RESEARCH PROJECT SUMMARY

Unlocking demand for low carbon & resource efficient innovation

Potential Market Forming Interventions for biobased solvents

PROJECT OVERVIEW

PURPOSE AND CONTEXT

This report presents the findings of a UKRI and DESNZ commissions research project into Market Forming Interventions (MFIs). The views and recommendations expressed are those of the authors and do not reflect official policy or government position.

The UK has a strong innovation base, with a pipeline of low-carbon, resource-efficient materials, products and business models. However, many innovations struggle to progress to commercial scale. Weak and uncertain demand, high perceived investment risk, and fragmented value chains continue to constrain scale-up. This limits progress towards generating value from UK-owned IP and building resilient and low carbon supply chains that help to meet net zero and circular economy goals.

The project, delivered by ERM in partnership with Eigen Ventures and the Scope 3 Peer Group, focused on identifying and designing Market Forming Interventions and enabling factors that could help accelerate the adoption of innovative materials, products, and business models across the UK chemicals sector. The recommended interventions are designed to work alongside existing policy frameworks, industry roadmaps, sector associations, stakeholder initiatives and net zero commitments, creating structured and systemic pathways to commercialisation. Grounded in extensive stakeholder engagement, it sets out practical options to unlock private investment, stimulate demand, and strengthen UK industrial competitiveness.

MFI DEFINITION AND NEED

Within the context of this project, a Market Forming Intervention (MFI) is defined as a potential demand-side measure that seeks to accelerate the adoption of novel technologies or business models to reduce lifecycle carbon emissions.

MFIs tackle the demand-side barriers that prevent innovations from scaling, such as uncertain demand, missing standards, misaligned incentives, and fragmented supply chains, using mechanisms like cost support, demand aggregation, financial de-risking, and predictable pricing.

SCOPE OF RESEARCH

Innovation areas explored: Defossilisation (Biochemicals, Carbon Capture and Utilisation (CCU), Advanced Plastic Recycling), Inorganic e-chemicals (e.g. e-ammonia), Industrial Symbiosis, New Formulations, Chemicals as a Service (CaaS)

MFI measures considered: Regulation and Lower Cost (e.g. subsidies), Demand Aggregation (e.g. Buyers' Club), Direct Financial Support (e.g. blended finance) and Price Support (e.g. Contract for Difference)

BIOBASED SOLVENTS IN MEDICINES WERE SELECTED FOR IN-DEPTH EXPLORATION

Biobased solvents were identified as a priority innovation area by this research project following a structured assessment of scoped innovation areas against environmental, market, economic and innovation readiness criteria:

- **High decarbonisation potential:** Non-food/feed crop-derived biobased solvents derived from solid biomass or carbon capture and utilisation (CCU) can deliver lifecycle GHG reductions of >60% compared with conventional petrochemical solvents[1].
- **Direct applicability in pharmaceuticals:** Biobased solvents have the potential to be drop-in replacements across key pharmaceutical processes, including API synthesis, extraction, purification, formulation and cleaning, without requiring fundamental process redesign.
- **Strong and growing demand signal:** Demand is driven by the pharmaceutical sector's need to address upstream Scope 3 emissions (≈90% of total emissions) and by health systems sustainable procurement requirements (e.g. UK'S NHS and systems in France and Norway).
- **Clear market-forming opportunity:** targeted interventions can unlock demand by increasing alignment on specifications and providing greater certainty and volume of offtake.
- **UK innovation and economic upside:** the UK has a strong innovation base in fermentation, CCU and membrane technologies, providing opportunities to develop proprietary processes, domestic manufacturing capacity and exportable intellectual property, with potential spillover into related chemical sectors (e.g. surfactants).

WHAT ARE THE DEMAND BARRIERS FOR BIOBASED SOLVENTS IN MEDICINES?

The uptake of biobased solvents in the pharmaceutical sector faces several key barriers that limit their adoption at scale:

- **Value perception** remains a major challenge, as biobased solvents are currently multiple times more expensive than conventional solvents (at oil prices prior to the 2026 Iran war) due to higher feedstock and energy costs and limited economies of scale. Carbon savings are often not fully incorporated into procurement decisions, and pharmaceutical companies' risk-averse nature further discourages switching to technologies that are not yet produced at scale.
- **Standards and regulatory requirements** also pose significant hurdles. The pharmaceutical sector has stringent purity and quality standards, and the process to approve alternative solvents is both lengthy and costly. Scaling drop-in solvents (e.g. biobased acetone replacing fossil acetone) could mitigate much of the regulatory burden, but removing uncertainty via testing for new impurities in biobased solvents remains.
- There is a **lack of transparency** from end customers about willingness to pay for carbon reduction, volumes and quality of biobased solvents required and supplier future capabilities. This limits suppliers' ability to reach Final Investment Decisions FID. Differences in approaches to mass balance accounting further complicate investment decisions and long-term offtake commitments.

[1] Celtic Renewables, 2025. Celtic Renewables: A Low-Carbon Solution for the Future of Grangemouth | Celtic Renewables

HOW COULD A CLEAN ROOM UNLOCK BIOBASED SOLVENT DEMAND?

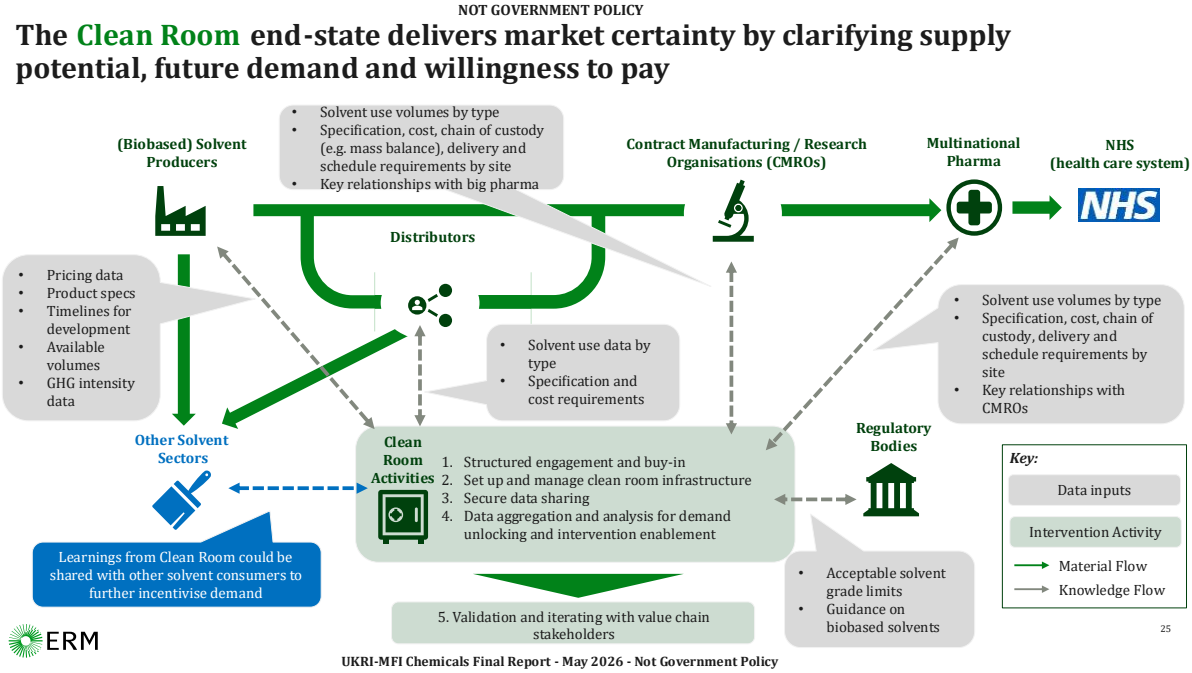
The formation of a Clean Room can could play a critical role in addressing these barriers by providing a **secure, neutral environment for sharing data across the solvent and pharmaceutical value chain**. By enabling confidential exchange of information on future solvent requirements between solvent suppliers and customers (pharmaceutical companies, contract manufacturers etc.), a Clean Room could help overcome the transparency and data-sharing challenges that currently hinder investment and scaling. This approach would support four core objectives:

1. **Improve transparency of future solvent requirements** (volumes, specifications, delivery constraints, costs, willingness to pay etc.) across the NHS's medicine value chains
2. **Enable demand-supply matching** strengthening demand signals
3. **De-risk investment and unlock offtake** by increasing certainty on pipeline demand requirements, potentially through supporting bilateral contracting between Clean Room participants.
4. **Identify any additional MFIs** required through use of aggregated insights

This recommended intervention could establish a demand anchor for biobased solvents within NHS supply chains, providing a stable source of demand to support the scale-up of UK-owned intellectual property domestically and internationally. By reducing reliance on fossil oil and gas feedstocks, it could strengthen supply-chain resilience and reduce exposure to geopolitical energy shocks. Substituting conventional fossil-based solvents with lower-GHG alternatives produced in the UK would reduce lifecycle supply-chain emissions, including both direct production emissions and the embodied emissions associated with imported solvents, while reinforcing domestic industrial capability.

WHAT COULD THE CLEAN ROOM LOOK LIKE?

We recommend that the Clean Room be independent and neutral, with public funding identified as the most suitable approach. This would avoid real or perceived bias that could arise from private commercial interests and aligns the intervention with the strategic net zero objectives of the government. An independent third-party could manage the clean room including: clean room operations, data collation and analysis, development of additional intervention proposals and delivery of analysis sharing with stakeholder groups. A suggested operational schematic of the Clean Room can be found below.



WHAT COULD THE CLEAN ROOM ACHIEVE?

- **Early alignment and confidence across the value chain:** Establishes a shared understanding of the Clean Room's purpose, scope and value, supported by clear communication on how data and inputs will be used, protected and translated into action.
- **Reduced delivery and adoption risk:** Provides a trusted foundation through clearly defined governance, legal safeguards and data privacy protections, ensuring that key risks, constraints and sensitivities are appropriately reflected in programme design.
- **Trusted evidence-base to accelerate decision-making:** Improves transparency on sector requirements, creating a clear line of sight between evidence, identified barriers and proposed interventions grounded in real demand and supply conditions.
- **Improved understanding of supply and demand-side needs:** Reduces uncertainty and data gaps through systematic validation and structured follow up, enabling more confident and timely decisions on biobased solvents.
- **Clear pathway to addressing demand blockers:** Builds shared understanding across the value chain to enable coordinated action, accelerate demand through greater transparency on requirements, and identify additional interventions to further stimulate market uptake.