

Now is the time for Asia to seize the opportunities of engineering biology

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The global bioeconomy is on the brink of a transformation as sweeping as the rise of AI, with bioengineering breakthroughs disrupting entire industries. Companies that embrace these advances stand to gain not just in sustainability, but in performance, profitability and product innovation. This shift is mirrored at the heart of a new report by the Capgemini Research Institute, “Engineering biology: The time is now”, which explores the immense opportunities unfolding in the bioeconomy,

At Cambridge Consultants, the deep tech division of Capgemini, we have witnessed at close hand the emergence of engineering biology, alongside AI and data-driven computational techniques. Capgemini’s state-of-the-art biotechnology lab is located at our UK headquarters, where experts are working to reduce costs and accelerate time-to-market for organisations across industries.

To understand the broader impact of this revolution, Capgemini Research Institute (CRI) cast its net widely to gauge the global state-of-play in the bioeconomy. The CRI spoke to 1,100 executives of large companies across the world and 500 executives from engineering biology and related start-ups. Here is what they found.

Key trends driving the rise of engineering biology

The report revealed that sustainability is a major driver of corporate interest, with more than 70% of organisations expecting biosolutions – that is products, materials or processes driven by engineering biology – to significantly speed their progress towards sustainability goals. Cost and performance advantages are the other key factors.

A growing sense of anticipation is also evident. Almost every executive surveyed – 99% in fact – expects engineering biology to spark sweeping changes to their industry over the next five to ten years or more. It is also the case that 96% of the organisations are already pursuing biosolutions. 40% of them are at an exploratory stage, while 56% are more active in experimentation, pilots or scaled deployments.

Meanwhile, the steady increase in investment reflects positive market sentiment around the scientific and commercial potential of engineering biology. 68% of executives say that their organisation plans to increase investment in the next two to five years.

More than half of organisations believing that disruptive approaches are required to reach net zero, and it is no surprise sustainability emerges as a major driver of corporate interest in engineering biology. Corporates believe that bio-based innovation can help in several important ways, including reduced pollution and emissions, improved product performance and safety, and a reduced exposure to supply chain disruptions.

But biosolutions need to both perform well and be harnessed properly to achieve sustainable outcomes. Most executives expect the emerging technologies to have a positive impact on climate change and plastic and air pollution. But they also appreciate that the environmental and social impacts of such advances must be assessed across the product lifecycle and supported by strong performance and cost efficiency assessment to drive market adoption.

These insights bring clarity to the extraordinary opportunity on the horizon – yet the report refuses to shy away from the significant challenges that need to be overcome. This latter aspect is one of the most valuable takeaways for any organisation seeking practical insights into achieving adoption at scale.

Technology as a key enabler

Representatives of corporates and engineering biology start-ups pointed to big barriers like high development cost, a lack of suitable large-scale infrastructure such as bioreactors, and talent shortages. They also recognise the complexities involved in reconfiguring supply chains, and evolving regulations governing the development and use of the new solutions. Almost two thirds (65%) of engineering biology start-ups say that a lack of bio-literacy hinders their ability to scale-up – which highlights the need to seek greater expertise in this field. Together, these challenges make the cost and time to produce biosolutions prohibitive for many applications.

Against this backdrop, digital and engineering technologies were identified as key assets for reducing costs, optimising bioprocesses, shortening time-to-market, and mitigating environmental and societal risks. AI was regarded as the most transformative technology for increasing the efficiency of R&D processes. Indeed, 98% of organisations are either using, or planning to use, AI to accelerate the adoption of biosolutions.

Robotics that automate processes and digital twins of bioreactors – which predict production outcomes – were also regarded as important measures to reduce costs and accelerate scale-up. But the research suggests that AI is the only dominant technology that is currently widely used to develop and scale biosolutions. 70% of organisations are already using AI, but only 20% of organisations have implemented robotics and only 11% digital twins.

Taking the leap towards a bioengineered future

What does the road ahead look like? It is clear that to accelerate adoption, organisations must formulate an informed strategy and roadmap, raise public awareness, consider sustainability impacts and build in circularity aspects to maximise potential. A clear, progressive regulatory bioeconomy framework across industries is essential. Capgemini's work addresses these challenges, reducing the time and cost of biosolution development, and unblocking the route to market.

As this new industry landscape emerges in Asia, we predict a strong future for business leaders who can capitalise on the growing momentum and achieve market viability. The time for engineering biology is now.