



PRESS RELEASE - 02.09.2026

EU Initiative leveraging AI to help European manufacturers cut waste and the boost circular economy

DATA4CIRC is helping manufacturers reduce waste, reuse more materials and make smarter decisions through artificial intelligence and data.

The public is increasingly encouraged to reuse and recycle, but achieving sustainability in large-scale manufacturing remains a major industrial challenge. Europe generates 10.7 million tonnes of electronic waste a year¹, yet barely half of it is properly collected, and less than half of the nearly one million tonnes of critical raw materials like copper and silicon it contains is ever recovered. In the automotive sector, raw material sourcing for steel and aluminium can account for up to 60% of a car's total lifecycle carbon emissions². And Europe's plastics industry produces around 54 million tonnes of plastic annually, generating over 32 million tonnes of waste, of which less than a third is recycled³. Coordinated by Spanish research company IDENER.AI, based in Seville, and funded by the European Union's Horizon Europe programme, the DATA4CIRC project is using artificial intelligence to solve this puzzle.

What is DATA4CIRC doing to solve the problem?

DATA4CIRC is building tools that will allow companies to safely track and share data about materials, components, and products without risking their proprietary information and business secrets. Security is a massive part of this: companies need to know their data is safe.

By applying AI to this data, factories will be able to make smarter, greener choices in real time. Manufacturers will be able to simulate complex production scenarios, anticipate the environmental impact of design modifications, such as repairing instead of replacing components, and identify the most suitable materials, strategies and suppliers for higher-quality recycling. The tool is designed to cut emissions by 5–10% and reduce raw material usage by up to 20%.

But DATA4CIRC also recognises that it isn't enough to just build tools; they need to be user-friendly, easily integrated into workflows, and practical for everyday operations. To ensure its tools meet these standards, DATA4CIRC places people at the centre of its design process: business leaders, workers, and technical experts are all actively involved in designing and testing the project's solutions to make sure they meet real needs in a way that is efficient and useful.

This work is built around a digital framework that brings together secure data-sharing spaces, digital models of production processes, and an AI-powered lifecycle assessment tool tracking a product's environmental impact from manufacture to disposal. Through close collaboration with end-users, DATA4CIRC aims to accelerate the adoption of circular practices across European manufacturing.

"Technology alone is never enough. Its success always depends on the human side: how people use it, adopt it and interact with it. That's why DATA4CIRC takes a human-centred approach. We work closely with end-users throughout

¹ E-waste (WEEE) generation and recovery: Eurostat/EU27+4 data, reported in the 2050 Critical Raw Materials Outlook for Waste Electrical and Electronic Equipment (2022 figures, published 2025).

² Automotive lifecycle emissions from raw materials (steel/aluminium): industry analysis on Scope 3 emissions in automotive supply chains; figure reflects general lifecycle assessment findings, not EU-specific data.

³ Plastics production and waste: Plastics Europe, *Plastics – the Fast Facts 2025* (2024 production data) and *Circular Economy for Plastics – A European Analysis* (2022 waste data).



**Funded by
the European Union**

DATA4CIRC has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101178152

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the project to ensure the solutions respond to their real needs and fit naturally into existing industrial processes," explains the project co-coordinator Álvaro Ojeda.

"What's interesting is that, even though the industries are very different, the same underlying principle applies: better data leads to better decisions, which leads to better circular outcomes. By applying our digital framework in these cases, we can show how data-driven approaches can make circularity tangible and measurable in practice," says the project co-coordinator Andrés Arias.

By applying the power of data to everyday decisions, DATA4CIRC is helping build a future where European manufacturing is both economically competitive and genuinely sustainable.

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