

PRESS RELEASE

November 11, 2025 || Page 1 | 4

1st Annual Conference, November 27, 2025

ZEvRA: European Research Consortium Makes Significant Progress on the Path to a Circular Economy for Electric Vehicles

Under the leadership of Fraunhofer IWU, 28 partners from academia and industry are working to reduce the carbon footprint of electric vehicles by at least 25 percent and significantly increase the share of recycled materials. After a year and a half, the European research project ZEvRA (Zero Emission electric Vehicles enabled by haRmonised circulaRity) can already report positive interim results. Examples include demonstrably, vehicle roofs can be economically stripped of paint and repurposed into new vehicle components, and many aluminum components can be nearly fully made from recycled (secondary) aluminum. Plastics and composite materials with up to 97 percent recycled content have already been processed into the first demonstration parts.

Since the project's launch in early 2024, significant progress has been made—particularly in developing a harmonized evaluation methodology for the circular economy of electric vehicles. This methodology provides a common framework that makes developments comparable and measurable, thus paving the way for circular vehicle concepts. It is a central component of ZEvRA's focus areas: digital tools, material and component use cases, and overall vehicle development.

Materials and Processes for Tomorrow's Circular Economy

The focus is on how key material groups in electric vehicles—such as steel, aluminum, plastics, glass, tires, and rare earth elements—can be fully integrated into closed material loops. These materials correspond to approximately 84 percent of the vehicle's weight. Priority is given to the use of recycled materials, complemented by alternative strategies like repurposing.

For example, used vehicle roofs have already been chemically stripped of paint, analyzed, and processed for second use through a specially developed process. Additionally, an AI-supported simulation software will soon assist in process development, reducing simulation times from up to 14 weeks to one or two days. In the aluminum category, three material variants with nearly 100 percent secondary aluminum have been realized for casting, extrusion, and foam alloys. Digital twins help optimize processes and ensure quality. Plastics and composite materials with up to 97 percent recycled content have been processed into the first demonstration parts, such

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as battery covers and interior components. In glass, digital printing has reduced enamel color consumption by about a quarter, while work is ongoing to integrate photovoltaic cells into vehicle roofs. A new tire approach already uses about 40 percent recycled materials without compromising safety.

Digitalization as an Enabler

Digital tools are driving the development of circular vehicle concepts. Another AI-based simulation tool, called *Circular-DESIGNer*, which is already available as a prototype, allows designers to assess sustainability strategies during the development phase and improve the design accordingly. *Design for Circular Economy* means considering the recyclability of a product –i.e., the reuse or repurposing of systems and components— from the very beginning. At ZEvRA, virtual twins of aluminum, plastics, and composites digitally represent complete material cycles. Furthermore, an architecture for the Digital Product Passport (DPP) has been designed to enhance the traceability of materials and components throughout their entire lifecycle.

Circular Complete Vehicle as the Target Vision

Based on the reference vehicle Škoda Enyaq, a modular vehicle concept with six main assemblies has been developed. New connection technologies, such as screw and flange systems, aim to reduce disassembly time by more than half in the future. This will make it easier to assemble valuable resources and components, and also recover them economically at the end of life. Especially for cost-effective materials, the profitability of a circular economy depends on such a paradigm shift. In the second phase of the project, ZEvRA will expand these concepts and processes to include the design of interior and exterior components as a foundation for physical demonstrators to prove their practical feasibility.

ZEvRA Shows Pathways to Solutions: 1st Annual Conference (November 27, 2025, hosted by project partner Eurecat in Cerdanyola, Spain, or hybrid)

ZEvRA's 1st Annual Conference will bring together leading players from the mobility and automotive industries to showcase practical pathways toward circularity in electric vehicles. The focus will be on innovations in design, materials, and business models. The conference will offer keynote speeches, workshops, and discussions on technical, regulatory, and economic challenges and solutions. The goal: to establish circular value chains in Europe more effectively via closer collaboration. More information and registration: [Breaking Down the Barriers Toward a Circular Automotive Industry – ZEvRA](#) (participation is free).

Knowledge Creates the Future

November 11, 2025 || Page 3 | 4

Since the project's inception, over 420 industry and research professionals have been engaged through workshops and conferences. In parallel, the researchers set up a learning platform based on Moodle. This platform offers training on lifecycle analyses, digital twins, and recycling processes.

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Fig. 1 ZEvRA aims to create a new body composed of six modules made from reused, reprocessed, or recycled parts.
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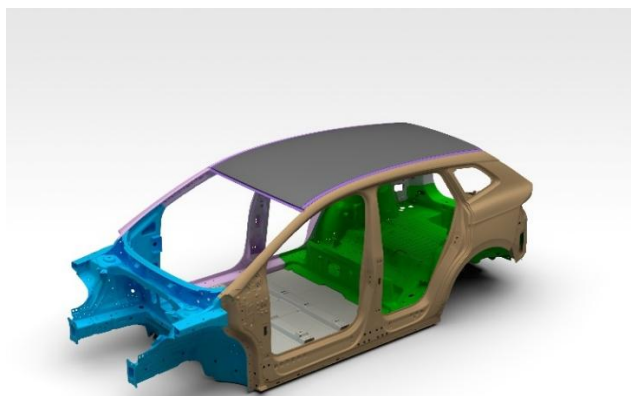


Fig. 2 Modular body design, divided for improved circular economy.
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**Abb. 3 Used, chemically
stripped roof with
galvanized surface: ready for
second use.**

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November 11, 2025 || Page 4 | 4