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Conclusions of CAESAR HEU project - CirculArity Enhancements by low quality Scrap Analysis and Refinement

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Scrap plays a crucial role in steelmaking in order to enhance processes sustainability, as it reduces the reliance on virgin raw materials and supports the circular economy, while lowering CO_2 emissions and energy demand. However, current trends in the EU scrap market show a slight decline in pre-consumer scrap streams (E2, E6, E8, turnings, etc.) and a short- and long-term increase in post-consumer scrap availability (E1, E3, HMS⋯), driven by the growth in steel consumption over the past decades. Nowaday, these so-called "low-quality" scrap streams do not meet the requirements of several applications, which limits their use in steel production, particularly for flat products.
To expand steel scrap recycling capacity and improve energy efficiency, while maintaining EU competitiveness and securing supplies in terms of raw materials, energy, and climate impact, innovative technologies must be deployed to clean, upgrade, and valorize scrap before it enters steelmaking furnaces. Over a four-year period, the CAESAR project brought together steel producers, technology providers, and research institutions to validate, at full industrial scale, integrated technologies for scrap upgrading, sorting, and characterization. The project's objective is to enable the local use of low-quality scrap streams in Europe while ensuring high product quality and creating valorization pathways for all recovered non-ferrous fractions, moving toward a zero-waste steel industry.
Close to the end of the project, several interesting results have been obtained on key topics:
• Mapping of the EU scrap market and characterization of exported low-quality grades –in particular with respect to locally consumed ones
• Selecting, testing and integrating the best available technologies to upgrade, sort and characterize lower-quality scrap
• Exploring advanced scrap cleaning and on-line characterization technologies
• Valorization of non-ferrous by-products generated by the upscaling steps and Life Cycle Assessment of the scrap upgrading compared to classical process
• Industrial scale validation of the technologies

The research leading to these results has been performed within the CAESAR project and received funding from the European Community's Horizon 2020 Programme under grant agreement n° 101058520.

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