Energy storage innovation - webinar EASE & ESTEP -

Klaus Peters, Secretary General ESTEP

08 December 2023, online





Energy storage innovation - webinar EASE & ESTEP 2023-12-06

Webinar

The "Energy Storage Innovation" webinar is presented by the European Steel Technology Platform (ESTEP) and the European Association for Storage of Energy (EASE;

In today's rapidly evolving industrial landscape, optimising daily operations is essential. Join us for this illuminating webinar where we will delve into energy storage solutions that are revolutionising energy-intensive indust. This event offers a unique opportunity to explore the possibilities and innovation potential in energy storage, as well as discover relevant suppliers who can help you shape the future of your industry. Q&A sessions will for after each presenter.









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Innovation examples

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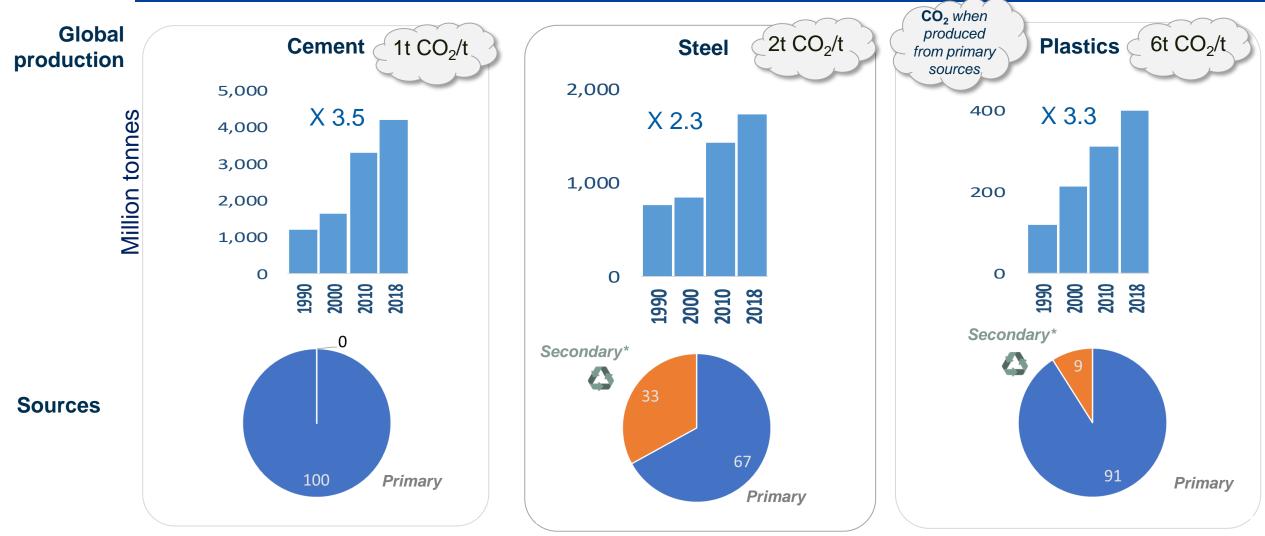






Challenge for all industries

How to meet the growing global demand in a Sustainable + Climate Neutral way



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



European Steel Technology Platform (ESTEP)

- 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 more than 5-fold by 2023: 68 members (Dec 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 (CO₂), Circular Economy) in order

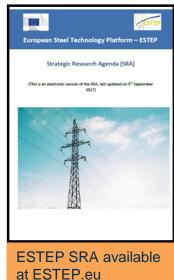
to create a sustainable EU steel industry

- Collaborative work in 6 Focus Groups
 - Thematic mini-conferences
 - Initiate proposal writing
 - Road mapping and publication
 - Work towards standardisation
- •EU Clean Steel Partnership (CSP)











EU Clean Steel Partnership Accelerate towards net zero CO₂ steelmaking

- 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
 exceptional start at 5 to end up with at least TRL 7
- 2 + 2 demonstrators showing CO₂ 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
 - Strategic Research and Innovation agenda is being updated: Have your voice heard







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



EU Clean Steel Partnership Strategic Research and Innovation Agenda (SRIA)

3 Technology Pathways for decarbonization

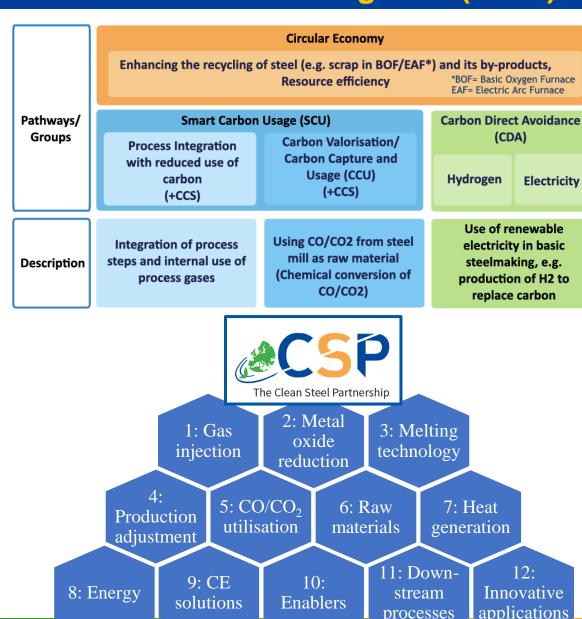
- Carbon direct avoidance (CDA)
- Smart carbon Usage (SCU)
 - Process Integration (PI)
 - Carbon, Capture, Storage, Utilization (CCUS)
- Circular Economy (CE)

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



CSP roadmap (SRIA): www.estep.eu/clean-steel-roadmap



Energy Storage in the Clean Steel Partnership

Energy storage technologies are part of Building Block 8 (BB8)

8: Energy

Energy management / Energy vector storage (H2, electricity, intermediate materials, ...) for clean steel production

- Fluctuating energy supply and supporting energy system transformation, through **storage** solutions and accumulation systems in the steelmaking plants
- Enhancing the **storage** of heat in the energy vector. Introduction of heat transfer media (e.g. diathermic oil, molten salt, liquid metals) not yet considered state-of-the-art in the steelmaking process, but that could improve the thermal exchange process and ultimately reduce CO2 emission
- Demonstrating smart energy use through the integrated energy management also considering **storage** strategy and relevant devices
- **Buffer solutions** in steel production processes aimed also at electric power balancing through harmonisation of demand and supply response



We wish you an interesting and encouraging webinar

Clean Steel Partnership CSP: Vision, Ambition and Resources

Pilot & Demonstration plants Completion and Integration First-of-a-kind deployments √ Immediate Budget ✓ Quick evolution √ Breakthrough CO, mitigation 2021–2027: 1.4 B€ invest Resources: 50% private Stage 1 Stage 2a 6 Areas of Intervention 25% by HEU + 25% by RFCS (AoI): 4 BBs at TRL 7 4 BBs at TRL 7 · Breakthrough 6 BBs at TRL 8 Budget allocation related technology examples 2 demos at TRLS to CO2 mitigation potential AoI SCU-CCUS, SCU-PI, CE AoI: SCU-CCUS CO2 Capture Chemical Conversion Vision CSP 2030ff 144 >40 M€ funding Biological Conversion Apl CDA, CE Demo #2 √ steel technologies Aol: SCU-PI completed, integrated, Iron Bath Reactor Stage 2b Stage 3 demonstrated Smelting Reduction 488s at TRL 7 ✓ ready for deployment Substitution with 6 BBs at TRL 8 -50% CO2 (from 2027) 2 demos at TRL 8 biomass/polymers >30 M€ fund 144 Gas injection -80-95% CO2 (from 2030) Demo #3 AoI SCU-PI 4 Building Block Demos: SCU-CCUS, CE Aol: CDA ✓ Target for steel industry: BB2: CO, neutral iron ore reduction H₂-based DR & SR -50 Mt CO2 / year (2030) BB4: Adjustment of today's production Electrolysis CO₂ neutral (2050) ш 50 M€ fund BB5: CO/CO, capture and storage · Ho in EAF H₂/RES in rolling mill √ leverage synergies of BB9: Steel specific circular economy all Building Blocks all Building Blocks common research Aol: CE Aol: Combination (~500 Mio.€) Mineral recovery ✓ resource efficiency **Aol: Enablers & Support Actions** Metal recovery 2030 √ competitiveness State of the Art Mid Term Short Term 2027 2021 2024 Long Term 2034 ✓ jobs and skills 2020 At least 4 demonstrators with towards -50% target (2030) towards -80% target (2050) Area of Intervention (AoI) Legend: overall mitigation target





www.estep.eu klaus.peters@estep.eu

Inputs from AoIs to Demos:





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