Blueprint “New Skills Agenda Steel”: Industry-driven sustainable European Steel Skills Agenda and Strategy (ESSA)

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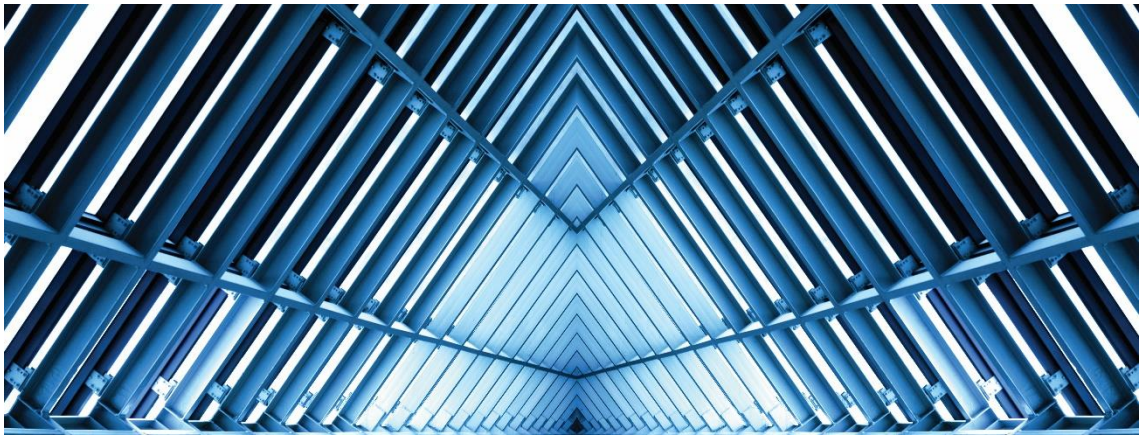
European Steel Skills Agenda (ESSA)



What’s New?

A new ESSA project’s deliverable* on

Digital transformation in European steel industry: state of art and future scenario (D2.1- 2nd version)

The assessment of the Technological development affecting the European Steel Industry is a progressive activity which characterizes the ESSA project throughout its duration.
Starting from the results of the first version of Deliverable 2.1(2019) an updated version has been released (July 2021) to include the technological and economic developments and trends of the last two years. The digital transformation in steel production has been analyzed in a wide range by including a) the increasing of the production efficiency and reduction of environmental impact; b) the role of digital technologies inside the technological transformation to reach the EU climate objectives set up by the European Green Deal; c) the support of digital technologies to the social innovation as key factor for the effective implementation of the technological transformation.

*The full version of this deliverable is available on ESSA website:
https://www.estep.eu/essa/download-area/deliverables/

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Digital transformation in European steel industry

Digital transformation can be considered among the key enabler directly impacting on advanced manufacturing and transversally affecting the pathway towards sustainability. As consequence, it can be said that:

- The technological transformation of the European Industry is driven by digitalization, aiming mainly to increase the production efficiency and sustainability in order to reduce the industrial environmental impact. That is particularly true for the energy-intensive industry, like steel manufacturing.
- The digital transformation of the steel production mainly concerns the application of the related technologies on the steel production processes, where the ongoing technological developments are focused on two fields: 1) advanced tools for the optimization of the whole production chain and 2) specific technologies for enabling the implementation of green technologies for low-carbon production.

Digital technologies supporting steel production are analysed in terms of **complexity of the steel manufacturing chain** and the need of **new technologies that go far beyond the conventional automation of industrial production**.

Digital technologies in supporting the social innovation

The need for social innovation is considered as a key factor for the effective implementation of the technological transformation. This means not only **upskilled workforce**, but also **changes in attitude** and behaviours **that can be supported by digital technologies** by improving working conditions and safety, creating qualified jobs and enhancing the workers’ competencies. On the other hand, digital innovation can enable and support the social innovation process, facilitating knowledge sharing, cooperative work and networking.

The role of digital technologies in supporting the social innovation is highlighted for enabling a wider corporate culture where processes, equipment and products are designed with the aim to improve safety and health of employees. Therefore, digital technologies allow the extensive continuous monitoring and control of processes through **process automation**, **robotization** of operations using robots to prevent contact with dangerous substances, fires and explosions, accidents at work, release heavy burdens, etc. In addition, digital technologies aim at releasing workers from process malfunctions, unexpected events, or accidents.
On the other hand, future scenarios consider digitalization enabling **a new way of work** within efficient plants in order to face the new challenges and to remain competitive and sustainable at the same time. Therefore, steel industries are and will be more and more digitalized, making available vast amount of data from the whole production chain and even from the ecosystem in the areas where steel plants are located.

To describe such scenario, the new term of **Industry 5.0** has been coined to highlight the **centrality of human beings** wherever they are, inside the manufacturing chain or in the neighbor community. Industry 5.0 harmonizes with the paradigm of Industry 4.0 through research and innovation and the transition towards a sustainable, human-centric and resilient European industry. Furthermore, Industry 5.0 **integrates social and environmental European priorities** into technological innovation by shifting to a systemic approach the challenges to be faced.
Six categories have been identified to be combined with others, as a part of technological frameworks: (i) Individualized Human-machine-interaction; (ii) Bio-inspired technologies and smart materials; (iii) Digital twins and simulation; (iv) Data transmission, storage, and analysis technologies; (v) Artificial Intelligence; (vi) Technologies for energy efficiency, renewables, storage and autonomy.

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Technological transformation and EU climate objectives

Digitalization fundamental component of the technological transformation affecting the Energy Intensive Industries (IIEs)

Digitization as a fundamental component of the technological transformation affecting the Energy Intensive Industries (IIEs) is necessary to reach the EU climate objectives, according to the European Green Deal for the European Union (EU) and its citizens. The ambitious objective foresees on achieving a complete reduction in net emissions of GHGs by 2050 and transforming the EU into a prosperous society, including a modern, resource-efficient and competitive economy through a well-defined Circular Economy model.

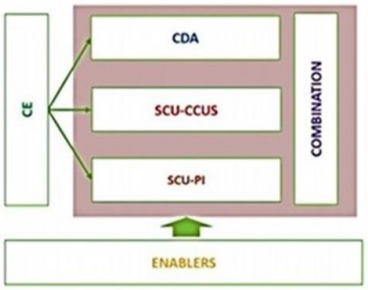
Furthermore, the Green Deal sets the transition to a sustainable economy through the identification of instruments that can help the EU to achieve its Zero Carbon ambitions through the progressive reduction of CO_2 emissions. Innovation is focused on green technologies, combined with EU initiatives aimed at Digitising European Industry, which includes a better and growing use of technologies as Big Data and AI.

Digital technologies as enabler of green technologies

Digital transformation and Industry 4.0 paradigm are analyzed in combination with the development and implementation of the green technologies within the technological pathways (CDA: Carbon Direct Avoidance, SCU-CCU: Smart Carbon Usage- Carbon Capture & Utilization, SCU-PI: Smart Carbon Usage Process Integration) and their combination.

Digital technologies as enabler of green technologies are defined by the recent EU initiatives for the steel industry: the “Green Steel for Europe” project and the Clean Steel Partnership (CSP).

The “GreenSteel for Europe” project aims at developing an innovative approach based on the combined assessment of promising technologies, industrial transformation scenarios, and policy options and impacts in order to face the decarbonisation of the European steel industry. On the other hand, the CSP and its roadmap defines the R&D&I activities for a sustainable production. According to the CSP roadmap, digitalization, as enabler, is included among the six areas of intervention, as in the picture below, comprising different technological pathways (and combinations thereof) with the target of a carbon-neutral steel production.



Source: Author’s elaboration on consultation with ESTEP members

The CSP roadmap also defines the specific contribution of the digital technologies to the development of the different green performances.

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Benefits, barriers and drivers

The digital technologies are generally applied in all the company’s areas, especially in the process chain control and where the management of large amounts of data is required (i.e., production, business, etc.).

Expected benefits:

- production (i.e., cost reduction and quality improvement),
- positive impact on workforce in terms of safer and healthier workplaces,
- environmental improvements (i.e., reduction of wastes, emissions, and re-sources consumptions.

Main barriers:

- cost of the investment (due to obsolescence of plant/infrastructures and equipment)
- the lack of highly skilled workforce
- skills gap
- acceptance of the new technologies by the workforce.

Main drivers for industrial innovation:

- digital transformation
- climate changes
  - digital technologies help to increasing energy and resource efficiency
  - digital technologies as enabler of the implementation of green technologies
  - digital technologies contribute keeping materials in use for a longer time by implementing a Circular Economy (CE) model
- synergies between the different EU initiatives
  - support companies in their digital transformation and CE.
- Industry 5.0
  - highlights the centrality of human being by integrating social and environmental priorities
  - enhances workers’ skills in carrying out a supervisor role in the human-machine interaction
  - foresees attraction and retention of talented people
  - improves companies’ competitiveness in a context of **sustainable, human-centric European industry**.

ESSA Website: www.estep.eu/essa

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