EEA briefing: Scaling circular business models

Introduction

The EU's Competitiveness Compass policy roadmap (EC, 2025a) sets a path for 'Europe to become the place where future technologies, services and clean products are invented, manufactured and put on the market, while being the first continent to become climate neutral'. The Clean Industrial Deal (EC, 2025b) also outlines concrete actions to 'turn decarbonisation into a driver of growth for European industries'. A key element of both initiatives is circularity. This aims to reduce resource use and waste, including by extending the lifetime of materials and products through the promotion of longer use, reuse and recycling. Circularity is a tool that can help Europe achieve its goals related to competitiveness, strategic autonomy, security of supply, climate change and the environment.

Scaling circular business models is necessary to achieve the EU's circularity ambitions and to meet overarching economic, social, environmental and climate goals. EU policymakers and businesses have shown interest in developing enabling frameworks for such models. This is reflected in the implementation of the Competitiveness Compass, the Clean Industrial Deal, the Circular Economy Action Plan (EC, 2020) and the forthcoming Circular Economy Act, among others. Together these establish a policy framework to accelerate the shift to resource-efficient, low-waste and climate-neutral production and consumption, including the promotion of circular business models.

Despite their potential, circular business models often encounter significant obstacles when attempting to scale in Europe. Many promising models remain confined to local initiatives or early adopter markets, facing barriers related to supply chain rigidity, technological limitations and producer and consumer behaviour, as well as linear policy and other lock-ins.

In 2021 the European Environment Agency (EEA) developed a conceptual framework for enabling circular business models (EEA, 2021; ETC WMGE, 2021a). It identified three types of innovation (business model, technical, and social) and two types of enablers (policy and education, and behavioural change) as key drivers of circular business models. Building on that framework, this briefing takes the next step by investigating how circular business models can scale beyond pilot success or niche scale.

Box 1. Questions answered in this briefing

- What is the implementation status of circular business models in Europe?
- What is the framework for scaling circular business models?
- Which key factors enable circular business models to scale?

Implementation status of circular business models in Europe

Some progress has been achieved in the adoption of technical, business and/or social innovations for sustainability and circularity. Nevertheless, the widespread adoption and scaling of circular business models in Europe is not yet evident (ECA, 2023; EEA, 2024a).

Circular business practices still account only for a small share of EU economic activity. At the overall economic level, circular economy sectors accounted for 1.8% of the EU's gross domestic product in 2023 (Eurostat, n.d.). Employment in these sectors records a similar percentage. The most recent employment data indicate that approximately 4.4 million people were employed in Europe's circular economy in 2023, representing about 2% of all jobs in the EU (Eurostat, n.d.). These numbers only include activities in the recycling, repair and reuse sectors, since other circular economy activities such as jobs related to circular product design are more difficult to estimate. Only companies carrying out circular activities as their primary function are included, thus excluding companies that offer recycling, repair or reuse beside their core business, as well as non-commercial circular activities.

Overall, circular business models and other initiatives are attracting a significant amount of finance from both private and public sources. The Platform on Sustainable Finance estimates current annual circular economy investment at the EU level to be EUR 18 billion, or 2.3% of the EUR 764 billion of total sustainable investment flows (PSF, 2025).

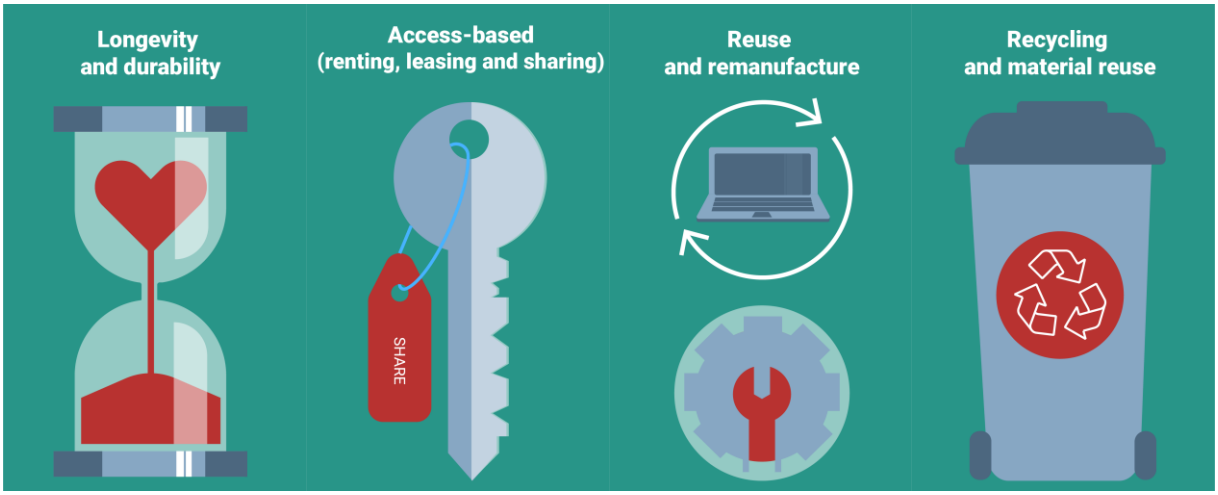
In this briefing, circular business models are considered in a broad sense, encompassing new circular ventures and changes to existing businesses. This includes the creation of circular start-ups, the diversification of incumbent firms into circular activities, the acquisition of circular businesses and the transformation of conventional business models towards circular strategies (Geissdoerfer et al., 2023).

Despite stronger regulatory support and growing investment, in most cases circular business models remain niche. This reflects mostly the persistence of technical, cultural, economic and political barriers to scaling circular business models.

At an overarching level, most circular business models continue to focus predominantly on waste management. End-of-life product handling remains the most mature and established area of the circular economy (EEA, 2024a). More support is needed to implement other types of circular business models, such as those that enable extended product lifetimes or increased reuse, on a broader scale that could generate large systemic impacts.

Building on previous work by the EEA (ETC WMGE, 2021b), four circular business model archetypes are identified as crucial to the transition towards circularity (Figure 1). A deeper understanding of these varied model types reveals how circular value is created and captured, while also highlighting the specific scaling challenges and opportunities of each.

Figure 1. Types of circular business models



Longevity and durability circular business models focus on producing and selling high-quality durable products. This allows for a long product and material life, both from a technical and an emotional perspective.

Recent policy initiatives at both national and EU levels mark important steps towards improving longevity and durability. The EU Ecodesign for Sustainable Products Regulation (EU, 2024a) and the EU Right to Repair Directive (EU, 2024b) establish new legislative foundations to this end, while national measures such as France's repair bonus illustrate the potential of targeted incentives.

Data show that repair activity that enables longevity and durability is relatively stable in the EU. Employment levels are also steady, although the number of companies offering such services is slightly declining.

While modest improvements in longevity and durability can be observed for certain product groups, such as household appliances, these remain exceptions rather than widespread trends. Recent data and knowledge show that household consumption of new products continues to rise. Premature replacement also remains common due to low cost, and emotional and software obsolescence, as well as declining product quality. Premature disposal of consumer goods leads to 261 million tonnes of CO_2-equivalent emissions, 30 million tonnes of resources and 35 million tonnes of waste in the EU each year. European citizens also lose around EUR 12 billion each year by replacing rather than repairing goods (EC, 2023).

Access-based circular business models, based on renting, leasing and sharing, sometimes referred to as Product-as-a-Service models, create value by providing temporary access to products through sharing, renting or leasing instead of product ownership. These models can help to increase the number of times a product is used.

For certain product groups, Product-as-a-Service models are already widely established, such as linen rental in the health and hospitality sectors, and workwear

rental services (Egebæk et al., 2024; EEA, 2024a). These business models are more likely to succeed in business-to-business markets, where economies of scale, more efficient customer acquisition and long-term contracts make it easier to achieve economic viability. Expansion into business-to-consumer and business-to-government markets often proves more challenging, as it requires changes in consumption habits and navigation of complex public procurement processes (Egebæk et al., 2024).

The number of EU companies renting out and leasing personal and household goods increased by 13% between 2021 and 2023, with over 46,000 active businesses in 2023. Turnover grew even more during this period, rising by 26% to reach EUR 21 billion in 2023 (ETC CE, 2026b).

Survey-based data suggest that citizens are increasingly engaging with such services, although uptake varies considerably between product groups. Stronger demand is seen for cars and mobility-related services than for other categories. Shared mobility models, especially car- and bike-sharing, are becoming prominent and illustrate both the opportunities and complexities of these models. While they can reduce individual ownership and raise utilisation rates, their environmental and climate benefits are not guaranteed. Substitution effects depend on whether such services replace private car trips or public transport, cycling and walking.

Despite some positive trends, the economic viability and sustainability of access-based circular business models remain a challenge. Rapid expansion has not always translated into profitability or environmental and climate benefits. This highlights how successful scaling of such business models depends not solely on citizen uptake. Durable and sustainable success also requires the creation of favourable policy and business conditions.

Reuse and remanufacture circular business models focus on extending the useful life of products and parts beyond the first user. This includes brands taking back or collecting products for resale in second-hand markets and platforms facilitating second-hand sales between users.

Reuse markets are growing across Europe, through both traditional second-hand channels and the rapid expansion of online platforms. Second-hand purchasing is now widespread, particularly for clothing and fashion. Projections suggest the resale apparel market in Europe could grow from EUR 15.9 billion in 2024 to EUR 26 billion in 2030 (KPMG, 2025).

In general, remanufacturing is less well-documented and data are limited. It is a rapidly growing sector in the EU, projected to reach a market size of EUR 100 billion by 2030 according to a Horizon 2020 research project (ERN, 2020). The same study suggests remanufacturing in the EU employs around 192,000 people across more than 7,200 companies. Remanufacturing mainly exists in business-to-business markets, such as the automotive, aerospace and medical equipment sectors. Company-level examples illustrate the commercial potential, as for example with providers of refurbished smartphones. Broader uptake remains constrained, however, due to high capital requirements, the absence of widely recognised

standards and product designs that do not allow for effective repair, remanufacturing or refurbishment (Parchomenko et al., 2023).

Recycling and material reuse circular business models focus on collecting and sorting discarded products, before reusing materials and parts or turning waste into secondary raw materials. This includes pre-consumer waste, such as unsold stock, and post-consumer waste that is either reused to produce new products or recycled into raw materials.

Recycling and material reuse is the most established part of the circular economy, supported by longstanding policy attention and a well-established recycling infrastructure. Patent data confirms ongoing innovation in recycling technologies, although the overall level of recycling has remained stable in recent years. The share of secondary materials in the EU economy is still modest, with recycled waste accounting for 12.2% of material consumption in 2024 and has shown only marginal growth since 2010 (Eurostat n.d.).

Overall, recycling and material reuse are not yet delivering large-scale substitution of virgin materials. High collection rates have not translated into widespread uptake of secondary raw materials. This is largely due to economic and technological barriers, particularly the lower cost of virgin inputs. Unlocking further progress will require more than technological innovation. Stable supply chains of high-quality recycled materials, supportive market structures and policy measures that stimulate demand for recycled content are all essential.

A framework for scaling circular business models in Europe

Scaling circular business models is essential for accelerating the transition to a circular economy. Yet scale remains one of the key challenges faced by businesses seeking to embed circularity into their operations. While pilot initiatives and start-ups contribute to innovation and technological advances, their impact and meaningful contribution to a sustainable economic transition depend on the ability to scale beyond niche markets (Rok and Kulik, 2020).

Limited scalability has been identified as a major barrier to the implementation of circular business models, even when demand for such circular models is expected to be high (Coscieme et al., 2022; EEA, 2021; Hultberg and Pal, 2021).

Given that many circular initiatives remain confined to pilot projects, niche markets or early adopters and are unable to break through into the mainstream economy, moving from isolated successes to system-level transformation requires a deliberate focus on scaling strategies.

Scaling circular business models involves more than the conventional notion of ‘growth’, i.e. growing the size, production volume or financial revenues of individual businesses. It demands structural changes, cultural shifts and the creation of supportive systems that allow circular value creation to expand, replicate and deepen

across industries and societies. Circular business models also remain embedded in a wider economic system that still rewards linear production and consumption. Price structures, regulatory frameworks, infrastructure and financial norms all favour short-term throughput. A realistic account of scaling therefore needs to acknowledge these systemic barriers and consider how policy, financial and collective action can realign the broader system to allow for the creation of circular value.

Scaling out, scaling up and scaling deep

Research has identified three distinct but complementary scaling strategies for circular business models: scaling out, scaling up and scaling deep (Figure 2).

Figure 2. Circular business models: scaling out, scaling up and scaling deep

Scaling out involves expanding the number of customers by increasing geographical reach or replicating and diffusing circular business practices in new locations or markets. This approach often aligns with conventional business growth strategies within a company's control but can also entail encouraging similar companies to adopt comparable practices. It often builds on successful business model innovation and technological readiness.

By scaling out, companies not only expand their customer base, but help to bring circularity across sectors and systems into the mainstream. An important challenge for circular business models wanting to expand into new markets is the existence of foreign market entry criteria, which are often not readily accessible or transparent (Yurdaanik Eskiyerli and Ewertz, 2024). These may include national registration requirements for extended producer responsibility (EPR) schemes, diverging definitions of waste and by-products that affect cross-border material flows, or restrictions on the resale of certain categories of goods (e.g. used electronics, medical equipment or construction materials). Such criteria can hinder cross-border diffusion, even when the business model itself is viable and mature.

Box 2. Scaling out: European examples

Too Good To Go (Denmark and across Europe) is an app that provides a platform to reduce food waste. The platform connects citizens with restaurants and stores that have unsold food at the end of the day, allowing them to purchase it at a discounted price. Since its launch in 2016, the app has reached 100 million registered users and

expanded into 19 countries. They claim to have saved over 135 million meals in 2024, avoiding 2.7kg of CO_2 emissions, 810 litres of water and 2.8m^2 of land use per saved meal (Too Good To Go, 2024).

Vinted (Lithuania and across Europe) is a consumer-to-consumer online marketplace for second-hand clothing and other products. The company operates in 23 countries across Europe and had over 105 million registered users in 2023 (Business of Apps, 2025). When entering new markets, Vinted ensures sufficient supply by connecting existing markets (e.g. when entering the Dutch market, customers could buy products from France). Vinted has also acquired local platforms as it has expanded, including Danish platform Trendsales.

Vytal (Germany and across Europe) is a German start-up founded in 2019 that offers a digital, deposit-free reusable packaging system for to-go food and drink. The company's proposition is that customers can borrow high-quality reusable containers from participating restaurants or food service partners via an app and return them to any partner location (Vytal, 2025). The company has scaled from Germany into 23 other countries, having a partner network of over 7,000 locations. Rolling out to new regions demands appropriate wash cycle capacity, container cleaning, return station networks and partner onboarding.

Scaling up involves transforming the broader system in which businesses operate to support broader adoption of circular business models. This might include reforming regulations or procurement rules, creating supportive standards or adjusting financial incentives. The goal is to remove barriers and create conditions where circular models can thrive across the economy. Here, the role of policy enablers is crucial as scaling up requires systemic changes beyond the scope of individual or single business models.

Box 3. Scaling up: European examples

Fairphone (Netherlands and across Europe) designs and produces smartphones with a focus on repairability, modularity and limited resource use. To succeed in scaling, Fairphone had to establish transparent value chains, provide incentives for suppliers to engage in enhanced due diligence processes and find mission-aligned investors to sustain its growth. Through collaboration with, for example, the Fair Cobalt Institute and engaging with significant industry players such as Google and LG, Fairphone has helped to create 'new "rules of the game" in the industry' for cobalt supply chains (Han et al., 2023).

Concular (Germany and across Europe) helps real estate projects adapt to the growing EU policy requirements related to the circular economy. It led the development of the first standard for pre-deconstruction audits (DIN SPEC 91484), which involved a wide range of stakeholders. This defines a standard procedure for recording building materials and products before demolition or renovation, to assess their potential for high-quality reuse and recovery. Concular is currently in the process of establishing an international standard that can be implemented into national regulations (Concular, n.d.).

Scaling deep addresses cultural and behavioural shifts and aims to embed circular principles in citizen and consumer mindsets and societal norms. A shift in citizen values and beliefs, translated into consumer preferences, trust and collaboration, is essential for long-term circular transformation. Indeed, for circular business models to have lasting impact, they must resonate with how people think, consume and interact, not just with how markets function or policies are defined.

While scaling out and scaling up contribute to business expansion and structural change, scaling deep ensures that circular business models become deeply rooted in citizen and consumer culture and business practice. Scaling deep fosters acceptance, legitimacy and everyday relevance. It therefore heavily relies on social innovation and behavioural enablers, such as education, community engagement and new narratives around ownership and sustainability.

Box 4. Scaling deep: European examples

Separate waste collection and sorting habits have become engrained in the everyday behaviour of many European citizens, enabling the development of recycling sector across the continent.

Carsharing services have become common in urban contexts across Europe. An increasing number of (especially young) people do not own a car, instead subscribing to a carsharing scheme. The number of shared cars per 1,000 people in Germany increased by as much as 624% between 2010 and 2023 (EEA, 2024c).

In practice, circular business models are pursuing all three modes of scaling simultaneously to some extent, so boundaries blur and different modes of scaling may overlap. For example, car-sharing companies combine scaling out (more cities), scaling up (the provision of public parking spots accommodating the model) and scaling deep (ownership-to-access becoming more mainstream).

Constraints on achieving economies of scale

Economies of scale refer to the advantages that businesses gain when they grow larger, such as producing goods at lower cost, working more efficiently or reaching more customers. These benefits often depend on new technologies and supportive policies.

Supply-side economies of scale occur when producing more goods or services lowers average costs. However, circular businesses may face more challenges in reaching this stage than conventional business models, especially when trying to grow within a system that still favours linear models. Activities such as repair, refurbishment, remanufacturing, reverse logistics and quality assessment tend to be labour-intensive and difficult to automate or fully standardise. As a result, unit costs decline more slowly as output increases. This limits competitiveness relative to linear models that are optimised for high volume and throughput (Ellen MacArthur Foundation, 2025).

Demand-side economies of scale occur when a product or service becomes more valuable as more users adopt it. This is especially relevant for circular business models based on sharing, such as car-sharing and tool libraries. Second-hand platforms also benefit, as larger networks improve availability, reduce wait times and allow for a better match of supply and demand.

Dynamic economies of scale come from learning, improving and becoming more efficient over time. Early-stage circular entrepreneurs are often challenged by limited experience and uncertainty (Henry et al., 2023; Van Opstal and Borms, 2023). However, support from incubators, accelerators and peer networks can help them to refine their models (Klofsten et al., 2024).

Even diseconomies of scale can occur when expansion leads to higher costs or unintended inefficiencies. In circular business models, these might stem from complex reverse logistics or long transport distances. Ultimately, this can undermine environmental and climate benefits and lead to higher costs.

Constraints in supply-chain collaboration

Scaling circular business models requires strong supply chain collaboration. Circular supply chains demand a high degree of integration among value-chain partners to enable product take-back, reuse, remanufacturing and recycling (De Angelis et al., 2018). There is heavy reliance on collaboration, trust, information sharing and collective action, all of which require social innovation.

Supply chain collaboration also extends beyond direct suppliers to include policymakers, financial institutions and citizens, who all play a crucial role in extending product lifecycles (Hultberg and Pal, 2021). Technology can also improve transparency and coordination across supply chain partners, for example digital platforms for product tracking or secondary material marketplaces. At the same time, policy enablers can incentivise or mandate collaborative practices, particularly through extended producer responsibility schemes and ecodesign regulations.

Box 5. Examples of supply chain collaboration

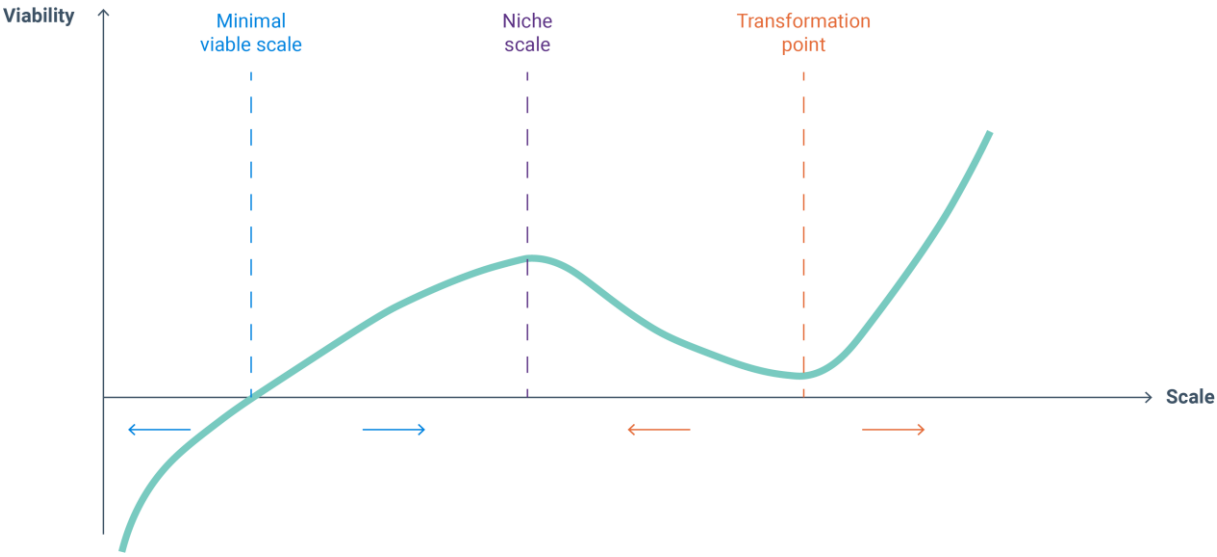
Kalundborg Symbiosis (Denmark) is a partnership between 17 public and private companies in Kalundborg, which promotes sharing of resources such as energy, water and materials (Kalundborg Symbiosis, 2025). For example, the Asnæs power station provides steam to Novo Nordisk and other companies, while Novo Nordisk supplies surplus yeast slurry to local farmers.

The Prato textile district (Italy) is an industrial symbiosis centred around the recovery of materials from used clothing. It consists of about 7,000 fashion enterprises that span clothing, furnishing textiles and yarn production. The district has crafted a highly interconnected system for recycling textile production waste, garment offcuts and used clothing, processing over 100,000 tonnes of pre- and post-consumer textile waste per year. This results in about 28,000 tonnes of regenerated fibre yarns each year (CORERTEX, 2022; PrismaPrato, 2025).

Three leverage points for scaling circular business models

Applying a supply chain and system perspective to scaling circular business models, three critical leverage points can be identified: a minimal viable scale, a niche scale, and a transformation point (Figure 3). The niche scale holds a relatively stable position, while the minimal viable scale and transformation point are critical thresholds that must be surpassed to enable further scaling of circular business models.

Figure 3. Leverage points for scaling circular business models



When circular business models operate beneath the **minimal viable scale**, their adoption remains too limited to achieve economic viability. At this stage, firms cannot generate sufficient demand to sustain their operations, as the costs of value creation and delivery exceed the revenue from a small customer base. Firms typically continue to operate at a loss and are eventually forced to cease operations. Once this minimal viable scale is exceeded, however, revenues can exceed costs and the model becomes economically viable for gradual adoption by a niche market segment. Policy interventions should therefore aim to support firms growing past this threshold to prevent sustained losses.

At the **niche scale**, businesses can create, deliver and capture value by targeting specific customer segments with tailored circular value propositions. Firms operating in niche markets can often identify strategic ‘sweet spots’ for market entry, where particular customer needs align strongly with circular offerings (Noëth et al., 2024). These include early adopters or ‘converted crowds’ who are already receptive to sustainability-oriented solutions and for whom the circular value proposition holds clear appeal. This requires viable technologies, iterative business model refinement and growing consumer acceptance.

Beyond this scale, businesses increasingly struggle to convince a broader set of customers. While their model may be functional for a dedicated group, mainstream citizens and consumers remain unconvinced as linear competitors dominate on cost,

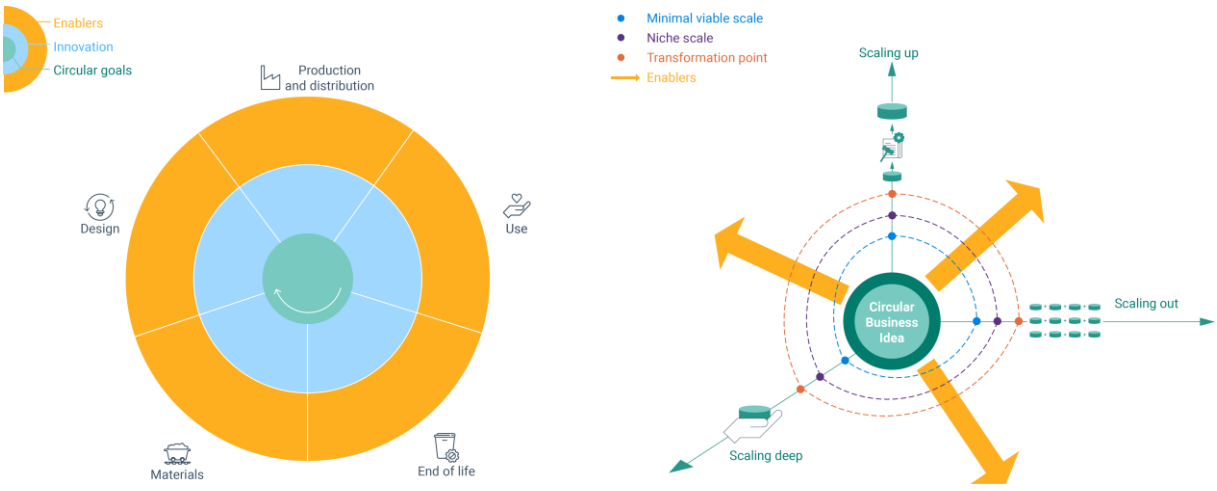
convenience and familiarity. Growth beyond this stage is constrained by path dependencies, as key system partners such as suppliers, financial institutions and policymakers remain locked into linear systems. This 'lock-in' makes circular models less attractive to the broader market, as infrastructure, regulations and financial instruments are optimised for traditional business models rather than circular alternatives.

Nevertheless, at a certain point, the scale of a business model may become large enough to reach a new threshold – one at which the surrounding ecosystem and customer behaviour have sufficiently adapted to the circular alternative, embedding it as part of the 'new normal'. At this **transformation point**, a sufficiently large group of citizens and consumers have transitioned towards circular models, causing a system shift towards a new default. This makes circularity a stable option that can fully compete with other models. Systemic policy support, widespread behavioural change and the normalisation of circular business practices are all required to reach this point.

Conceptual framework

To situate our perspective and framework for scaling circular business models in relation to the 2021 EEA report, Figure 4 contrasts the original framework with an extended version that places particular emphasis on scale.

Figure 4. Original framework (left) and additional framework (right) on scaling circular business models



The left diagram in Figure 4 presents the framework conceptualised in the 2021 EEA report, which provided an initial analytical structure for enabling circular business models (EEA, 2021; ETC WMGE, 2021b). The framework starts from circular goals across the value chain and integrates enabling factors such as innovation, policy and behavioural change. Its primary focus is on how firms can innovate their value proposition, value creation and value capture processes to implement circular

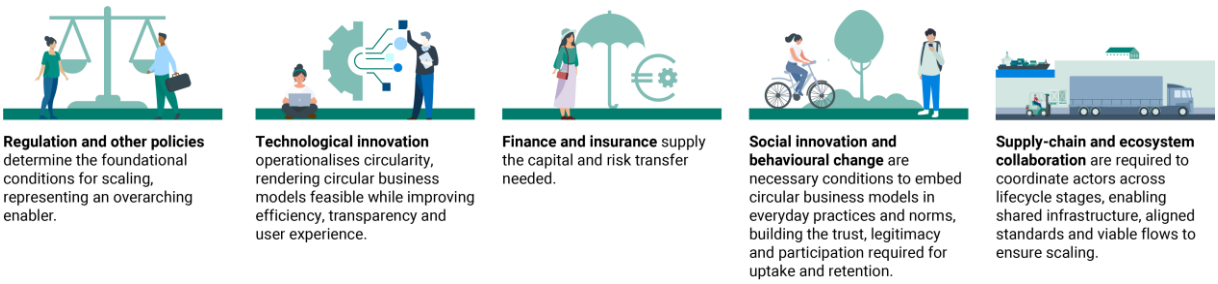
strategies such as reuse, repair and recycling. It also highlights the conditions under which these business models can achieve their circular goals.

The right diagram in Figure 4 shows an enriched framework, with a focus shifted towards the dynamics of scaling circular business models. Starting again from circular goals at the core of business models, this framework highlights the three distinct but interrelated scaling perspectives – scaling out, scaling up and scaling deep – each of which can be supported by enabling factors. In addition, it makes explicit how scaling trajectories depend on reaching successive thresholds: from a minimal viable scale to a niche scale and ultimately to system-wide transformation.

Enablers for scaling circular business model

Based on this conceptual framework, we have identified and examined five key enablers for scaling circular business models, as illustrated in Figure 5.

Figure 5. Key enablers for scaling circular business models



Regulation and other policies play a foundational role in enabling the scaling of circular business models. Because markets often fail to internalise environmental and social externalities, circular models face structural disadvantages compared to linear incumbents. This limits their competitiveness in the absence of enabling policy frameworks that actively support circularity. Regulatory instruments such as extended producer responsibility, ecodesign requirements for sustainable products, tax incentives and circular public procurement help redefine the institutional context in which circular business models operate. This creates a more level playing field and improves the competitiveness of circular value propositions. To reach systemic transformation, policy must move beyond niche support towards institutional alignment, ensuring that price signals, standards and enforcement mechanisms consistently favour circularity. Regulation and other policies can also enable scaling of circular business models that benefit the wellbeing of citizens as well as a fair and just transition (EEA, 2026)

The EU has seen some progress in the development of such enabling policies. Measures such as the EU Right to Repair, eco-modulated EPR fees, reduced VAT on repair services and mandatory take-back schemes enhance the credibility of durability-, repair- and service-based propositions. They reduce operational barriers, clarify responsibilities (e.g. in Product-as-a-Service models) and stabilise revenues through procurement mandates, subsidies and grants. Public procurement of circular

furniture in the Netherlands and repair VAT reductions or subsidies in Sweden, France and Austria illustrate how predictable demand and fiscal support can help firms move beyond the minimal viable scale.

Policy also enables scaling out, scaling up and scaling deep. Harmonised EU standards on product design, labelling and recycled content facilitate geographical expansion (scaling out). Regulations such as the Ecodesign for Sustainable Products Regulation, extended producer responsibility schemes, the Right to Repair Directive and sector-specific legislation reshape market conditions (scaling up) by disincentivising linear models and embedding circular requirements into the 'rules of the game'. At the cultural level (scaling deep), instruments such as repairability indices, awareness campaigns and support for community repair initiatives shift consumer norms and strengthen the societal legitimacy of circular practices. The Circular Economy Act is expected to advance circular business models, especially for recycling and material reuse business models.

Technological innovation is a crucial enabler for the development and scaling of the core features of circular business models, from modular design and traceability to digital service delivery and predictive maintenance. It supports efficiency, transparency and behavioural change across product lifecycles. Technological advances strengthen circular value propositions by improving the traceability, performance and reliability of products, as well as the quality and convenience of services. Modular design, as seen in furniture and electronics, extends product lifetimes by facilitating repair, upgrading and customisation, while creating recurring service opportunities.

In value creation and delivery, new technologies enable more efficient collection, automated sorting and AI-supported refurbishment as well as digital platforms that match supply and demand. For instance, sensor-based sorting in textile or electronics reuse and predictive maintenance in service-based models reduce labour costs and improve delivery reliability.

In terms of scaling, digital platforms, modular design and standardised IT systems facilitate rapid geographical replication (scaling out). At a system level (scaling up), innovations such as product passports and advanced remanufacturing technologies reduce transaction costs and enable integration across supply chains. Technology also supports scaling deep by influencing user behaviour through apps, repair guides and feedback tools that normalise reuse and conscious consumption.

Across development stages, technology also helps firms reach minimal viable scale by lowering transaction and repair costs. It supports replication through, for example, shared IT infrastructure (e.g. resale platforms, product passports and supply chain optimisation). At the transformation point, it also enables sector-wide interoperability and external economies of scale, reducing transaction costs across systems and embedding circularity as a new industry norm.

Finance and insurance play a critical role in enabling any business model to emerge, stabilise and scale. For circular business models, accessing financing is particularly challenging because their value propositions often rely on unfamiliar asset

structures, extended payback periods, and revenue streams tied to product longevity or service-based offerings rather than one-off sales. These characteristics can make financial returns less predictable and collateral harder to value, increasing perceived risk for investors and insurers (Ma et al., 2025). Leasing, sharing and refurbishment models require high upfront investment in assets, infrastructure and working capital, while revenues accrue gradually. Without patient capital, impact finance or blended finance schemes, such models struggle to reach market maturity. Insurance mechanisms are equally important, particularly for access-based models, where risks related to damage, loss or hygiene can erode already thin margins.

In terms of scaling, access to leasing capital and working capital enables geographical expansion (scaling out), while the integration of circular criteria into sustainable finance taxonomies and bank risk assessments supports systemic change (scaling up). While often overlooked, finance also plays a role in scaling deep by incentivising cultural shifts in consumption and investment. Consumer finance products, such as credit schemes, deposit systems and insurance packages, influence household behaviours including habits around return, reuse and maintenance.

Ultimately, reaching transformation requires alignment between circular performance metrics and mainstream financial logic, supported by tools such as circular risk assessment frameworks, green bonds and blended finance to redirect capital toward durable, shared and regenerative business models.

Social innovation and behavioural change are essential for embedding circular business models into everyday practices, social norms and shared values and to help improve well-being and a fair transition (EEA, 2026). These help to build trust, legitimacy and participation among citizens, necessary factors for the uptake and long-term viability of circular business models.

The transition to a circular economy is not only a technical or economic challenge, but also a social one. Initiatives such as repair cafés, tool libraries and platform cooperatives engage users as co-creators, further embedding and building trust in circular practices throughout society. Campaigns such as right to repair movements shift cultural norms toward longevity and reuse, making circular products and services more socially acceptable. Behavioural enablers, such as convenience, reputation systems and storytelling serve to reduce perceived risks and stigma in sharing or resale markets. Educational initiatives and brand narratives that celebrate durability (e.g. promoting repair and emotional attachment to products) further normalise circular consumption. Strong community engagement also improves value capture through customer loyalty, word-of-mouth growth and lower marketing costs.

In terms of scaling, social innovation supports scaling out by enabling community-based prototypes, such as repair cafés and clothing swaps, to be replicated across regions (Bauwens et al., 2020). Scaling up occurs when grassroots initiatives become institutionalised, for example through co-creation processes between municipalities and citizen initiatives (Konietzko et al., 2020) or integration into education systems (Derks et al., 2022). Social innovation has its strongest impact when scaling deep. By reshaping norms around ownership, convenience and

disposability, it redefines what is desirable and aspirational. Circular practices become culturally anchored through media, education and community identity, creating durable demand for circular business models.

Supply-chain and ecosystem collaboration: Circular business models cannot operate in isolation. They rely on value chains and ecosystems where actors coordinate across the design, production, use and recovery phases. Collaboration enables shared infrastructure, mutual trust and aligned standards that are vital for efficiency and legitimacy. In ensuring such collaboration, so-called transition brokers can help enhance processes of change, build alliances, help create the necessary preconditions and the scaling (Cramer, 2020)

Collaboration enables value propositions that no single actor could deliver alone. For instance, the promise of closed-loop production requires coordinated activities between reverse logistics operators, sorting partners, remanufacturers and retailers. Shared product standards or sector-wide take-back agreements enhance consumer confidence in circular promises (De Angelis et al., 2018).

Joint innovation, co-investment and logistics partnerships are essential to manage complexity in value creation and delivery. In second-hand retail, for example, pre-sorting agreements and product grading protocols across collection centres reduce duplication, assure harmonisation and enable scaling. For product-service system (PSS) models, alignment with after-sales service partners is critical to guarantee maintenance and returns. Several European pilots found horizontal collaboration between competitors, such as shared reverse logistics for white goods, as key to achieving scale (Han et al., 2022).

New forms of collaboration also create opportunities for value capture. Examples include revenue sharing, joint branding and pooled resource use. A repair platform, for instance, may earn income both from its own repair services and from commissions on partner products. In addition, agreements at the ecosystem level can open the door to external funding or to participation in certification schemes. However, collaboration also requires shared risk and mutual trust, especially where costs and benefits are unevenly distributed (Van Opstal et al., 2024). The Kalundborg industrial symbiosis model illustrates how shared infrastructure and mutually beneficial resource flows can yield collective economic and environmental returns (Kalundborg Symbiosis, 2025).

Thus, the scaling of circular business models depends not only on individual company strategies, but also on the strength of the entire systems in which they operate. Collaboration enables value propositions that no single actor could deliver alone, in which different actors contribute complementary capabilities and resources, for example through transition brokers. Closed-loop production, for example, requires coordination among collectors, sorters, remanufacturers and retailers. Shared standards and take-back agreements enhance consumer confidence and ensure consistent quality.

In terms of scaling, partnerships with retailers, logistics providers or digital platforms allow circular services to expand geographically by leveraging existing distribution

channels (scaling out). Scaling up requires sector-wide alliances, shared R&D and coordinated lobbying to reshape standards and supply-demand relations. Scaling deep emerges when collaboration is grounded in shared purpose, away from competition towards collective value creation. Ultimately, transformation depends on full system alignment. Here, circular logic is embedded across entire value chains and supported by coordinated infrastructure, governance and long-term cooperation.

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