

New Innovative Approaches in GRP Recycling

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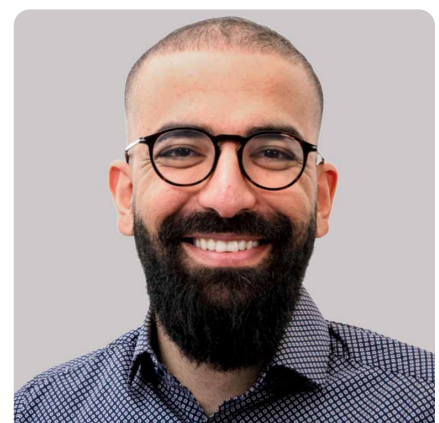
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1. Intro

Glass fibre reinforced plastic (GRP) is a versatile composite material that has been used across various industries since the mid-1930s – including aerospace, automotive, shipbuilding, and wind turbine manufacturing [1]. Amiblu has been using GRP for over 60 years in infrastructure solutions and has continuously invested in its own research and development to improve its pipe systems.



Fig. 1: GRP Long-term corrosion resistance testing since 1978, Amiblu Technology Center in Norway

The benefits of this composite material [2] are obvious: GRP products are lighter than many other materials, highly durable, weather-resistant, chemically resilient, corrosion-proof, easy to clean and repair, dimensionally stable, and waterproof. In short, GRP is an exceptionally durable material with a very long service life. This makes it particularly interesting from a sustainability perspective for environmentally conscious companies like Amiblu. After all, a pipe system that functions reliably over many generations and does not require early replacement significantly contributes to sustainability. Low maintenance combined with a long lifetime result in significant benefits for both the environmental and public funds.

This fact is also emphasised in a position paper published by the European Plastic Pipes and Fittings Association TEPPFA in June 2025 [3]. TEPPFA calls for a regulatory approach that encourages innovation and sustainability without compromising product quality – through flexible, incentive-based policies, better end-of-life collection systems, and acceptance of advanced recycling methods. The paper outlines a forward-looking vision for plastic recycling in Europe, especially for long-life applications like plastic pipes that play a key role in a sustainable circular economy.

1.1. Sustainability Taken Further

However, long service life is just one part of the sustainability equation. Amiblu also conducts Life Cycle Assessments (LCA) and cradle-to-gate studies to evaluate the environmental impact of raw materials and manufacturing processes. The company has compiled LCAs for over 1,200 products in a comprehensive platform and has published ISO-standardised Environmental Product Declarations (EPDs) since 2021, available on the company website and recognized international platforms.



Fig. 2: Actions Amiblu takes to find innovative recycling methods

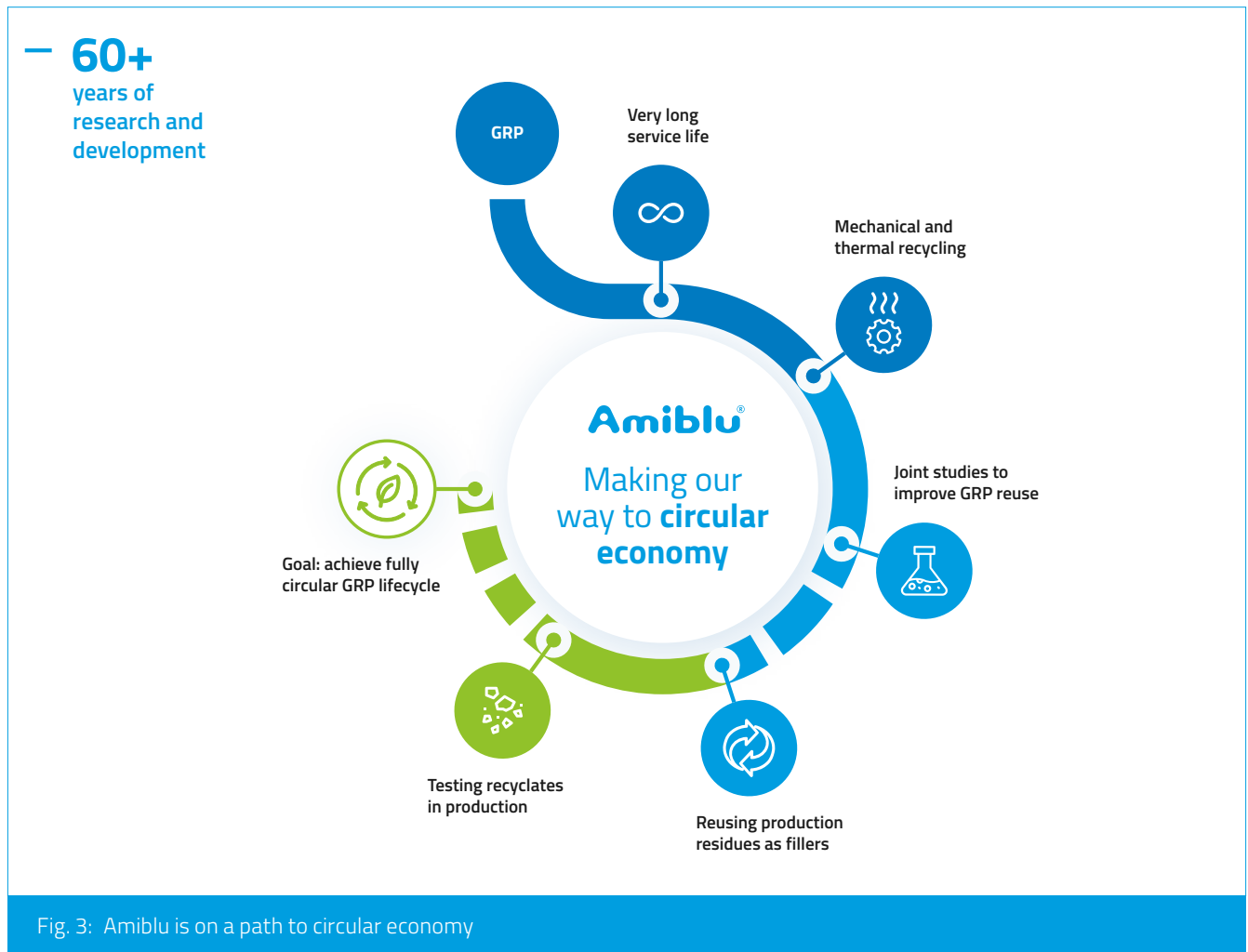
While GRP pipes often remain functional for many decades, Amiblu is already working on innovative recycling methods to reduce CO₂ emissions, conserve resources, and support the circular economy. These efforts also address how to deal with production waste and post-consumer GRP waste streams.

2. GRP Recycling: A Technical Challenge

What makes GRP so durable also makes it challenging to recycle: The glass fibres are firmly bonded to the plastic matrix through chemical and physical processes. Current recycling approaches vary depending on the material composition. In addition to mechanical recycling, where GRP is shredded and used as filler in new products, co-processing in cement production has been widely used in European countries, where GRP replaces fossil fuels in cement plants [4]. However, this process is far from ideal [5], as valuable raw materials are lost and the preparation of GRP waste for use as fuel is complex and costly.

2.1. Fundamental Research for the Most Sustainable Solutions

New, innovative recycling approaches are needed to integrate GRP waste into new material cycles and make a valuable contribution to achieving the European Union's sustainability goals: a climate-neutral circular economy by 2050 and a doubling of recycled material use between 2020 and 2030 [6]. Meeting these ambitious goals requires collaborative efforts and new solutions. Amiblu contributes by participating in international studies that focus on fundamental research for developing new GRP recycling methods.



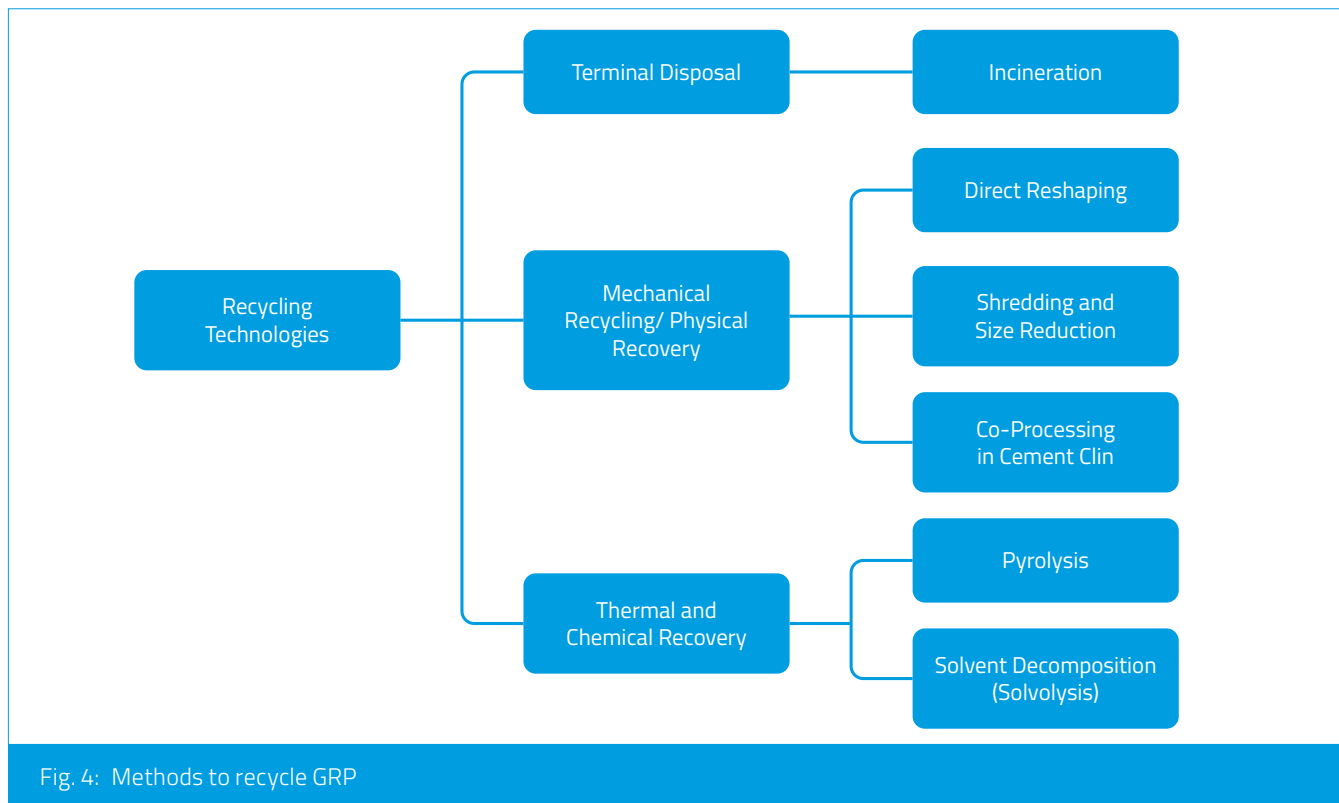
The Norwegian project "ReCoMFi: Recycling of Composite Materials as Fillers" (2021–2026) explores the reusability of mechanically shredded GRP from used products and production waste as mineral-based filler components in new GRP products [7]. Amiblu is one of five participating companies whose recyclates are being studied for their processability and effects on the mechanical properties of the final GRP products. Researchers are also working to chemically alter the surface of the recyclates to enhance mechanical properties. Lab studies are providing data for future pilot projects. The aim is for the recycled material to serve not just as an inert filler but to also offer valuable mechanical properties.

The German project "BladeReUse – Developing a Method for Resource-Saving and CO₂-Reducing Reuse of Wind Turbine Blades in Infrastructure" is led by the Karlsruhe Institute of Technology (KIT) (2023–2026). Funded by the Federal Ministry for Economic Affairs and Climate Action under the Lightweight Construction Technology Transfer Program (TTP LB), it explores large-scale applications for fiber-reinforced composites in infrastructure—such as noise barriers, trench shoring, or coastal and water protection [8]. Amiblu Germany GmbH is one of KIT's official research partners. The project's overarching goal is to develop and examine the entire reuse process, including cost-effective and automated dismantling

methods that adhere to environmental and occupational safety, methods to reshape thermoset component segments (e.g., transforming curved blade sections into flat panels), and the qualification of reuse components for safe use in construction—including preparatory work for approval applications.

Another project Amiblu supports by providing GRP product waste is led by Joulmine GmbH & Co KG in Bremen. The company specializes in wind turbine

blade recycling and aims to fully recycle all components [9]. This includes both material cycling and energy recovery. Joulmine operates a pilot reactor and has been testing and optimizing a technically innovative recycling method. Materials undergo dry pre-treatment, and the organic components are converted into synthesis gas, which can be used to produce new raw materials such as hydrogen or olefins as energy carriers.



Pyrolysis or thermal recycling has been of particular importance as there are many technology suppliers around Europe offering commercially implementable processes. Amiblu is collaborating with several players providing services and technologies in the field of composites recycling. We are exploring these technologies to understand the outputs of such processes, which mainly include hydrocarbons, glass fibres, and sand. As part of our R&D, and in collaboration with raw material suppliers, we are exploring options to upgrade these outputs and reintegrate them into our own processes or provide them to potential customers.

In the Norwegian project “Lønnsomhet i Sirkulærøkonomien” by Norwegian Circular Materials Technology [10] and funded by Innovation Norway, the focus is on opportunities for reusing glass fibres recovered from the pyrolysis recycling process developed by Gjærnkraft AS, a Norwegian recycling company. The project consists of 10 partners aiming to benchmark the quality of the glass fibres recovered by Gjærnkraft in their own production process. The Amiblu Technology Center in Norway is project partner and will participate in the qualification tests and production trials, with the goal of exploring opportunities to incorporate the material into Amiblu's full-scale production process and technology to increase the circularity of Amiblu pipes.

2.2. Closed-Loop Recycling: Using Production Waste as a Resource

Amiblu is also taking its own steps to support GRP circularity. At one German facility, production waste is collected, stored in big bags, and reused in centrifugal casting processes as substitute for traditional fillers. These substitute fillers, which include glass fibres, resin, and other materials, are reintegrated without compromising product quality – making this a true closed-loop recycling process. The GRP pipes produced with substitutes match the performance of those made with entirely new materials.

Following the successful initial implementation two years ago, the process will be rolled out to other production sites. This could enable the reuse of up to 400 tons of production waste per year. Additionally, these collected waste materials can be supplied to other industries, like e.g. for use in adhesives or sealants.



Fig. 5:

Production waste is reused in centrifugal casting processes as substitute for traditional fillers

2.3. ISO 17025-Certified Testing for Innovation and Quality

The process was developed and tested at an on-site R&D centrifugal casting lab, involving experts from both Germany and Amiblu Technology AS in Norway. The project was supported by Amiblu's ISO 17025-accredited GRP testing laboratory in Norway, which is re-evaluated annually by the national accreditation body. This ensures compliance with standards and confirms that the lab delivers independent, state-of-the-art test results. The lab is the foundation for innovation at Amiblu—from raw material selection through to production and product development.

2.4. Driving Research on Recyclate Use

Another in-house Amiblu project explores how shredded GRP waste can be reintegrated into manufacturing using resin bonding, without compromising on product quality and performance. Early trials have been promising, and the project will receive a €500,000 investment for further development in the coming years. The initial focus is on recyclates from production waste and test pipes that are no longer needed.

3. Conclusion

The exceptional longevity of composite products like GRP significantly enhances sustainability. This is especially true for GRP pipe systems, which perform reliably for generations and save resources otherwise needed for repairs or replacements. However, due to the material's composite nature, recycling at end of life is complex.



Fig. 6: Amiblu is working hard to make its sustainability strategy a reality

As a forward-thinking company, Amiblu believes thermal recovery alone is not enough. That's why it supports and conducts extensive R&D into advanced recycling methods. The substitution of fillers with production waste is already a reality, and the next step is to reintroduce recyclates into production – moving toward standardized processes that will eventually enable the return of used pipes and construction site waste to the material cycle.

This vision defines Amiblu's sustainability strategy: building a more independent, closed-loop recycling pathway for GRP – one that could serve as a model for other sectors such as automotive or wind energy in the future.

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Find out more

- **Amiblu Environmental Product Declarations (EPDs)**
<https://www.amiblu.com/environmental-product-declarations/>
- **Amibu Sustainability Brochure**
<https://www.amiblu.com/wp-content/uploads/Amiblu-Sustainability-Brochure-EN.pdf>

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