



How BSI created a net zero blueprint for cutting emissions with industrial biotechnology

Creating a research-based roadmap to help achieve net zero targets



The story at a glance

- Industrial biotechnology (IB) has the potential to significantly reduce carbon emissions. It's integral to achieving net zero – but to get full value and innovation from it, the UK needs to do much more.
- One of the key challenges standing in the way was found to be a lack of standards and regulations to support companies in developing high-risk innovation.
- Innovate UK commissioned BSI to draw up a strategic roadmap for the development of standards and regulations as an enabling framework for UK industrial biotechnology.
- BSI consultants carried out an extensive research project and then created a roadmap identifying the steps required for UK industrial biotech companies to maximize their contribution to a prosperous net zero future.

The starting-point

IB is strategically important as a key enabler of decarbonization. It's the driving force for a strong and vibrant bioeconomy, which in 2014 was estimated to support over 5 million jobs. The bioeconomy represents the economic potential of using the power of bioscience, biotechnology and renewable biological resources to replace fossil-derived feedstocks in the development of innovative products, processes and services.

IB products are part of our everyday lives. One of the biggest areas is biofuels, derived from renewable resources such as sugars (ethanol) and vegetable or animal oils and fats (diesel) and blended into regular fuel. Another large-scale application is in the production of biological washing powders and liquids.

IB's transformative technologies have the potential to change our relationship with the resources we use and open up entirely new headroom for inspiring solutions that can improve our lives. Just as vehicle electrification and renewable energy are transforming their respective areas, IB reimagines the way we make things and also enables us to create entirely new, superior products.

IB technologies will therefore be critical to achieving the UK's ambitious target of doubling the bioeconomy between 2018 and 2030 and achieving net zero greenhouse emissions by 2050. The industry will do this by delivering step-change innovations and attracting inward investment through capitalizing on the UK's world-class research capabilities.



“This report is so timely, given the UK government’s recent ambitious new emissions target setting the UK on the path to net zero by 2050, and backed by the Prime Minister’s own Ten Point Plan for a green industrial revolution aiming to create and support up to 250,000 British jobs by 2030.”

Paul Bello,
Innovate UK’s Innovation Lead
for Industrial Biotechnology

The challenge

IB has enormous potential to grow the economy, create high-value jobs, contribute to net zero targets and deliver new solutions for some of our most pressing global issues.

But there are still many obstacles in the way of the UK’s ability to capitalize on its position of relative strength and opportunity. If the moment is not seized now, the industry – and the UK – has much to lose.

The *National Industrial Biotechnology Strategy to 2030* was published in 2018. It recognized the need to address several challenges in policy, innovation, infrastructure, skills and communication in order to secure the UK’s position at the vanguard of adopting IB as ‘Business as Usual’ across a wide range of sectors. **One of these challenges is the need to develop and implement standards and regulations that support high-risk innovation** by giving confidence to researchers, manufacturers and consumers, and by creating the frameworks for market uptake.

Innovate UK (IUK) approached BSI for help. In partnership with the Industrial Biotechnology Leadership Forum (IBLF), IUK commissioned BSI to produce a report on the challenges and opportunities in the IB industry, and create a strategic roadmap for the development of standards and regulations as an enabling framework for UK industrial biotechnology.

The objective of the report was to support the acceleration of IB as a contributor to reducing CO2 emissions reduction and to attaining the UK’s legislated target of net zero greenhouse emissions by 2050.

“This excellent report by BSI points the way towards a sustainable future by examining the significant contribution that industrial biotechnology can make to the UK’s prosperity and quest for net-zero.”

Paul Mines, co-chair (interim), Industrial Biotechnology Leadership Forum



The solution

BSI consultants put together a multidisciplinary team of experts tailored to this project, drawn from across BSI and from our international network of contacts to maximize the expertise.

The research phase of the project ran for 5 months. The consulting team interviewed stakeholders from over 50 organizations, representing a cross-section of sectors, technologies, maturity stages and domain expertise. They explored the opportunities for IB growth, the challenges faced, and the potential role of standards and regulations in overcoming roadblocks and as a lever for IB momentum. The team then carried out desktop research to produce an in-depth analysis of the existing standards and regulatory landscape.

Based on this research, they identified the sectors with the greatest potential to cut CO₂, as well as the key gaps and challenges that needed to be tackled. **They then created an in-depth report of their findings and a roadmap that sets out recommended action areas for standards and regulations.** Importantly, it places those recommended actions in the context of the strategic imperatives that will together secure future success for UK IB.

The team identified the report's action areas and created the corresponding roadmap with the

understanding that the scale and complexity of the challenges require a holistic, systems-thinking approach. The pathways and action areas address a range of points related to infrastructure, tax policy, regulations and standards, infrastructure, perceptions and behaviours.

Example findings:

- **Biofuels** offered an average greenhouse gas saving of 82% compared with fossil fuel use. A longer-term and enduring contribution to UK net zero goals is also achievable via sustainable aviation fuels (SAFs) produced for the UK aviation sector, whose gross emissions accounted for 7% of the total UK carbon emissions in 2017.
- **Agri-tech** represents a prime area of opportunity for IB to contribute to CO₂ reduction, with good traction achievable in the next 3-5 years. This is firstly a reflection of the overall GHG emissions profile of the farming sector: it accounts for 10% of the country's total emissions, producing 45.6 million tonnes of carbon dioxide equivalent (CO₂e) a year.
- **Bioplastics** are an essential piece of the long-term net zero jigsaw and an area of huge growth conversion potential for IB, but they require a jump-start now to overcome roadblocks and gain critical mass and traction.

"The report was described as 'excellent' and 'timely' by the organizations that commissioned it."

Paul Bello, Innovate UK's Innovation Lead for Industrial Biotechnology,

The result

Published in March 2021, *Industrial Biotechnology Report: strategic roadmap for standards and regulations* provides a route-map for companies in the IB supply chain who want to follow good practice and take action to reduce CO2 emissions. It also provides valuable guidance to policymakers and industry on future regulation and standardization priorities.

The report:

- Identifies five industry sectors with short-to-medium-term potential for reducing carbon using IB: agritech, biofuels, fine and speciality chemicals, plastics, and textiles
- Provides a roadmap to unlock this potential with recommendations grouped into four pathways: circular resources, communication tools, informed science-led approach, and a supportive level-playing field
- Suggests a combination of government support, agreement on good practice and private sector investment is needed to realise the potential of industrial biotechnology

The focus of the roadmap is on opportunities for action and results in the short to medium term, defined in the report as the next 3-5 years. Opportunities include those in sectors and applications which hold the greatest potential for IB-enabled CO2 reduction within this short timeframe. The roadmap also addresses the imperatives for achieving greater traction for IB as a whole in the next few years, including where more material results and impacts in terms of CO2 reduction and economic value are likely to require a longer horizon.

Much is achievable in the next 3-5 years that will lay the foundations for the UK's ability to capitalize on its world-class science and to optimize innovation and value from IB as a pivot towards a more sustainable economy.

The report was described as 'excellent' and 'timely' by the organizations that commissioned it.

Paul Bello, Innovate UK's Innovation Lead for Industrial Biotechnology, said: "Innovate UK together with the Industrial Biotechnology Leadership Forum are extremely pleased to see the delivery and official launch of the BSI roadmap detailing where regulation and standards can stimulate industrial biotechnology sector policy and innovation, and reduce greenhouse gas emissions through bio-based processes, products and services that displace fossil-derived equivalents. This report is so timely given the UK government's recent ambitious new emissions target setting the UK on the path to net zero by 2050, and backed by the Prime Minister's own Ten Point Plan for a green industrial revolution aiming to create and support up to 250,000 British jobs by 2030".

Paul Mines, co-chair (interim), Industrial Biotechnology Leadership Forum, commented: "This excellent report by BSI points the way towards a sustainable future by examining the significant contribution that industrial biotechnology can make to the UK's prosperity and quest for net-zero. It highlights how important industrial sectors that touch our everyday lives might be transformed and how standards and regulations, communicated clearly, are vital in this fast-growing technology space".

About Knowledge Services

Knowledge Services gives clients the right minds for the right solutions, drawing on relevant expertise from across BSI and from our international network of contacts. This produces a multidisciplinary team that can address the client's specific needs – whether that's better standards management, new content development, strategic advice or transformation activities.

About BSI Consulting

BSI Consulting is focused on providing our clients with the tools and services to ensure they are resilient and sustainable with their environmental, health and safety programs, supply chain and cybersecurity information.

We are committed to ensuring that organizations are future ready for years to come.

About the Industrial Biotechnology Leadership Forum

The IBLF connects stakeholders across the industrial biotech community. It worked with other collaborative networks, and industry stakeholders, to develop the *National Industrial Biotechnology Strategy to 2030*.

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can help you create excellence for
your organization and industry

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