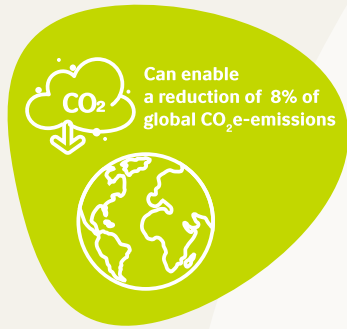


There is a biosolution for (almost) everything

We live in a dynamic and rapidly changing world. There are many challenges to solve – feeding growing populations, mitigating climate change and getting more out of our shared resources. Biotechnology can provide powerful biosolutions to address these issues.

Biosolutions at a glance



Towards 2030, a full utilization of selected biosolutions can enable a reduction of 8% of global CO₂e-emissions equivalent to 4.3 billion tons CO₂e



Current addressable market for biosolutions estimated at ~EUR 15 billion



Economic impact from biosolutions is expected to grow 3x by 2040



For every job created in biotech, 4 additional jobs are created in supporting sectors¹

Biosolutions are part of the answer to some of the world's biggest challenges

Biosolutions help industries and societies reach a net-zero world, in which industries and communities make the most of raw materials and resources, while making green products more accessible and affordable for consumers. Biosolutions can reduce the use of fossil-based resources and waste, enable food systems to produce more food with less, or enable better health around the world. Towards 2030, a full utilization of selected biosolutions can enable a reduction of 8% of global CO₂e-emissions equivalent to 4.3 billion tons CO₂e².

Examples of how biosolutions can make a difference:

- In 2050, the world will have approx. 3 billion cars on the roads. Less than 20% of them will be electric. To reduce emissions in the transport sector, we need sustainable fuel sources. Bioethanol leads to 40% lower CO₂ emissions compared with fossil-based petrol. Second-generation biodiesel gives new life to waste oils and emits 60% less GHG than traditional diesel.
- Carbon capture can seize more than 90% of CO₂ emissions from power plants and industrial facilities and is required to reach the Paris Agreement. Enzymes enable a more clean and cost-efficient process for capturing carbon.
- Fermented proteins require 90% less land and water and result in 90% less CO₂ emissions compared to animal proteins. If we replaced 10% of global animal protein with alternative protein, we would save 50% of the EU's arable land.
- Biological inoculants (biofertilizers) can replace chemical fertilizers and make plants more resilient to climate change while reducing the carbon footprint of crops by 15%³.
- In plastics recycling, enzymes can help break down PET to its original building blocks to create infinite loops of plastics recycling. With the world currently producing 400 million tons of plastic each year, the potential for recycling is significant.

We estimate the current addressable market for biosolutions to be around EUR 15 billion and growing⁴. According to the World Economic Forum, the economic impact from biosolutions is expected to grow by a factor of three by 2040, driven by growing needs and demands from growing populations around the world⁵.

1. Study conducted by WiFor on behalf of EuropaBio, December 2020.

2. Copenhagen Economics: "The potentials of biosolutions", 2022

3. JumpStart LCA: Biostimulants reduce the carbon footprint of one ton of corn by as much as 15%. Applied to all cornfields in America, that could add up to CO₂e savings of almost four million metric tons.

4. Novozymes internal estimates (CMD 2021 market analysis adjusted)

5. WEF 2018; WEF 2022; Novozymes internal estimates.

Novozymes is the market leader in biosolutions

At Novozymes, we use the power of biotech to create biosolutions to help our customers grow their businesses while enabling a healthier planet. In 2022, 90% of our revenue contributed to accelerating a climate-neutral society, transforming food systems and/or enabling healthier lives, and we continue to expand the reach of our biosolutions.



Accelerating towards a climate-neutral society

55 billion tonnes. That's what the global CO₂ equivalent emissions come to in just one year. Together with our customers, we're lowering emissions in industry and food production. We're also removing fossil-based ingredients from everyday products and capturing carbon.



Transforming food systems

9.7 billion people will need food in 2050. That means we need to rethink food production from field to fork. With biosolutions, our customers are growing more per acre and ensuring better quality, more nutritious food. They're generating less food waste and serving up plant-based and alternative proteins.



Enabling healthier lives

In supermarkets and health stores around the world, more and more people are looking for ways to improve their wellbeing and health. Our biosolutions provide supplements for better gut health. They also make lower-sugar, higher-fiber dairy possible. And they lead to healthier baked goods.

What is a biosolution?

Biosolutions are composed of biological products that are anchored in biotech, i.e. they utilize living organisms, including enzymes, microorganisms, bacteria cultures, pheromones, etc. for concrete applications and products that are used in other industries' manufacturing processes and as end products to enable sustainable transformations such as emission reductions⁶.

Biosolutions can be used to increase the yield of agriculture, reduce land use, provide alternative sources of protein for food, lower demand for plastic and pesticides, prevent food waste, and improve biodiversity, food supply, and food security.

Figure 1: Biosolutions usages in different economic sectors

Industry	Agriculture	Transport
Bio plastics	Bio controls, incl. bio fertilizers	Bio fuels
Fermentation-based solutions, food cultures, ingredients in the food industry	Fermentation of feedback	Fermentation-based jet and marine fuels
Alternative proteins for food	Biological plant protections	
Probiotics for human consumption	Anaerobic digestion of slurry	
Enzymes	Probiotics for animals	
Bio fuels	Alternative proteins for fodder	
Enzyme-based CCS and CCU	Microbial milk proteins	
Bio cement		
Microbial materials		

Figure 1 - Note: Examples of biosolutions marked in grey are solutions that are currently being developed and may be fully matured and scaled after 2030. Biofuels for transport consist of different product generations. **Source:** Copenhagen Economics

6. Copenhagen Economics: "The potentials of biosolutions", 2022