

Launching circular pilot lines in the Meuse-Rhine region to boost circularity of electric vehicle production

Bert Dexters¹, Nataliya Babych^{2,*}, Mohammad M. Alam³, Xiao Ma², and Philip Eyckens²

¹ Central Bureau, Flanders Make, Oude Diestersebaan 133, 3920 Lommel, Belgium

² CodesignS, Flanders Make, Gaston Geenslaan 8, 3001 Leuven, Belgium

³ MotionS, Flanders Make, Gaston Geenslaan 8, 3001 Leuven, Belgium

*Corresponding author. nataliya.babych@flandersmake.be

EXTENDED ABSTRACT

On the way to a cleaner environment, circular approach requires inverting material resources from various waste flows. Such flows might be of different origin and occurring at different stages of a product life cycle: starting from a resource extraction, followed by a transportation, manufacturing, usage, and ending with a product End-of-Life (EoL) in linear economy. In advanced scenario, when circular strategies are coming into play, at the EoL, the product is recycled and some materials are recovered (in a current way of practice, even in most advanced scenarios, some waste is generated anyway; although it may be incinerated at the very end, which is still influencing environmental pollution). Practically, industrial actors with the best circularity intends are aiming to decrease various waste flows at different levels within various processes. Within this publication, we discuss and explore some circularity questions within automotive sector in EU and Meuse-Rhine region. Most recent data (ACEA, 2024) shows that in 2023 in EU, a car production generated about 800000 tons of waste per year, which results in about 85 kg of waste per single car production on average. Although numbers for European car recycling (ACEA, 2023) are pretty optimistic: 85% of materials are recycled at the EoL, majority of cars are transported out of EU when approaching EoL. Real numbers and what is happening to the cars afterwards is not fully tracked nowadays. To improve circularity (decrease overall waste flows), joint

synchronized actions are needed at different levels. At the highest EU level, upcoming circularity actions for automotive sector are outlined within

- Industrial Action Plan for the European automotive sector (European Commission, 2025),
- Proposal on circularity requirements for vehicle design and on management of end-of-life vehicles (European Commission, 2023).

Looking from a single company perspective: none can achieve circular economy alone. A new value creation requires either a new business model or a new industrial ecosystem. A transition towards circular economy impacts the entire value chain and requires collaboration and coordination across multiple actors. For businesses to thrive along any new circular material loop, a new non-disruptive value chain has to be envisioned, implemented and maintained. This involves creating interconnected systems that rely on such material resources as either products after their first use, or sorted waste streams. Currently such resource streams are yet not well established, so the opportunities are open for SMEs to explore and benefit from. New business ecosystems based on intensive collaboration of stakeholders may help to overcome economic and technological barriers towards circularity. Running until mid-2027, the CYPRESS INTERREG project will establish a highly circular and resource-efficient supply chain within electric vehicle production that spans a cross-border ecosystem within the Meuse-Rhine region. The goal is to reduce the ecological footprint and promote long-term sustainability in the automotive sector by fostering collaboration among SMEs and larger enterprises within the value chain, from material supply and recycling to manufacturing and testing. CYPRESS is creating a collaborative platform for over 150 companies and regional stakeholders, driving innovation in circular materials, processes, and business models. The project will co-develop three pilot production or remanufacturing lines for key automotive components, including (1) a battery module of an electric car tailored for refurbishment and repair; (2) a hydrogen tank for the fuel cell electric vehicle that is partly produced with recycled carbon fibre; and (3) a gearbox for electric vehicle drivetrains. The project aim is to establish at least one physical pilot production line through cross-border cooperation, leveraging regional private investments through a grant scheme. As part of the transition, the project will also focus on developing assessment studies, technological toolkits, and training programs for technicians, engineers, and managers. By boosting a circular economy that is efficient in usage of materials and energy, this project effectively promotes the Green Transformation. The regional SMEs that are often innovation drivers forms the main project target group, but also larger enterprises

will benefit. The targeted companies are those active in the automotive value chain: material supply and recycling, design, simulation and engineering, manufacturing, assembly and testing. In addition, SMEs in circular materials, processes and business models may grow their business in the automotive sector. A strong involvement of the regional industry is embedded within each activity of this project.

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