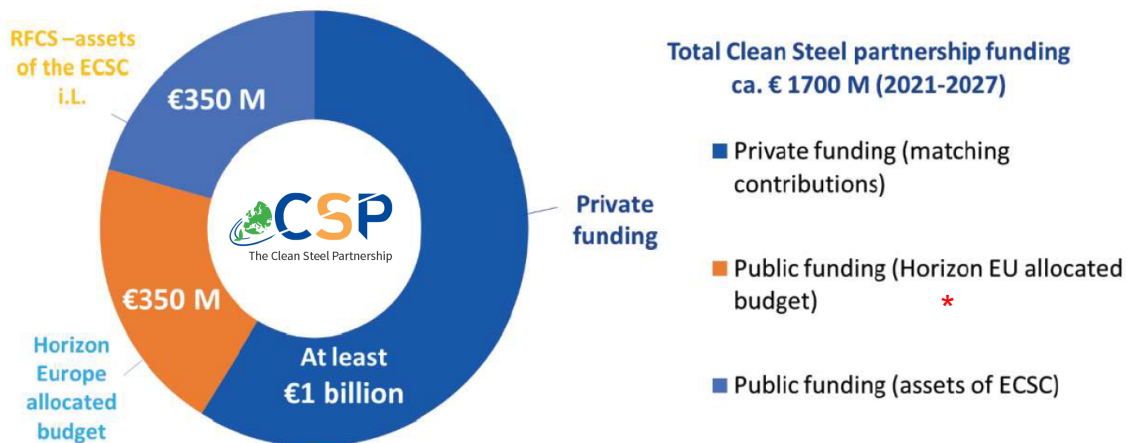
## Clean Steel Partnership – CSP

- Horizon Europe (2021-2027)
- Co-programmed Partnership**
- Two financial funding pillars
  - Horizon Europe
  - Assets of Research Fund for Coal and Steel (RFCS)
- Established by **Memorandum of Understanding (MoU)**
  - ESTEP
  - DG RTD & DG Grow
- SRIA explains in detail the **intended activities of CSP**
- SRIA adopted** by the Partnership Board of the Clean Steel Partnership on 13 December 2021
- SRIA Update** end 2023/beginning 2024
- Upcoming event : On the road for SRIA 2030 – 14 November @PressClub Brussels (ESTEP website)



### Horizon Europe 2021-2027

- Dedicated investment of € 350 million, with contribution of private funding.
- Clean Steel has 2 sources of funding, HE and RFCS, contributing to research & innovation with a total of € 700 million in the period 2021-2027.

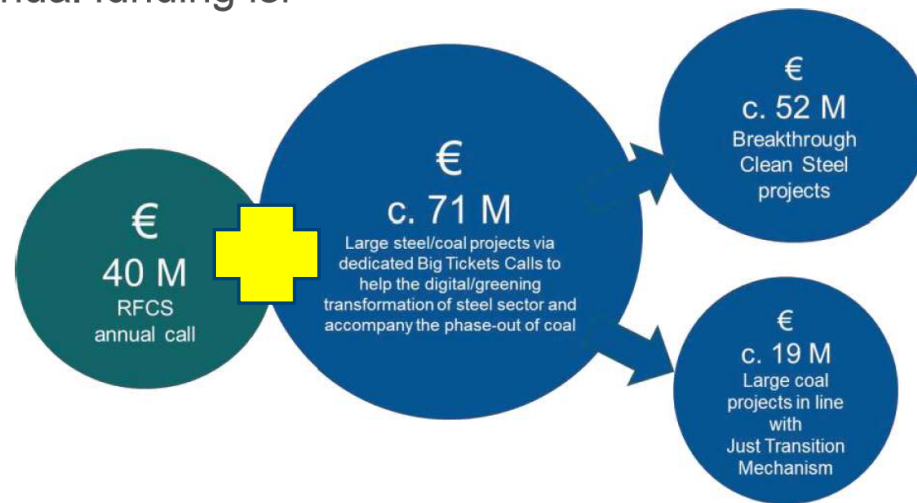


\* ECSC=European Coal and Steel Community (grandfather of the EU)



### RFCS

- By Council decision it relies on multiannual technical guidelines.
- With the new legal base in force since 2021 the annual funding is:



The distribution of funding is set at **27.2 %** for coal-related research and **72.8 %** for steel-related research, as provided for by Article 4(2) of the implementing measures, decided by the Council in 2003.



- Public calls open to every organization

- According to Horizon Europe (HEU) regulation
- According to Research Fund for Coal and Steel (RFCS) regulation
- No membership etc. required



- ESTEP facilitates the private side of the Clean Steel Partnership

- Membership in ESTEP (European Steel Technology Platform) available for steel stakeholder
- Clean Steel Partnership board private side composed of ESTEP members
- ESTEP organises CSP related events for its members (in addition to open events)
  - Contribute to definition of the call texts of CSP (HEU+RFCS)
  - Information sharing
  - Brokerage event, consortium matchmaking





**Topic 18:** Carbon Direct Avoidance in steel:  
Electricity and hydrogen-based metallurgy

**Topic 19:** Improvement of the yield of the iron and steel making

**Topic 22:** Adjustment of Steel process production to prepare for the transition towards climate neutrality

**Topic 13:** Raw material preparation for clean steel production

**Topic 16:** Modular and hybrid heating technologies in steel production

**Obj. 1:** Preparation of steel CO/CO<sub>2</sub> gases for Carbon Capture Use and Storage (CCUS)

**Obj. 2:** Process Integration (PI) in steel plants to reduce the use of fossil carbon and associated CO<sub>2</sub> emissions

**Obj. 3:** CO<sub>2</sub> neutral iron ore reduction (Increasing the use of pre-reduced iron carriers)

**Obj. 4:** Developing technologies to reduce the specific energy required to produce steel



Prg.	Year	Topic	Project Acronym
HEU	2021	18	MaxH2DR
		19	HiYield
		19	ReMFra
		19	CAESAR
		22	RecHycle
	2022	13	PureScrap
		13	TransZeroWaste
		16	GreenHeatEAF
		16	ModHEATech
		16	HyTecHeat

Prg.	Year	Obj.	Project Acronym
RFCS Big Ticket Steel	2022	2	MODIPLANT
		2	FullH2Reheat
		2	HYDREAMS
		2	TWINGHY

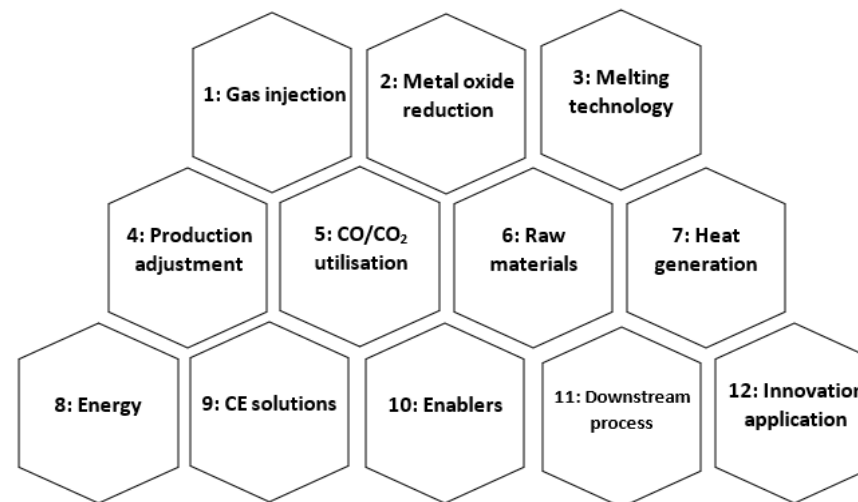
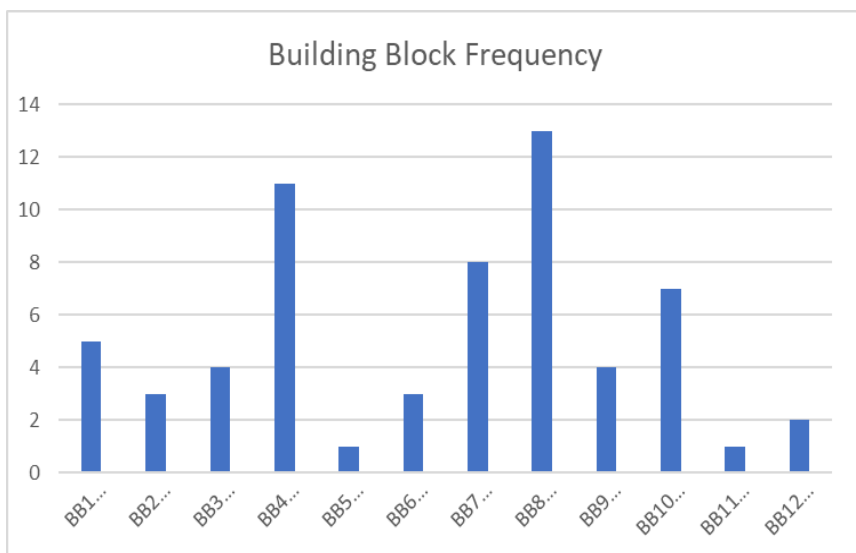
no	project acronym	EU funding
1	MaxH2DR	4,2
2	CAESAR	5,6
3	HIYIELD	3,6
4	RemFRa	4,8
5	RecHycle	6,2
6	PURESCRAP	5,0
7	TransZeroWaste	5,0
8	GreenHeatEAF	3,6
9	HyTecHeat	3,4
10	ModHEATech	3,4
11	FULL2REHEAT	8,6
12	HYDREAMS	4,3
13	MODIPLANT	8,0
14	TWINGHY	4,5

Total > 70 million Euro

### Long project title

1. MaxH2DR provides missing knowledge and data of reduction processes
2. Circularity Enhancements by Low quality Scrap Analysis and Refinement
3. Highly efficient technologies for increased yields in steelmaking processes and reduced environmental impact
4. Improving circularity and sustainability in the EU steel industry
5. Recycling renewable hydrogen for climate neutrality
6. Purity improvement of scrap metal
7. Upgrading of low-quality iron ores and mill scale with low carbon technologies
8. Electric arc furnaces to reduce steelmaking emissions
9. Hybrid technologies for low-CO2 steel manufacturing
10. MODular HEATING TECHNOLOGY through renewable resources for steel production
11. Demonstrator of Industrial Transformation with Hydrogen for HAV long products rolling mills
12. Clean Hydrogen and Digital tools for REheating And heat treatMent for Steel
13. MODular hybrld technology in the Steel PLANT production
14. Digital TWINS for Green HYdrogen transition in steel industry

Call	Call Topic	Project Name	BB1 Gas Injection	BB2 Metal Oxide Reduction	BB3 Melting Technology	BB4 Product Adjustment	BB5 CO/CO2 Utilisation	BB6 Raw Materials	BB7 Heat Generation	BB8 Energy	BB9 CE Solutions	BB10 Enablers	BB11 Downstream Process	BB12 Innovation Application
HEU 2021	#18	MaxH2DR	x	x		x				x		x		x
	#18	RecHycle	x	x		x	x			x		x		x
	#19	HiYield				x				x	x			
	#22	ReMFra		x							x			
	#22	CAESAR				x		x		x	x	x		
HEU 2022	#13	PURESCRAP			x			x		x	x	x		
	#13	TransZeroWaste			x			x	x	x				
	#16	GreenHeatEAF			x	x			x	x				
	#16	ModHEATech			x	x			x	x				
	#16	HyTecHeat				x			x	x		x		
RFCS BT 2022		MODIPLANT	x			x			x	x				
		FULL2REHEAT	x			x			x	x		x	x	
		HYDREAMS	x			x			x	x				
		TWINGHY				x			x	x		x		





### CSP calls 2023 Cluster 4 Horizon Europe



**Topic 43:** Low carbon-dioxide emission technologies for melting iron-bearing feed materials **OR** smart carbon usage and improved energy & resource efficiency via process integration

**Topic 45:** Circular economy solutions for the valorisation of low-quality scrap streams, materials recirculation with high recycling rate, and residue valorisation for long term goal towards zero waste

### CSP RFCS BIG Ticket call objectives



1. CO2 neutral iron ore reduction (Increasing the use of pre-reduced iron carriers)
2. Developing technologies to reduce the specific energy required to produce steel
3. Circular economy and sector coupling solutions to meet the zero-waste goal for steelmaking
4. Preparation of steel CO/CO2 gases for Carbon Capture Use and Storage (CCUS)
5. Process Integration (PI) in steel plants to reduce the use of fossil carbon and associated CO2 emissions

Prg.	Year	Topics	Funding budget	# proposals	# selected for funding (estimate)
HEU	2023	43	23	2	2
		45	12	8	2-3
RFCS	2023	1-5	130	9	1

In total 14+6=20 CSP projects

2021-2023	total	EU fund	private	Column1
	101	64	37	Horizon Europe
	61	30	30	RFCS BT
	162	94	67	total
				(mio. €)



SEARCH FUNDING & TENDERS

HOW TO PARTICIPATE

PROJECTS & RESULTS

WORK AS AN EXPERT

SUPPORT



Get started

clean steel partnership



Match whole words only

GRANTS

TENDERS

Submission status



Forthcoming (2)



Open for submission



Closed

Programming period

Select a Programme period...



Filter by Programme / Programme group

Select a Programme...



### Funding and tenders (2)

 Need help?



Sort by:

Submission status



Digital transformation and ensuring a better use of industrial data, which can optimise steel supply chains (**Clean Steel Partnership**) (IA)

Call for proposal

Grant

HORIZON-CL4-2024-TWIN-TRANSITION-01-44

Programme Horizon Europe (HORIZON)

Status **Forthcoming**

Type of action HORIZON Innovation Actions

Deadline model single-stage

Opening date 19 September 2023

Deadline date 07 February 2024 17:00:00 Brussels time

CO2-neutral steel production with hydrogen, secondary carbon carriers and electricity OR innovative steel applications for low CO2 emissions (**Clean Steel Partnership**) (RIA)

Call for proposal

Grant

HORIZON-CL4-2024-TWIN-TRANSITION-01-46

Programme Horizon Europe (HORIZON)

Status **Forthcoming**

Type of action HORIZON Research and Innovation Actions

Deadline model single-stage

Link: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-search> Search: Clean Steel Partnership



SEARCH FUNDING & TENDERS

HOW TO PARTICIPATE

PROJECTS & RESULTS

WORK AS AN EXPERT

SUPPORT



Get started

Big Tickets for Steel



Match whole words only

GRANTS

TENDERS

Submission status



Forthcoming



Open for submission



Closed (2)

Programming period

Select a Programme period...



Filter by Programme / Programme group

Select a Programme...



### Funding and tenders (2)

Need help?



Sort by:

Submission status



#### RFCS-2022-CSP-Big Tickets for Steel

RFCS-2022-CSP

Call for proposal

Grant

Programme	Research Fund for Coal & Steel (RFCS)	Status	Closed
Type of action	RFCS Project Grants	Deadline model	single-stage
Opening date	03 March 2022	Deadline date	03 May 2022 17:00:00 Brussels time

#### RFCS-2023-CSP-Big Tickets for Steel

RFCS-2023-CSP

Call for proposal

Grant

Programme	Research Fund for Coal & Steel (RFCS)	Status	Closed
Type of action	RFCS Project Grants	Deadline model	single-stage
Opening date	02 February 2023	Deadline date	04 May 2023 17:00:00 Brussels time



## CSP calls 2024 Cluster 4 Horizon Europe

### Topic 44:

Digital transformation and ensuring a better use of industrial data, which can optimise steel supply chains

### Topic 46:

CO<sub>2</sub>-neutral steel production with hydrogen, secondary carbon carriers and electricity  
**OR** Innovative steel applications for low CO<sub>2</sub> emissions



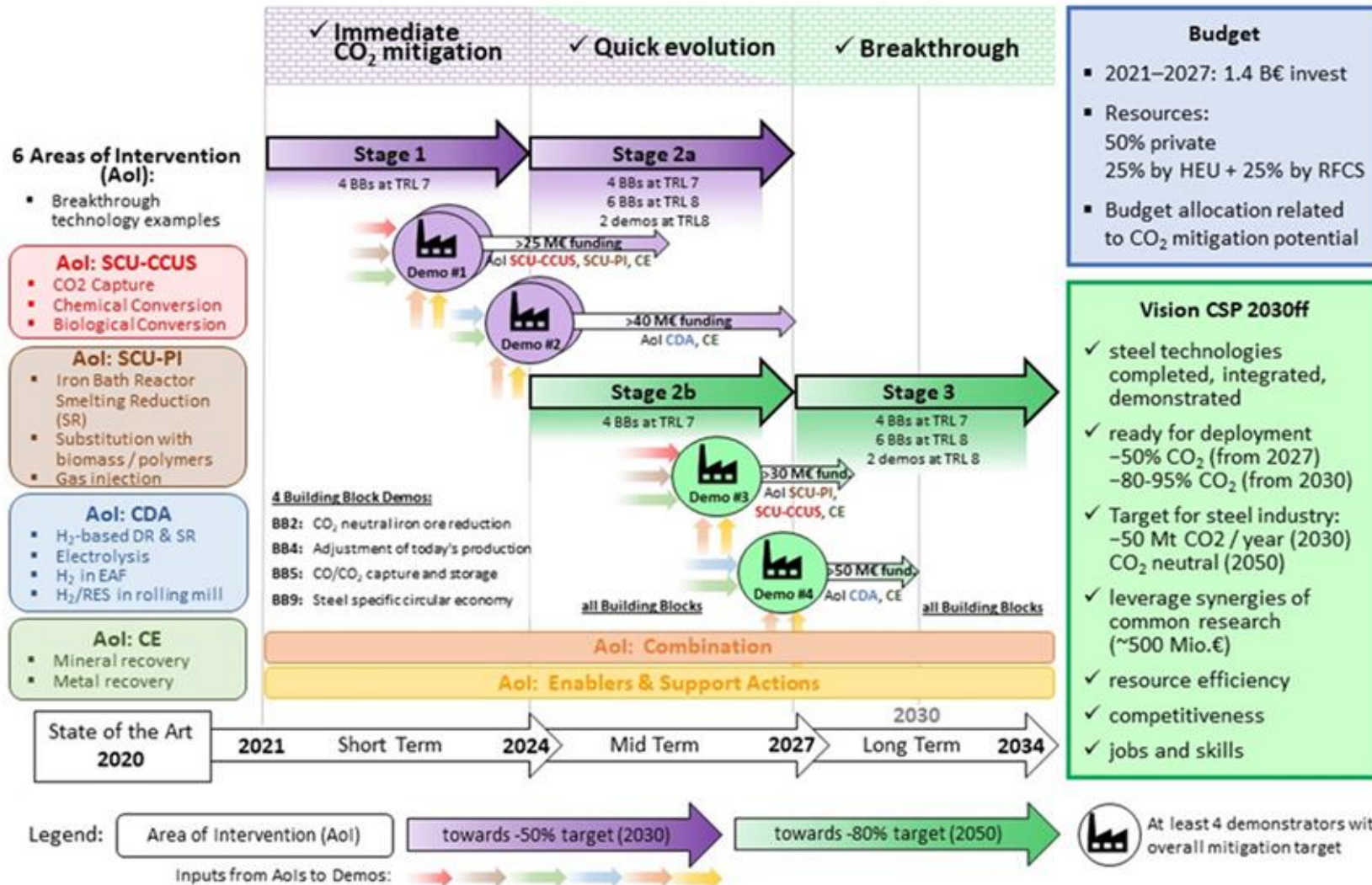
## CSP RFCS Big Ticket 2024 call objectives \*

1. Cross cutting issues: digitalisation, skills and social innovation
2. CO<sub>2</sub> neutral iron ore reduction (Increasing the use of pre-reduced iron carriers)
3. Technologies to improve energy efficiency, increase heat recovery and enhance Process Integration (PI) approaches in steel production.
4. Advanced steel alloys for special applications
5. Circular economy and sector coupling solutions to meet the zero-waste goal for steelmaking
6. Preparation of steel CO/CO<sub>2</sub> gases for Carbon Capture Use and Storage (CCUS)

\* Subject to changes



## Clean Steel Partnership CSP: Vision, Ambition and Resources



**Budget**

- 2021–2027: 1.4 B€ invest
- Resources:
  - 50% private
  - 25% by HEU + 25% by RFCS
- Budget allocation related to CO<sub>2</sub> mitigation potential

**Vision CSP 2030ff**

- ✓ steel technologies completed, integrated, demonstrated
- ✓ ready for deployment
  - 50% CO<sub>2</sub> (from 2027)
  - 80-95% CO<sub>2</sub> (from 2030)
- ✓ Target for steel industry:
  - 50 Mt CO<sub>2</sub> / year (2030)
  - CO<sub>2</sub> neutral (2050)
- ✓ leverage synergies of common research (~500 Mio.€)
- ✓ resource efficiency
- ✓ competitiveness
- ✓ jobs and skills

[www.estep.eu](http://www.estep.eu)  
[klaus.peters@estep.eu](mailto:klaus.peters@estep.eu)

- Horizon Europe Information

- Startseite: [https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe\\_en](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en)
- [https://research-and-innovation.ec.europa.eu/events/horizon-europe-info-days\\_en](https://research-and-innovation.ec.europa.eu/events/horizon-europe-info-days_en)
- Clean Steel Partnership – CSP: <https://www.estep.eu/clean-steel-partnership/>
- European Partnerships  
[https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe\\_en](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe_en)

- Research Fund for Coal and Steel (RFCS) Information

- RFCS workshop: How to write better proposals 13 Dec 2023 (tbc)  
RFCS Big Ticket Info Day: 3<sup>rd</sup> week Feb 2024  
[https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/research-fund-coal-and-steel-rfcs\\_en#events](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/research-fund-coal-and-steel-rfcs_en#events)
- General documents  
[https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/research-fund-coal-and-steel-rfcs\\_en#documents](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/research-fund-coal-and-steel-rfcs_en#documents)