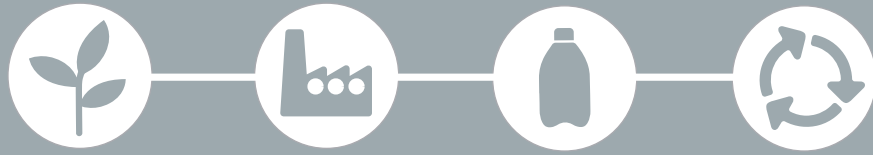


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JOBS AND GROWTH GENERATED BY INDUSTRIAL BIOTECHNOLOGY IN EUROPE

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THE ECONOMIC IMPACT OF INDUSTRIAL BIOTECHNOLOGY

THIS STUDY PROVIDES UNIQUE INDICATORS AND MULTIPLIERS TO DEMONSTRATE THE MAGNITUDE OF THE IMPACT OF INDUSTRIAL BIOTECHNOLOGY ON THE WIDER ECONOMY

To reduce greenhouse gas emissions as well as the EU's dependence on fossil carbon, a transition towards an increasingly bio-based economy is needed.

Industrial biotechnology (IB) is one of the EU's strengths and has been recognised as one of the six Key Enabling Technologies (KETs) by the European Commission as it is a major driving force for EU innovation and for its potential to boost competition, jobs and growth through the development of novel bio-based products. It makes smart use of science to develop microorganisms and enzymes to produce a wide variety of renewable chemicals, materials, pharmaceuticals, food, feed and fuels.

However, despite the strategic importance of industrial biotechnology for the EU economy, a comprehensive picture of the impact of this sector has been missing. This is a largely because IB is a cross-cutting and technology driven sector, which is not readily identifiable in existing economic statistics. Hence, the current study quantifies the economic importance of the IB sector and provides a forecast for the IB sector employment by 2030.

OVERALL ECONOMIC IMPACT



DIRECT ECONOMIC EFFECT



In 2013, the IB sector employed about 94.000 full time equivalents (FTEs) for its core activities in the EU28. This corresponds to about 5,2% of employment generated in the EU chemical and pharmaceutical sectors. The largest share of employment is generated in the markets of bio-based chemicals, bioplastics, biofuels, antibiotics and enzymes.

UPSTREAM ECONOMIC EFFECT



The demand for goods and services by the core IB sector created an additional 269.000 FTEs in supplying sectors. The upstream employment is generated notably in the manufacturing sector (supplying e.g. process control technologies), business services sector, and biomass supplying sector. Interestingly, sourcing of inputs from biomass rather than fossil resources (as traditional chemicals production does) results in a positive effect of 16% more upstream employment.

DOWNSTREAM ECONOMIC EFFECT



The IB sector sells its products to other sectors, where these generate subsequent economic activity. The employment associated with using and integrating IB outputs is referred to as 'downstream effects', and amounted to approximately 98.000 FTEs in 2013. The highest downstream employment is in the chemical and pharmaceutical sectors, which is understandable as IB enables production of various basic chemicals and active ingredients, which are used for further processing. Other sectors with high downstream employment are the automobile and food & feed sector.



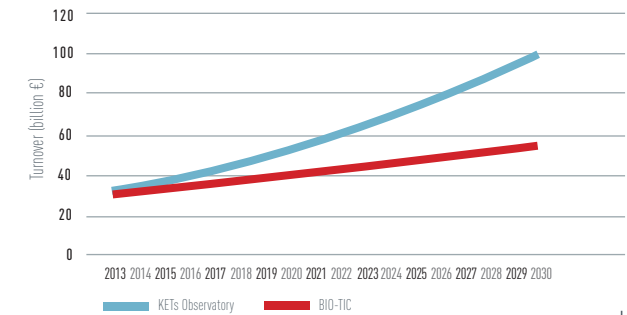
The induced economic impact is created through the directly and indirectly created employment. These employees receive a wage higher than an unemployment benefit, and spend part of this income in the EU economy. This spending generates additional employment, which amounted to approximately 25.000 FTEs in 2013.

OUTLOOK - TURNOVER

A projection for turnover in 2030 is made based on the same sources of IB sector growth forecasts as used to forecast employment. Turnover defined at the value chain level is not straightforward to interpret as it contains double counting of turnover of various firms along the chain. Therefore, the turnover forecast is focused on turnover of the core IB sector only.

The turnover of the core IB industry, which amounted to €31,5 billion in 2013, will increase to between €57,5 billion and €99,5 billion by 2030. The IB sector is and will contribute significantly to the EU economy.

IB turnover forecasts



OUTLOOK - EMPLOYMENT

A projection for employment in 2030 is made based on two sources of IB sector growth forecasts:

- ▶ Extrapolation of the historical growth rate (7%) observed in the KETs Observatory production statistics
- ▶ The market forecast of 4% compounded annual growth rate towards 2030 calculated in the BIO-TIC project

For these two scenarios, results indicate that employment in the IB value chain will reach between 900.000 and 1.500.000 FTEs by 2030.

In 2013, the core IB sector represented 5,2% of total employment in chemicals and pharmaceuticals. Assuming that overall employment in these sectors will remain flat as has been the case over the past few years, the share of IB based employment in these sectors will increase to between 9,5%-16,5% by 2030. Hence, it is clear that the IB sector will play a key role in promoting employment in these sectors.

IB employment forecast

