Scaling the Circular Bioeconomy: Unlocking Biobased Industries

The circular bioeconomy presents one of **the greatest business opportunities of the 21st century.** It represents a systemic alternative to the current extractive, linear, fossil-based economy and offers holistic solutions to pollution, climate change and biodiversity loss as well as to resource security and economic prosperity.

Biobased industries play a crucial role: technologies and sectors that harness biological resources and processes to replace fossil-based products across chemicals, materials, packaging, textiles and agricultural inputs. Against a backdrop of rising climate-related losses and growing geopolitical risk, scaling these industries is imperative.

This paper outlines the five key barriers to scaling these industries, and five promising steps we can take to accelerate progress. To do so will require closer alignment between innovators, corporates and investors. The Circular Bioeconomy Alliance (CBA) will continue to convene key partners to drive action forward and bring the bioeconomy from niche to norm.

The Circular Bioeconomy: Understanding Biobased Industries

The circular bioeconomy aligns with and builds on principles for a circular economy, putting nature and ecological principles at the heart of the transition, and relying on nature-based and bioeconomy solutions to accelerate change.

> The CBA defines the circular bioeconomy as an **economy centred around the restoration, protection and sustainable use of natural capital.** It is rooted in regenerative landscapes that enhance biodiversity, contribute to climate mitigation and adaptation, and support human health and wellbeing while ensuring a sustainable, inclusive and resilient economy. Therefore, it should be seen as a new conceptual framework for using renewable natural capital to holistically transform and manage our land, food, health and industrial systems as well as our cities so that they prosper in harmony with nature.

This broad definition encompasses the full arc of the circular bioeconomy – from healthy ecosystems and regenerative landscapes at its foundation, through primary production, to the industrial and economic sectors that transform biological resources into products and services.

This paper focuses specifically on the scaling of biobased industries: the technologies and sectors that harness biological resources and processes to produce solutions that can replace fossil-based products with sustainable materials. It is in these industries where some of the most transformative innovation is emerging, and where barriers to scale remain most acute.

Innovative solutions are found across multiple industries, for example the creation of materials like bioplastics, textiles and nanocellulose; biobased construction materials like mass timber and mycelium; and innovation in the food sector including new agri-tech and biobased food supplements and feed.

April 2026

Examples of existing bioeconomy solutions include:

- **Colorifix** uses synthetic biology to replace petrochemical textile dyes, sharply reducing water and energy use, and is now scaling to commercial deployment across Europe and Asia following $18 million in strategic investment.
- **GFBiochemicals** produces plant-based levulinic acid and derivatives from agricultural residues at industrial scale, supported by 200+ patents, supplying biobased inputs for solvents, personal care and materials.
- **Givaudan** a global flavours, fragrances and active cosmetic ingredients company, has transitioned its hyaluronic acid portfolio to precision-fermentation-based production, achieving a 92% cut in greenhouse gas emissions.
- **Shellworks** developed Vivomer, a biobased, vegan and home-compostable plastic alternative compatible with existing manufacturing lines, with ~5–6 million units produced, $15 million raised (2026) and a 100 million-unit annual target by 2028.
- **Metsä Spring** is scaling multiple wood-based alternatives to fossil-derived products: Woodio uses wood chip composite to replace plastics and ceramics in bathroom products; Kuura™ converts wood pulp into textile fibres for clothing and technical textiles; and FineCell uses pulp-based cellulose to produce biobased powders and hydrogels in beauty, healthcare and paint products. *(The 'New Wood: Building a bio-based future' exhibition in March 2026 showcased a range of wood-based alternatives).*

Importantly, these bioeconomy solutions will not only help us to transition to a circular bioeconomy, achieving critical pollution, climate and nature targets. They also support resource security, especially in regions with low availability of fossil resources, as well as job creation and economic growth, including in rural areas, provided the public and private sector work together to holistically scale up circular bioeconomy supply chains as well as regenerative landscapes.

Key Barriers

Scaling the circular bioeconomy faces structural barriers. **The following five barriers and suggested actions reflect the most critical bottlenecks identified through the CBA's multi-stakeholder engagement.**

1. **The fossil price gap and commercialisation valley of death**. Biobased materials are typically 1.5–2x more expensive than fossil equivalents, while biobased production operates at just 1–5% of required volumes. Competing against industries backed by decades of subsidies and established infrastructure, innovators face a structural price disadvantage at the critical moment of commercial scale-up – characterised by high capital requirements, uncompensated price gaps and lack of offtake commitments
2. **The finance gap and patient capital deficit**. The EU alone faces an annual investment gap of €2.07–3.35 billion in innovative biobased industries, with a further €1 billion shortfall in R&D. Finance mechanisms are not designed for biobased innovation – early-stage ventures and those in the 'commercialisation valley of death' struggle to attract capital due to long development timelines, technical risks and limited commercial track records.
3. **Weak and inconsistent demand signals.** There is limited willingness among consumers, brands and public authorities to pay a premium or to fully account for life-cycle impacts in purchasing decisions. Without credible demand certainty, reorienting supply-side subsidies alone will not create viable business cases.

4. **Infrastructure and value-chain fragmentation.** Insufficient biorefinery capacity, scarce shared piloting and demonstration facilities, fragmented feedstock supply chains and shortages of bio-specific manufacturing expertise compound risk across the value chain – limiting the ability of innovators to reach proof-of-concept at commercial scale.
5. **Policy fragmentation and regulatory uncertainty**. Fragmented frameworks across regions create uncertainty for innovators and investors. Without a stable long-term regulatory and incentive horizon – ideally 15 years or more – companies cannot assess competitiveness or attract the patient capital that biobased industries require.

Suggested Actions and Promising Solutions

1. **Create demand certainty.** Long-term offtake agreements and procurement commitments from corporates signal market viability and de-risk investment for innovators. Aggregating demand through collective corporate purchasing agreements – at defined volumes and timelines – can create the demand signals needed to attract capital, bring down the cost curve and reach economies of scale.

   Setting time-bound targets matters too. Corporates should develop strategic transition plans or roadmaps to shift from fossil-dependent processes to more sustainable, bio-based systems. Integrating these roadmaps into executive accountability, procurement strategies and Scope 3 reporting will further embed and scale solutions.

   EXAMPLES
   WEF First Mover Coalition: aggregates corporate purchasing commitments across sectors where reducing emissions is technically difficult and economically challenging to create demand signals, attract capital and drive down costs. The coalition represents more than 100 member companies with over $19 billion in combined purchasing commitments for green technologies by 2030 (First Movers Coalition).

   L'Oréal: committed to sourcing over 75% of ingredients from nature or recycled materials by 2030 (L'Oréal for the Future 2030).

   P&G: aim to reach net zero supply chain emissions by 2040 with 40% reduction in supply chain emissions per unit of production by 2030 for the priority categories including laundry detergents, fabric enhancers, shampoo, conditioner, body wash, and baby diapers (P&G Climate Transition Action Plan).

2. **Deploy patient, blended capital.** Public-private partnerships, green bonds, and impact instruments with 10–15-year horizons are needed to bridge the 'valley of death'. Intermediary platforms connecting innovators directly with corporations are a critical missing link. Sovereign wealth funds, with their intergenerational mandates, are also well-placed to steward natural assets and regenerative practices.

   EXAMPLE
   Circular Biobased Europe Joint Undertaking: A €2bn public-private partnership between the **European Union and Bio-Based Industries Consortium** accelerating the shift to a sustainable bioeconomy. By de-risking high-tech projects, the initiative has successfully mobilised €3 in private investment for every €1 of public funding, bridging the 'valley of death' between laboratory innovation and large-scale commercial production (CBU).

3. **Price in externalities and strengthen policy.** Internalising the true cost of fossil-based production – through a uniform CO_2 tax, payment for ecosystem services, and active carbon and biodiversity markets – would level the playing field.

Policy predictability is a critical systemic enabler. A stable 15-year regulatory and incentive horizon allows companies to assess competitiveness and attract funding with confidence. Harmonised regulatory frameworks would also enable clearer consumer value communication and mainstream adoption. Europe's forthcoming EU Bioeconomy Act is a critical opportunity to deliver this.

4. **Support fast, low-cost pilots and corporate validation: the Living Labs model.** Corporate investment remains lower than optimal, often relying on mergers and acquisitions or insetting models. Supporting a selection of pilot solutions will help show what is possible.

EXAMPLES

Sofinnova Partners: have been investing for more than a decade in early-stage companies that use biotechnology to make a positive environmental impact including by multiple venture capital impact funds (Sofinnova Partners).

L'Oréal: established €100 million open-innovation accelerator (L'AcceleratOR) spanning 70+ challenge areas, offering pilots, funding and scale-up pathways to create demand-side pull for bio-based solutions (L'AcceleratOR).

CBA Living Lab 1.0: The Apulia Regenerative Cotton Project was launched in June 2023 to introduce agroforestry-based cotton production in Italy. T-shirts are available in flagship stores in Spring – crafted from Regenagri-certified cotton, along with its Digital Product Passport (DPP), highlighting traceability across the entire regenerative supply chain (CBA).

The CBA implements '**Living Labs'** to demonstrate scalable, on-the-ground blueprints as the basis to create new business opportunities and transform supply chains while regenerating landscapes and supporting local communities. Living Labs show what is possible, inspiring others to shift capital, practices and standards whilst building market-ready pipelines. Exploring how this model can be applied to scale bio-solutions in Europe and globally will be a critical next step.

5. **Deepen collaboration and build a stronger narrative.** With global climate-related insured losses reaching $100 billion annually and rising sharply, the transition to biobased chemicals and materials is essential to mitigate and adapt to climate change and other geopolitical risks driven by our economic dependence on fossil fuels. There is a clear and urgent need to align innovators, corporates and investors to unlock scalable solutions, articulate the importance of an economic shift to biobased industries, and build a strategic narrative on long-term investment returns.

Next steps

We will not scale the circular bioeconomy alone. **The CBA is ready to act as an enabling platform** to build momentum and achieve tangible outcomes within concrete value chains at the regional and global level. In collaboration with key partners the CBA will explore **developing a bio-solutions Living Lab within Europe and globally** to connect promising solutions with off takers and investors. In parallel, a potential **Bioeconomy Leaders Coalition** could connect and amplify existing efforts.

For further information and examples, please see the **10-Point Action Plan for a Circular Bioeconomy of Wellbeing** (EFI, 2020) which remains salient and provides a coherent framework of enabling actions and practical examples. For more information and to join this collaborative effort please contact info@circularbioeconomyalliance.org

April 2026

This note is informed by the Roundtable on Scaling the Circular Bioeconomy, which was convened by the Circular Bioeconomy Alliance (CBA) and hosted at Windsor Castle on 30 March 2026, followed by a reception with His Majesty King Charles III. The roundtable brought together investors, corporations, and solution-providers to focus on accelerating the transition to a bio-based economy.

Photo: Fergus Burnett

We would like to thank the following organisations for their participation and engagement:

Bio-based Industries Consortium (BIC)
Beckers Group
Biosyntia
BlackRock
Caldara e Associati
The European Chemical Industry Council (CEFIC)
Circular Biobased Europe Joint Undertaking (CBE JU)
Circular Economy Services
Colorifix
Delphis Eco
Generation Investment Management
GFBiochemicals
Givaudan
Hind
L'Oréal
Metsä Spring
Novo Holdings
One Planet Sovereign Wealth Funds Network (OPSWF Network)
Parley for the Oceans
Procter & Gamble
Reckitt Benckiser
Sofinnova Partners
The Shellworks
Unilever