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The European Union-funded project “**Enabling Circular Value Chains via Production Digitization and Human Empowerment**” (ENCIRCLE) officially launched on 1st of October 2024. The ENCIRCLE project is setting a new benchmark in sustainable manufacturing by offering an advanced framework for environmental impact assessment. This European initiative leverages state-of-the-art technologies, including Digital Twins, Soft Sensors, and Digital Product Passports, to transition traditional manufacturing methods toward sustainable, circular models. At the core of ENCIRCLE’s approach is a virtual production line—an innovative digital ecosystem that enables comprehensive simulation, training, and optimization of manufacturing processes with minimal environmental impact. The ENCIRCLE project is supported by the Horizon Europe research and innovation (RIA) program under Grant Agreement No 101178230, and will run for three years, bringing together a dynamic consortium of 15 partners across Europe, including top research institutions, industry leaders, and specialized SMEs.

The kick-off meeting, held on **29 and 30 of October 2024 in Thessaloniki, Greece**, gathered all partners to outline objectives, defined roles, and set the project’s anticipated impact towards **transitioning from linear to circular manufacturing by building on and advancing digital technologies**. The ENCIRCLE project aims to:

1. Decarbonize manufacturing, searching for sustainable production configurations and designs that reduce environmental footprint without compromising quality.
2. Train workforce through gamification, cultivating new skills and fostering a new circular mindset.
3. Follow a human-centered design and propose a symbiotic ecosystem of humans and AI through explainable Human-in-the-Loop methodologies.

Aligned with the EU’s guidelines on sustainable production, ENCIRCLE emphasizes a strategic approach to circularity at each stage of the product lifecycle, with key objectives focusing on:

1. **AI-driven Modelling and Simulation Parametric Techniques** for product design
2. **Machine Learning-Assisted Algorithms** for dynamic production reconfiguration
3. **Cognitive Digital Twin Simulation Environment** for optimized manufacturing processes
4. **Circularity and Life Cycle Assessment (LCA) Framework**
5. **Human-in-the-Loop (HITL) Recommendation Engine**
6. **Digital Product/Material Passport (DPP)**, enabled by Distributed Ledger Technologies

With the achievement of above objectives, ENCIRCLE’s outcomes are expected to significantly enhance waste reduction, transparency, and material validation while reducing energy consumption and boosting productivity within the manufacturing sector. ENCIRCLE’s end goal is to create a culture of sustainable consumption and responsible production, encouraging businesses to adopt circular CRM systems and empowering consumers with digital tools for sustainable choices. By exploring legal and ethical dimensions, the project is committed to creating a model for the industry that aligns with the environmental needs of the planet, ultimately contributing to the global effort of mitigating climate change and fostering a sustainable economy.

For more information, please visit the project website (www.encircle-project.eu) and/or contact the project coordinator:

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