



SUSTAINABLE IRON AND STEEL DEVELOPMENT INITIATIVES

IEA EXPERTS' DIALOGUE ON EFFECTING THE SUSTAINABLE TRANSITION OF IRON AND STEEL

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IEA GLOBAL TECHNOLOGY ROADMAP FOR IRON AND STEEL

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EUROFER REPRESENTS THE ENTIRE EUROPEAN STEEL INDUSTRY



The European Steel Association (EUROFER) was founded in 1976 and is based in Brussels

328,000 people work directly for the Steel Industry at over 500 sites in Europe

Europe produces 160 million tonnes of steel annually

Steel is 100% recyclable, infinitely

EU STEEL INDUSTRY'S STRATEGIC TECHNOLOGICAL PATHWAYS

EU steel industry's strategy for significant CO₂ emissions reduction combines a series of technologies taking resource availability into account



KEY INNOVATIVE LOW-CO2 PROJECTS OF THE EU STEEL INDUSTRY



Source: Publicly available literature, presentations

borders are in place

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framework conditions and infrastructures beyond site

INDUSTRIAL DEMONSTRATION OF È PROJECTS & ROLL-OUT

Period	Smart Carbon Use (SCU) Carbon Direct Avoidance (CDA)		CO ₂ reduction potential* (up to)
2018-2021	SCU	CCU (ethanol)	80% with CCS and H_2
2021-2025	SCU	CCU (methanol)	80% with CCS and H_2
2022-2027	SCU	Process Integration	80% with CCUS
2025-2030	CDA	Hydrogen based steelmaking	95%
2025-2030	CDA	Hydrogen based steelmaking	95%
2025-2035	CDA	Hydrogen based steelmaking	95%
2025-2035	CDA	Iron ore electrolysis	95%
2022, 2026, 2031, 2036	Start of market roll-outs if CAPEX & OPEX are competitive at demonstration phase, & regulatory framework conditions and infrastructures beyond site borders are in place		
2050	Carbon-neutral steel industry in Europe (80-95% CO ₂ reduction)		

*Potential CO_2 reduction compared to Blast Furnace route in case of full scale implementation. CO_2 reduction of the entire steel industry depends on the combination of production technologies.

KEY MESSAGE

- 1. EU steel industry's strategy for significant CO2 emissions reduction **combine a series of technologies** taking resource availability into account.
- 2. With hydrogen-based steelmaking as well as the transformation and improvement of fossil-based steel making technologies and the enhancement of recycling of steel scrap and steel by-products, the EU steel industry as a whole may substantially reduce its CO2 emissions if the necessary surrounding conditions such as availability of suitable raw materials (iron ore, scrap), low-carbon electric energy (for EAF and hydrogen production), related infrastructure and adequate regulatory framework are in place.
- 3. The transformation to a low-carbon steel industry will require significant additional carbon free electric energy. The EU steel industry will require **about 400 to 480 TWh/year of CO2 free electricity** for the production processes including EAF technology and for hydrogen production by electrolyser technology.

KEY MESSAGE

- 6. Currently, it is **not possible to establish a reliable technology-mix scenario**. This is due to the fact that the eventual applicability of a certain technology is subject to regional conditions, most importantly energy cost, energy availability, infrastructure availability, local extent of industrialisation, local legal restrictions and the actual technology readiness level achieved.
- 7. This transformation of the EU steel sector will require high **investment cost and lead to significant increase of production costs.**
- 8. The expected far-reaching transformation of the EU steel sector cannot be undertaken by the sector on its one – it requires **coordination and cooperation** between a range of stakeholders, including EU institutions, governments, the energy sector and other industries. **Concerted efforts and support for the significant investment needs** are crucial.





THANK YOU FOR YOUR ATTENTION

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