



## Talking point



### White biotech: Revolution in instalments

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**Industrial biotechnology offers huge development opportunities for the chemicals industry, enabling more efficient processes, innovative products and reduced dependence on the raw material oil. However, there is still a long way to go in building a chemicals industry geared to biomass. The main obstacles are price competition from established value chains based on oil and rivalry between medical and industrial biotech in the race for R&D funds.**

Nothing less than a revolution is what the potential of industrial biotech is promising the chemicals industry – zero dependence on oil as a raw material. Petroleum is the most important feedstock for many products of the chemicals industry. Industrial biotechnology, referred to as white biotech, points to alternatives. Bio-plastics from maize starch, biodiesel from soya oil and amino acids from fermented biomass as a fodder supplement – these are all applications for biotech processes. However, biotech's advantages lie not only in changes in the raw materials base. Above all, the technology makes it possible to develop innovative products such as compostable plastics, and their production methods frequently go hand in hand with high process efficiency.

Thanks to these advantages, white biotech has so far taken root primarily in the fine and specialised chemicals segment, with innovative products in most cases being bio-engineered and existing processes not being supplanted by new ones. However, in the bulk segment (up to 100,000 tonnes per year), conventional procedures based on fossil inputs are still predominant. All in all, biotech products generate only around 6% of chemicals industry revenues in Germany despite the robust growth of the past decade. This alone indicates that there has not yet been any revolutionary shake-up in the chemicals industry, but instead more of an evolutionary shift. But this is not to say there will not be an upheaval for individual products, given major advantages in the new methods of production.

One curbing factor in particular has been the insufficient number of biotechnological production processes. This number has remained low up to now because industrial biotech has attracted significantly less public R&D funding and venture capital than medical biotech. For example, at mid-decade only 2% of all research investment in biotechnology in the OECD went towards industrial applications (medical biotech: 87%) – even though the chemicals market is much bigger than the global pharmaceuticals market. While the R&D investment ratio has slightly shifted towards white biotech in the meantime, a large gulf continues to separate the two segments. The relatively high margins on medicinal products are the driving force for investments, not only by investors but also by pharmaceuticals firms themselves. These benefit from the high standing of health. By contrast, chemicals products generate much lower margins on average, which is why risk capital investors are much more selective in their funding allocations. The chemicals firms are, of course, equally prepared to invest money to shore up their existing market positions. But they usually focus on fine and specialised chemicals, and partly on polymers. Basic chemicals, which usually have much lower margins, are by contrast generally left out of the running because of fierce competition from abroad.

A further curbing factor is to be seen in established value chains and production plant. Biotech facilities often differ substantially from conventional facilities that process fossil inputs. So a transition to biomass not only spawns investment requirements for new production sites. It also destroys the capital invested in existing plants. This means that even if a competitive biotech process is developed, it may not make good business sense for the company to convert its facilities, or at least not immediately.

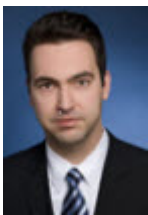
The situation in the commodities markets also exerts a major influence on how white biotech will develop in the future. There was a surge in the price of oil during the past decade, which in principle was auspicious for a conversion to biomass. Already today, 13% of chemicals production uses renewable resources. The increasing use of biomass for energy and material processes of course gives rise to the question as to whether there is enough cropland available in Germany and the world in the first place to be able to produce sufficient volumes of

biomass for the diverse types of application. The competition between the different types of use is likely to intensify going forward considering the growth of the world's population. To be realistic, it looks impossible to stage a widespread conversion of world chemicals production and of the global food and energy supply to biomass all at once. Rising demand and scarcity of supply are likely, as in the case of oil, to push up prices on the biomass market and thus increase the relative costs of biomass-based processes.

In future, the increasing possibilities for using wood as a biomass input will grow in importance. For example, the German government recently funded a pilot project in which industrial companies were able to test their wood-based processes to ascertain the feasibility of their industrial-scale use. In addition, research is being conducted on processes and plants that can not only convert biomass but also petroleum and hence make companies less vulnerable to fluctuations in the price of one type of raw material or the other.

Furthermore, a high oil price enhances the appeal of alternative energies. On a medium to long-term horizon, more widespread use of electric cars could, for example, curb the demand for oil from the transport sector. In many industrial countries this is the biggest user of oil. There would be less adjustment pressure on chemicals companies as a result.

Despite the curbing factors discussed above, the future viability of white biotech is not at issue. New products will remain the main driver for the time being and hold opportunities for established market participants as well as new entrants. Moreover, intensified research efforts in the industry will increasingly enable established production processes to be replaced. This is how the transition to a bio-economy will be driven. However, the associated changeover process will tend to resemble a revolution in instalments and ultimately result in a chemicals sector that builds strongly on biomass but is nonetheless still dependent on oil.



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