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Making circular economy bankable

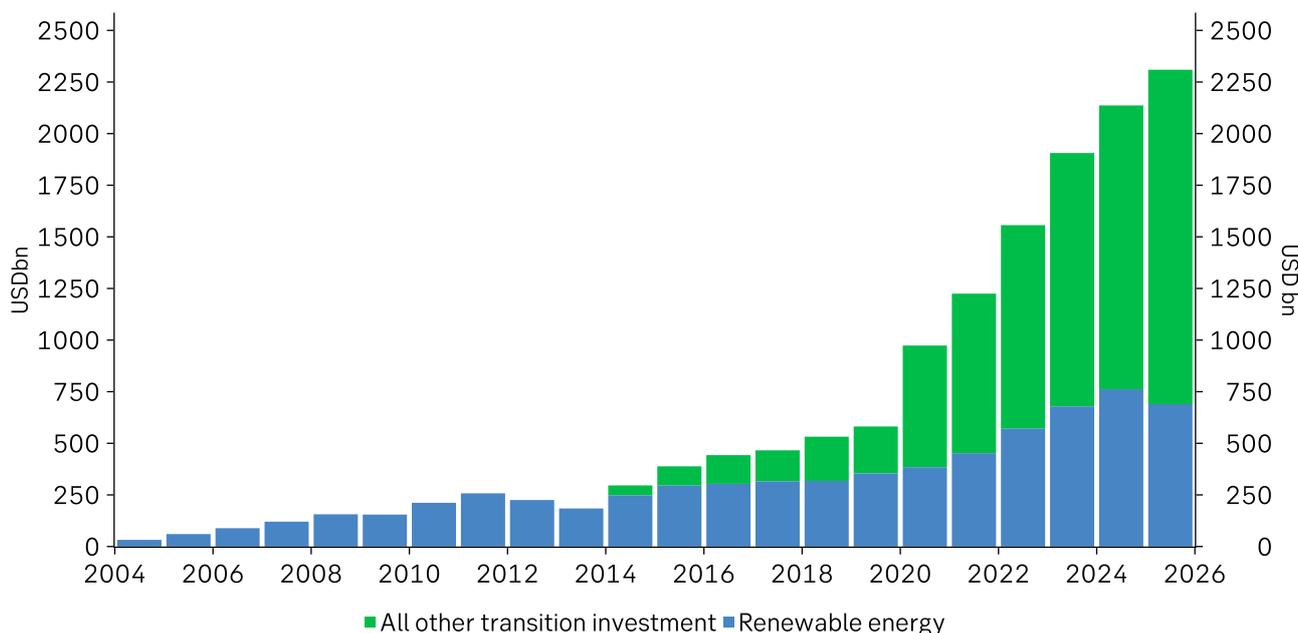
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# Energy transition update

Transition driven by need for electricity in new technology regime

2025 saw the first decline in global investment in renewable energy in more than a decade. Total transition investment is still rising as focus shifts to upgrading whole energy system. European investment is set to rise, driven by electricity demand from next generation of technology and need to reduce import dependency. An electrified, AI-enabled production model would open the door to a truly sustainable circular economy.

**Figure 1 Global transition investment**



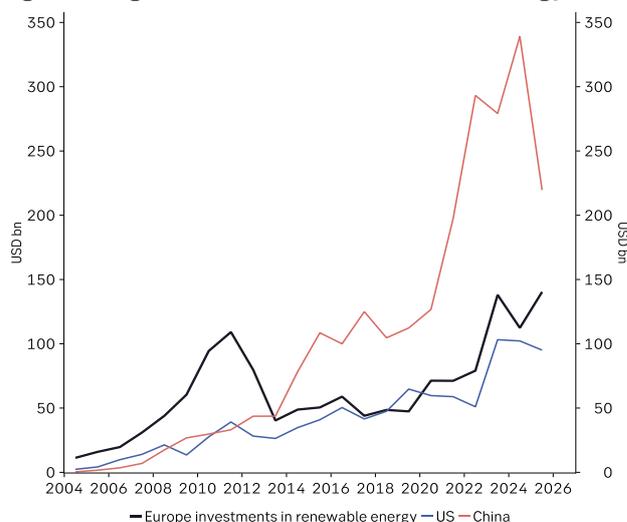
Source: BloombergNEF

## First decline in more than 10 years

Global investment in renewable energy declined for the first time in more than a decade last year according to new data from BNEF. Total investment in solar and wind dropped from USD 762bn in 2024 to USD 690bn in 2025. The reason was a sharp decline in China from USD 339bn to USD 219bn after a change in subsidy rules last summer. In Europe, renewable energy investment increased to a new all-time high, while investment was flat in the US.

At the same time, total transition investment continued rising to a new all-time high of USD 2.3tn, driven by increased investment in grids, storage and electrified transportation (Figure 1). We believe the real story is that China's transition investment is broadening, shifting the focus from the source of energy to the entire energy system including electrification of energy-using sectors.

**Figure 2 Regional investment in renewable energy**



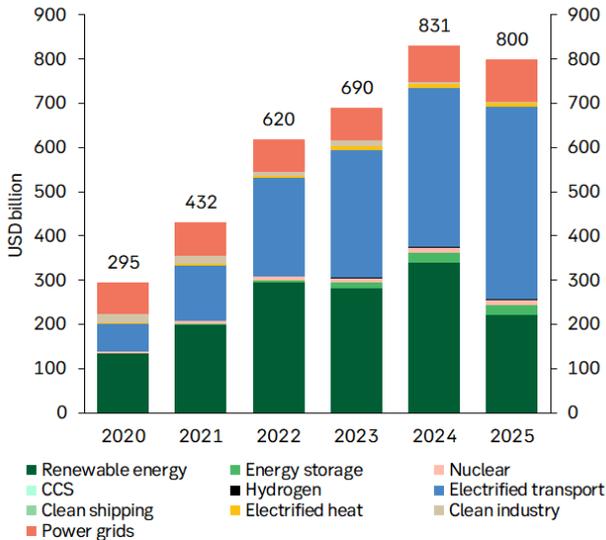
Source: BloombergNEF

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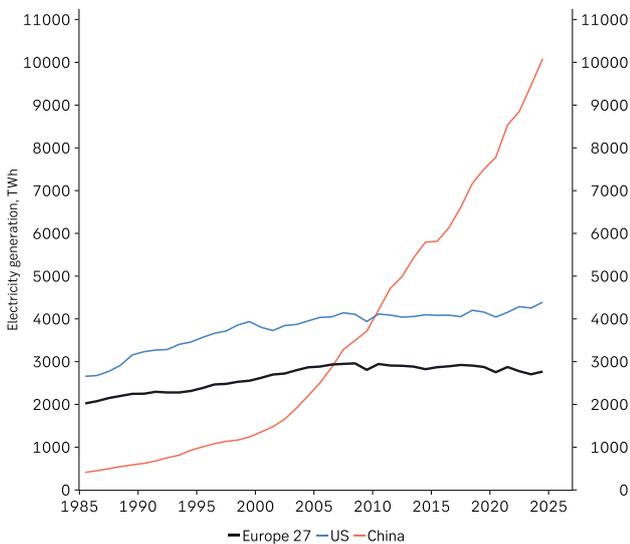
**Figure 3 Energy transition investment in China**



Source: BloombergNEF

While China's investments in renewable energy declined in 2025 to the lowest level since 2021, the continued decline in the cost of renewable energy means that the output from renewable energy is still increasing rapidly. Furthermore, total transition investment was close to unchanged. China thus continues to invest in areas like power grids, storage facilities and electrified transportation (Figure 3).

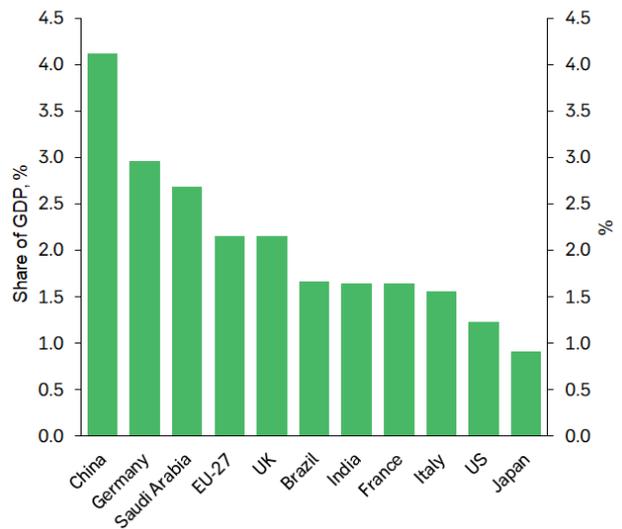
**Figure 4 Electricity generation**



Source: Our World in Data

The real story could be that the total supply of electricity is now at a level where China does not need to increase investment as much after annual growth of almost 6% over the past decade. If investment in solar and wind stay at the current level and the nuclear and hydropower investment plans continue, then China's electricity generation is likely to continue outpacing the rest of the world (Figure 4). Then it makes sense to focus on the energy system instead of just the renewable energy supply.

**Figure 5 Energy transition investments, % of GDP 2025**



Source: BloombergNEF

The rest of the world is not in the same situation. Figure 5 shows total transition investment as a share of GDP according to BNEF. China spends around 4% of GDP annually, which is more than total estimated spending on defence and way more than the rest of the world is investing. Germany is closest with spending at 3% of GDP, while the EU average is close to 2% of GDP. Saudi Arabia is also at the front, allocating 2.7% of GDP to energy transition investment. However, the US is far behind both China and Europe and only invests a little more than 1%.

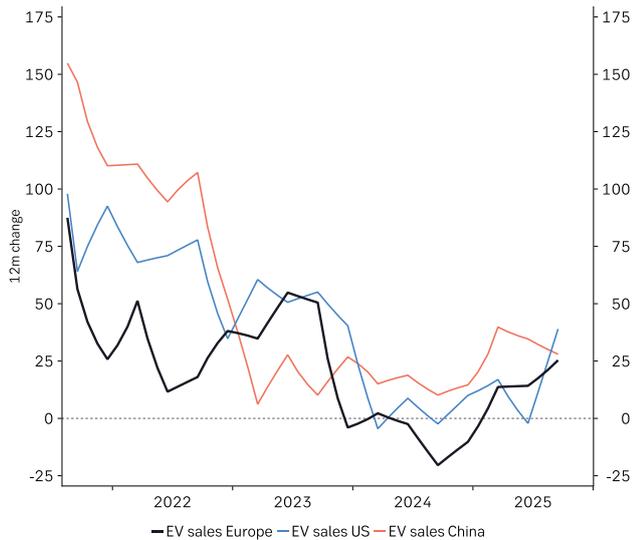
If Europe wants to accelerate the transition, investment will have to increase by 50-100% before the end of this decade, taking total transition investment as a share of GDP to 3-4% with a rising share going to grids, storage and transportation in the same way as we see in China. This is not unrealistic as the investment level has already doubled from 2020 to 2025.

**Electrification is a key transition driver**

The electrification of the transportation system is likely to be a key driver for the transition. A shift from diesel and gasoline to electricity as power source for both small and large vehicles would tilt the demand for energy away from oil, but it will require a significant increase in electricity generation. The only way to achieve that in Europe in a geopolitically secure way is with renewable energy. Gas turbines have long order backlogs and also maintain a high import dependency. Nuclear is still 5-10 years away.

This transportation transition is already gathering pace. After dipping in 2024, EV sales are now rising around 25% on an annual basis in both China, Europe and the US (Figure 6). Here we also have technological progress as the underlying force. EVs become better and cheaper every year and no longer need subsidies to take market share

**Figure 6 BEV sales, 12m change**

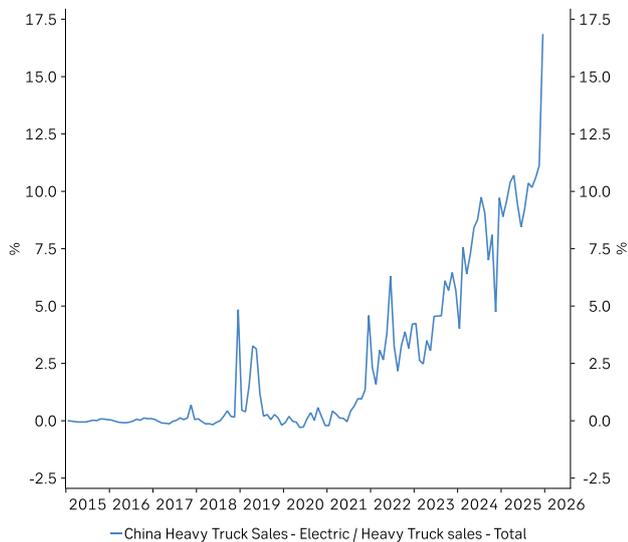


Source: BloombergNEF

In 2025, European producers have started offering affordable cars with very long range that do not need subsidies to compete, and the price/quality mix will continue improving for at least another decade.

However, China is one step ahead also in this area, electrifying not just personal transportation but also commercial transportation. As seen in Figure 7, the share of heavy trucks sales that are pure electric vehicles is exploding and has already reached 17%.

**Figure 7 China heavy trucks – electric, % of total**



Source: Bloomberg, SEB

**Electrification/AI open for circular economy**

From China’s perspective, electrification and the energy transition are not the end goal but should rather be seen as steps on the way towards an AI-driven production model that opens for a broader, deeper sustainability than just reducing emissions.

At the same time as it has ramped up the supply of electricity, China is also commoditizing AI models. Cheaper AI opens the door for the next step in the ongoing technology revolution, where AI moves from virtual to physical embedded AI. Electrified vehicles are fine, but autonomous driving will mark the final step away from combustion engine motors, and that is where the real productivity effects begin.

The next step will be to let AI transform the way vehicles are produced in a break with the assembly-line production model. AI-enabled production methods have been underway for a decade already in the shape of a shift from sales to services as main revenue source for advanced capital goods producers and some even taking the next step to capital goods as a service with payment for usage.

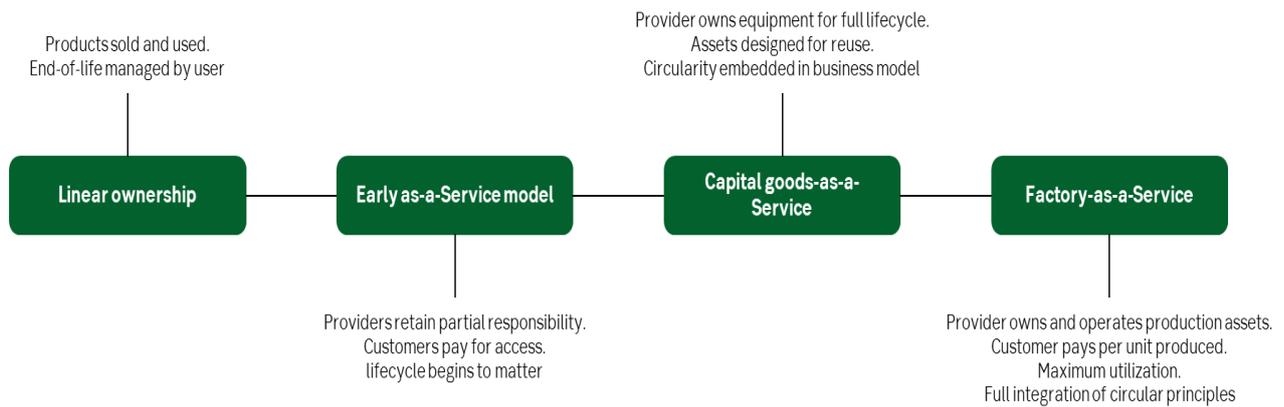
This initial change is not a break with the linear production model into something you could call circular, but it is a step on the way. Production still follows the same linear model, with materials and components coming in at one end and final products coming out, ending their days on the scrapheap. However, changing the revenue stream from sales to service completely changes the incentives from a resource intensity perspective.

In the linear ownership model (Figure 8) value creation only moves in one direction. Materials become components, components become products, and information flows largely one way. Once sold, the manufacturer has limited economic interest in the asset and once the product reaches end-of-life cycle it is mostly just waste.

The early as-a-service model changes incentives. Predictive maintenance, service agreements and capital-goods-as-a-service create a feedback loop through embedded sensors and shared data platforms. Information now flows back from the installed base. For producers, this means optimizing for uptime and lifetime rather than replacement cycles. Suddenly it makes sense to build products that last as long as possible. At the same time, service agreements provide more stable and predictable income streams, which increases the market value of the companies.

Longer lasting machines become more profitable as it increases the revenue per unit produced. Information flow allows faster repair times and more uptime for the users. Components must be traceable and end-of-use products must be recoverable assets rather than scrap. Once sold the producer keeps ownership over the product and promises to take back the products after end-of-life cycle. Products are then disassembled, refurbished and reused. Design for disassembly becomes economically rational.

**Figure 8 Linear ownership model illustration**



Source: SEB Strategy Research

This means the interests of producers to increase their economic value become aligned with the interests of society to reduce the resource intensity of the economy, both to protect the ecosystem and to reduce shortages of physical resources.

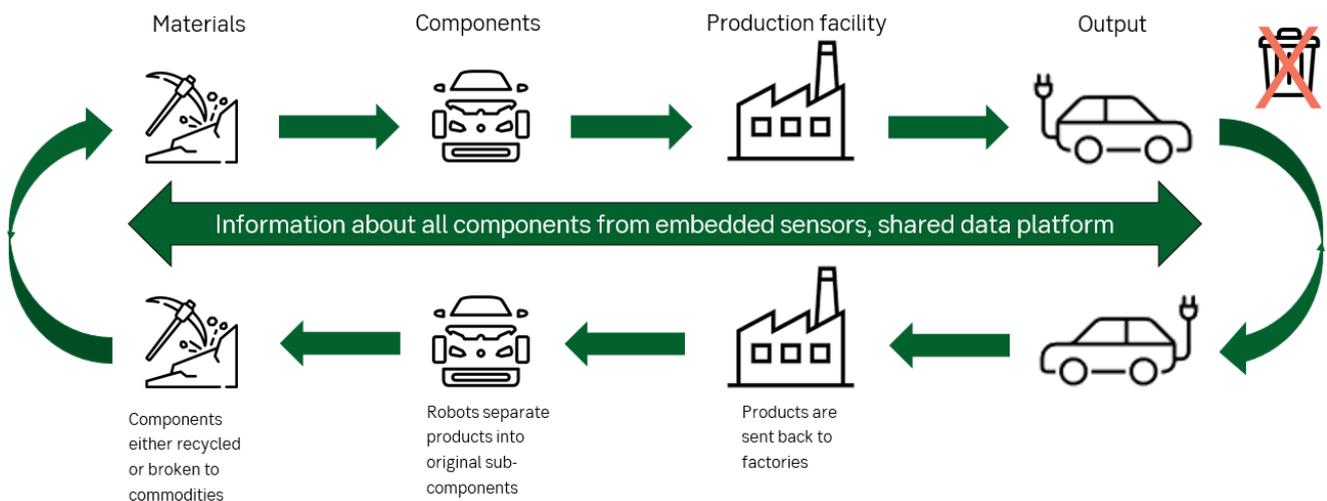
As AI-enabled autonomous machines improve, it will allow even deeper changes in the production model, where production units shift to being manned by autonomous robots and the whole production process can be marketed as a service. Labour costs will become a less important competitive parameter, while the cost of electricity becomes more important. Factories will move closer to the end market, reducing the need for transportation, and this opens the door for recycling of more parts

Over time, this opens the door for a truly circular economic model where old products are stripped down and components recycled at the same location where new products are being produced (Figure 9). This will require

substantial changes in the way products are designed, ensuring that all components are trackable and designed for recycling before the first production takes place. We do not expect to see truly circular production models for at least another decade. However, the contours can already be glimpsed when you look at how advanced robots have become both in production and sorting/recycling.

AI is the coordination layer that makes this scalable. If the robots are able to assemble the products and the products are designed for reuse, then the robots can disassemble the products and use the components for new products. Furthermore, the cost of a robot is essentially the energy input, which means the cheaper your energy input is the cheaper your labour is. This would open the door for a break with model of products being produced, where the labour cost is cheapest and factories could be located closer to the user, where the product would then later be returned.

**Figure 9 Circular production model illustration**



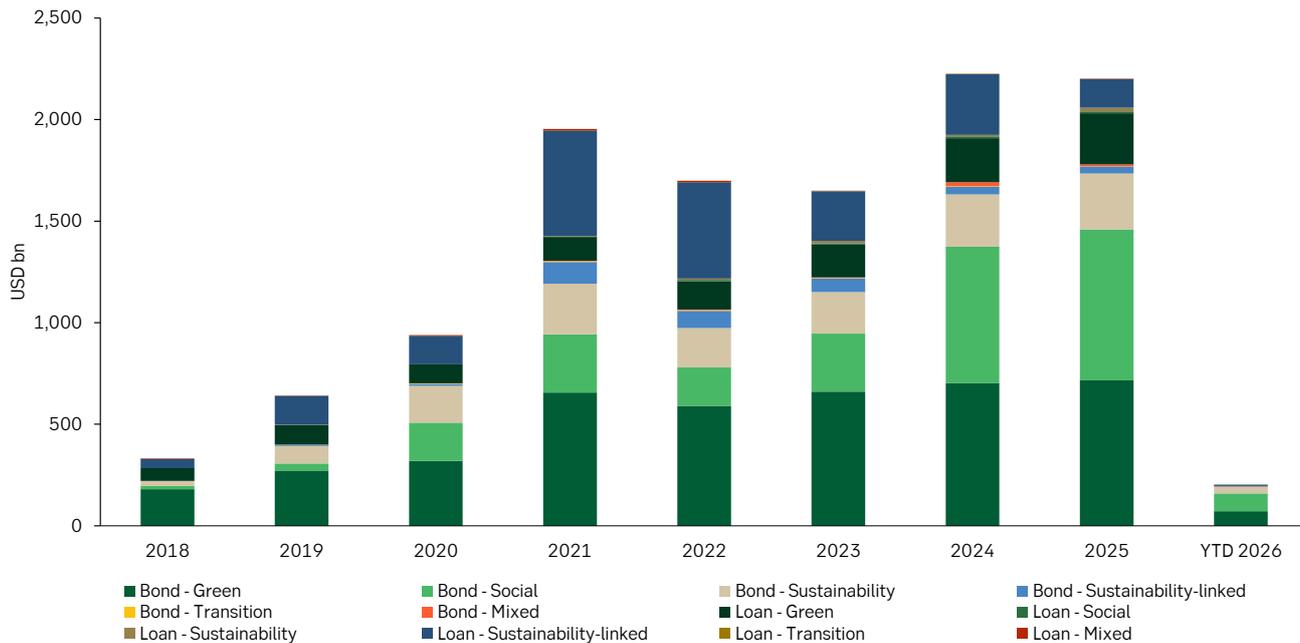
Source: SEB Strategy Research

# Sustainable finance market update

Resilience and recycling promote robust growth in sustainable finance

Global sustainable finance issuance reached USD 2.2tn in 2025, marking the second-best year despite political challenges. Circular economy initiatives gained prominence in bond frameworks with project allocations observed in material, consumer discretionary and industrial sectors. Venture capital markets see investment mainly in battery recycling.

**Figure 10 Sustainable debt transactions by product**



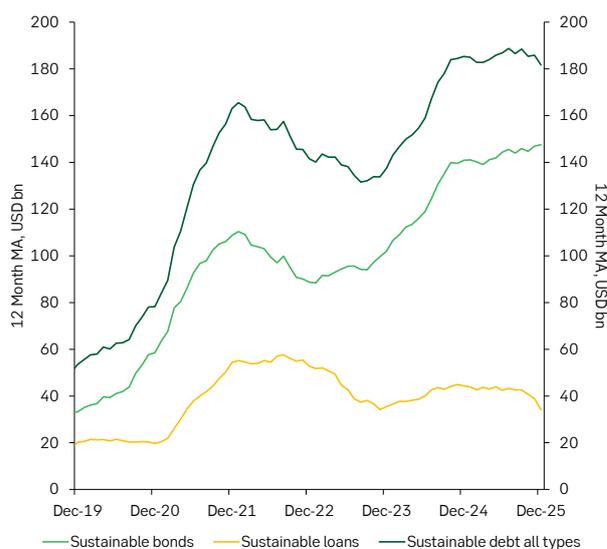
Source: BloombergNEF, SEB as of January 31, 2026

## 2025 second-best year ever for sustainable finance

Global sustainable finance issuance reached USD 2.2tn in last year, just 1% below the 2024 record. This marks 2025 as the second-strongest year ever for sustainable finance—despite intensifying political headwinds, including the acceleration of the ESG backlash under the Trump administration and the EU’s decision to scale back key sustainable-finance regulations.

At the segment level, sustainable bonds—including green, social, sustainability, sustainability-linked, and transition formats—registered a solid 5% increase in new issuance during 2025. This momentum is also visible in the upward trajectory of the 12-month moving average.

**Figure 11 Sustainable debt transactions moving average**



Source: BloombergNEF, SEB as of December 31, 2026

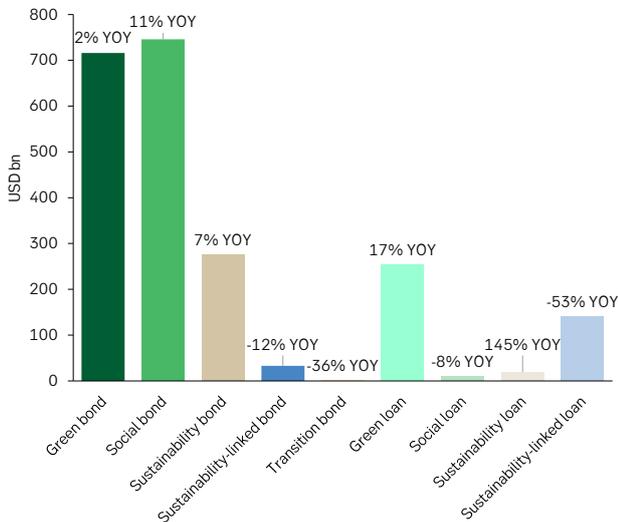
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In contrast, sustainable loan activity continued to soften. Although green loans rebounded with 17% year-on-year growth, sustainability-linked loans contracted sharply, declining by more than 50% versus 2024.

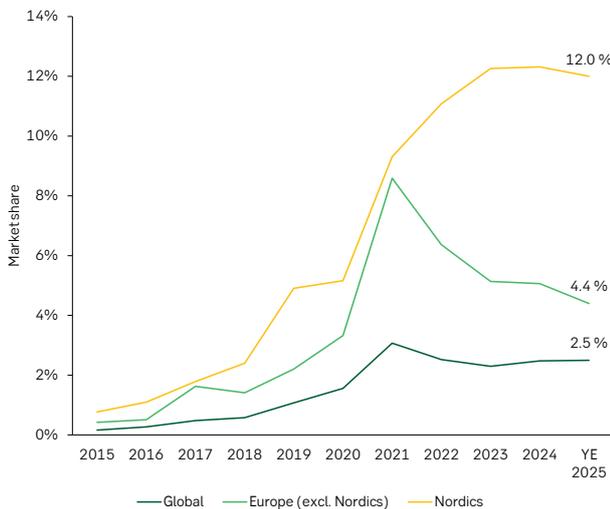
**Figure 12 Sustainable debt transaction by type YE 2025<sup>1</sup>**



Source: BloombergNEF, SEB as of January 31, 2026

In 2025, the market share of sustainable bonds remained stable at 2.5% globally, signalling a plateau in relative growth. Both Europe and the Nordics experienced declines in sustainable bond penetration, reflecting broader softness in regional issuance trends.

**Figure 13 Sustainable bond market share**



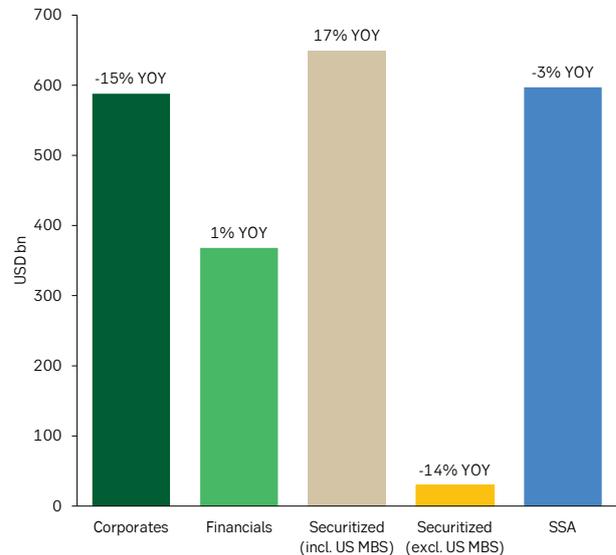
Source: BloombergNEF, SEB as of 31 December 2025

### Mortgage-backed securities change the picture

Securitized debt—driven predominantly by U.S. mortgage-backed securities (MBS)—was the only asset

class to record expansion in sustainable structures during 2025. Excluding U.S. MBS, sustainable securitized debt issuance amounted to just USD 29.8bn. Without this segment, the overall sustainable debt market would have contracted by 7% in 2025, and sustainable bond issuance would have declined by 1% year-on-year.

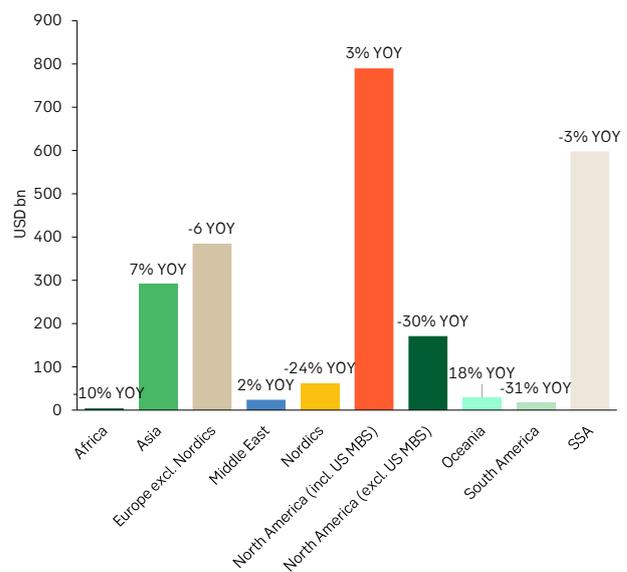
**Figure 14 Sustainable debt sector YE 2025**



Source: BloombergNEF, SEB as of January 31, 2026

The influence of U.S. MBS becomes even more pronounced in a regional breakdown. Adjusting for MBS, North America would have posted a 30% decline in sustainable finance activity last year. Among major regions, only Asia achieved growth in sustainable bonds and loans in 2025.

**Figure 15 Sustainable debt transaction by region YE 2025**



<sup>1</sup> Sustainability bonds/loans include the new category as per Bloomberg methodology of 'mixed bonds/loans'

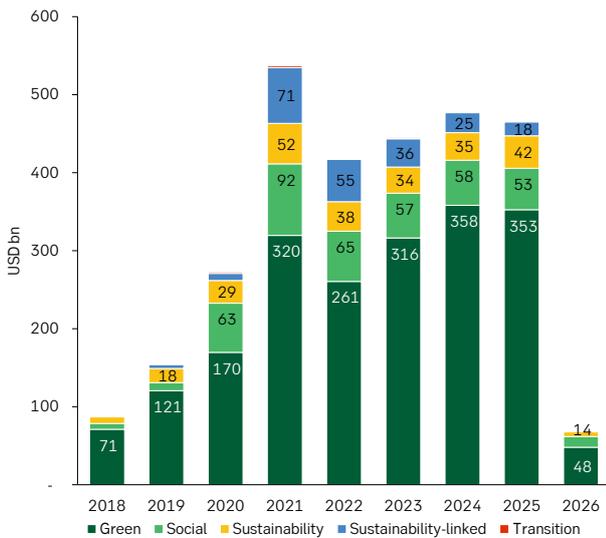
Source: BloombergNEF, SEB as of January 31, 2026

Notably, not all US issuers of sustainable MBS adhere to ICMA’s key recommendation to obtain a Second Party Opinion (SPO). Fannie Mae’s Social, Green, and Sustainable Bond Frameworks have received SPOs, as have Freddie Mac’s Single-Family Social, Global MBS and Corporate Social Debt Bonds Frameworks. By contrast, Ginnie Mae’s Social Impact and Sustainability Framework, published in 2023, was issued without an SPO.

### Europe’s infrastructure needs drive green bond growth to USD 370bn in 2026

As we have outlined in greater detail [here](#), new issuance of green, sustainable, sustainability-linked and transition bonds in Europe reached USD 464bn in 2025, on par with 2024. Last year continued the trend which has seen social and sustainability bonds declining compared to the record setting year of 2021 when governments and EU institutions issued extraordinary amounts of social and sustainability bonds to address the outfall of the COVID pandemic.

**Figure 16 European sustainable bond issuance by type**

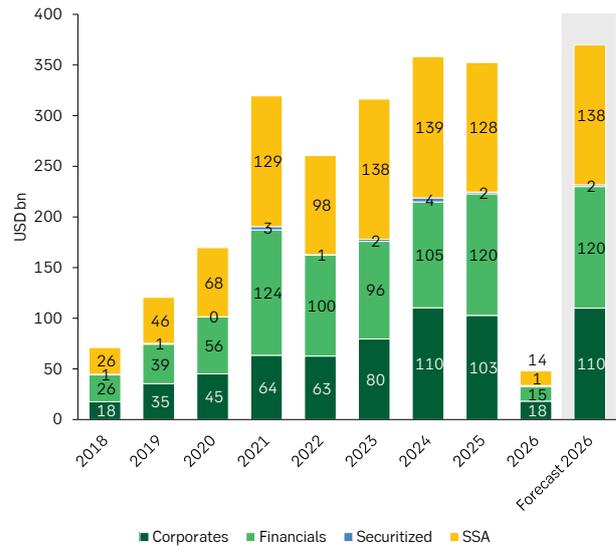


Source: BloombergNEF, SEB as of January 31, 2026

Looking ahead, we expect European green bond issuance to reach a new record of approximately USD 370bn in 2025. Green bonds remain the most suitable instrument to finance Europe’s accelerating investment needs in clean energy supply, grid expansion, and resilient infrastructure.

The anticipated growth will be driven primarily by sovereign, supranational, and agency (SSA) issuers, supported by continued momentum in corporate green bonds—particularly from companies that own, operate, or develop energy and grid-related assets.

**Figure 17 European green bond issuance by sector**



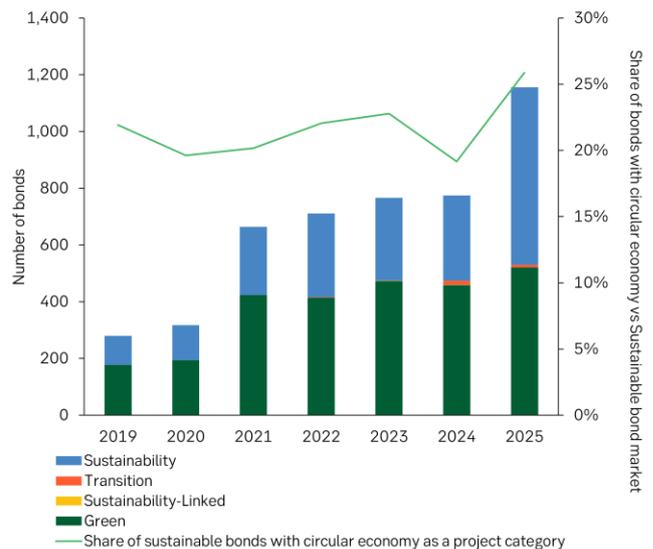
Source: BloombergNEF, SEB as of January 31, 2026

### Circular momentum in sustainable bonds

In alignment with the overarching focus of this report on circular economy, particular attention has been paid to sustainable bond issuance where circular economy is specified as a use-of-proceeds category.

Circular economy is increasingly adopted in sustainable finance. As of 2025, over 25% of all bonds in the global sustainable debt market now incorporate circular economy as a category. In 2025 alone, nearly 1,200 newly issued sustainable bonds included circular economy as a use-of-proceeds category. This underscores that circular economy has become mainstream in the sustainable debt market.

**Figure 18 Sustainable bonds issued with circular economy as a use-of-proceeds category**

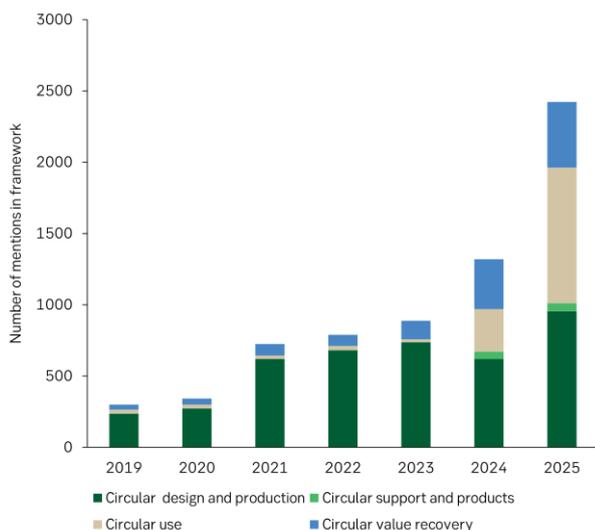


Source: BloombergNEF, SEB as of December 31, 2025

## Circular design and production are a mainstream subcategory

Figure 19 illustrates the number of circular economy subcategories that are mentioned in the bond frameworks, where a framework may have more than one subcategory listed. From 2019 to 2025, circular design and production emerged as the most frequently cited circularity component in sustainable bond frameworks, rising from roughly 250 mentions to nearly 1,000. This steady increase highlights a sustained focus on redesigning products and manufacturing processes to reduce waste and improve resource efficiency.

**Figure 19 Bond issuance by circular economy subcategory<sup>2</sup>**



Source: BloombergNEF, SEB as of December 31, 2025

However, circular use overtook circular design and production to become the dominant subcategory in 2025. This transition is likely a response to evolving consumer expectations, particularly regarding the durability and reusability of products.

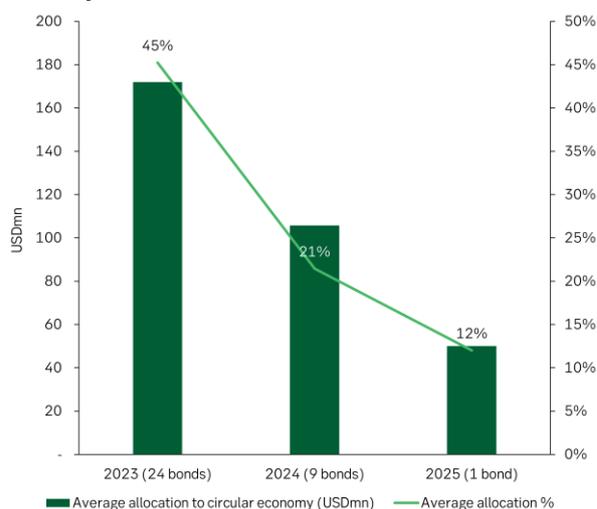
## Sustainable bond allocation to circularity

While it is informative to identify how many bonds categorise circularity within their frameworks, it is equally important to understand the actual volume of capital being directed to circularity projects. Many post-issuance reports aggregate allocations across several issuances, which can risk double counting and obscures capital flow to specific projects. To avoid this, the scope of the analysis has been deliberately narrowed to include only those bonds where allocation reports are specific to an individual instrument.

Applying this refined methodology, we identified 34 sustainable bonds issued between 2023 and 2025 with proceeds explicitly allocated to circular economy. Figure 20 shows the average annual allocation of sustainable bond

proceeds to circular economy projects, along with the average share of each bond's total issuance dedicated to circular economy initiatives. Allocation volumes and shares are shown as averages rather than total sum values, thereby providing a clearer representation of capital deployment per bond and minimising the risk of distortion due to double counting.

**Figure 20 Average share of allocation to circular economy of total amount issued**



Source: BloombergNEF, SEB as of December 31, 2025

The data reveals notable shifts over the period from 2023 to 2025. Attributed to the fact that the bonds are still early in their lifecycle, therefore there remains ample opportunity for issuers to allocate funds to circular economy projects before the bonds reach maturity.

In 2023, allocations to circular economy projects were at their highest within the observed timeframe. The average allocation per bond reached approximately USD 172mn, with a considerable 45% of the total bond proceeds directed towards circular economy activities. This reflects significant investor and issuer commitment to advancing circularity within that year.

## Industrials dominate corporate sustainable bonds that include circularity

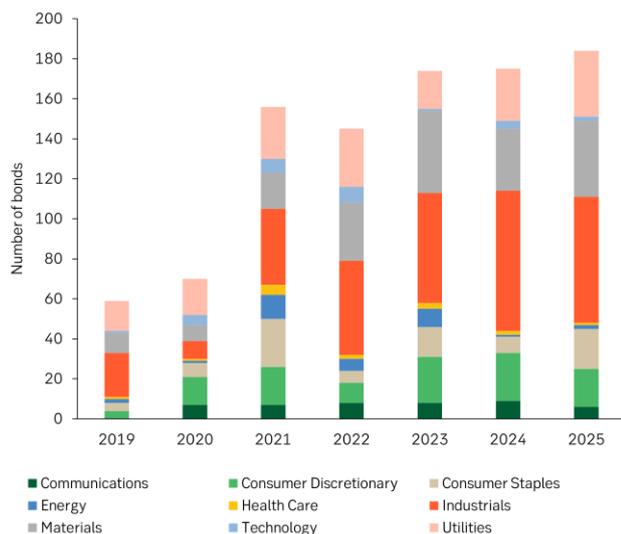
Between 2019 and 2025, there has been consistent annual growth in the number of corporate bonds that included circularity. This upward trajectory highlights the increasing importance of circular economy principles within corporate financing strategies.

This analysis focuses on corporates since it is possible to better anticipate the future direction of circularity projects and investments within the business sector.

<sup>2</sup> A bond may have more than one project subcategory in its framework

Throughout this period, the industrials sector has maintained a leading position, representing 32% of all corporate bonds categorised under circularity. This dominance is indicative of the sector's strong commitment to circular manufacturing practices, material efficiency, recycling, and waste reduction. The materials and utilities sectors follow closely behind, further reflecting the broadening scope and adoption of circularity-related initiatives across key industries.

**Figure 21 Corporate sustainable bonds with circular economy as a use-of-proceeds by sector<sup>3</sup>**



Source: BloombergNEF, SEB as of December 31, 2025

### Case Study: Munters Group AB Green Bond Framework

A notable example of a green bond framework that incorporates circular economy principles is provided by Munters Group AB, an industrial company that designs, manufactures, and services systems that control humidity, temperature, and air quality. In 2025, Munters published its green bond framework, explicitly designating circular economy as a use-of-proceeds category. The framework prioritises the extension of product lifespans, with a particular emphasis on activities such as repair, refurbishment, and upgrades. To support these objectives, Munters intends to allocate proceeds towards investments in property, plant, equipment, and technological advancements. This targeted approach highlights the company's commitment to promoting circularity within its operations by facilitating longer product use and more efficient resource management.<sup>4</sup>

<sup>3</sup> Governments and financials have been removed to focus on corporate allocations. Their allocations are the smallest amongst the sectors

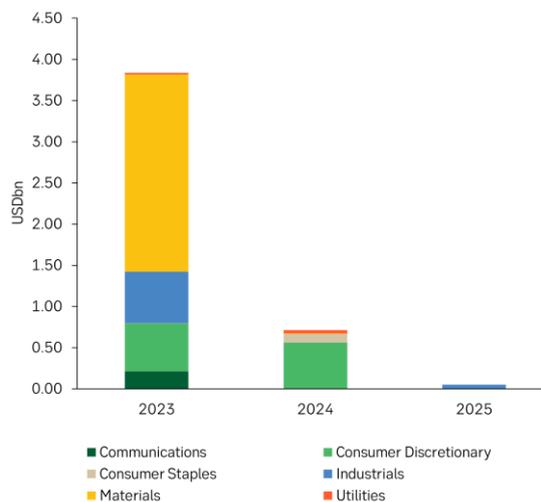
<sup>4</sup> [Munters AB Green Bond Framework](#)

### Allocations made to projects in materials, consumer discretionary and industrial sectors

In 2023, the materials sector represented the largest share of allocations towards circular economy initiatives within sustainable bonds, with consumer discretionary and industrials sectors also receiving significant levels of capital. This dominance of materials reflects the sector's pivotal role in circularity efforts at the time, likely due to its substantial impact on resource use and waste generation.

By 2024, however, a notable shift occurred. Both material and industrial sectors experienced a reduction in their share of allocations, while the consumer discretionary sector emerged as the new leader in terms of capital dedicated to circular economy projects.

**Figure 22 Sustainable bond circular economy allocations by industry<sup>5</sup>**



Source: BloombergNEF, SEB as of December 31, 2025

### Case study: Circular economy allocations by Stora Enso

Stora Enso, a prominent company in the pulp and paper sector, exemplifies sectoral commitment to the circular economy through targeted bond allocations. In their most recent post-issuance allocation report from 2024, Stora Enso disclosed that 30% of the proceeds from their bond issued in 2023 have been directed towards sustainable product processes. This allocation demonstrates their dedication to utilising primary raw materials that are renewable, recyclable, and fossil-free, thereby supporting the circular economy by reducing waste.<sup>6</sup>

The allocated funds have specifically supported Stora Enso's consumer board site investment in Oulu, Finland. At

<sup>5</sup> Government and financials have allocations into circular economy but have been removed to focus on corporate allocations.

<sup>6</sup> [Green and Sustainability-Linked Financing Report 2024](#)

this facility, the company is focused on ensuring the design of consumer boards is inherently recyclable. This approach reinforces one of the fundamental pillars of the circular economy: the creation of products designed for recyclability.<sup>7</sup>

### Venture capital funding for circular economy

The transition from a linear to a circular economy requires significant disruption to established processes and the adoption of innovative approaches stretching from raw material use, product design to resource recovery. As a result, monitoring venture capital activity is crucial for identifying where potential breakthroughs might occur, enabling the acceleration of circular economy practices in the near future.

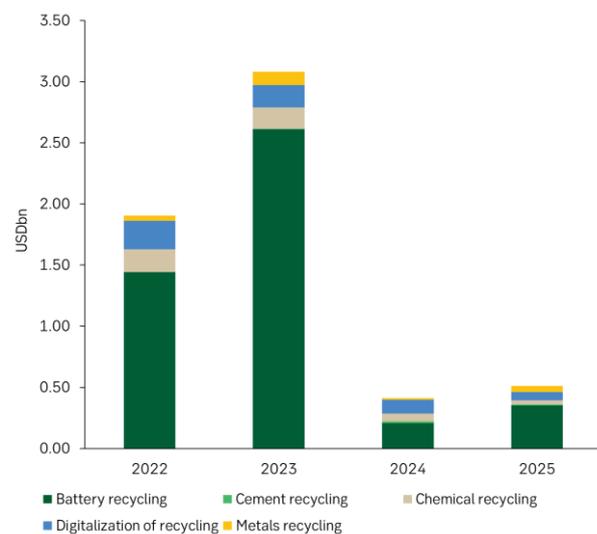
Although elements of the circular economy are present across a wide range of industries and technologies, this analysis maintains a focused scope. It highlights investments in sectors that are closely aligned with the 10 R framework for circularity, as detailed in the article '[Circular economy and resilience](#).' This targeted approach provides a clearer understanding of how venture capital is contributing to the development of circular solutions and where significant changes may be expected.

### Battery recycling dominates investment

Investment activity in recycling-related circular economy categories witnessed a significant surge in 2023, as illustrated in Figure 23, reaching a peak of over USD 3bn. This represented an increase of approximately 50% compared to the previous year, underscoring heightened investor interest and activity in this area during that period. However, this upward trend did not persist, as funding levels fell sharply in subsequent years. In both 2024 and 2025, total investments in recycling-related circular economy initiatives dropped and remained below USD 1bn, marking a notable contraction following the previous year's high.

Throughout the period 2022-2025, battery recycling consistently maintained a dominant position within the recycling investment landscape. This category accounted for a substantial proportion of overall funding, reflecting robust momentum in circularity efforts related to electric vehicles (EVs). The prevalence of battery recycling investments highlights the influence of regulatory measures aimed at supporting circular practices in the EV sector, further driving capital allocation towards these activities. Further details can be found in the [regulatory update](#).

**Figure 23 Venture capital investments into circular economy**



Source: BloombergNEF, SEB as of December 31, 2025

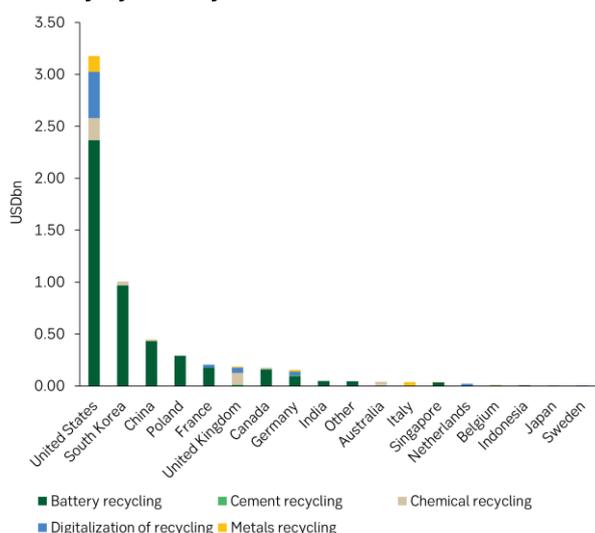
### US leads in recycling investment amid complicated trade relations with China

Over the period, venture capital funding directed towards companies engaged in circular economy initiatives has been predominantly allocated to US enterprises. Notably, firms such as Redwood Materials Inc and Ascend Elements have attracted significant investment, with their operations centred on the development of battery recycling facilities and the establishment of closed-loop cathode material supply chains.

The concentration of recycling-related funding in the United States can be attributed to the ongoing trade dynamics between the US and China. China's extensive influence and dominance throughout the battery value chain have compelled the United States to prioritise battery recycling as a means of recovering essential materials. This strategic focus enables the US to secure the resources required for domestic battery production, mitigating reliance on imports and reinforcing circularity within the industry. For more information on batteries, please refer to our last report: [SEB Sustainable Finance Outlook: Charging the Transition](#).

<sup>7</sup> [Setting new standards for the future of packaging industry | Stora Enso](#)

**Figure 24 Venture capital investments into circular economy by country 2022-2025**



Source: BloombergNEF, SEB as of December 31, 2025

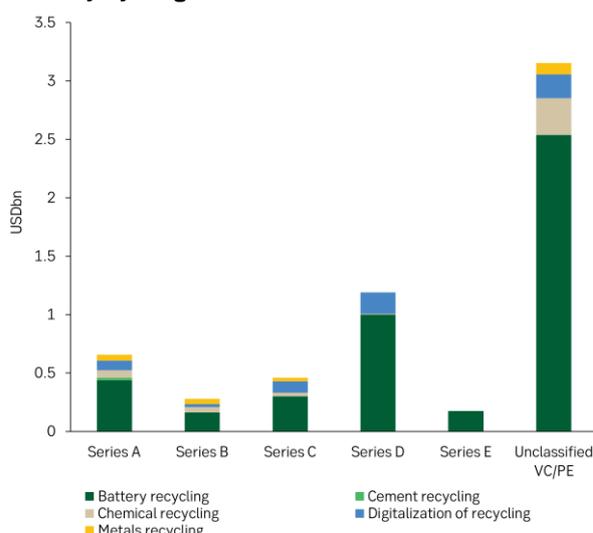
### Varying levels of maturity amongst recycling innovations

The pace at which these recycling innovations will achieve broad adoption remains uncertain, largely because investment-stage data for many companies is not disclosed.

Even so, available information shows that nearly USD 1.2bn has been invested in Series D-stage companies to date. This substantial funding indicates a notable degree of maturity among certain battery recycling startups and those focusing on the digitalisation of recycling processes. The advanced stage of these companies suggests that they are progressing towards readiness for integration into sustainable bond projects, potentially accelerating the circular economy transition within their sectors.

In contrast, most venture capital investments in chemicals and metals recycling have taken place at a relatively early stage (series A, B, C). As these companies continue to develop, it may take several years before robust and scalable solutions for recycling these components are implemented in practice. This slower pace underscores the need for ongoing support and innovation to advance circularity in these areas, ultimately paving the way for their inclusion in sustainable financing mechanisms.

**Figure 25 Venture capital investments into circular economy by stage 2022-2025**



Source: BloombergNEF, SEB as of December 31, 2025

The timeline for integrating recycling innovations into sustainable bond projects remains uncertain. Much of this uncertainty stems from the lack of comprehensive data regarding the investment stages of relevant companies. At present, many enterprises involved in recycling have not had their funding rounds or stages clearly classified, making it difficult to predict when these innovations will become viable for sustainable financing initiatives.

# Regulatory update

## Regulatory and policy developments promoting circular economy

Recent EU regulatory and policy developments addressing the circular economy include the EU Taxonomy, Clean Industrial Deal, Circular Economy Act, Ecodesign for Sustainable Products Regulation, and the Critical Raw Materials Act. These measures aim to improve resource efficiency and reduce dependence on raw material imports by promoting recycling, product longevity and sustainable production practices.

### **EU regulations affecting companies**

Circular economy related regulations in the EU spans industrial policy, product regulation and sustainability reporting. As of early 2026, developments relevant to circular business models are concentrated in framework legislation and consultation processes rather than new binding requirements. Circular economy and some of the key business models are also affected by the sustainable finance framework especially the Corporate Sustainability Reporting Directive (CSRD) and the EU Taxonomy.

### **EU Taxonomy**

The EU Taxonomy includes “transition to a circular economy” as one of its environmental objectives and sets technical screening criteria for eligible activities. In some cases, the criteria explicitly reference service-based or product-as-a-service approaches (including retained product ownership by the provider), alongside requirements linked to resource efficiency, product lifetime extension and end-of-use return arrangements. Do No Significant Harm requirements apply across objectives and commonly include conditions relating to pollution prevention, waste and chemicals management.

### **Key regulatory developments**

#### ***Clean Industrial Deal***<sup>8</sup>

The European Commission published the Clean Industrial Deal on 26 February 2025, setting out the objective to double the EU circularity rate to 24% by 2030 and references circular economy measures within the EU's industrial and competitiveness agenda. It does not introduce new circular economy legislation but identifies

circularity alongside decarbonisation and industrial resilience objectives.

#### ***Circular Economy Act***<sup>9</sup>

The Commission launched a public consultation in August 2025 on a Circular Economy Act. As of February 2026, no legislative proposal has been adopted and the scope and timelines remain under development. The Act aims to establish a more integrated single market for secondary raw materials and certain waste flows, increase the supply of high-quality recycled materials, and stimulate demand for these materials within the EU. It is also intended to contribute to the EU's objective of increasing the circularity rate (the proportion of materials reused or recycled in the economy) and to build on elements of the existing Circular Economy Action Plan.

#### ***Ecodesign for Sustainable Products Regulation (ESPR)***<sup>10</sup>

The ESPR entered into force on 18 July 2024. It establishes a framework for future product-specific eco-design requirements, to be set via delegated acts. The regulation provides for Digital Product Passports, with product coverage and data requirements to be defined.

#### ***Critical Raw Materials Act (CRMA)***

The CRMA, adopted in 2024, sets 2030 benchmarks for strategic raw materials:

- 10% extraction, 40% processing and 25% recycling of EU annual demand
- A 65% cap on dependency on any single third country per material

The Act references recycling and recovery as part of the EU's supply diversification approach.

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<sup>8</sup> [Clean Industrial Deal - European Commission](#)

<sup>9</sup> [Circular Economy Act - European Commission](#)

<sup>10</sup> [Ecodesign for Sustainable Products Regulation \(ESPR\) - European Commission](#)

# Circular economy and resilience

Embracing circular strategies can strengthen business resilience and safeguard the environment

Adopting circular economy strategies can address key environmental and financial risks by improving resource efficiency, extending product lifespans, and rethinking asset ownership. It emphasises the urgency for businesses and policymakers to transition from linear to circular material flows in order to enhance resilience, reduce supply chain volatility, and create new value opportunities.

## Turning linear risks into circular opportunities

The circular economy is becoming increasingly relevant as it has the potential to address key structural drivers of both sustainability impacts and financial risk: linear material flows.<sup>11</sup> This article seeks to explore the role of circular economy in addressing some of these risks such as supply chain volatility and disruption, what is necessary to enable this long discussed but still elusive concept to potentially become a reality, and why this matters now more than ever.

The linear economy drives multiple interlinked environmental crises and strategic risks for business and society. Environmental systems research indicates that human activities are exceeding 7 out of the 9 planetary boundaries, including climate change, biosphere integrity (biodiversity), land use change and freshwater use, with increasing systemic risk to economies and corporate performance.<sup>12</sup>

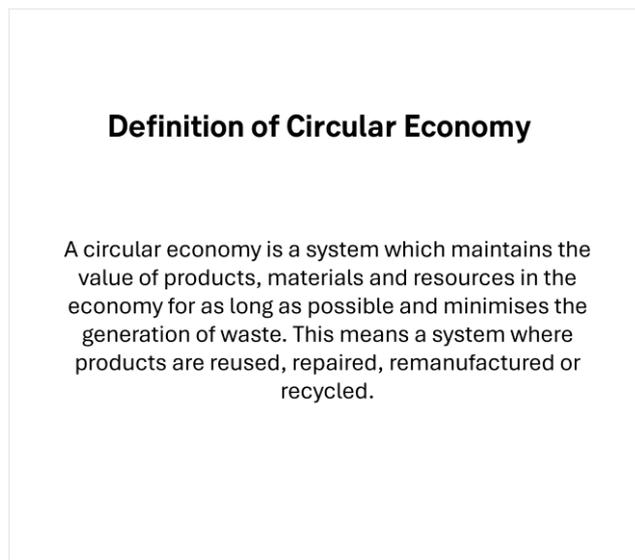
This is not theoretical science. In January 2026, the UK government announced a national security warning when it published Global biodiversity loss, ecosystem collapse and national security<sup>13</sup>, outlining how global biodiversity loss and the collapse of critical ecosystems could affect the UK's resilience, security and prosperity. The analysis concludes:

- Global ecosystem degradation and potential ecosystem collapse pose high risks to economic stability, food security and geopolitical conditions, with impacts already materialising and likely to intensify through 2050 and beyond.
- All critical ecosystems assessed are on pathways toward severe degradation, with some at risk of irreversible loss of function. These changes are expected to increase water insecurity, reduce crop yields, disrupt global food systems

and intensify competition for resources, with cascading effects including economic instability, conflict and supply-chain disruption.

This highlights the urgency but also brings potential for new opportunities. Circular economy has the potential to reshape business models through three interrelated levers: improving resource efficiency by securing circular material flows, extending product lifespans to preserve embedded value, and rethinking product ownership through business models including service-based and asset-retention models. Together, these levers shape how impacts, value, risk and resilience are distributed across the value chain.

## Figure 26 Circular economy definition



Source: European Union

<sup>11</sup> <https://initiatives.weforum.org/navigating-global-value-chain-disruption/navigator>

<sup>12</sup> Stockholm Resilience Centre, *Seven of nine planetary boundaries now breached. 2025*

<sup>13</sup> [https://assets.publishing.service.gov.uk/media/696e0eae719d837d69afc7de/National\\_security\\_assessment\\_-\\_global\\_biodiversity\\_loss\\_ecosystem\\_collapse\\_and\\_national\\_security.pdf](https://assets.publishing.service.gov.uk/media/696e0eae719d837d69afc7de/National_security_assessment_-_global_biodiversity_loss_ecosystem_collapse_and_national_security.pdf)

## Circular Economy Strategies

The Circular Economy offers a response to interconnected climate, nature and growth risks, and is not solely an environmental initiative. It has the potential to connect:

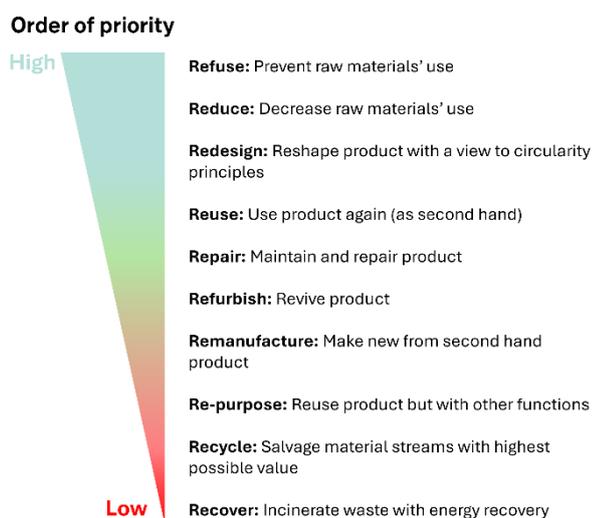
- Impacts on climate, nature and people arising from material extraction, processing and waste disposal;
- Business risks related to resource scarcity, supply concentration, and price volatility; and
- Opportunities for value creation, including through new value pools, increased productivity, extended lifetimes and service-based value propositions.

For some companies, these can translate into three core business model questions: how efficiently materials are sourced and retained (resource efficiency), how long products and assets remain in productive use (product lifespans), and who owns and controls assets over time (product ownership).

### From recycling to system design: interpreting the 10R hierarchy

Circular economy is framed through frameworks such as the 10R hierarchy.<sup>14</sup> The steps higher up the hierarchy generally preserve more embedded material and energy than recycling or recovery. The hierarchy also illustrates that the most value-preserving strategies, such as refusal, rethinking and reuse, are closely linked to extended product lifespans and retained ownership, which enable control over assets and materials throughout their lifecycle.<sup>15</sup>

**Figure 27 Levels of circularity: 10 R's**



Source: Adapted from Cramer (2022)

## Impacts, risks and planetary boundaries

Material flows cause major impacts and highlight the need for resource efficiency. Many sustainability challenges are

linked to how materials are extracted, processed, used and disposed of, making resource efficiency and material circularity central to both impact reduction and risk management.

As highlighted earlier by the UK government's January 2026 analysis on biodiversity loss and national security, these risks are already materialising and are expected to intensify through mid-century. Additionally, in February 2026 the IPBES Business and Biodiversity Assessment outlined that the biodiversity losses caused by economic activity pose "a critical and pervasive systemic risk to the economy, financial stability and human wellbeing".

Quantitative evidence increasingly shows that material use, rather than energy alone, is a dominant driver of environmental and economic risk. Analysis by the UNEP International Resource Panel, Global Resources Outlook, demonstrates that increasing resource use is the main driver of the triple planetary crisis (climate change, biodiversity loss and pollution).

Extraction and processing of material resources (fossil fuels, minerals, non-metallic minerals and biomass) account for over 55% of greenhouse gas emissions (GHG) and 40% of particulate matter health related impacts. If land use change is considered, climate impacts grow to more than 60%, with biomass contributing the most (28%) followed by fossil fuels (18%) and then non-metallic minerals and metals (together 17%). Biomass (agricultural crops and forestry) also account for over 90% of the total land use related biodiversity loss and water stress.

In practical terms these impacts affect:

- Input availability and cost (e.g. water scarcity, soil degradation, geopolitical disturbances);
- Operational continuity (e.g. extreme weather events); and
- Sales volumes and value (e.g. customer and stakeholder demands/preferences).

Social and human rights risks are also linked to material flows, particularly in upstream stages such as resource extraction and primary processing. Reducing reliance on primary extraction and increasing transparency and control over materials already in circulation may reduce exposure to some upstream human rights and social risks.

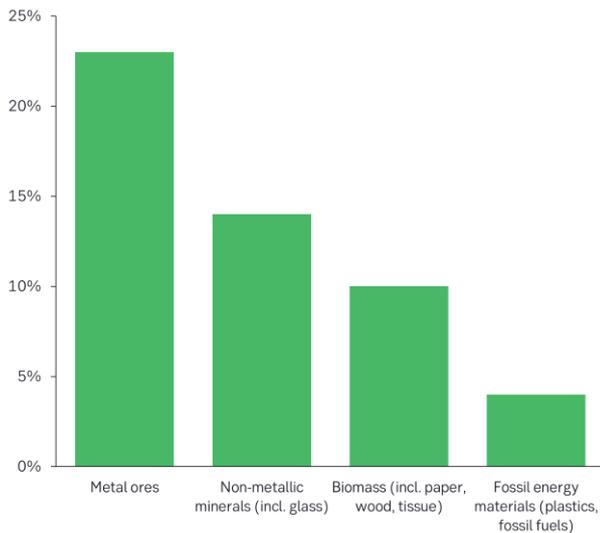
In the EU, circularity remains low for most material streams, highlighting where resilience and impact risks are significant, and where opportunities may be being missed. In 2024, the circularity rate in the EU was only 23% for metal ores, 14% for non-metallic minerals (including glass), 10% for biomass (including paper, wood, tissue,

<sup>14</sup> Adapted from Cramer (2022) *Building a Circular Future Ten Takeaways for Global Changemakers*

<sup>15</sup> JRC. *Capturing the Potential of the Circular Economy Transition in Energy-Intensive Industries. 2025*

etc.), and 4% for fossil energy materials (including plastics and fossil fuels)<sup>16</sup>.

**Figure 28 EU circularity rates by material type, % in 2024**



Source: Eurostat, Circular Economy: Material Flows and Circularity Rates, 2024

When mature and widespread, circular economy strategies affect the overall system design, by reducing virgin material demand, extending asset lifetimes and preserving embedded value, and thus addressing the actual impacts, rather than focusing solely on mitigation through traditional waste management policies.

### Risks and resilience: material dependency

In linear economy systems, environmental impacts remain largely external to company balance sheets. However, the degradation associated with material extraction and processing increasingly feeds back into economic systems.

As ecological pressures grow, the costs of land-use change, water stress, pollution and resource depletion are progressively transmitted through supply chains and operations into financial considerations. Companies dependent on primary inputs are seeing these translate into risks, highlighting exposure to transition, physical and nature-related risk. Consequently, these risks will increasingly need to be understood as relevant for financial performance.

This was highlighted in the survey findings from SEB's Nordic Seminar in January, where supply chain disruption was named the top risk to growth, cited by 30% of companies surveyed, ahead of geopolitical risk.

For many sectors, supply chains are global and complex, and dependence on primary material inputs, particularly some key metals and minerals, exposes companies to disruption, cost shock and operational uncertainty. The International Energy Agency's Global Critical Minerals Outlook 2025 projects continued strong demand for key energy transition minerals (including copper, lithium and nickel), even as supply constraints persist, underscoring structural risk in material markets.<sup>17</sup>

### The case of copper

Copper is a critical material for renewable energy infrastructure and electrification technologies. Under scenarios such as the International Energy Agency's Net-Zero Emissions by 2050 pathway, demand for copper is projected to grow substantially as power systems supported by renewables may require six to twelve times more copper than fossil-fuel-based systems, and overall demand could increase by 50% by 2050.<sup>18</sup>

Primary copper production faces challenges including long development timelines and social and environmental impacts for new mines, declining ore quality and permitting challenges.

Recycling copper, particularly from end-of-life products such as electronics, vehicles and infrastructure, can provide a secondary supply source where its properties allow it to be recycled indefinitely without loss of quality. Recycled copper can save up to around 85% of the energy required for primary production, reducing associated greenhouse gas emissions and other environmental and social impacts.<sup>19</sup>

According to the World Resources Institute, recycled copper accounts for roughly one-third of global supply. While this alone cannot replace primary production, significantly increasing end-of-life copper recovery could provide access to millions of additional tonnes of copper by 2040, helping mitigate tight supply conditions and price volatility.

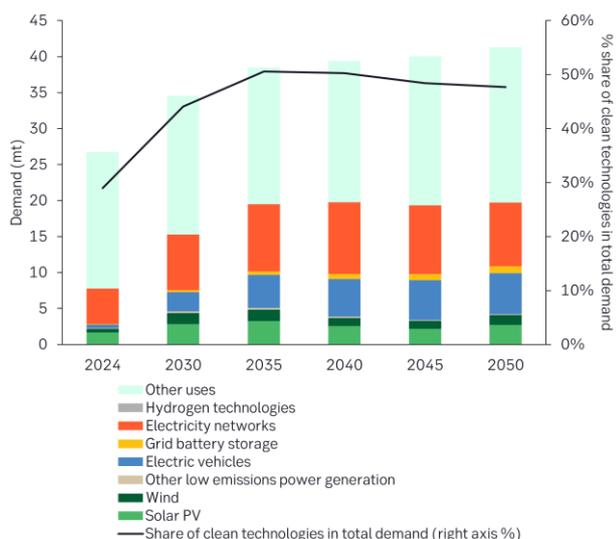
<sup>16</sup> Eurostat, Circular Economy: Material Flows and Circularity Rates, 2024

<sup>17</sup> IEA, Global Critical Minerals Outlook 2025

<sup>18</sup> World Resources Institute 2025, More Than Ore: The Pivotal Role Recycled Copper Can Play in the Energy Transition

<sup>19</sup> Ibid.

**Figure 29 Copper demand in IEA Net Zero by 2050 scenario**



Source: World resources institute and EIA critical minerals data explorer

This cannot be achieved by recycling alone: products need to be designed and used without disposal to gain resource effectiveness through extended product lifetimes and retained ownership. Longer duration infrastructure, modular design and refurbishment can delay end-of-life losses, while service-based or retained-ownership models allow producers to maintain visibility over copper stocks in use. Shifting circularity upstream from waste management towards lifecycle control, strengthening both supply resilience and value retention reduce material supply risks, generate new value opportunities for second life products and contribute to reducing the impact of the energy transition's resource needs. Several policies in the EU such as the Critical Raw Materials Act (CRMA) Regulation, the Waste from Electronic and Electrical Equipment (WEEE) <sup>20</sup> now being updated and integrated into the Circular Economy Act, due for adoption in 2026. <sup>21</sup>

### Opportunities: resource efficiency and value creation

From a value creation perspective, circular economy shifts the focus from production volume to resource effectiveness and productivity: the economic value generated per unit of material across its lifecycle

Circular economy approaches may alter a company's risk profile by restructuring how value is generated from materials already in circulation. Resource efficiency lowers the absolute volume of primary inputs required to generate revenue, reducing exposure to extraction-linked volatility.

Extending asset lifetimes shifts value creation from throughput to utilisation, moderating replacement risk and smoothing revenue patterns. Retained ownership and service-based offerings may preserve residual value and translate into enhanced 'lifetime value'.

Asset-as-a-Service models offer a distinct circular pathway that links environmental impact reduction to measurable resilience benefits. Rather than transferring ownership at point of sale, the producer retains control of the asset over its lifecycle and monetises performance, availability or output. If financially viable, this model incentivises product durability, modular design and recoverability, potentially reducing virgin material demand and lifecycle emissions per unit of revenue. It is also considered to support resilience and stability:

- Service contracts generate recurring cash flows, reducing dependence on cyclical replacement sales.
- Ownership retention enables recovery, refurbishment and redeployment, supporting collateral values.
- Lifecycle extension and component reuse may reduce sensitivity to commodity price swings, particularly relevant in sectors exposed to critical minerals volatility.

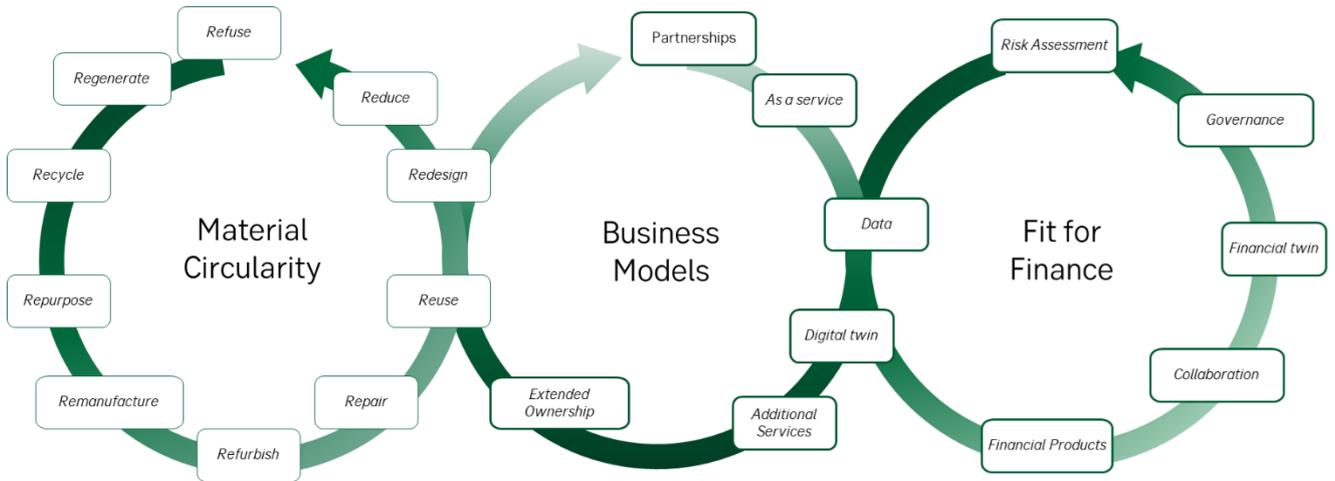
From a financing perspective, potential for cash-flow visibility, recoverability of underlying assets and lower reliance on virgin inputs combined with maintenance and ongoing market demand, "as-a-service" models can simultaneously advance environmental performance and balance-sheet resilience. These opportunities can be material. They are not universal and depend on different sector characteristics, types of assets and, importantly, customer needs and expectations. But they offer potential for long-term competitiveness and value creation, especially when combined with resilience benefits of circular business.

These opportunities may need companies to reassess some key factors including who controls the asset over time, who decides over its use, and who carries balance-sheet and residual value risk. These are questions central to financing. The interaction between the business models and materials circularity has been well established. Business models that test usage-based offerings pose challenges for financing and that viability is an important enabler to in return enable the material circularity to emerge.

<sup>20</sup> Waste from Electrical and Electronic Equipment (WEEE) EU rules on treating WEEE to contribute towards a more circular economy, 2015.

<sup>21</sup> [Circular Economy - Environment - European Commission](#)

**Figure 30 Circular dynamics: financing viable business models that enable material circularity**



Source: Adapted from Bain 2023

The fit between financing and the business model are potentially key to enable circular material flows and capture resilience opportunities. Understanding how to align these business and financial models has been explored in pilots to build understanding of business risk,

capital allocation and financing structures. These are examined further in the next articles in this series.

Think big, start small, act now, and learn fast.

# Circularity can drive financial benefits

## Advantages of a circular economy model

The finance industry can play an important role in the transformation from linear to circular business models. It can be a facilitator and a partner in developing business model changes. This article outlines potential value drivers of circular business models, and which aspects are relevant for the financing of such models.

### Introduction

With the reshaping of corporate strategies towards circular economy eco-systems comes the need for assessing how, where and by whom value is created in the value chain. This is important for the finance industry that will, as always, evaluate downside risks as well as the future potential of each sector to generate stable income streams. For some sectors a redefined strategy may not only have implications on how risks and opportunities are assessed, but also on what financial products and services are needed to support this strategic shift.

### Value creation in the system

The circular economy can offer significant benefits from an environmental perspective. Sharing products and extending the lifetime of the products can lower the number of products manufactured, resulting in reduced emissions. But creating closed loops for raw materials will also ease the pressure on nature if for example mining for virgin materials can be hampered.

However, there are not only environmental benefits from transitioning into a circular economy. Financial benefits could be material too, at least once platforms and infrastructure are in place to enable circular business practices and models. But the potential and size of these benefits are likely to vary between sectors and value chain positions as well as with circular economy activity, and not in the least, over time, with benefits perhaps not materializing in the short term. Quantifying the value creation of circular economy activities can be complex to measure.<sup>22</sup> Nonetheless, efforts to broadly outline the

potential has been made.<sup>23</sup> The high level potential financial benefits could be summarised as follows<sup>24</sup>:

**Firstly**, by way of *reduced cost and/or increase in income per unit* (i.e. margin improvement or productivity gains) through:

- *Resource efficiency* in the form of reduced costs for input material (where costs for recycling and materials handling do not exceed the cost for extracting virgin material)
- *Extending the lifespan* of the unit allowing it to generate income for a longer period of time (if the cost for value preservation by improving the durability of the unit or by increasing repair and maintenance efforts do not exceed the income generated during the lifetime expansion)
- *Retained ownership / usership models* that enable higher asset utilisation / capacity sharing by selling the usership for, or access to, the same unit to more than one user, for example through as-a-service business models (assuming the sum of the net income from subscription fees from all users under retained ownership exceed the income from selling the unit). Retained ownership also enables the ability to capture the value in raw materials at the products end of life. This could be utilised as an additional revenue stream or a reduced cost for input materials (i.e. back to resource efficiency).

**Secondly**, by way of *expansion into novel income streams* facilitated by a centralised ownership of the units, for example as a result of implementing as-a-service business

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<sup>22</sup>[“WEF Harmonizing Metrics to Measure Circularity A Call to Action 2024.pdf”](#)

<sup>23</sup> [“The circular economy: Moving from theory to practice”](#). McKinsey & Company, 2016

<sup>24</sup> See for example [Strategy in a Circular World | Bain & Company](#), or [Circular Business Models | Ellen MacArthur Foundation](#), or [Circular Business Models | Ellen MacArthur Foundation](#), or [WEF Circular Transformation of Industries The Art of Scaling Circular Supply Chains 2025.pdf](#)

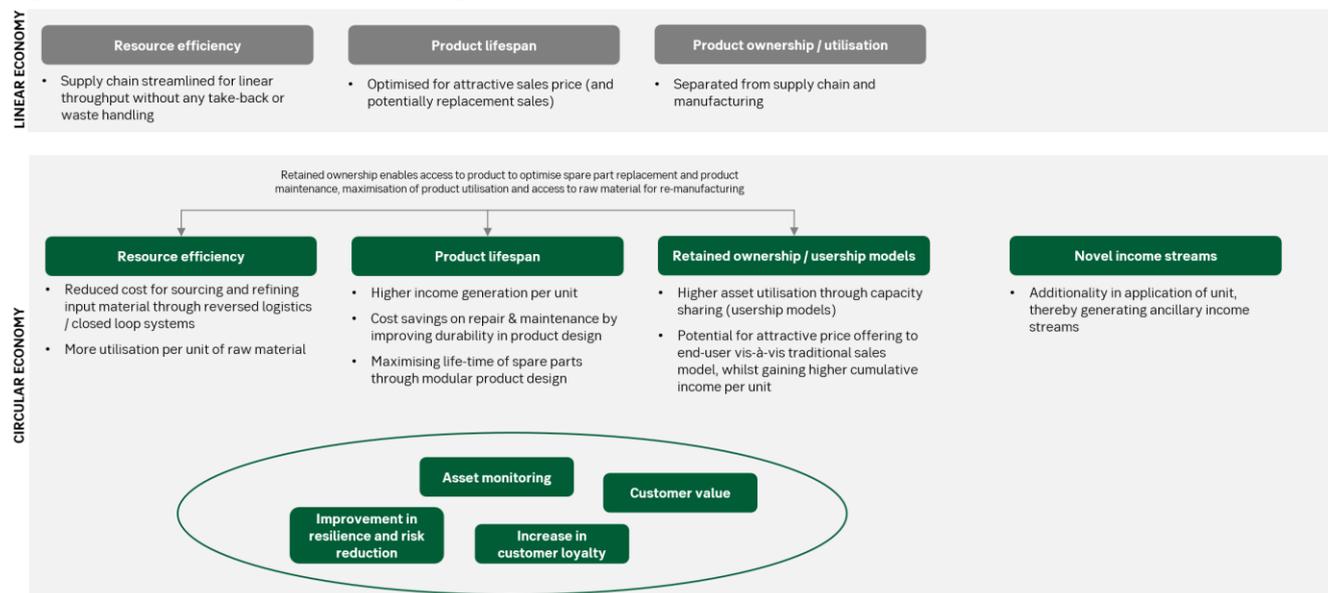
models (e.g. vehicle batteries applied for electricity grid services). Also, unless the scrap value of the asset (and/or remanufacturing potential or input material looping back into own production) at its end of life does not exceed the value that could be captured through an alternative application, the asset could be removed from its first purpose and be engaged in novel income streams (e.g. where technology allows, removing the battery from an electric vehicle for use in energy storage solutions).

**Thirdly**, eco-system participants may also put value on aspects that could indirectly translate into financial benefits such as:

- *Increase in customer loyalty* through usership contracts (subscription-based models / rental / pay-per-use / as-a-service / loyalty programmes / etc) that could, depending on their design, result in lock-in effects (contractual or habit based) and lead to recurring (and higher predictability in) income streams
- *Improvement in resilience and risk reduction* through the recurring income streams, but also through diversification by expanding into other sources of income. In addition, a higher level of control of, and access to, input material in the value chain (through closed loop recycling) is often referenced as an important risk reducer, and possibly protection against price volatility, in times of vulnerable logistics chains and geopolitical uncertainty.<sup>25</sup>

- *Customer value* created through as-a-service models such as flexibility (e.g. pay-per-use models), avoidance of up-front investments, exchanging capital expenditures for operating expenditures – Capex for Opex (might be viewed positively), avoidance of maintenance responsibilities, potentially lower Total Cost of Usership, improved customer experience (through a holistic no hassle usership model) and environmental/social value (either through recycling of input materials or through business models based on a sharing economy). Also, the customer base could potentially be expanded to customers that are unwilling to make an up-front investment and/or own an asset, but that have an interest in accessing the asset under a usership format. This could be particularly relevant for assets crucial for the electrification of society, such local energy systems (rooftop solar, battery storage) or battery powered vehicles that may come with a higher price tag than the fossil fuel driven equivalent.
- *Asset monitoring* through data created by the product (e.g. Internet of Things, AI) could i) enable the analysis of user behaviours to enhance the usership experience and optimise the number of users per product, and if relevant, make the product available for other purposes when there is no user demand, and ii) enable the analysis of the condition of the asset to facilitate maintenance and maximise spare part lifetime and product availability (up-time).

**Figure 31 Potential value creation through circular economy**



Source: Bain & Company, SEB

Of course, every sector and individual company will need to make their own careful consideration of the business potential that may or may not arise from these potential

value creation drivers. Also, the perception on value is likely going to differ between members in the value chain. Nonetheless, there are indications that the circular

<sup>25</sup> See for example [Designing supply chains for the circular economy | Ellen MacArthur Foundation](#)

economy is widely recognised among business leaders as a potential value driver. For example, in a survey conducted by the World Economic Forum in collaboration with Bain & Company and University of Cambridge, 95% of executives (in a sample of 491 persons) stated that “circularity will be important or very important to their organisations within three years”.<sup>26</sup>

In sum, the fact that value can be created throughout the value chain is important. This incentivises a transfer to circular business practices where participants together can build and create new value as opposed to compete for a pre-defined and fixed value-universe (defined by price- and margin pressure).

### **As-a-service models as an enabler for circularity**

As outlined [here](#), mechanics for shifts in business models such as retained ownership or as-a-service offerings *could* lead to circularity or regenerative resource flows. But it is worth noting that such shifts in business models do not automatically materialise in environmental benefits. For example, a simple shift in ownership of an asset does not by default lead to capacity sharing or higher asset utilisation unless combined with a service offering that incentivises such practices. Neither is it clear that higher utilisation of an asset necessarily leads to fewer assets being manufactured (which would reduce the resource use) - if the access to an asset is made easily available to more users (e.g. through usership models), the demand for the assets may even increase (so called rebound effects caused by an increased consumption) resulting instead in increased demand for assets and thereby higher raw material usage. Again, an evaluation of the environmental credentials of each individual business model will determine the value proposition from a sustainability perspective.

Nonetheless, depending on sector, it can be argued that retained or centralised ownership over assets could entail advantages such as better control of material circulation, incentives for product design that facilitates spare part replacement as well as repair and maintenance, and not least user- and product- optimisation to maximise utilisation and life time. From this perspective, an as-a-service model could be an enabler for creating circular ecosystems.

But a centralised or retained ownership also raises questions about the financing of the assets and the associated cost of capital.

### **Financing the circular economy**

Financiers can support and facilitate the creation of circular business models in the real economy, either where a circular business is supported through traditional financing products or where financial products are applied with a specific purpose to drive the circularity development.

#### *Labelled products based on traditional financing products:*

There are plenty of examples of so called labelled financial products (e.g. green loans and bonds as well as sustainability linked loans and bonds) that aim to drive the development towards circular business practices either by recognising investments towards circularity or by recognising the improvement of circularity based, and business relevant, metrics.

The “Sustainable Finance Market Update” article provides a more detailed outline of circularity in the labelled products market.

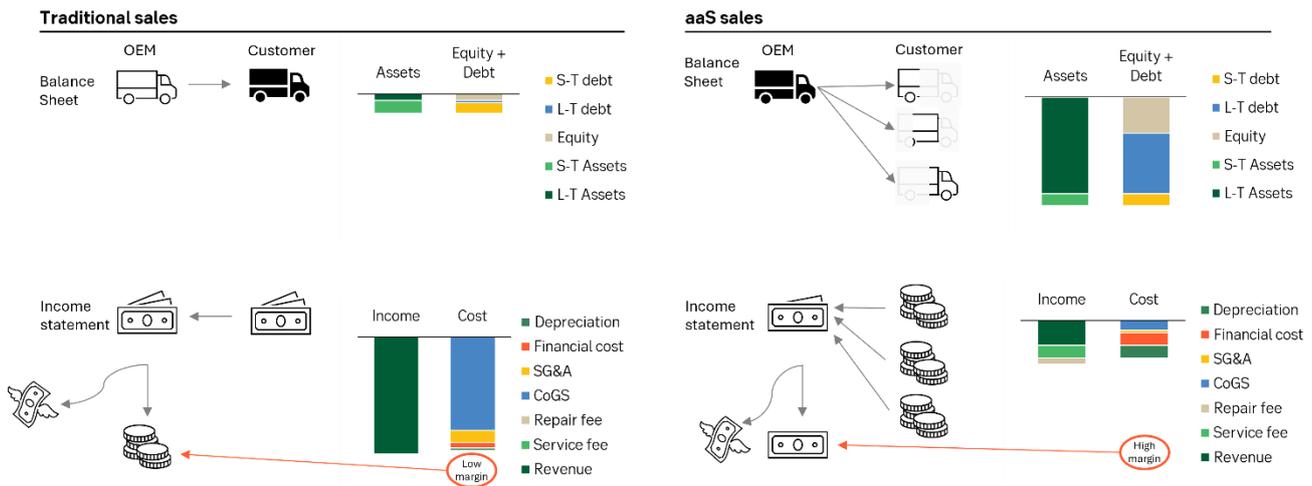
*Asset focused financing:* For industries where the circular model centres around (heavy) physical assets, and where steps are taken towards as-a-service models, the financing solutions may be transformative. In other words it goes beyond just highlighting efforts through a sustainable finance label.

- In a linear model, where the physical assets are purchased up-front by the users of the assets (households or B2B customers), the asset manufacturer can rely on a lean balance sheet with short term financing needs for inventory and accounts receivables. There is a reasonable timing match between income streams (full up-front payment for the full value of the product) and investments / producer costs (expenses to manufacture the asset). Examples of financial products applied include general corporate purpose debt or working capital financing.
- In an as-a-service model, where the physical assets are not sold to the users but rather offered under utilisation contracts, the balance sheet of the manufacturer (or any other stakeholder keeping the assets in central ownership) will grow and the financing needs with it. Under the assumption that the physical assets have a long lifetime (ideally also maximised through durability design and repair & maintenance), the need for long term financing increases. And, instead of up-front product sales revenues, income streams are disbursed over the lifetime of the asset (through usership fees) creating a significant mismatch and time-gap between front-end asset investments and slowly aggregating income streams.

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<sup>26</sup>[WEF Circular Transformation of Industries The Art of Scaling Circular Supply Chains 2025.pdf](#)

**Figure 32 Balance sheet and income statement implications of asset-as-a Service (aaS)**



Source: SEB

### Changing asset valuation

The concept of making large investments today that will generate a return in the future is of course not unique to the circular economy. The timing difference between the need for liquidity to invest in assets today with the income these assets will generate over several years into the future can be bridged in different ways. Drawing a parallel to the energy sector, up-front investments into power generation assets such as solar and wind parks are often supported by power purchase agreements where energy consumers enter into long-term (often fixed price) contracts to buy the electricity. Another parallel can be drawn with the property sector, where large up-front investments are made either in the construction of a building or when acquiring an existing building, with the future revenue that the property will generate coming in the form of rental income from tenants. By securing a high likelihood of future income streams these assets are made 'bankable'.

As more focus is put on the actual physical asset in the transfer to as-a-service business models, financial products that traditionally have been based on asset value (e.g. leasing) might become more relevant, at least as an incremental shift (depending on what stakeholder is suitable for intermediate and long-term ownership respectively), where the size of the debt and the annual financial costs (instalments and interest) are based on an estimated residual or reselling value (i.e. book value or market value) of the asset. Taking a further step and instead focusing on the cash flows that an asset will generate, financing instruments could be constructed around the value of the future income streams, for example through financial products such as contract financing (targeting the user and based on the value of

contracts/invoices), or simply a debt instrument (targeting the asset owner) where size and tenor are based on a traditional assessment of the (contracted) future cash flows. For assets with long lifetimes, the assessment of future revenue potential may however need to go beyond the time frame of any customer contracts, or alternatively through several contract renewals (or well beyond residual value under traditional leasing structures).

**Figure 33 Moving valuation of assets**



Source: SEB

For physical assets that are intended to have long lifetimes, with recurring upgrades, it is not always straight forward to estimate the value of the remaining future cash flows that the asset could generate. Neither is it obvious how to evaluate the risk of the estimated future cash flow failing to materialise. In other words, a model that derives value from the accumulated cash flows over the life of the asset

would require comfort from the respective stakeholders when it comes to allocating and sharing the usership risk. Thus, data generated by the physical asset (through e.g. Internet of Things, sensors etc) on aspects such as utilisation patterns and asset condition can become valuable also for the structuring of relevant debt instruments as it could contribute to a more sophisticated understanding of cash flow variations. Ultimately the financing terms for the assets could be guided by usership metrics such as number of hours, kilometres, litre-s, volumes and similar.

The next article, "The financial twin" sets out an example of how physical asset generated data can be relevant in the financing context.

### **Transition to a new platform**

Transformation into a circular business model may require building new infrastructure, redesigning value chains and creating new platforms. Thus, the challenge lies in the transition itself and the process of reaching the new steady state under the new business model. Where large investments are required, e.g. into assets through retained ownership models or into reverse logistics and material processing equipment, the time to reach a positive return on investment could be long (in particular if taking into account the cost of capital). But on the other hand, depending on sector and situation, the closed loop supply chain or the usership income model might be more resilient than the traditional linear model. And building on the potential value creation in the system, it might be possible

to unlock and access new / increased / more stable income streams.

But a shift into a circular business model could also be a shift into more complexity and uncertainty not only with regards to the stability and size of potential future income streams, but also as to how the value creation in the system will be divided between functions and stakeholders in the value-chain. And uncertainty is typically seen as an obstacle to investments. Businesses with aspirations to enter the as-a-service model with durable and heavy assets (which implies a significant build-up of assets on the balance sheet with associated financing) may even find it relevant to consider capital outside traditional bank financing in the pursuit to locate portfolios of assets outside the balance sheet. Risk sharing between equity and debt, and a diversification across the risk appetite range, could potentially also be addressed by entering partnerships for new business structures (e.g. through special purpose vehicles).

In sum, it will clearly be hard for corporates and other market participants to make the shift to fully circular business models in one go, and for financiers to support such swift shift. It will require incremental steps and collaborations across sectors and between parties bringing together a range of skills. Engagement in co-creations, learning together, and by developing pilots to address one circularity feature or value driver at a time, is one way to explore opportunities and to deliver proof-of-concepts that could ultimately be scaled.

# The financial twin

An innovative way to value equipment used in an asset as a service business model

SEB's "financial twin" model aggregates multi source data to assess equipment value based on projected cashflows, thereby enabling financing that is better aligned with circular, service-oriented business models and supporting sustainable finance.

**Figure 34 The financial twin concept**



Source: SEB - Asset solutions

## New business models set new requirements on valuation

Today, banks employ a wide range of methodologies to value equipment portfolios, most of which originate from traditional linear business models. Approaches such as book value or perceived market value continue to be prevalent because they are well established, easy to apply, and aligned with how industrial assets have historically been owned and traded.

In these linear models, equipment is manufactured, sold, and ultimately assessed based on what it might resell for on the secondary market. While this logic is suitable for businesses that transfer ownership at the point of sale, it becomes increasingly insufficient in markets where ownership structures and revenue models are evolving. As companies transition toward service-oriented offerings, conventional valuation techniques often fail to capture the full economic potential of an asset.

## Why traditional valuation falls short in a Product-as-a-Service world

This limitation becomes especially evident in the rapidly growing "product as a service" economy. In this model, equipment is no longer sold outright. Instead, it is made available for users to access when needed, with payment

structures that reflect usage rather than ownership. These usage-based arrangements may take the form of fixed monthly fees, pay per use pricing, hybrid subscription models, or fully flexible schemes that charge customers only for actual consumption. While these models offer clear benefits to end users—improved affordability, and reduced capital expenditures—they introduce substantial challenges for banks and financiers. Traditional valuation approaches, designed around ownership transfer and resale assumptions, are poorly suited to situations where equipment generates value through recurring service income rather than being sold on a linear path.

To address this shift, we are working alongside clients to develop a financial model that fundamentally reframe how equipment value is assessed. Instead of focusing on resale value, these models evaluate equipment based on the cashflows it generates over its operational lifetime. This cashflow centric perspective acknowledges that the longer equipment remains functional, the more income it can produce.

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### **The Financial twin concept**

We conceptualize this innovation through a three-layered model. At the foundation lies the physical equipment, the tangible asset that performs the intended function. The next layer is the digital twin, created by equipping machines with sensors that capture real time operational data such as usage patterns. This digital representation serves as a dynamic and continuously improving dataset. Building on this, we introduce the financial twin—a model developed at SEB that transforms operational insights into forward looking financial projections. By analysing patterns in usage and cost for maintenance, the financial twin predicts future cashflows.

In general, we see that clients adopting a product as a service business model typically begin with a pilot initiative, financing the initiative with their own capital. As the business expands, the focus shifts toward identifying an appropriate on balance sheet financing solution to support further growth.

### **The financial twin makes circularity bankable**

Today, the financial twin already enables us to issue loans based on projected cashflow generation, providing a financing solution that is better aligned with service based business models.

Looking ahead, our ambition—together with that of many clients—is to extend this approach further by taking risk at the asset portfolio level. This would allow equipment to be financed off the client's balance sheet, reducing leverage and improving capital efficiency.

As more businesses embrace product as a service models, the evolution of valuation and financing methods becomes not only necessary but inevitable. By integrating the physical, digital, and financial dimensions of equipment, our approach provides a forward looking pathway for the industry. It aligns financing practices with real value creation, supports circular operating models, and strengthens the foundation for a service driven economy.

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