Sustainable by design

Implementing the circular economy

HIGH PERFORMANCE POLYMERS

RADICI GROUP

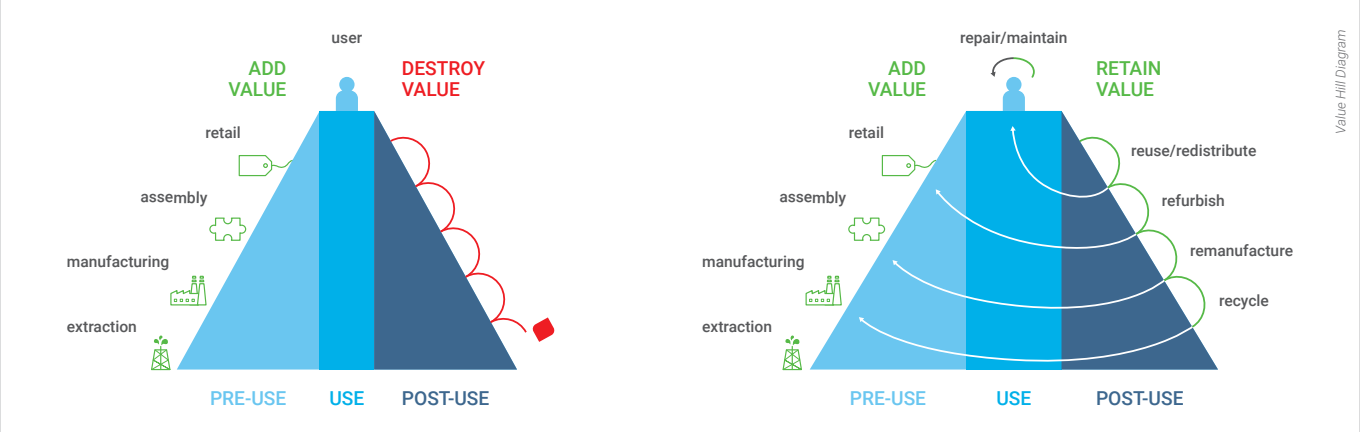
*About **80%* of product-related environmental impacts** are determined during the **design phase**.*

(Ellen MacArthur Foundation)*

Linear vs Circular economy

In our current economy, we take materials from the Earth, make products from them and, eventually, throw them away as waste. **This is a linear process**, and **its environmental impact is huge**.

The **circular economy** is a system where **materials never become waste**. **Products are kept in circulation** through processes like **maintenance**, **reuse**, **remanufacturing** and **recycling**. **Waste is stopped at the beginning of a product life cycle** by **carefully crafting the product's conception**.



In a circular economy model, the crucial environmental and economic principle of **extracting maximum value from a product before its end of use** is fully exploited. **This objective can be achieved** in practice by **following Ecodesign principles**.

Ecodesign means

- Considering the **environmental aspects** of products already **during their concept and development stage**.
- Implementing **measures to improve products** from the start, so as to fully **support** a **circular economy** model.
- Adopting a **life-cycle approach**, because **sustainability** can be achieved and assessed only by considering an **overall view of all stages of product life – cradle-to-cradle**.

Advantages of Ecodesign

- **Cost and resource efficiency**
- **Energy conservation**
- **Innovation**
- **Sustainable development**
- **Value preservation**
- **Market competitiveness**
- **Regulatory compliance**
- **Brand awareness**

Policymakers and global markets are increasingly focusing their attention on **ecodesign as a potentially very distinctive and competitive approach**.

On Purpose design guidelines

	PURPOSE	FOCUS ON	RADICIGROUP SPECIFIC SOLUTIONS
PRE-USE	Design for **Manufacturing**	Energy, raw materials, auxiliary materials, emissions.	• Products with **improved processability**, high-fluidity range of materials. • **Process simulation** for gate optimization.
	Design for **Assembly**	Elimination, simplification, standardization, reduced number of materials and components.	• Very wide range of engineering materials with **optimized properties** for numerous combinations of purposes and needs. • Our **Engineering Service** can help redesign to integrate functions and reduce or simplify assembly operations.
	Design for **Logistics**	Minimized packaging, optimized shape, lightweight.	• Different **packaging solutions** available for our products. • Engineering Service can assist in **redesigning** and **optimizing** part shape to fit more parts into a single shipment.
USE	Design for **Use**	User sustainable behaviour, energy efficiency, durability and longevity.	• Dedicated material ranges comprising **durable** and **low environmental impact** materials (recycled, bio-based, etc.), as well as materials for structural and heavy duty applications. • **Lightweighting** and **metal replacement** projects can be supported by our Engineering Service. • Lighter parts in certain sectors (e.g., Automotive) intrinsically lead to **reduced energy consumption** and **emissions** during use.
POST-USE	Design for **Disassembly**	Elimination, simplification, standardization, reduced number of materials and components.	• Engineering Service's design advice can help **minimize hybrid material streams** that could be difficult to separate. • Design with **snap-fits** and other assembly techniques.
	Design for **Reuse** and **Repurposing**	Targeting the same purpose or a different function.	• Wide range of **durable materials**. • Engineering Service helping to **translate functional requirements** («first» and «second» life cycles) into design tips.
	Design for **Repair** and **Maintenance**	Easy access, replaceability, traceability.	• Laser markable specialties with all available technologies to implement QR codes and **tracing of parts and materials**.
	Design for **Recycling**	Quality, purity, control.	• **Minimization of hybrid material streams** potentially difficult to separate. • Technical Service supporting customers with Material Selection to identify the **best alternatives for recyclability**. • RadiciGroup strong mechanical **recycling expertise** and capacity to develop closed-circle value chains with customers.

RadiciGroup System Solutions for the entire life cycle

- **LCA** and **EPD** studies to measure a product's environmental impact with regularly updated reliable and certified numbers.
- **Green-energy-powered** production systems.
- **CDP**-based emission reporting and **SBTi** approved near-term emission reduction targets.
- **Co-design** through our **Engineering Service**, aimed at improving performance, optimizing resources and preserving the maximum value of every product over time.
- **Computer-Aided Engineering (CAE)** software and in-depth technical knowledge to assess product suitability for the intended purpose, encompassing the **product's entire life cycle**.
- A worldwide **Marketing** and **Technical Service** that can actively support customers in all stages of product design.

*"The implementation of **Ecodesign changes the fundamental nature of a product development process** as a system design approach is required."*

(K. Van Doorsselaer, R.J. Koopmans, Ecodesign – Hanser, 2021)

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