

INSIGHTS

BIOSOLUTIONS

A series of overlooked climate technologies

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The world is facing existential threats from climate change, loss of biodiversity, and a growing population. To overcome these threats, we need all hands on deck to deploy new technologies that can help our transition to a more sustainable society.

Biosolutions are biological technologies that can help our society lower its carbon footprint, increase biodiversity, and feed the earth's growing population.

Biosolutions are considered **enabling technologies** that contribute to other industries' sustainable pathways, either as substitutes for existing non-sustainable products, or by enabling known production processes to become more sustainable.

Biosolutions have enormous potential. For example, eight types of biosolutions have the potential to decrease current global emissions by 8% by 2030, but regulatory barriers, particularly in the EU, are hindering companies with innovations in biosolutions from scaling and accessing markets.

It is imperative for EU policymakers to understand the potential and importance of biosolutions for the green transition, especially due to the urgency of the task. Similar to the case

of other green technologies, the EU risks falling behind the USA and other countries that have recognised the potential of biosolutions and are currently moving rapidly.

In this *CE Insight*, we underline the importance of biosolutions to develop a more sustainable world while highlighting the obstacles that impede their efficient development and adoption, including biosolutions being **overlooked climate technologies**.

Our insights stem from our report "The Potentials of Biosolutions" for Alliance for Biosolutions, an interview with the European Biosolutions Coalition, and desk research.

Biosolutions have potential across several hard-to-abate industries.

Biosolutions¹ encompass a range of technologies, from traditional methods like fermentation to everyday products such as enzymes in laundry detergents, and future biotechnological advances.

As enabling technologies, biosolutions help other industries lower their greenhouse gas emissions, particularly within industry, agriculture, and transport, which are sectors with hard-to-abate emissions. Across eight categories of biosolutions, there is potential for more than four billion tonnes of CO₂e reduction by 2030, the equivalent of 8% of current global emissions, see figure below.

Other biosolutions are currently being developed, for example, enzyme carbon capture solutions to capture CO₂ emitted from point sources, producing food from CO₂ without the use of traditional agricultural land, storing carbon in soil using biochar from agricultural side streams, producing alternatives to cement and steel with significantly lower emissions, and algae to substitute for other ingredients in various products.²

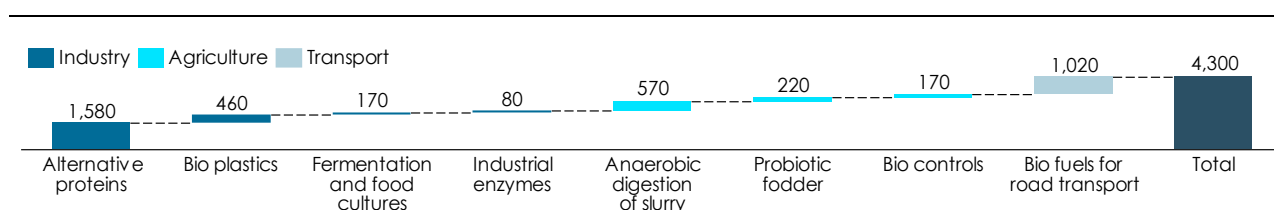
Biosolutions can help sustain and even increase biomass, which is already in short supply for many usages in food production, materials, and energy. What makes biosolutions especially relevant for sustainable development is that they are produced in a **circular value chain**, and some solutions can even reproduce biological materials.³

“The new thing about biosolutions is that we can reproduce biology in a circular system,”

says Sofie Carsten Nielsen, Director of the European Biosolutions Coalition, established in 2023.

Global emission reduction potential in 2030 for selected biosolutions

Million tonnes CO₂e



Source: [Copenhagen Economics](#) (2022): The potential of biosolutions

¹ Biosolutions constitute biological products that are anchored in biotechnology, i.e., utilisation of living organisms, including enzymes, microorganisms, bacteria cultures, pheromones etc. for concrete applications and products to enable sustainable transformations such as emission reductions.

² See for example [Novozymes](#) (CO₂ capture), [the Novo Nordisk Foundation and Bill & Melinda Gates Foundations' project](#) (producing food from CO₂), [Stiesdal](#) (biochar), [Biomason](#) (alternative to cement), [research at the University of Southern Denmark](#) (alternative to steel), and [Algiecel](#) (algae).

Biosolutions are overlooked technologies.

Despite their potential, biosolutions are often overlooked in the public debate and by politicians in Europe.

“One of the reasons for establishing the European Biosolutions Coalition was to make biosolutions more widely known and for their potentials to be recognised in the public debate,” says Sofie Carsten Nielsen.

Biosolutions are often ingredients in other industries' production processes and products, like enzymes in laundry detergents, fermentation and food cultures in food, and pheromones in perfumes. They are therefore not apparent to the end consumer and have struggled to become well-known in the public domain. Wind turbines and electric vehicles are much more visible products for the green transition.

Another reason may be that for a long time, the sector has not had a unified voice in Europe to show its potential and raise concerns, even though for decades Europe has had a strong biosolution industry with several large-scale, profitable biosolution companies. This is exemplified by the merger of Novozymes and Chr. Hansen into Novonesis in January 2024,⁴ two companies that were established in 1925⁵ and 1874⁶, respectively, highlighting the longstanding success of the biosolutions industry in Europe.

“The European biosolution industry has developed from being purely market-based, B2B-driven industry to a more purpose-driven, visionary sector with a unified political voice,” says Sofie Carsten Nielsen.

³ For example, in 2023, the Novo Nordisk Foundation and Bill & Melinda Gates Foundations initiated a [project to utilise CO₂ to produce proteins for food production](#).

⁴ See [Novozymes](#) (2024).

⁵ While Novozymes was formally established in 2000 with the split of Novo Nordisk, the original company stems back from 1925 with enzymes production from 1939, see [Novozymes](#).

⁶ See [Chr. Hansen](#).

Is Europe unknowingly ceding its leadership position?

There are indications that Europe is at risk of ceding its biosolutions leadership to the US and China.

Firstly, the US government has biotechnology high on its agenda⁷ and has allocated at least USD two billion for federal incentives within biotechnology and biomanufacturing⁸, which comes on top of state and local incentives for specific investments⁹.

Secondly, private investments are typically a good indicator of future growth in a sector. From August 2022 to December 2023, larger biotech funding¹⁰ in the USA amounted to USD 1.7 billion. In contrast, biotech funding in Europe only reached USD 1.2 billion and USD 1.1 billion in the Asia-Pacific region.¹¹

Thirdly, patent applications in the USA and China have increased for biosolutions in recent years, which is not the case for key European countries.¹²

A holistic approach is needed for Europe to succeed.

“There is a need to address biosolutions holistically in Europe – by going from a fossil-based regulatory paradigm to a biological, circular, and green regulatory paradigm,” says Sofie Carsten Nielsen.

Several factors impede the success of biosolutions, but three common obstacles include regulation, costs, and consumer preferences.

In the EU, regulation slows the roll-out of some biosolutions. Existing EU agricultural policies, chemical policies, and food policies were designed at a time when many biosolutions were not yet developed.

Policies were designed to handle safety concerns for chemicals and fossil fuel-based technologies and are not fit to handle the biological content in biosolutions. The absence of separate regulations for biosolutions means that they must conform to existing paradigms, resulting in long and arduous product approval processes.

“The EU is the region that invested most in R&D for biotechnology, has some of the strongest research clusters, and some of the most competitive companies – but when the products go to the market in the EU, they cannot sell their products. They are all born in Europe, but they grow up elsewhere – if we are not careful,” adds Sofie Carsten Nielsen.

Ursula von der Leyen's forthcoming 2024 initiative on biotech and biomanufacturing signals a pivotal moment for the European biosolutions industry.¹³ The initiative could encompass three key elements that would boost the industry:

1. Establish industry and product codes for biotech¹⁴ and implement regulatory sandboxing for expedited product approval processes.
2. Adopt carbon taxes more broadly to narrow the price gap between traditional products and biosolutions.
3. Promote low-emission substitutes for traditional consumer goods such as red meat.

The initiative should underline the EU's commitment to fostering innovation and sustainability, laying the groundwork for a prosperous future for European biotechnological growth driven by biosolutions.

⁷ See [The White House](#) (2023).

⁸ From a presidential Executive Order in 2022. Incentives are provided for biotechnology and biomanufacturing, see [The White House](#) (2022).

⁹ See for example [Good Jobs First: Subsidy tracker](#)

¹⁰ Covering the largest seed fundings, series A-E fundings and private equity investments with up to five investments per month for each region. These numbers do not cover greenfield investments, mergers & acquisitions, and pharmaceutical funding. See

¹¹ See [labiotech.eu](#) (2022-2023) based on crunchbase.com

Missing data in March 2023. Data contains the biggest fundings to private companies in each month (usually top 5, but in some months less than five are included). In comparison, total biotech mergers & acquisitions in the US and Europe increased from an around 10 billion USD on average per year from 2006-2014 and reached 30 billion per year on average from 2015-2022. See [EY](#) (2023).

¹² See [DI Analyse](#) (2023).

¹³ See [European Commission](#) (2023).

¹⁴ I.e. NUTS and HS/CN nomenclature. This could facilitate a more tailored policy design for biosolutions.

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