2025

BUILDING RESLIENT UK BIO-BASED SUPPLY CHAINS

BBIA
CHAMPIONING THE INDUSTRIAL BIOECONOMY

biomass connect

BDC Biorenewables Development Centre

High Value Biorenewables

01 Introduction

Bio-based chemicals and materials designed, developed, and manufactured in the UK offer a once-in-a-generation opportunity to secure industries in the transition away from oil and gas. Building from world-leading expertise in these sustainable technologies, we can create a resilient engine for net-zero, securing and growing hundreds-of-thousands of highly skilled and productive jobs.

Manufactured chemicals are in everything we use in our daily lives – plastics, food, textiles, energy, batteries, defence products, mobile phones, and medicines. They are vital to our food security, the clothes we wear, heating our homes, affording national security, enabling communications, and delivering treatments for diseases.

Today, almost all chemicals are manufactured from fossil oil and gas[1], and are responsible for ~10% of Global-Greenhouse-Gas-Emissions[2].

As global temperatures continue to rise, the drive towards a more environmentally friendly economy is not an option; it is a necessity. We simply cannot afford to keep digging up fossil resources and releasing more carbon dioxide into the atmosphere. It's time to start using carbon that is already above ground (or in our soils). Future sources of carbon for the chemical industry include biomass, carbon dioxide capture, and recycled feedstocks.

Biobased chemicals and materials are derived from renewable biological resources like plants, algae, mycelium and organic waste – known as 'biomass', reducing dependence on fossil oil and gas[11].

The UK chemicals industry has an ambition. By 2050, it will have doubled in size whilst sourcing 30% of its carbon feedstock from biomass[2]. With the right support bio-based chemicals and materials have the potential to generate upwards of £204 billion annual revenue for UK plc by 2050[3] and significantly contribute to the UK's net zero commitment.

Evidence has shown that starting with the adoption of just fifteen high-potential bio-based chemicals will achieve more than 5.2 million-tonnes CO_2eq GHG-savings annually[4]. This is greater than the CO_2eq GHG-savings generated through the Road Traffic Fuel Obligation in 2021[5].

The transition to a sustainable, low-carbon economy requires bold innovation and resilient infrastructure — particularly in how we source, produce, and distribute materials. As the UK accelerates its journey toward net zero, building resilient UK bio-based supply chains needs to be a national priority. These supply chains, rooted in the use of renewable biological resources from agriculture, forestry, and waste, offer a critical pathway to reducing reliance on fossil-derived materials, enhancing economic self-sufficiency, and meeting climate commitments.

This report captures the key insights, discussions, and recommendations from *Building Resilient UK Bio-Based Supply Chains* Event held on June 30th, 2025, which brought together stakeholders from industry, academia and government. The event explored the strategic importance of developing robust and sustainable bio-based supply chains in the UK — from supporting rural economies and boosting innovation, to strengthening national resilience in the face of global disruptions.

Recent global events — including the COVID-19 pandemic, climate-induced supply failures, and geopolitical instability — have underscored the vulnerabilities in global supply chains. Against this backdrop, the UK must act to diversify and regionalise its sources of biomass, invest in domestic processing capabilities, and create enabling policies that support a thriving bioeconomy. A resilient bio-based supply chain is not merely an environmental imperative — it is an economic and strategic necessity.

This report outlines outputs from the event, including key challenges and opportunities, and the collective actions needed to build a secure, sustainable, and future-ready bio-based economy in the UK.

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[1] The Royal Society: Catalysing change: Defossilising the chemical industry Policy Briefing - defossilising-chemical-industry-report.pdf (royalsociety.org)
[2] Innovate UK: Sustainable carbon ambition for the UK chemicals industry - Sustainable carbon ambition for the UK chemicals industry - Innovate UK Business Connect (ktn-uk.org)
[3] Data from reference no.2, extrapolated to 2050 at CAGR of 9% (Chemicals Global Market Report 2024, research and markets)
[4] DESNZ: Project contract PS22436 - Economic and climate benefits to the UK of an increased use of bio-based chemicals (RAF097/2223) 2024, unpublished
[5] HMG: The Renewable Transport Fuel Obligation – an essential guide Road Traffic Fuel Obligation https://assets.publishing.service.gov.uk/media/65a8113db2f3c60013e5d4ce/rtfo-essential-guide-2024.pdf

02 State of the Nation: Workshop Discussions

Several discussions took part at the event, alongside a live Slido poll, which are summarised below, which have then been formulated into a SWOT analysis, and then into conclusions and next steps (Section 3).

Feedstock Sourcing and Availability:

- **Diverse Biomass Sources:** The UK has a range of potential biomass feedstocks, including agricultural residues, annual and perennial biomass crops, forestry biomass, industrial byproducts (such as food waste), and marine biomass.
- **Competition for Feedstock:** There's increasing competition for biomass resources, and growing demand for bio-based could outstrip supply. Prioritising biomass / determining a biomass hierarchy use for applications that are hard to decarbonise could be a policy consideration.
- **Regional Variation and Availability:** Feedstocks vary significantly across UK regions, from different types of biomass to waste by-products, mapping of this would be useful. Over two-thirds of the workshop delegates did not fully understand what feedstocks the UK has and how to access them.
- **Sustainability and Ethics:** Ensuring sustainable and ethical sourcing of raw materials is paramount, considering land use, water resources, and agricultural practices (e.g., diversification, promoting biodiversity).

Conversion Technologies and Bioprocessing:

- **Industrial Biotechnology (IB):** The UK has a strong research base in Industrial Biotechnology and Engineering Biology. Feedstocks can be optimised to deliver required traits, but this requires research funding. Continued public and private investment is essential to drive innovation, develop new technologies but there is a time lag between investment and returns.
- **Biorefineries:** These facilities are crucial for transforming diverse feedstocks into a range of bio-based products.
- **Scaling Up:** A significant challenge lies in scaling up laboratory and pilot-scale processes to commercial production, some facilities are expensive and this slows progress. There needs to be some sort of standardisation of Life Cycle Analysis – studies are currently very variable.

Market and Economic Factors:

- **Market Development and Procurement:** Market development needs to be led by government – for example, nationalised procurement requirements for big organisations such as the NHS could rapidly improve the bio-based market – developing demand and enabling cost reductions through economies of scale.
- **Consumer Demand:** Growing consumer demand for environmentally sustainable alternatives is a key driver for the bio-based market. Industries are now looking to market pull to develop their strategies. Consumers need good information to be able to make an informed choice, like the 'traffic light' system used on food labelling. Product performance and cost are still the greatest influencers above any environmental factors.
- **Investment and Finance:** Biobased supply chains take some time to establish, they need their economic viability to be demonstrated, together with security of materials to help reduce perceived risks. Addressing the biobased economy challenges could be collaborative across the supply chain.

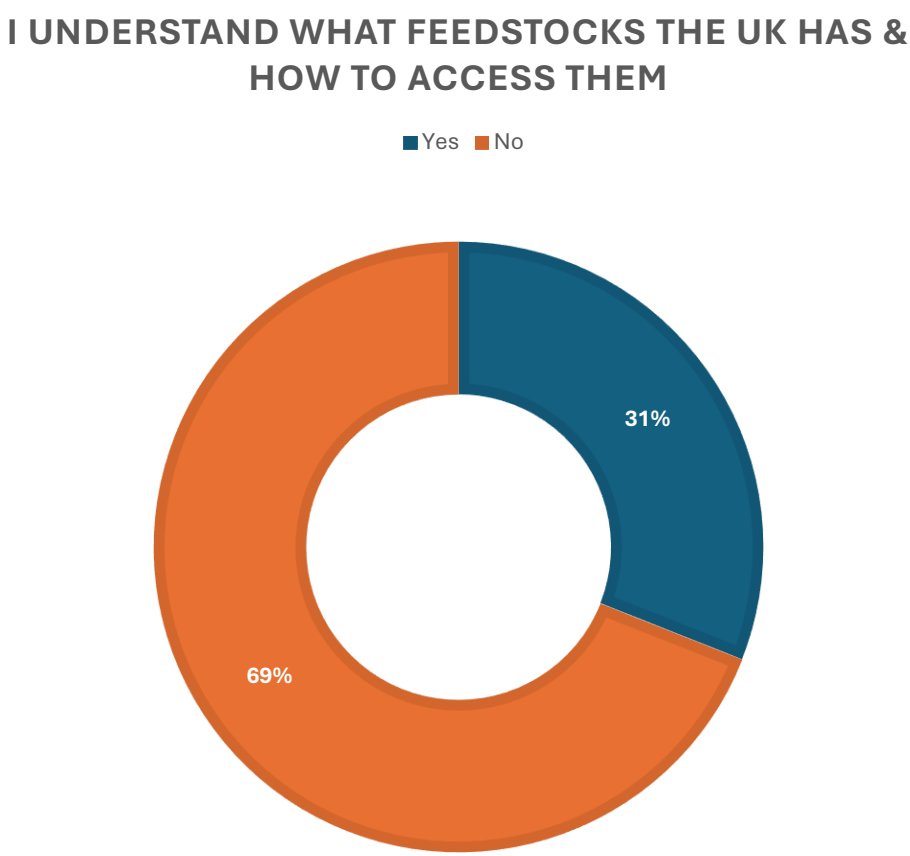
Training, Knowledge Exchange and Co-ordination:

- **Bio-based trade association/ network**: could enable knowledge/ talent exchange, advocating for biobased and raising awareness of opportunities.
- **Skills and training**: support required for building biobased supply chains.

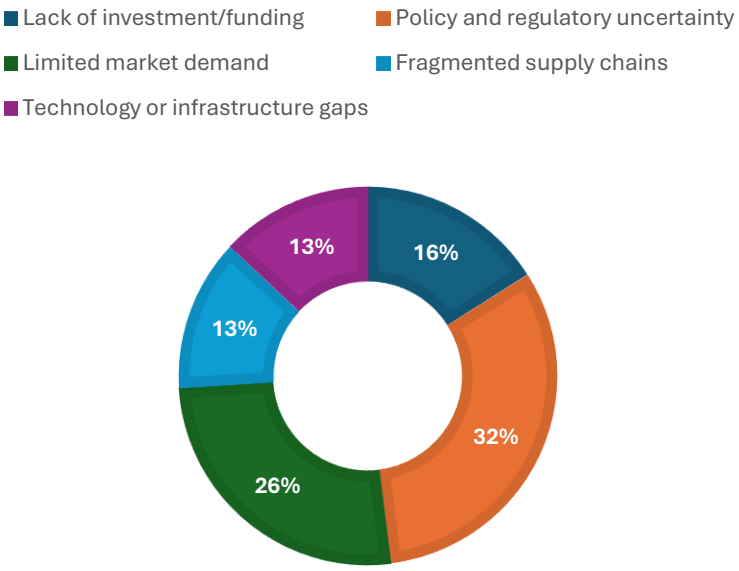
Policy and Regulatory Environment:

- **Co-ordination of Government Departments:** A major challenge is the fragmentation of UK government policy across various departments (e.g., DEFRA, DSIT, DESNZ), leading to conflicting approaches and potentially hindering the sector's growth. A more unified and strategic approach is needed. For example, a Biomass Commission could develop and oversee policy on the use of bio-based feedstocks and implementation of bio-based products.
- **Supportive Regulations:** The current regulatory landscape often favours black carbon. Regulations that facilitate market entry for bio-based materials and products, including clear standards, certification, and labelling schemes would improve uptake of bio-based materials. Such policies should be direct for bio-based products and not just implied. Some policies are unintentionally harming bio-based supply chains, e.g. plastics made from bio-waste with no recycled materials do not fit into the Plastic Packaging Tax policy. Defining waste is also a regulatory matter that needs addressing, since current regulations hinder its use as a feedstock. Regulatory uncertainty was thought to be the biggest barrier to scaling bio-based supply chains in the UK.
- **Incentives and Funding:** Government incentives, subsidies, and taxation policies can play a crucial role in de-risking investments, encouraging adoption, and supporting the transition to a bio-based economy. This could include nationalised procurement. Workshop delegates considered that creating regulatory incentives was the highest priority for developing bio-based supply chains.

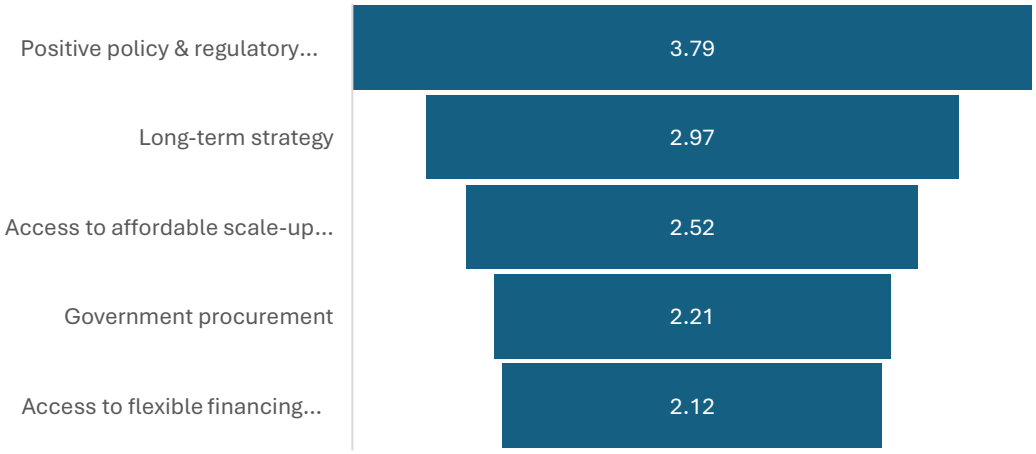
A live survey was administered, using Slido, with key highlights below:



WHAT IS THE BIGGEST BARRIER TO SCALING BIO-BASED SUPPLY CHAINS IN THE UK TODAY?



Rank the following in terms of priority in creating UK bio-based supply chains: (1 top priority - 5 lowest priority)



In one word describe that state of UK Bio-based supply chains today....

In one sentence, what does a successful UK bio-based supply chain look like to you by 2030?

Less biomass imports, positive public perception of biomass, working carbon credits market a resilient, circular, and commercially competitive ecosystem that replaces fossil-based inputs with homegrown, low carbon bioproducts, creating regional jobs, boosting exports, and driving net zero innovation.			
Defined biogenic feedstock UK market (volumes/specification) with contracted supplies to industry of 100s kilo tonnes for UK chemicals manufacturing.	A novel regenerative farm to shelf value chain involving new process infrastructure.	An integrated land based - holistic approach to bio-based supply chain where value is shared throughout. Regionally integrated, circular, and resilient established pipelines from feedstock source to products on shop shelves.	A diverse range of sustainable cost-effective sources of biomass that make use of new technology.
A patchwork quilt of land use where different crops are planted for ecosystem services and climate change adaptation benefits whilst growing and for a bio refinery array of used when harvested.	Understanding our core strengths for developing a series of connected sustainable supply chains that support growth and resilience in the UK economy.	Transparency of bio-based raw material sources, chemistries and suppliers' Circular solutions that contribute to economic growth and long-term UK resilience.	
Affordable and reliable with high quality standards.	Multiple bio-refinery hubs that have grown organically to utilise co-products from each other and are selling common chemicals product slates into the market.	Making planetary meaningful reductions in GHG emissions and clean economic growth; cross section partnership and public engagement developed thoroughly.	
One major industry hub which has 20% exports.	Industry has achieved critical mass and is able to thrive on its own. Where alternative bio-based products are outcompeting existing products on price.	Bio-based products manufactured from local wastes and crops with clear traceability, less sourcing from abroad, rapidly growing domestic market, average consumer is happily purchasing bio-based.	Viable markets for all products along the supply chain: integrated, collaborative, incentivised, long term reliable, sustainable supply at a competitive price.

SWOT Analysis of UK Bio-Based Supply Chains

STRENGTHS	OPPORTUNITIES
Strong R&D ecosystem: World-class research institutions in biotechnology, engineering biology, and sustainable materials (e.g., UKRI, BBSRC-funded centres). **Growing policy support**: Backed by the UK Engineering Biology Strategy, Net Zero Strategy, and circular economy frameworks, currently in development. **Abundant biomass sources**: Availability of agricultural residues, food waste, forestry by-products, and municipal waste for feedstock. **Emerging industrial clusters**: Development of bioeconomy hubs (e.g. Teesside, Grangemouth, York and North Yorkshire) with infrastructure for biomanufacturing and research. **Sustainability leadership**: UK's global reputation and leadership in climate policy enhance the credibility of sustainable supply chains.	**Defossilisation drivers**: Demand for more sustainable materials in packaging, construction, transport fuels, and textiles. **Rural economic growth**: Potential to revitalise rural and post-industrial regions through localised biomass processing. **Circular economy integration**: Leverage food waste, sewage, and agricultural residues to close resource loops. **International leadership**: Position the UK as a global hub for sustainable biomaterials and innovation. **Investment and innovation**: Attract green finance and foster SME-led growth in bio-based tech startups. **Emissions Trading Scheme**: Benefit bio-based products by providing them with a competitive advantage by being exempt from the tax. **Public Procurement**: Boost the bio-based sector by creating market demand.
WEAKNESSES	**THREATS**
Fragmented supply chains: Lack of coordination between feedstock producers, processors, and end-users. **Insufficient scale-up infrastructure**: Limited access to demonstration and commercial-scale biorefineries hampers technology deployment. **Feedstock logistics**: Challenges in collecting, storing, and transporting biomass economically across regions. **Policy uncertainty**: Inconsistent or short-term incentives for investment and unclear long-term regulatory signals. **Skills gap**: Limited workforce trained specifically for bio-based industrial processes and supply chain management.	**Global supply chain volatility**: Dependence on imported bio-based inputs (e.g., starch, pulp, bioethanol) exposes the UK to disruption. **Competing markets for available biomass:** Driven by conflicting departmental policies. **International competition**: Other nations (e.g., EU, US, China) are heavily investing in their bioeconomy with stronger industrial policies. **Public perception and regulatory risk**: Misunderstanding of biotech or sustainability claims can cause public backlash or regulatory delays. **Climate impacts on biomass**: Extreme weather and changing growing conditions could reduce feedstock reliability.

03 Recommendations for Next Steps

Best use of Biomass

- Develop a unified cross-departmental biomass utilisation hierarchy and associated joined up policies and regulatory environment that ensures biomass and biowastes are prioritised for high value chemicals and materials, to derive the maximum value from our bio-resources.

Availability of Biomass

- Map UK biomass feedstocks and provide open access database of such.

Regulatory Clarity and Support

- Improve regulatory clarity for bio-based chemicals, materials and processes.

Infrastructure Accessibility and Development

- Better information sharing on available open-access infrastructure.

Funding and Investment

- Ringfenced public funding for bio-based innovations through Innovate UK.
- Establish a bio-based innovation team within British Business Bank Capital and National Wealth Fund for targeted investment.
- Implementation of Mansion House Reforms to unlock capital for bio-based ventures.

Market Development and Public Procurement

- Introduce financial tax incentives and positive regulations to encourage investment in and adoption of bio-based innovations, including, tax incentives for bio-based products, ensuring SMEs benefit from research-intensive R&D tax relief rates.
- Implementation of government procurement policies that prioritise bio-based products.
- Launch public awareness campaigns to educate businesses and consumers on bio-based products, and their end-of-life correct disposal.

International Collaboration and Trade

- Provide export support for UK bio-based manufacturers through trade missions and incentives.
- Incentivise exports through inclusion of bio-based products in trade agreements.

List of Registered Delegates:

First name	Surname	Affiliation
Joshua	Ang	University of York
Andrew	Beggin	Phytovation Ltd
Paul	Bello	UKRI - Innovate UK
Harriet	Berry	Natural Compound Solutions at Royal Holloway University
Susan	Brench	Starbons Ltd
Dave	Bryant	IBERS, Aberystwyth University
Antoine	Buchard	SCHEMA Hub - University of York
Zoe	Burrell	BBSRC
Caroline	Calvert	University of York
Mark	Corbett	Biorenewables Development Centre
Graeme	Cruishank	Centre for Process & Innovation
Jane	Evison	Cosmetics Cluster UK
Sasan	Fouladi-Pour	Department for Business and Trade
Paul	Fraser	RHUL
Dave	Freeman	Cargill
Paul	Freemont	Imperial College London
Jim	Gibson	Celtic Renewables
Ian	Graham	University of York
Adrian	Higson	Alder BioInsights
Oscar	Hinze	Department for Science, Innovation and Technology
Florian	Ilias	Terravesta
Shivani	Kataria	Sheffield Hallam University
Melanie	Kreye	University of York
Michael	Lewis	Heugh Farm Ltd
Kevin	Lindegaard	Crops for Energy
Richard	Lock	Holiferm
Anju	Massey-Brooker	The Royal Society of Chemistry
Geraldine	Mateu	UKRI - Innovate UK
Robyn	McPherson	University of Birmingham
Rob	Meadley	Brown & Co
Aline	MIller	University of Manchester
Will	Milligan	Extracellular
James	Nelson	2M Group of Companies
Walid	Omara	Sheffield Hallam University
Julian	Pietrzyk	MiAlgae
Reza	Ranjbar	Centre for Process & Innovation
Jenny	Readman	Centre for Process Innovation Ltd
Michael	Rugen	University of East Anglia
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Evie	Simpson	University of York
Stephanie	Simpson	University of York
Jacob	Smith	Department for Science, Innovation and Technology
Richard	Smith	2M Group of Companies
Tracey	Taylor-Preston	York & North Yorkshire Combined Authority
Yit	Teh	Biomass Connect
Jen	Vanderhoven	BBIA
Jeanette	Whitaker	UK Centre for Ecology & Hydrology
John	Williams	Aquapak
Ana	Winters	Aberystywth University
Anna	Zhenova	Green Rose Chemistry