

THERE IS NO PLANET B

PRESERVING GLOBAL
NATURAL RESOURCES
WITH A **CIRCULAR ECONOMY**

CIRCULAR ECONOMY: THE KEY TO MITIGATING UNSUSTAINABLE RESOURCE CONSUMPTION.

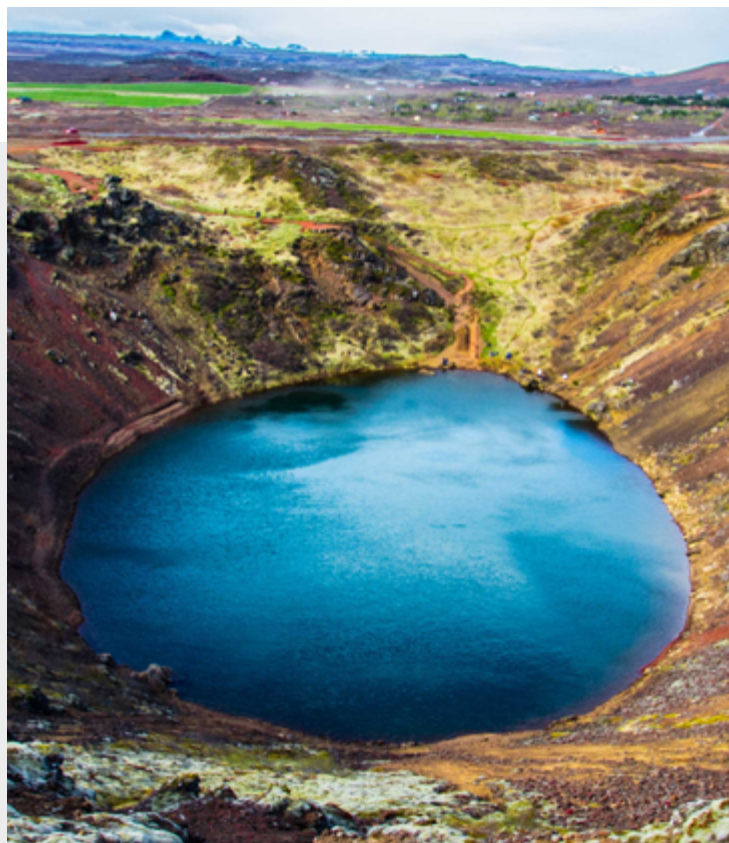
With a population of 8 billion and increasing consumption, we are approaching unsustainable levels of resource utilization, pollution, and waste. Organizations and society need to increase circularity from 7.2%^[1] today to approximately 80% in order to meet planetary boundaries.

We live on a planet of finite resources. Regrettably, humans are wasteful to the point that natural resources are being depleted at a rate that exceeds the Earth's capacity for regeneration. As it currently stands, humankind's use of resources requires more than 1.75 planets to sustain.^[2] If we continue on this path, by 2030 we will need resources equivalent to two planets, which is clearly impossible. Collectively, we must recognize the limits of our planet's resources and undertake a profound shift in our mindsets and behaviors.

The concept of a circular economy is that it is an accelerator to mitigating the impact on all the planetary boundaries and to managing resources better overall. Adopting a circular strategy will allow organizations to operate within these boundaries, build business resiliency and enable the planet's self-regeneration. Importantly, organizations must understand the significance of maximizing product utilization and embracing product as a service as the definitive business model for sustainable success.

^[1] The Circularity Gap Report 2023
<https://www.circularity-gap.world/2023>

^[2] *We Don't Live on 1.75 Earths—But we Act Like We Do*,
Fortune, July 29 2019



What is a circular economy?

A circular economy is a sustainable production and consumption model that focuses on maximizing the life cycle of products and materials. This means implementing business models that go far beyond recycling alone and promote a **regenerative cycle** where resources are utilized efficiently and waste is minimized across the entire life cycle (e.g., product as a service, product life extension, sharing platforms, sell and buy-back, repair and maintenance services, second-hand platforms).

Rather than applying this traditional linear "take-make-waste" approach, a circular economy aims to keep materials and products within the economic system for as long as possible. This involves designing products with durability, modularity, and adaptability in mind, facilitating their repair and maintenance, and promoting the circulation of materials through effective recycling and remanufacturing processes.



The evolution of the circular economy

Before the 2000s, there were little to no mechanisms to recover product components when they reached the end of their life. The widespread use of a “take-make-waste” model meant products followed a linear lifecycle. Resources were extracted, built into a product and used for a very short period, and then disposed of, eventually ending up in landfill.

In a circular model, the aim is to minimize the use of materials and optimize resource utilization, from raw material extraction to reducing waste throughout the product chain. As the shift towards circularity has gained momentum, there has been a notable acceleration in adopting different circular economy models. Implementing circularity now requires multi-loop systems that prioritize material recovery at different phases of the product life cycle. Each stage of the life cycle should involve various mechanisms that allow resources to be reduced, repaired, refurbished, repurposed, remanufactured, or recycled.

As materials progress through this journey of circularity, the level of transformation increases, making it more complex to maintain materials' maximum performance levels.

Designing products with circularity in mind – and enforcing a collective effort along the supply chain – is critical to increasing the quantity of reusable material at the end of the chain. To a certain extent, moving toward circularity implies shifting from an economy of volume to an economy of value.

The industry around solar panels, for instance, illustrates the need to tackle challenges for the future. Metals that are used in production, like silver and copper, are being depleted at source. At the same time, there are no mechanisms in place to recover and recycle these materials. As a result, it has been predicted that there will be 4,000,000 tonnes of scrap solar panels by 2030, which could reach 200,000,000 tonnes globally by 2050.^[3]

Not addressing these kinds of issues now will lead to bigger problems in the future; and the case of solar panels is highly replicable with the other technologies that support the decarbonation of the economy. But the good news is that we have never been so well-equipped to overcome such challenges.

^[3] Challenge to stop solar panels becoming a 'waste mountain', [BBC.com](https://www.bbc.com/news/technology-62888888), June 3, 2023

NOW IS THE TIME TO LEAD THE TRANSITION

Embracing a circular economy means switching from short-term economic benefits to long-term societal and monetary value. A circular approach creates business resiliency, and builds in cost avoidance, and the ability to market and deliver products over the long term. Incorporating circularity into the design phase now will help secure a sustainable future. Even if it entails higher upfront costs in the next decade, it will lead to affordability in the long run.

There are driving forces that support the acceleration of the adoption of circularity. Whether industries are pushed, pulled, or a mix of both, the journey toward a circular economy is inevitable, and industry leaders in each sector must either launch initiatives or make circular economy one of their strategic pillars to improve their resilience and competitiveness.

Legislation and public funding also play a key role. While it might not directly influence the business model, it may have significant repercussions on product design and the operational practices that support it. For instance, what if the use of single-use plastics is prohibited one day? Will the organization be prepared to adapt to new legislative developments that suddenly up-end their current ways of operation?

So, it is important that the legislative landscape is constantly monitored to anticipate and, as necessary, comply. Some recent developments in legislation such as the EU right-to-repair initiative in Europe are direct outcomes of corporate initiatives.

However, since circular economy transformations are complex by nature, industries are creating their own standards to measure and track their progress toward circularity independently of existing regulations. For instance, Schneider Electric has developed its own circular labeling standards to demonstrate the quality of their refurbished products, or their ability to give products a new lease on life at the end of their intended use. However, such standards are unique to Schneider Electric and are not widely recognized within the market.

PUSH DRIVERS: Circular economy as a strategic topic to mitigate risks	PULL DRIVERS: Circular economy as an opportunity to expand business
Sourcing risks • Resource reserve depletion (silver in 2030, copper in 2050) • Supply chain disruptions and geopolitical tensions (war in Ukraine, Suez Canal, COVID-19, etc.) Price volatility In last five years: • +72% for aluminium, +130% for copper, +60% for steel Intensification of regulations • EU Action Plan for the Circular Economy • EU "right-to-repair" • AGEC Law in France User expectations • 72% of consumers want to adopt circular practices ^[4]	New business models and benefits • USD \$4.5 billion of potential economic benefits by 2030 • The recycling market for electronics only is expected to grow and reach USD \$66 billion by 2026 Job creation • Potential creation of 3 million jobs in the EU by 2030 (European Environment Agency) Reducing environmental impact • Recycled steel production emits on average 3x less greenhouse gases than the production of virgin steel Innovation • The digital technologies market for the circular economy is estimated to grow from USD \$29 billion to USD \$220 billion between 2019 and 2030

^[4] Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

AN ECOSYSTEMIC TRANSFORMATION WITH LASTING IMPACT

Activating circularity will not happen overnight. Groupe SEB, a producer of kitchen appliances and the world's largest manufacturer of cookware, is now a largely circular organization. Their journey started in the early 2000s when C-suite executives embraced the circularity messaging and spearheaded a company-wide transformation aimed at ensuring long-term benefits for the organization.

Their initiative has delivered some remarkable results. Utilizing a circular approach has made it possible for Groupe SEB to achieve a CO2 reduction of up to 70% with recycled plastics in comparison to oil-based plastics. There have also been substantial monetary savings as the cost of recycled plastic is, on average, 25% lower than that of first-use plastic.

It is important for companies to understand that circular projects cannot be framed in a linear fashion. Businesses hoping to operate in the circular economy, while continuing to work in silo-synching, will not be able to deliver their intended results. Those that maintain linear habits in a circular context often stop circular initiatives because they don't see the true value behind them.

Moreover, if an immediate, full-scale transformation is not yet possible, there are a number of ways in which organizations could mobilize and take incremental steps. For example, they could create dedicated business units, program steering groups, or even separate businesses that operate at arm's distance from the legacy organization – all with a strong focus on prioritizing circularity from the start – and then look for synergies. This will lay the foundation for future integration so that circular practices can gradually be expanded across the entire business. The important factor is to harness dedicated capabilities in one form or another to operate circularly.

To be circular, organizations need to think holistically and bring together the following elements:

- Business model
- Product design
- Operations
- Partnership ecosystems.

Business model

Before embracing a circular approach, organizations should first assess the economic and environmental viability of their business model by considering three factors:

1. **The learning curve.** As a company gains circular experience and becomes more efficient, it must accurately account for the operational changes related to higher productivity, greater volumes, and improved processes, especially when dealing with products that will soon be fit for circularity.
2. **Total cost of ownership (TCO) per product.** Since shared products go through multiple use cycles, which results in wear and tear, companies must be prepared to factor in additional maintenance and repair costs in their overall TCO.
3. **Rising energy and material costs.** Companies must anticipate the rising expenses associated with higher energy and material costs to better plan their sourcing and pricing strategies going forward.

Expanding these efforts and achieving industry-wide alignment is crucial for overall progress and achieving common objectives. For example, companies may collectively choose to discontinue the use of certain materials or collaborate with specialized repair service providers. They may also establish mutually beneficial collection networks, optimizing the recycling process for their specific products.

Product design

Product design is the cornerstone of a circular strategy. By selecting materials with lower environmental impact, while also considering modularity to enable product disassembly for technical products, this stage has the potential to mitigate 80% of emissions.

To ensure the best circular activity at the right time, organizations should consider introducing traceability and connectivity elements. These can facilitate predictive maintenance so that proactive measures help improve product circularity. However, to achieve this level of integration, design, engineering, and marketing teams will need to work more closely together.

Operations

Adapting to a circular economy involves the development of **reverse operations**. This covers various stages, including collection, sorting, dismantling, reconditioning, and recycling. In a circular context, reconditioning can be thought of as revitalizing, because it is possible to either repair, refurbish, remanufacture, or repurpose depending on the level of granularity that is required to revalorize products.

Reverse operations will require new strong capabilities, combining novel approaches and techniques. There can be synergies with existing production processes to leverage some of the already established supply chains. However, challenges are likely to emerge due to the sheer volumes involved in collection and processing, which need to be addressed within the organizational structure.

Beyond the volume issue, organizations will also need to deal with products that are not currently fit for circularity. This adds an additional level of complexity to automate reverse operations, requiring agility and scalability in the collection, dismantling, and sorting processes. By working with regional trading partners, organizations can generate more local economies, which can help reduce the economic and environmental costs of overcoming such challenges in operations.

Partnership ecosystems

Organizations must understand their own capabilities and limitations when it comes to circular business operations. Rarely will an enterprise be able to work without any input from external entities. Collaboration with partners (such as specialists in design, materials, logistics, etc.) is key to leveraging initiatives and achieving success in the circular economy. Identifying and engaging with suitable partners who share the same circular vision can help businesses develop innovative solutions. By pooling resources, knowledge, and expertise with these partners, the transition toward a circular model can be done much more efficiently. It is important to consider the complementarity of skills and expertise when searching for partners.

Additionally, developing EPR (extended producer responsibility) models can promote the creation and adoption of new standards that favor circularity across the entire value chain. Operating in the right ecosystem also sometimes means collaborating with direct competitors. This may sound counterintuitive from a business standpoint, but it is often necessary for attaining circularity, especially when coordinating new industry value chains that work toward common goals.

Organizations should look for partners who can support local activities and help generate higher volumes in the short term. Open platforms are emerging where axes from vertical or horizontal value chains collaborate by sharing information to activate circular value chains.



CREATING NEW VALUE CHAINS

Applying a circular economy means mastering the flow of goods onto the market. However, it is currently extremely rare to have an end-to-end view of where goods are, from the production phase through the use phase and into the post-use phase. Enabling the transfer of data across parties and then monitoring the value at each stage of the life cycle is highly complex, but it is possible with software platforms and new traceability technologies.

Platforms can support the implementation of new circular projects by ensuring transparent and trustworthy transactions between direct and indirect partners. The business cases allow for multiple uses of a product, increasing its profitability compared to a single-use scenario that often occurs with linear production methods. Platforms also offer the opportunity to strategize and adjust manufacturing processes, which becomes particularly important in situations where materials become scarce or unavailable.

Virtualization tools and digital twins can support the design of new products; they can test fast and fail fast. They can also be used to consider what the disassembly processes will look like – right from the beginning of the design phase – to ease the revalorization process further along the chain.

Data platforms are essential for traceability and ecosystem creation. For example, they have played a key role in developing smart assembly lines that improve maintenance services, product life extension, or material recycling. The same approach must also be applied to **disassembly lines** by incorporating the Internet of Things (IoT) and advanced machinery. This will ensure that all operations are monitored and connected through platforms, enabling efficient inventory management and seamless integration with customer relationship management (CRM) systems.

^[5] Capgemini and AWS announce the launch of a technology platform to improve the lifespan of aircraft parts, capgemini.com, June 21, 2023

One example in an industry that is investing heavily in becoming more sustainable is Capgemini's [Lifecycle Optimization for Aerospace^{\[5\]}](#) platform, developed with support from AWS. This platform aims to accelerate the adoption of circular economy practices in the aviation industry by automating the inspection process, optimizing lifecycle analysis of aircraft parts, and guiding decisions to extend their lifespan. Several major players in the aviation sector, including Air France and Safran, have participated in its development and will be amongst the first users of the platform.

Data sharing enables overall product and waste management

A multinational utility company has developed business and operational efficiency in a circular fashion through a **collaborative industry platform**.

This platform combines information on stock and unused parts from multiple energy plants. Whenever there is a turndown in operations, users have access to a single inventory and repository of spare parts that can be put back into circulation.

The platform is now able to be used in 24 countries, enabling more than 4,000 users to upload their inventories of spare parts or search for the specific parts they need. Today, more than 180,000 product references are available across 90+ shared inventories.

This creates **new revenue** by monetizing surplus parts and freeing up capital that would otherwise be tied up in unused stock. The platform promotes **sustainable lifecycle management** by giving unused spare parts an opportunity to be utilized and avoids the duplication of parts across different sites. The platform also **minimizes maintenance delays** and downtime by facilitating the immediate availability of spare parts.



TECHNOLOGY AND KNOWLEDGE UNDERPIN A CIRCULAR ECONOMY

When organizations transition toward circularity, it is important to identify the areas that most closely align with the objectives they want to achieve with a circular approach.

To begin, it is advisable for companies to assess their product portfolio and identify the hot spots that present significant economic potential and resilience against sourcing risks as well as the restorative prospects in terms of waste reduction. This could be viable sourcing, increased production efficiency, reduced energy usage, or improved customer perceptions. This analysis serves as a starting point for initiating the circular transformation step by step, focusing on these high-priority areas.

At Capgemini, we have worked with many clients, overcoming key circular economy challenges

by bringing together our strategy, consulting, engineering, and digital skills. We have seen a substantial emphasis on the development of new circular products and how customer expectations have shifted toward more environmental consciousness.

We help create and orchestrate new circular ecosystems as well as their supporting value chains. By merging our own expertise with the knowledge of our partners, we can ensure these ecosystems drive collaboration, innovation, and sustainable practices to deliver immediate value for all contributors.

Capgemini is committed to accelerating the transition to a sustainable future with our partners. By working together, we can make circular economies a reality and address one of the most complex challenges of our time.

CIRCULAR ECONOMY : AN INDUSTRIAL AND COMMERCIAL IMPERATIVE

Our Circular Economy service helps clients move strategically and operationally from a linear economy that can destroy value, to a circular economy that preserves value.

We use the principles of a circular economy to create environmental and business value by minimizing the use of raw materials and resources and reducing the production of waste. We do this by building circular value across five entry points: Sourcing Model, Product design, Product (re)utilization, Product life extension and Revalorizing waste.

We help close the loop by leveraging technology, using skills from across the Capgemini Group, plus a clear methodology built around tangible tools and value-chain solutions, helping to combat the obstacles and achieve circularity at scale.

Business benefits: improved resource security, risk reduction, reputation enhancement, commercial resilience and social responsibility.

Further reports and points of view



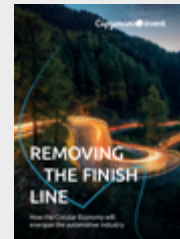
[Circular economy for a sustainable future \(CRI\):](#)

How organizations can empower consumers and transition to a circular economy



[Intelligent Industry: The Rise of Circularity:](#)

How to scale circular economy for industry leaders



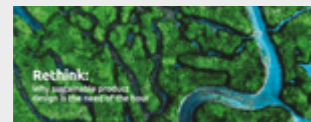
[Removing the finish line:](#)

How the Circular Economy will energize the automotive industry



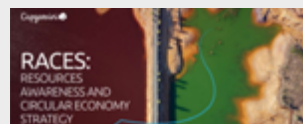
[InventX 2022 – Circular Economy](#)

Regardless of the business nature, the circular economy is a strategic pillar in every industry.



[Sustainable product design \(CRI\)](#)

Moving towards sustainable product design



[Carbot challenge to resource constraints:](#)

How corporates can quantify resource criticality and build a resilient business strategy

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About Capgemini

Capgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided every day by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of over 360,000 team members in more than 50 countries. With its strong 55-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering, and platforms. The Group reported 2022 global revenues of €22 billion.

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